

Package ‘INLA’

October 16, 2023

Type Package

Title Full Bayesian Analysis of Latent Gaussian Models using Integrated Nested Laplace Approximations

Description Full Bayesian analysis of latent Gaussian models using Integrated Nested Laplace Approximation. It is a front-end to the inla-program.

Additional_repositories <http://inlabru-org.r-universe.dev/>

Depends R (>= 3.5),
Matrix (>= 1.3-0),
sp (>= 1.6-0)

Imports graphics,
grDevices,
fmesher (>= 0.0.9.9026),
lifecycle,
methods,
parallel,
rlang,
splines,
stats,
utils,
withr

Suggests Deriv,
Ecdat,
HKprocess,
MatrixModels,
Rgraphviz,
deldir,
devtools,
doParallel,
dplyr,
evd,
fields,
ggplot2,
gsl,
graph,
gridExtra,
knitr,
markdown,
MASS,

```

matrixStats,
mlogit,
mvtnorm,
numDeriv,
pixmap,
rgl,
rmarkdown,
sf,
shiny,
sn,
spdep,
splancs,
terra,
tidyterra,
testthat,
tools,
INLAspacetime

```

VignetteBuilder knitr

BuildVignettes true

LazyData true

License GPL (>= 2) + file LICENSE

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Collate '00000.R'

```

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INLA-package	<i>Integrated Nested Laplace Approximation</i>
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Description

Package to perform full Bayesian analysis on generalised additive mixed models using Integrated Nested Laplace Approximations.

Details

Package INLA

Version Currently, this package uses a YY.MM.DD versioning system, and is in heavy development. See <https://github.com/hrue/r-inla/> and <https://www.r-inla.org>

License GPL2

See the web-site <https://www.r-inla.org> for further details.

Author(s)

Havard Rue, Sara Martino, Finn Lindgren, Daniel Simpson and Andrea Riebler

as.inla.mesh.segment	<i>Convert sp objects to inla.mesh.segment objects.</i>
----------------------	---

Description

[Superseded] by [fmesher::fm_as_seg\(\)](#)

Usage

```
as.inla.mesh.segment(sp, ...)
```

```
inla.sp2segment(sp, ...)
```


Arguments

`sp` An `sp` polygon object of class `Polygon`, `Polygons`, `SpatialPolygons`, or `SpatialPolygonsDataFra`
`...` Additional arguments passed on to `fmesher::fm_as_seg()`.

Value

A `inla.mesh.segment()` object, or a list of `inla.mesh.segment()` objects.

Functions

- `inla.sp2segment()`: **[Superseded]** by `fmesher::fm_as_seg()`

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

`inla.mesh.segment()`

BivMetaAnalysis

Bivariate Meta Analysis

Description

Data are taken from a meta-analysis to compare the utility of three types of diagnostic imaging - lymphangiography (LAG), computed tomography (CT) and magnetic resonance (MR) - to detect lymph node metastases in patients with cervical cancer. The dataset consists of a total of 46 studies: the first 17 for LAG, the following 19 for CT and the last 10 for MR.

Usage

`BivMetaAnalysis`

Format

A data frame with 92 observations on the following 9 variables.

N a numeric vector

Y a numeric vector

diid a numeric vector

lag.tp a numeric vector

lag.tn a numeric vector

ct.tp a numeric vector

ct.tn a numeric vector

mr.tp a numeric vector

mr.tn a numeric vector

References

J. Scheidler and H. Hricak and K. K. Yu and L. Subak and M. R. Segal, "Radiological evaluation of lymph node metastases in patients with cervical cancer: a meta-analysis", JAMA 1997

Examples

```
data(BivMetaAnalysis)
```

Cancer	~~ data name/kind ... ~~
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Description

~~ A concise (1-5 lines) description of the dataset. ~~

Format

A data frame with 6690 observations on the following 4 variables.

Y Number of cases

N a numeric vector

Age a numeric vector

region a numeric vector

References

Rue, H and Held, L. (2005) *Gaussian Markov Random Fields - Theory and Applications* Chapman and Hall

cgeneric	<i>cgeneric models</i>
----------	------------------------

Description

A framework for defining latent models in C

Usage

```
inla.cgeneric.define(model = NULL, shlib = NULL, n = 0L, debug = FALSE, ...)
```

```
inla.cgeneric.q(cmodel = NULL)
```

Arguments

model	The name of the model function
shlib	Name of the compiled object-file with model
n	The size of the model
debug	Logical. Turn on/off debugging
...	Additional arguments, required by <code>inla.cgeneric.define()</code> to be named arguments
cmodel	The name of a cgeneric model-object (output from <code>inla.cgeneric.define</code>

Author(s)

Havard Rue <hrue@r-inla.org>

control.bgev

control.bgev

Description

Control variables in `control.*` for use with `inla()`. The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.bgev(
  q.location = 0.5,
  q.spread = 0.25,
  q.mix = c(0.1, 0.2),
  beta.ab = 5L
)

inla.set.control.bgev.default(...)
```

Arguments

<code>q.location</code>	The quantile level for the location parameter
<code>q.spread</code>	The quantile level for the spread parameter (must be < 0.5)
<code>q.mix</code>	The lower and upper quantile level for the mixing function
<code>beta.ab</code>	The parameters a and b in the Beta mixing function
<code>...</code>	Named arguments passed on to the main function

Details

The `control.bgev`-list is set within the corresponding `control.family`-list as control parameters to the `family="bgev"`

See Also

Other control: `control.compute()`, `control.expert()`, `control.family()`, `control.fixed()`, `control.gcpo()`, `control.group()`, `control.hazard()`, `control.inla()`, `control.lincomb()`, `control.link()`, `control.lp.scale()`, `control.mix()`, `control.mode()`, `control.pardiso()`, `control.pom()`, `control.predictor()`, `control.scopy()`, `control.update()`, `control.vb()`

control.compute	<i>control.compute</i>
-----------------	------------------------

Description

Control variables in `control.*` for use with `inla()`. The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.compute(
  openmp.strategy = "default",
  hyperpar = TRUE,
  return.marginals = TRUE,
  return.marginals.predictor = FALSE,
  dic = FALSE,
  mlik = TRUE,
  cpo = FALSE,
  po = FALSE,
  waic = FALSE,
  residuals = FALSE,
  q = FALSE,
  config = FALSE,
  likelihood.info = FALSE,
  smtp = NULL,
  graph = FALSE,
  internal.opt = TRUE,
  save.memory = NULL,
  control.gcpo = INLA::control.gcpo()
)

inla.set.control.compute.default(...)
```

Arguments

<code>openmp.strategy</code>	The computational strategy to use: 'small', 'medium', 'large', 'huge', 'default' and 'pardiso'.
<code>hyperpar</code>	A boolean variable if the marginal for the hyperparameters should be computed. Default TRUE.
<code>return.marginals</code>	A boolean variable if the marginals for the latent field should be returned (although it is computed). Default TRUE
<code>return.marginals.predictor</code>	A boolean variable if the marginals for the linear predictor should be returned (although it is computed). Default FALSE
<code>dic</code>	A boolean variable if the DIC-value should be computed. Default FALSE.
<code>mlik</code>	A boolean variable if the marginal likelihood should be computed. Default TRUE.

cpo	A boolean variable if the cross-validated predictive measures (cpo, pit) should be computed (default FALSE)
po	A boolean variable if the predictive ordinate should be computed (default FALSE)
waic	A boolean variable if the Watanabe-Akaike information criteria should be computed (default FALSE)
residuals	Provide estimates of residuals (whatever we mean by that). (default FALSE) Currently only residuals base on expected (saturated) deviance are available. The sign of the residuals are only very likely correct. These residuals are not properly justified from a Bayesian point of view, hence must be used with caution. It is provided in the hope they would be useful. This feature is EXPERIMENTAL for the moment, so changes can happen at any time.
q	A boolean variable if binary images of the precision matrix, the reordered precision matrix and the Cholesky triangle should be generated. (Default FALSE.)
config	A boolean variable if the internal GMRF approximations be stored. (Default FALSE. EXPERIMENTAL)
likelihood.info	A boolean variable to store likelihood-information or not. This option requires config=TRUE (Default FALSE. EXPERIMENTAL)
smtp	The sparse-matrix solver, one of 'default', 'taucs', 'band' or 'pardiso' (default inla.getOption("smtp")). smtp='pardiso' implies openmp.strategy='pardiso'.
graph	A boolean variable if the graph itself should be returned. (Default FALSE.)
internal.opt	A boolean variable, if to do internal online optimisations or not. (Default TRUE.)
save.memory	A boolean variable, make choices which saves memory over accuracy. (Default 'inla.getOption("save.memory")')
control.gcpo	(For experts only!) Set control variables for the gcpo. The intended use is to use inla.group.cv. Refer to control.gcpo , ?inla.group.cv and the vignette for details.
...	Named arguments passed on to the main function

See Also

Other control: [control.bgev\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.expert

control.expert

Description

Control variables in `control.*` for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.expert(
  cpo.manual = FALSE,
  cpo.idx = -1,
  disable.gaussian.check = FALSE,
  jp = NULL,
  dot.product.gain = FALSE,
  globalconstr = list(A = NULL, e = NULL)
)

inla.set.control.expert.default(...)
```

Arguments

<code>cpo.manual</code>	A boolean variable to decide if the inla-program is to be runned in a manual-cpo-mode. (EXPERT OPTION: DO NOT USE)
<code>cpo.idx</code>	The index/indices of the data point(s) to remove. (EXPERT OPTION: DO NOT USE)
<code>disable.gaussian.check</code>	Disable the check for fast computations with a Gaussian likelihood and identity link (default FALSE)
<code>jp</code>	An object of class <code>inla.jp</code> defining a joint prior
<code>dot.product.gain</code>	Output the gain in optimizing dot-products? (Default FALSE)
<code>globalconstr</code>	Add a global constraint (see <code>?f</code> and argument <code>extraconstr</code>). Note that a global constraint does NOT correct the normalisation constant.
<code>...</code>	Named arguments passed on to the main function

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.family

control.family

Description

Control variables in `control.*` for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.family(
  dummy = 0,
  hyper = NULL,
  initial = NULL,
  prior = NULL,
  param = NULL,
  fixed = NULL,
  link = "default",
  sn.shape.max = 5,
  gev.scale.xi = 0.1,
  control.bgev = NULL,
  cenpoisson.I = c(-1L, -1L),
  beta.censor.value = 0,
  variant = 0L,
  control.mix = NULL,
  control.pom = NULL,
  control.link = NULL,
  link.simple = "default"
)

inla.set.control.family.default(...)
```

Arguments

<code>dummy</code>	A dummy argument that can be used as a workaround
<code>hyper</code>	Definition of the hyperparameters
<code>initial</code>	(OBSOLETE!) Initial value for the hyperparameter(s) of the likelihood in the internal scale.
<code>prior</code>	(OBSOLETE!) The name of the prior distribution(s) for othe hyperparameter(s).
<code>param</code>	(OBSOLETE!) The parameters for the prior distribution
<code>fixed</code>	(OBSOLETE!) Boolean variable(s) to say if the hyperparameter(s) is fixed or random.
<code>link</code>	(OBSOLETE! Use <code>control.link=list(model=)</code> instead.) The link function to use.
<code>sn.shape.max</code>	Maximum value for the shape-parameter for Skew Normal observations (default 5.0)
<code>gev.scale.xi</code>	(Expert option, do not use unless you know what you are doing.) The internal scaling of the shape-parameter for the GEV distribution. (default 0.1)
<code>control.bgev</code>	See ?control.bgev
<code>cenpoisson.I</code>	The censoring interval for the censored Poisson
<code>beta.censor.value</code>	The censor value for the Beta-likelihood ($0 \leq \text{beta.censor.value} < 1/2$)
<code>variant</code>	This variable is used to give options for various variants of the likelihood, like chosing different parameterisations for example. See the relevant likelihood documentations for options (does only apply to some likelihoods).
<code>control.mix</code>	See ?control.mix
<code>control.pom</code>	See ?control.pom

control.link	See ?control.link
link.simple	See inla.doc("0inflated")
...	Named arguments passed on to the main function

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.fixed	<i>control.fixed</i>
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Description

Control variables in `control.*` for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.fixed(
  cdf = NULL,
  quantiles = NULL,
  expand.factor.strategy = "model.matrix",
  mean = 0,
  mean.intercept = 0,
  prec = 0.001,
  prec.intercept = 0,
  compute = TRUE,
  correlation.matrix = FALSE,
  remove.names = NULL
)

inla.set.control.fixed.default(...)
```

Arguments

cdf	A list of values to compute the CDF for, for all fixed effects
quantiles	A list of quantiles to compute for all fixed effects
expand.factor.strategy	The strategy used to expand factors into fixed effects based on their levels. The default strategy is us use the <code>model.matrix</code> -function for which NA's are not allowed (<code>expand.factor.strategy="model.matrix"</code>) and levels are possible removed. The alternative option (<code>expand.factor.strategy="inla"</code>) use an <code>inla</code> -specific expansion which expand a factor into one fixed effects for each level, do allow for NA's and all levels are present in the model. In this case, factors MUST BE factors in the <code>data.frame/list</code> and NOT added as <code>+.factor(x1)+.</code> in the formula only.

mean	Prior mean for all fixed effects except the intercept. Alternatively, a named list with specific means where name=default applies to unmatched names. For example <code>control.fixed=list(mean=list(a=1, b=2, default=0))</code> assign 'mean=1' to fixed effect 'a', 'mean=2' to effect 'b' and 'mean=0' to all others. (default 0.0)
mean.intercept	Prior mean for the intercept (default 0.0)
prec	Default precision for all fixed effects except the intercept. Alternatively, a named list with specific means where name=default applies to unmatched names. For example <code>control.fixed=list(prec=list(a=1, b=2, default=0.01))</code> assign 'prec=1' to fixed effect 'a', 'prec=2' to effect 'b' and 'prec=0.01' to all others. (default 0.001)
prec.intercept	Default precision the intercept (default 0.0)
compute	Compute marginals for the fixed effects ? (default TRUE)
correlation.matrix	Compute the posterior correlation matrix for all fixed effects? (default FALSE) OOPS: This option will set up appropriate linear combinations and the results are shown as the posterior correlation matrix of the linear combinations. This option will imply <code>control.inla=list(lincomb.derived.correlation.matrix=TRUE)</code> .
remove.names	A vector of names of expanded fixed effects to remove from the model-matrix. This is an expert option, and should only be used if you know what you are doing.
...	Named arguments passed on to the main function

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.gcpo

control.gcpo

Description

Control variables in `control.*` for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.gcpo(
  enable = FALSE,
  num.level.sets = -1,
  size.max = 32,
  strategy = c("posterior", "prior"),
  groups = NULL,
  selection = NULL,
  friends = NULL,
```

```

    verbose = FALSE,
    epsilon = 0.005,
    prior.diagonal = 1e-04,
    correct.hyperpar = TRUE,
    keep = NULL,
    remove = NULL,
    remove.fixed = TRUE
  )

  inla.set.control.gcpo.default(...)

```

Arguments

enable	TODO
num.level.sets	TODO
size.max	TODO
strategy	TODO
groups	TODO
selection	TODO
friends	TODO
verbose	TODO
epsilon	TODO
prior.diagonal	TODO
correct.hyperpar	TODO
keep	TODO
remove	TODO
remove.fixed	TODO
...	Named arguments passed on to the main function

Details

(For experts only!) Set control variables for the gcpo in [control.compute](#). The intended use is to use `inla.group.cv`. Refer to `?inla.group.cv` and the vignette for details.

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.group	<i>control.group</i>
---------------	----------------------

Description

Control variables in `control.*` for use with `inla()`. The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.group(
  model = "exchangeable",
  order = NULL,
  cyclic = FALSE,
  graph = NULL,
  scale.model = TRUE,
  adjust.for.con.comp = TRUE,
  hyper = NULL,
  initial = NULL,
  fixed = NULL,
  prior = NULL,
  param = NULL
)

inla.set.control.group.default(...)
```

Arguments

model	Group model (one of 'exchangeable', 'exchangeablepos', 'ar1', 'ar', 'rw1', 'rw2', 'besag', or 'iid')
order	Defines the order of the model: for model ar this defines the order p, in AR(p). Not used for other models at the time being.
cyclic	Make the group model cyclic? (Only applies to models 'ar1', 'rw1' and 'rw2')
graph	The graph specification (Only applies to model 'besag')
scale.model	Scale the intrinsic model (RW1, RW2, BESAG) so the generalized variance is 1. (Default TRUE)
adjust.for.con.comp	Adjust for connected components when scale.model=TRUE? (default TRUE)
hyper	Definition of the hyperparameter(s)
initial	(OBSOLETE!) The initial value for the group correlation or precision in the internal scale.
fixed	(OBSOLETE!) A boolean variable if the group correction or precision is assumed to be fixed or random.
prior	(OBSOLETE!) The name of the prior distribution for the group correlation or precision in the internal scale
param	(OBSOLETE!) Prior parameters
...	Named arguments passed on to the main function

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.hazard	<i>control.hazard</i>
----------------	-----------------------

Description

Control variables in `control.*` for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.hazard(
  model = "rw1",
  hyper = NULL,
  fixed = FALSE,
  initial = NULL,
  prior = NULL,
  param = NULL,
  constr = TRUE,
  diagonal = NULL,
  n.intervals = 15,
  cutpoints = NULL,
  strata.name = NULL,
  scale.model = NULL
)

inla.set.control.hazard.default(...)
```

Arguments

model	The model for the baseline hazard model. One of 'rw1', 'rw2' or 'iid'. (Default 'rw1'.)
hyper	The definition of the hyperparameters.
fixed	(OBSOLETE!) A boolean variable; is the precision for 'model' fixed? (Default FALSE.)
initial	(OBSOLETE!) The initial value for the precision.
prior	(OBSOLETE!) The prior distribution for the precision for 'model'
param	(OBSOLETE!) The parameters in the prior distribution
constr	A boolean variable; shall the 'model' be constrained to sum to zero?
diagonal	An extra constant added to the diagonal of the precision matrix
n.intervals	Number of intervals in the baseline hazard. (Default 15)

cutpoints	The cutpoints to use. If not specified they are computed from 'n.intervals' and the maximum length of the interval. (Default NULL)
strata.name	The name of the stratification variable for the baseline hazard in the data.frame
scale.model	Scale the baseline hazard model (RW1, RW2) so the generalized variance is 1. (Default <code>inla.getOption("scale.model.default")</code> .)
...	Named arguments passed on to the main function

See Also

Other control: `control.bgev()`, `control.compute()`, `control.expert()`, `control.family()`, `control.fixed()`, `control.gcpo()`, `control.group()`, `control.inla()`, `control.lincomb()`, `control.link()`, `control.lp.scale()`, `control.mix()`, `control.mode()`, `control.pardiso()`, `control.pom()`, `control.predictor()`, `control.scopy()`, `control.update()`, `control.vb()`

control.inla	<i>control.inla</i>
--------------	---------------------

Description

Control variables in `control.*` for use with `inla()`. The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.inla(
  strategy = "auto",
  int.strategy = "auto",
  int.design = NULL,
  interpolator = "auto",
  fast = TRUE,
  linear.correction = NULL,
  h = 0.005,
  dz = 0.75,
  diff.logdens = 6,
  print.joint.hyper = TRUE,
  force.diagonal = FALSE,
  skip.configurations = TRUE,
  mode.known = FALSE,
  adjust.weights = TRUE,
  tolerance = 0.005,
  tolerance.f = NULL,
  tolerance.g = NULL,
  tolerance.x = NULL,
  tolerance.step = 0.001,
  restart = 0L,
  optimiser = "default",
  verbose = NULL,
  reordering = "auto",
  cpo.diff = NULL,
```

```

npoints = 9,
cutoff = 1e-04,
adapt.hessian.mode = NULL,
adapt.hessian.max.trials = NULL,
adapt.hessian.scale = NULL,
adaptive.max = 25L,
huge = FALSE,
step.len = 0,
stencil = 5L,
lincomb.derived.correlation.matrix = FALSE,
diagonal = 0,
numint.maxfeval = 1e+05,
numint.relerr = 1e-05,
numint.abserr = 1e-06,
cmin = -Inf,
b.strategy = "keep",
step.factor = -0.1,
global.node.factor = 2,
global.node.degree = .Machine$integer.max,
stupid.search = TRUE,
stupid.search.max.iter = 1000L,
stupid.search.factor = 1.05,
control.vb = INLA::control.vb(),
num.gradient = "central",
num.hessian = "central",
optimise.strategy = "smart",
use.directions = TRUE,
constr.marginal.diagonal = sqrt(.Machine$double.eps),
improved.simplified.laplace = FALSE,
parallel.linesearch = FALSE,
compute.initial.values = TRUE,
hessian.correct.skewness.only = TRUE
)

inla.set.control.inla.default(...)

```

Arguments

strategy	Character The strategy to use for the approximations; one of 'auto' (default), 'gaussian', 'simplified.laplace', 'laplace' or 'adaptive'.
int.strategy	Character The integration strategy to use; one of 'auto' (default), 'ccd', 'grid', 'eb' (empirical bayes), 'user' or 'user.std'. For the experimental mode, then 'grid' equal 'ccd' for more than two hyperparameters.
int.design	Matrix Matrix of user-defined integration points and weights. Each row consists theta values and the integration weight. (EXPERIMENTAL!).
interpolator	Character The interpolator used to compute the marginals for the hyperparameters. One of 'auto', 'nearest', 'quadratic', 'weighted.distance', 'ccd', 'ccdintegrate', 'gridsum', 'gaussian'. Default is 'auto'.
fast	Logical If TRUE, then replace conditional modes in the Laplace approximation with conditional expectation (default TRUE).
linear.correction	Logical Default TRUE for the 'strategy = laplace' option.

h	Numerical The step-length for the gradient calculations for the hyperparameters. Default 0.005.
dz	Numerical The step-length in the standardised scale for the integration of the hyperparameters. Default 0.75.
diff.logdens	Numerical The difference of the log.density for the hyperparameters to stop numerical integration using <code>int.strategy='grid'</code> . Default 6.
print.joint.hyper	Logical If TRUE, the store also the joint distribution of the hyperparameters (without any costs). Default TRUE.
force.diagonal	Logical If TRUE, then force the Hessian to be diagonal. (Default FALSE)
skip.configurations	Logical Skip configurations if the values at the main axis are too small. (Default TRUE)
mode.known	Logical If TRUE then no optimisation is done. (Default FALSE.)
adjust.weights	Logical If TRUE then just more accurate integration weights. (Default TRUE.)
tolerance	Numerical The tolerance for the optimisation of the hyperparameters. If set, this is the default value for <code>'2.5tolerance.f'</code> , <code>'tolerance.g'</code> and <code>'5tolerance.x'</code> ; see below.
tolerance.f	Numerical The tolerance for the absolute change in the log posterior in the optimisation of the hyperparameters.
tolerance.g	Numerical The tolerance for the absolute change in the gradient of the log posterior in the optimisation of the hyperparameters.
tolerance.x	Numerical The tolerance for the change in the hyperparameters (root-mean-square) in the optimisation of the hyperparameters.
tolerance.step	Numerical The tolerance for the change in root-mean_square in the inner Newton-like optimisation of the latent field.
restart	Numerical To improve the optimisation, the optimiser is restarted at the found optimum 'restart' number of times.
optimiser	Character The optimiser to use; one of <code>'gsl'</code> or <code>'default'</code> .
verbose	Logical Run in verbose mode? (Default FALSE)
reordering	Character Type of reordering to use. (EXPERT OPTION; one of "AUTO", "DEFAULT", "IDENTITY", "REVERSEIDENTITY", "BAND", "METIS", "GENMMD", "AMD", "MD", "MMD", "AMDBAR", "AMDC", "AMDBARC", or the output from <code>inla.qreordering</code> . Default is <code>'auto'</code> .)
cpo.diff	Numerical Threshold to define when the cpo-calculations are inaccurate. (EXPERT OPTION.)
npoints	Numerical Number of points to use in the <code>'strategy=laplace'</code> approximation (default 9)
cutoff	Numerical The cutoff used in the <code>'strategy=laplace'</code> approximation. (Smaller value is more accurate and more slow.) (default 1e-4)
adapt.hessian.mode	Logical Should optimisation be continued if the Hessian estimate is void? (Default TRUE)
adapt.hessian.max.trials	Numerical Number of steps in the adaptive Hessian optimisation
adapt.hessian.scale	Numerical The scaling of the <code>'h'</code> after each trial.

<code>adaptive.max</code>	Selecting <code>strategy="adaptive"</code> will chose the default strategy for all fixed effects and model components with length less or equal to <code>adaptive.max</code> , for others, the gaussian strategy will be applied.
<code>huge</code>	Logical If TRUE then try to do some of the internal parallelisations differently. Hopefully this will be of benefit for 'HUGE' models. (Default FALSE.) THIS OPTION IS OBSOLETE AND NOT USED!
<code>step.len</code>	Numerical The step-length used to compute numerical derivaties of the log-likelihood (0 means default which depends on <code>stencil</code>)
<code>stencil</code>	Numerical Number of points in the stencil used to compute the numerical derivaties of the log-likelihood (5, 7 or 9). (default 5)
<code>lincomb.derived.correlation.matrix</code>	Logical If TRUE compute also the correlations for the derived linear combinations, if FALSE do not (Default FALSE)
<code>diagonal</code>	Numerical Expert use only! Add a this value on the diagonal of the joint precision matrix. (default 0.0)
<code>numint.maxfeval</code>	Numerical Maximum number of function evaluations in the the numerical integration for the hyperparameters. (Default 100000.)
<code>numint.reterr</code>	Numerical Relative error requirement in the the numerical integration for the hyperparameters. (Default 1e-5)
<code>numint.abserr</code>	Numerical Absolute error requirement in the the numerical integration for the hyperparameters. (Default 1e-6)
<code>cmin</code>	Numerical The minimum value for the negative Hessian from the likelihood. Increasing this value will stabalise the optimisation but can introduce bias. (Default -Inf)
<code>b.strategy</code>	Character If <code>cmin</code> is used, either keep the linear term (with <code>b.strategy="keep"</code>) or skip the contribution by setting the linear term to zero (<code>b.strategy="skip"</code>). The default value is "keep"
<code>step.factor</code>	Numerical The step factor in the Newton-Raphson algorithm saying how large step to take (Default 1.0) YES! setting this to a negative values means = 1, EXCEPT the first time (for each thread) where <code>lstep.factor</code> is used.
<code>global.node.factor</code>	Numerical The factor which defines the degree required (how many neighbors), as a fraction of $n-1$, that is required to be classified as a global node and numbered last (whatever the reordering routine says). Here, n , is the size of the graph. (Disabled if larger than 1, default 2)
<code>global.node.degree</code>	Numerical The degree required (number of neighbors) to be classified as a global node and numbered last (whatever the reordering routine says). (default <code>.Machine\$integer.max</code>)
<code>stupid.search</code>	Logical Enable or disable the stupid-search-algorithm, if the Hessian calculations reveals that the mode is not found. (Default TRUE.)
<code>stupid.search.max.iter</code>	Numerical Maximum number of iterations allowed for the stupid-search-algorithm. (default 1000)
<code>stupid.search.factor</code>	Numerical Factor (≥ 1) to increase the step-length with after each new iteration. (default 1.05)

control.vb	list of arguments for various VB corrections. See control.vb() for details.
num.gradient	Character Set the numerical scheme to compute the gradient, one of "forward" or "central" (default).
num.hessian	Character Set the numerical scheme to compute the Hessian, one of "forward" or "central" (default).
optimise.strategy	Character THIS OPTION IS EXPERIMENTAL. Chose the optimiser strategy, one of "plain" or "smart" (default)
use.directions	THIS OPTION IS EXPERIMENTAL. Unless FALSE or NULL, use directions for computing gradient and Hessian, initialised with use.directions if a matrix.
constr.marginal.diagonal	Add stability to $AQ^{-1}A^T$ by adding a small diagonal term. (default $\epsilon^{0.5}$)
improved.simplified.laplace	If TRUE use an experimental improved variant, otherwise, use the standard one.
parallel.linesearch	Use serial (default) or parallel line-search (highly experimental for the moment)
compute.initial.values	Compute initial values for the latent field or not. (experimental-mode only)
hessian.correct.skewness.only	If TRUE (default) correct only skewness in the Hessian, for the hyperparameters. If FALSE, correct also variance. (This option is for experimental-mode only)
...	Named arguments passed on to the main function

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.lincomb

control.lincomb

Description

Control variables in `control.*` for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.lincomb(verbose = FALSE)
```

```
inla.set.control.lincomb.default(...)
```

Arguments

verbose	Use verbose mode for linear combinations if verbose model is set globally. (Default FALSE). This option is only available for the default <code>inla.mode</code> (<code>inla.mode="compact"</code>).
...	Named arguments passed on to the main function

See Also

Other control: `control.bgev()`, `control.compute()`, `control.expert()`, `control.family()`, `control.fixed()`, `control.gcpo()`, `control.group()`, `control.hazard()`, `control.inla()`, `control.link()`, `control.lp.scale()`, `control.mix()`, `control.mode()`, `control.pardiso()`, `control.pom()`, `control.predictor()`, `control.scopy()`, `control.update()`, `control.vb()`

`control.link`
`control.link`

Description

Control variables in `control.*` for use with `inla()`. The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.link(
  model = "default",
  order = NULL,
  variant = NULL,
  hyper = NULL,
  quantile = NULL,
  a = 1,
  initial = NULL,
  fixed = NULL,
  prior = NULL,
  param = NULL
)

inla.set.control.link.default(...)
```

Arguments

<code>model</code>	The name of the link function/model
<code>order</code>	The order of the link function, where the interpretation of order is model-dependent.
<code>variant</code>	The variant of the link function, where the interpretation of variant is model-dependent.
<code>hyper</code>	Definition of the hyperparameter(s) for the link model chosen
<code>quantile</code>	The quantile for quantile link function
<code>a</code>	The parameter a in the LOGa link
<code>initial</code>	(OBSOLETE!) The initial value(s) for the hyperparameter(s)
<code>fixed</code>	(OBSOLETE!) A boolean variable if hyperparameter(s) is/are fixed or random
<code>prior</code>	(OBSOLETE!) The name of the prior distribution(s) for the hyperparameter(s)
<code>param</code>	(OBSOLETE!) The parameters for the prior distribution(s) for the hyperparameter(s)
<code>...</code>	Named arguments passed on to the main function

Details

The control.link-list is set within the corresponding control.family-list as the link is likelihood-family specific.

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.lp.scale	<i>control.lp.scale</i>
------------------	-------------------------

Description

Control variables in control.* for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.lp.scale(hyper = NULL)

inla.set.control.lp.scale.default(...)
```

Arguments

hyper	Definition of the hyperparameter(s)
...	Named arguments passed on to the main function

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.mix	<i>control.mix</i>
-------------	--------------------

Description

Control variables in control.* for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.mix(
  model = NULL,
  hyper = NULL,
  initial = NULL,
  fixed = NULL,
  prior = NULL,
  param = NULL,
  npoints = 101,
  integrator = "default"
)

inla.set.control.mix.default(...)
```

Arguments

model	The model for the random effect. Currently, only model='gaussian' is implemented
hyper	Definition of the hyperparameter(s) for the random effect model chosen
initial	(OBSOLETE!) The initial value(s) for the hyperparameter(s)
fixed	(OBSOLETE!) A boolean variable if hyperparameter(s) is/are fixed or random
prior	(OBSOLETE!) The name of the prior distribution(s) for the hyperparameter(s)
param	(OBSOLETE!) The parameters for the prior distribution(s) for the hyperparameter(s)
npoints	Number of points used to do the numerical integration (default 101)
integrator	The integration scheme to use (default, quadrature, simpson)
...	Named arguments passed on to the main function

Details

The control.mix list is set within the corresponding control.family-list a the mixture of the likelihood is likelihood specific. (This option is EXPERIMENTAL.)

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.mode

control.mode

Description

Control variables in control.* for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.mode(
  result = NULL,
  theta = NULL,
  x = NULL,
  restart = FALSE,
  fixed = FALSE
)

inla.set.control.mode.default(...)
```

Arguments

result	Previous result from inla(). Use the theta- and x-mode from this run.
theta	The theta-mode/initial values for theta. This option has preference over result\$mode\$theta.
x	The x-mode/initial values for x. This option has preference over result\$mode\$x.
restart	A boolean variable; should we restart the optimisation from this configuration or fix the mode at this configuration? (Default FALSE.)
fixed	A boolean variable. If TRUE then treat all thetas as known and fixed, and if FALSE then treat all thetas as unknown and random (default).
...	Named arguments passed on to the main function

Details

For internal use and for algorithms built on to of INLA.

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.pardiso

control.pardiso

Description

Control variables in control.* for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.pardiso(
  verbose = FALSE,
  debug = FALSE,
  parallel.reordering = TRUE,
  nrhs = -1
)

inla.set.control.pardiso.default(...)
```

Arguments

verbose	Show detailed output (default FALSE)
debug	Show internal debug output (default FALSE)
parallel.reordering	Do reordering in parallel (default TRUE)
nrhs	Number of right-hand sides to solve for in parallel (-1 will determine this adaptive)
...	Named arguments passed on to the main function

Details

Extra options controlling the PARDISO library

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.pom

control.pom

Description

Control variables in `control.*` for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.pom(cdf = "logit", fast = FALSE)

inla.set.control.pom.default(...)
```

Arguments

cdf	character The cdf to use, "logit" (default) or "probit"
fast	Logical Use a faster but approximate form for the probit cdf (default FALSE)?
...	Named arguments passed on to the main function

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.predictor	<i>control.predictor</i>
-------------------	--------------------------

Description

Control variables in `control.*` for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.predictor(
  hyper = NULL,
  fixed = NULL,
  prior = NULL,
  param = NULL,
  initial = NULL,
  compute = FALSE,
  cdf = NULL,
  quantiles = NULL,
  cross = NULL,
  A = NULL,
  precision = exp(15),
  link = NULL
)

inla.set.control.predictor.default(...)
```

Arguments

hyper	Definition of the hyperparameters.
fixed	(OBSOLETE!) If the precision for the artificial noise is fixed or not (default TRUE)
prior	(OBSOLETE!) The prior for the artificial noise
param	(OBSOLETE!) Prior parameters for the artificial noise
initial	(OBSOLETE!) The value of the log precision of the artificial noise
compute	A boolean variable; should the marginals for the linear predictor be computed? (Default FALSE.)
cdf	A list of values to compute the CDF for the linear predictor
quantiles	A list of quantiles to compute for the linear predictor

cross	Cross-sum-to-zero constraints with the linear predictor. All linear predictors with the same level of 'cross' are constrained to have sum zero. Use 'NA' for no contribution. 'Cross' has the same length as the linear predictor (including the 'A' matrix extension). (THIS IS AN EXPERIMENTAL OPTION, CHANGES MAY APPEAR.)
A	The observation matrix (matrix or Matrix::sparseMatrix).
precision	The precision for $\eta^* - A\eta$, (default $\exp(15)$)
link	Define the family-connection for unobserved observations (NA). link is integer values which defines the family connection; family[link[idx]] unless is.na(link[idx]) for which the identity-link is used. The link-argument only influence the fitted.values in the result-object. If is.null(link) (default) then the identity-link is used for all missing observations. If the length of link is 1, then this value is replicated with the length of the response vector. If an element of the response vector is !NA then the corresponding entry in link is not used (but must still be a legal value). Setting this variable implies compute=TRUE.
...	Named arguments passed on to the main function

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.scopy

control.scopy

Description

Control variables in control.* for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.scopy(
  covariate = NULL,
  n = 5,
  model = "rw2",
  mean = 1,
  prec.mean = 1,
  prec.betas = 10
)

inla.set.control.scopy.default(...)
```


Arguments

covariate	The covariate for the scopy function
n	Number of betas
model	scopy model (one of 'rw1' and 'rw2')
mean	The prior mean for mean(betas)
prec.mean	The prior precision for mean(betas)
prec.betas	The prior precision prec(betas-mean(betas))
...	Named arguments passed on to the main function

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.update\(\)](#), [control.vb\(\)](#)

control.update	<i>control.update</i>
----------------	-----------------------

Description

Control variables in `control.*` for use with [inla\(\)](#). The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.update(result = NULL)

inla.set.control.update.default(...)
```

Arguments

result	Update the joint posterior for the hyperparameters from result
...	Named arguments passed on to the main function

See Also

[inla\(\)](#)

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.vb\(\)](#)

control.vb

control.fixed

Description

Control variables in `control.*` for use with `inla()`. The functions can be used to TAB-complete arguments, and returns a list of the default control arguments, unless overridden by specific input arguments.

Usage

```
control.vb(
  enable = "auto",
  strategy = c("mean", "variance"),
  verbose = TRUE,
  iter.max = 25,
  emergency = 25,
  f.enable.limit = c(30, 25),
  hessian.update = 2,
  hessian.strategy = c("default", "full", "partial", "diagonal")
)

inla.set.control.vb.default(...)
```

Arguments

<code>enable</code>	Logical/Character Use this feature? If "auto" this will be selected automatically.
<code>strategy</code>	Character What to correct, either "mean" or "variance".
<code>verbose</code>	Logical Be verbose or not.
<code>iter.max</code>	Integer Maximum number of iterations.
<code>emergency</code>	Numeric If the standardized correction for the mean is larger than this value, then call the vb.correction off and issue a warning
<code>f.enable.limit</code>	Vector of length 2. The size limit to correct for a <code>f()</code> . First element is for <code>strategy="mean"</code> . Second element is for <code>strategy="variance"</code> .
<code>hessian.update</code>	How many times the Hessian is updated for each correction (<code>strategy="variance"</code> only).
<code>hessian.strategy</code>	Select strategy for computing the Hessian matrix for <code>strategy="variance"</code> , one of "full", "diagonal", "partial" and "default".
<code>...</code>	Named arguments passed on to the main function

Details

`control.vb` List of arguments for various VB corrections. Used for `control.inla` `control.vb` specifications.

See Also

Other control: [control.bgev\(\)](#), [control.compute\(\)](#), [control.expert\(\)](#), [control.family\(\)](#), [control.fixed\(\)](#), [control.gcpo\(\)](#), [control.group\(\)](#), [control.hazard\(\)](#), [control.inla\(\)](#), [control.lincomb\(\)](#), [control.link\(\)](#), [control.lp.scale\(\)](#), [control.mix\(\)](#), [control.mode\(\)](#), [control.pardiso\(\)](#), [control.pom\(\)](#), [control.predictor\(\)](#), [control.scopy\(\)](#), [control.update\(\)](#)

crs_wkt

*Handling CRS/WKT***Description**

[Deprecated] in favour of [fmesher::fm_wkt\(\)](#) and related methods.

Get and set CRS object or WKT string properties.

Usage

```
inla.wkt_is_geocent(wkt)

inla.crs_is_geocent(crs)

inla.wkt_get_ellipsoid_radius(wkt)

inla.crs_get_ellipsoid_radius(crs)

inla.wkt_set_ellipsoid_radius(wkt, radius)

inla.crs_set_ellipsoid_radius(crs, radius)

inla.wkt_unit_params()

inla.wkt_get_lengthunit(wkt)

inla.wkt_set_lengthunit(wkt, unit, params = NULL)

inla.crs_get_wkt(crs)

inla.crs_get_lengthunit(crs)

inla.crs_set_lengthunit(crs, unit, params = NULL)
```

Arguments

wkt	A WKT2 character string
crs	A <code>sp::CRS</code> or <code>inla.CRS</code> object
radius	numeric
unit	character, name of a unit. Supported names are "metre", "kilometre", and the aliases "meter", "m", "International metre", "kilometer", and "km", as defined by <code>inla.wkt_unit_params</code> or the <code>params</code> argument. (For legacy PROJ4 use, only "m" and "km" are supported)
params	Length unit definitions, in the list format produced by <code>inla.wkt_unit_params()</code> , Default: <code>NULL</code> , which invokes <code>inla.wkt_unit_params()</code>

Value

For `inla.wkt_unit_params`, a list of named unit definitions

For `inla.wkt_get_lengthunit`, a list of length units used in the wkt string, excluding the ellipsoid radius unit.

For `inla.wkt_set_lengthunit`, a WKT2 string with altered length units. Note that the length unit for the ellipsoid radius is unchanged.

For `inla.crs_get_wkt`, WKT2 string.

For `inla.crs_get_lengthunit`, a list of length units used in the wkt string, excluding the ellipsoid radius unit. (For legacy PROJ4 code, the raw units from the proj4string are returned, if present.)

For `inla.crs_set_lengthunit`, a `sp::CRS` object with altered length units. Note that the length unit for the ellipsoid radius is unchanged.

For `inla.wkt_unit_params`, a list of named unit definitions

For `inla.wkt_get_lengthunit`, a list of length units used in the wkt string, excluding the ellipsoid radius unit.

For `inla.wkt_set_lengthunit`, a WKT2 string with altered length units. Note that the length unit for the ellipsoid radius is unchanged.

For `inla.crs_get_wkt`, WKT2 string.

For `inla.crs_get_lengthunit`, a list of length units used in the wkt string, excluding the ellipsoid radius unit. (For legacy PROJ4 code, the raw units from the proj4string are returned, if present.)

For `inla.crs_set_lengthunit`, a `sp::CRS` object with altered length units. Note that the length unit for the ellipsoid radius is unchanged.

Functions

- `inla.wkt_is_geocent()`: **[Deprecated]** in favour of `fmesher::fm_wkt_is_geocent()`
- `inla.crs_is_geocent()`: **[Deprecated]** in favour of `fmesher::fm_crs_is_geocent()`
- `inla.wkt_get_ellipsoid_radius()`: **[Deprecated]** in favour of `fmesher::fm_ellipsoid_radius()`
- `inla.crs_get_ellipsoid_radius()`: **[Deprecated]** in favour of `fmesher::fm_ellipsoid_radius()`
- `inla.wkt_set_ellipsoid_radius()`: **[Deprecated]** in favour of `fmesher::fm_wkt_set_ellipsoid_radius()`
- `inla.crs_set_ellipsoid_radius()`: **[Deprecated]** in favour of `fmesher::fm_ellipsoid_radius<-()`

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

`inla.sp_get_crs()`

`inla.sp_get_crs()`

Examples

```
## Not run:
c1 <- fmesher::fm_CRS("globe")
inla.crs_get_lengthunit(c1)
c2 <- inla.crs_set_lengthunit(c1, "km")
inla.crs_get_lengthunit(c2)
```

```
## End(Not run)

## Not run:
c1 <- inla.CRS("globe")
inla.crs_get_lengthunit(c1)
c2 <- inla.crs_set_lengthunit(c1, "km")
inla.crs_get_lengthunit(c2)

## End(Not run)
```

cut

Group-wise model criticism using node-splitting

Description

This function performs group-wise, cross-validators model assessment for an INLA model using so-called node-splitting (Marshall and Spiegelhalter, 2007; Presanis et al, 2013). The user inputs an object of class `inla` (i.e. a result of a call to `inla()`) as well as a variable name (`split.by`) specifying a grouping: Data points that share the same value of `split.by` are in the same group. The function then checks whether each group is an "outlier", or in conflict with the remaining groups, using the methodology described in Ferkingstad et al (2017). The result is a vector containing a p-value for each group, corresponding to a test for each group i , where the null hypothesis is that group i is consistent with the other groups except i (so a small p-value is evidence that the group is an "outlier"). See Ferkingstad et al (2017) for further details.

Usage

```
inla.cut(result, split.by, mc.cores = NULL, debug = FALSE)
```

Arguments

<code>result</code>	An object of class <code>inla</code> , i.e. a result of a call to <code>inla()</code>
<code>split.by</code>	The name of the variable to group by. Data points that have the same value of <code>split.by</code> are in the same group.
<code>mc.cores</code>	The number of cores to use in <code>parallel::mclapply</code> . If <code>is.null(mc.cores)</code> , then check <code>getOption("mc.cores")</code> and <code>inla.getOption("num.threads")</code> in that order.
<code>debug</code>	Print debugging information if TRUE, default is FALSE

Value

A numeric vector of p-values, corresponding to a test for each group i where the null hypothesis is that group i is consistent with the other groups except i . A small p-value for a group indicates that the group is an "outlier" (in conflict with remaining groups).

This function is EXPERIMENTAL!!!

Author(s)

Egil Ferkingstad <egil.ferkingstad@gmail.com> and Havard Rue <hrue@r-inla.org>

References

- Ferkingstad, E., Held, L. and Rue, H. (2017). Fast and accurate Bayesian model criticism and conflict diagnostics using R-INLA. arXiv preprint arXiv:1708.03272, available at <http://arxiv.org/abs/1708.03272>. Published in Stat, 6:331-344 (2017).
- Marshall, E. C. and Spiegelhalter, D. J. (2007). Identifying outliers in Bayesian hierarchical models: a simulation-based approach. Bayesian Analysis, 2(2):409-444.
- Presanis, A. M., Ohlssen, D., Spiegelhalter, D. J., De Angelis, D., et al. (2013). Conflict diagnostics in directed acyclic graphs, with applications in Bayesian evidence synthesis. Statistical Science, 28(3):376-397.

Examples

```
## See http://www.r-inla.org/examples/case-studies/ferkingstad-2017 and Ferkingstad et al (2017).
```

debug.graph	<i>Debug a graph-file</i>
-------------	---------------------------

Description

Debug a graph specification on file (ascii-mode only), by checking the specification along the way.

Usage

```
inla.debug.graph(graph.file)
```

Arguments

graph.file The filename of the graph (ascii-mode)

Value

If an error is found, then an error message is shown, otherwise the graph-object returned by `inla.read.graph()` is returned.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

`inla.read.graph`

Examples

```
## Not run:
cat("3\n 1 1 2\n 2 1 1\n 3 4\n", file="g.dat")
g = inla.debug.graph("g.dat")

## End(Not run)
```

Drivers	<i>Time series with seasonal effect</i>
---------	---

Description

Monthly total of car drivers killed or several injured in England from January 1969 to December 1984

Format

A data frame with 204 observations on the following 4 variables.

y Number of deaths

belt Indicator of weather the belt was compulsory to use (1) or not (0)

trend time (in months)

seasonal time (in months)

Details

NB: The last 12 lines of the data set have the first column set to NULL since these data were not observed but we want to predict them.

References

Rue, H and Held, L. (2005) *Gaussian Markov Random Fields - Theory and Applications* Chapman and Hall

Examples

```
data(Drivers)
```

dryrun	<i>Do a dryrun to extract some internal information upfront</i>
--------	---

Description

Do a dryrun to get information about the internal storage and the list (and ordering) of the hyperparameters

Usage

```
inla.dryrun(...)
```

Arguments

... Same arguments as `inla()`

Value

A list of start-index and length for each latent component and a list of the hyperparameters in the model

Author(s)

Havard Rue <hrue@r-inla.org>

Epil

Repeated measures on Poisson counts

Description

Seizure counts in a randomised trial of anti-convulsant therapy in epilepsy for 59 patients.

Format

A data frame with 236 observations on the following 7 variables.

y Number of seizures

Trt indicator for the presence of treatment

Base 8-week baseline seizure counts

Age Age of the patient

V4 indicator variable for the 4th visit.

rand a numeric vector

Ind indicator for the specific patient

Source

WinBUGS/OpenBUGS Manual Examples Vol I

Examples

```
data(Epil)
```

extract.groups

Extract tagged boundary/internal segments.

Description

Extract boundary or internal segments tagged by group id:s.

Usage

```
extract.groups(segm, groups, groups.new = groups, ...)
```

```
## S3 method for class 'inla.mesh.segment'
```

```
extract.groups(segm, groups, groups.new = groups, ...)
```


Arguments

<code>segm</code>	An <code>inla.mesh.segment()</code> object.
<code>groups</code>	The segment groups id:s to extract.
<code>groups.new</code>	Optional vector of group id remapping; <code>groups[k]</code> in the input will be replaced by <code>groups.new[k]</code> in the output.
<code>...</code>	Additional arguments, passed on to other methods.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.mesh.segment\(\)](#)

f

Define general Gaussian models in the INLA formula

Description

Function used for defining of smooth and spatial terms within `inla` model formulae. The function does not evaluate anything - it exists purely to help set up a model. The function specifies one smooth function in the linear predictor (see [inla.list.models\(\)](#)) as

$$w f(x)$$

Usage

```
f(
  ...,
  model = "iid",
  copy = NULL,
  scopy = NULL,
  same.as = NULL,
  n = NULL,
  nrep = NULL,
  replicate = NULL,
  ngroup = NULL,
  group = NULL,
  control.group = inla.set.control.group.default(),
  control.scopy = inla.set.control.scopy.default(),
  hyper = NULL,
  initial = NULL,
  prior = NULL,
  param = NULL,
  fixed = NULL,
  season.length = NULL,
  constr = NULL,
  extraconstr = list(A = NULL, e = NULL),
  values = NULL,
```

```

cyclic = NULL,
diagonal = NULL,
graph = NULL,
graph.file = NULL,
cdf = NULL,
quantiles = NULL,
Cmatrix = NULL,
rankdef = NULL,
Z = NULL,
nrow = NULL,
ncol = NULL,
nu = NULL,
bvalue = NULL,
spde.prefix = NULL,
spde2.prefix = NULL,
spde2.transform = c("logit", "log", "identity"),
spde3.prefix = NULL,
spde3.transform = c("logit", "log", "identity"),
mean.linear = inla.set.control.fixed.default()$mean,
prec.linear = inla.set.control.fixed.default()$prec,
compute = TRUE,
of = NULL,
precision = exp(13),
range = NULL,
adjust.for.con.comp = TRUE,
order = NULL,
scale = NULL,
rgeneric = NULL,
cgeneric = NULL,
scale.model = NULL,
args.slm = list(rho.min = NULL, rho.max = NULL, X = NULL, W = NULL, Q.beta = NULL),
args.ar1c = list(Z = NULL, Q.beta = NULL),
args.intslope = list(subject = NULL, strata = NULL, covariates = NULL),
vb.correct = TRUE,
locations = NULL,
debug = FALSE
)

```

Arguments

...	Name of the covariate and, possibly of the weights vector. NB: order counts!!!! The first specified term is the covariate and the second one is the vector of weights (which can be negative).
model	A string indicating the chosen model. The default is iid. See <code>names(inla.models())\$latent</code> for a list of possible alternatives and inla.doc() for detailed docs.
copy	The name of the model-component to copy
scopy	The name of the model-component to smooth-copy (where the copy-function is a spline)
same.as	Can be used with <code>copy=". . "</code> . <code>same.as="A"</code> says that this copy should use the same scaling parameter as another copy "A"
n	An optional argument which defines the dimension of the model if this is different from <code>length(sort(unique(covariate)))</code>

nrep	Number of replications, if not given, then nrep=max(replications)
replicate	A vector of which replications to use.
ngroup	Number of groups, if not given, then ngroup=max(group)
group	A vector of which groups to use.
control.group	Controls the use of group
control.scopy	Controls the use of scopy
hyper	Specification of the hyperparameter, fixed or random, initial values, priors and its parameters. See ?inla.models for the list of hyperparameters for each model and its default options or use inla.doc() for detailed info on the family and supported prior distributions.
initial	THIS OPTION IS OBSOLETE, DO NOT USE
prior	THIS OPTION IS OBSOLETE, DO NOT USE
param	THIS OPTION IS OBSOLETE, DO NOT USE
fixed	THIS OPTION IS OBSOLETE; DO NOT USE
season.length	Length of the seasonal component for model="seasonal"
constr	A boolean variable indicating whater to set a sum to 0 constraint on the term. By default the sum to 0 constraint is imposed on all intrinsic models ("iid","rw1","rw1","besag", etc..).
extraconstr	This argument defines extra linear constraints. The argument is a list with two elements, a matrix A and a vector e, which defines the extra constraint $Ax = e$; for example <code>extraconstr = list(A = A, e=e)</code> . The number of columns of A must correspond to the length of this f-model. Note that this constraint comes additional to the sum-to-zero constraint defined if <code>constr = TRUE</code> .
values	An optional vector giving all values assumed by the covariate for which we want estimated the effect. It must be a numeric vector, a vector of factors or NULL.
cyclic	A boolean specifying wheather the model is cyclical. Only valid for "rw1" and "rw2" models, is <code>cyclic=T</code> then the sum to 0 constraint is removed. For the correct form of the graph file see <i>Martino and Rue (2008)</i> .
diagonal	An extra constant added to the diagonal of the precision matrix to prevent numerical issues.
graph	Defines the graph-object either as a file with a graph-description, an <code>inla.graph</code> -object, or as a (sparse) symmetric matrix .
graph.file	THIS OPTION IS OBSOLETE, DO NOT USE
cdf	THIS OPTION IS OBSOLETE, DO NOT USE
quantiles	A vector of maximum 10 quantiles, $p(0), p(1), \dots$ to compute for each posterior marginal. The function returns, for each posterior marginal, the values $x(0), x(1), \dots$ such that $\text{Prob}(X < x(p)) = p$
Cmatrix	The specification of the precision matrix for the generic, generic3 or z models (up to a scaling constant). Cmatrix is either a (dense) matrix, a matrix created using <code>Matrix::sparseMatrix()</code> , or a filename which stores the non-zero elements of Cmatrix, in three columns: i, j and Qij. In case of the generic3 model, it is a list of such specifications.
rankdef	A number defining the rank deficiency of the model, with sum-to-zero constraint and possible extra-constraints taken into account. See details.

<code>Z</code>	The matrix for the z-model
<code>nrow</code>	Number of rows for 2d-models
<code>ncol</code>	Number of columns for 2d-models
<code>nu</code>	Smoothing parameter for the Matern2d-model, possible values are $c(0, 1, 2, 3)$
<code>bvalue</code>	The boundary conditions for model <code>rw2d</code> , 0 means use the correct subspace (default), while 1 means condition on 0's outside
<code>spde.prefix</code>	Internal use only
<code>spde2.prefix</code>	Internal use only
<code>spde2.transform</code>	Internal use only
<code>spde3.prefix</code>	Internal use only
<code>spde3.transform</code>	Internal use only
<code>mean.linear</code>	Prior mean for <code>model="linear"</code>
<code>prec.linear</code>	Prior precision for <code>model="linear"</code>
<code>compute</code>	A boolean variable indicating whether the marginal posterior distribution for the nodes in the <code>f()</code> model should be computed or not. This is usefull for large models where we are only interested in some posterior marginals.
<code>of</code>	Internal use only
<code>precision</code>	The precision for the artificial noise added when creating a copy of a model and others.
<code>range</code>	A vector of size two giving the lower and upper range for the scaling parameter <code>beta</code> in the model <code>COPY</code> , <code>CLINEAR</code> , <code>MEC</code> and <code>MEB</code> . If <code>low = high</code> then the identity mapping is used.
<code>adjust.for.con.comp</code>	If <code>TRUE</code> (default), adjust some of the models (currently: <code>besag</code> , <code>bym</code> , <code>bym2</code> and <code>besag2</code>) if the number of connected components in graph is larger than 1. If <code>FALSE</code> , do nothing.
<code>order</code>	Defines the order of the model: for model <code>ar</code> this defines the order <code>p</code> , in <code>AR(p)</code> . Not used for other models at the time being.
<code>scale</code>	A scaling vector. Its meaning depends on the model.
<code>rgeneric</code>	A object of class <code>inla.rgeneric</code> which defines the model. (EXPERIMENTAL!)
<code>cgeneric</code>	A object of class <code>inla.cgeneric</code> which defines the model. (EXPERIMENTAL!)
<code>scale.model</code>	Logical. If <code>TRUE</code> then scale the <code>RW1</code> and <code>RW2</code> and <code>BESAG</code> and <code>BYM</code> and <code>BESAG2</code> and <code>RW2D</code> models so the their (generlized) variance is 1. Default value is <code>inla.getOption("scale.model.default")</code>
<code>args.slm</code>	Required arguments to the <code>model="slm"</code> ; see the documentation for further details.
<code>args.ar1c</code>	Required arguments to the <code>model="ar1c"</code> ; see the documentation for further details.
<code>args.intslope</code>	A list with the subject (factor), strata (factor) and covariates (numeric) for the <code>intslope</code> model; see the documentation for further details,

vb.correct	Add this model component to the list of nodes to be used for the (potential) vb correction? If TRUE do, and do not if FALSE. Can also be a vector of nodes to add in the correction-set.
locations	A matrix with locations for the model dmatern. This also defines n.
debug	Enable local debug output

Details

There is no default value for rankdef, if it is not defined by the user then it is computed by the rank deficiency of the prior model (for the generic model, the default is zero), plus 1 for the sum-to-zero constraint if the prior model is proper, plus the number of extra constraints. **Oops:** This can be wrong, and then the user must define the rankdef explicitly.

Value

TODO

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

[inla\(\)](#), [hyperpar.inla\(\)](#)

fgn	<i>Return the coefficients in the 3-component AR(1) mixture representing FGN(H)</i>
-----	---

Description

This function will return the coefficients in the 3-component AR(1) mixture representing FGN(H)

Usage

```
inla.fgn(H, K = 4L, lag.max = NULL, approx = TRUE)
```

Arguments

H	The Hurst coefficient ($0 < H < 1$), or a vector of those
K	The number of components in representation, must be 3L or 4L
lag.max	Integer. If positive integer, return the coefficients implicitly as the ACF from 0 to lag.max
approx	Logical. If lag.max is an positive integer and approx is FALSE, then return the true ACF instead of the approximated one.

Value

`inla.fgn` returns a named matrix. If `is.null(lag.max)`, then first column is H , columns $1+1:K$ are lag one correlations (or ϕ 's), and columns $1+K+1:K$ are the weights. If `lag.max > 0`, then return the ACFs in columns $2+(0:lag.max)$, for the H in column 1, either the approximated ones or the true ones.

This function is EXPERIMENTAL!!!

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
r = c(inla.fgn(0.7))
r_m = inla.fgn(seq(0.6, 0.8, by=0.01))
```

Germany

Disease Mapping

Description

Cases of Oral cavity cancer in Germany from 1986-1990

Format

A data frame with 544 observations on the following 4 variables.

region Region of Germany

E Fixed quantity which accounts for number of people in the district (offset)

Y Number of cases

x covariate measuring smoking consumption

References

Rue, H and Held, L. (2005) *Gaussian Markov Random Fields - Theory and Applications* Chapman and Hall

Examples

```
data(Germany)
```

graph.convert	<i>INLA utility functions</i>
---------------	-------------------------------

Description

Various utility functions for INLA

Usage

```
inla.geobugs2inla(adj, num, graph.file = "graph.dat")
```

Arguments

adj	A vector listing the ID numbers of the adjacent areas for each area. This is a sparse representation of the full adjacency matrix for the study region, and can be generated using the Adjacency Tool from the Map menu in GeoBUGS.
num	A vector of length N (the total number of areas) giving the number of neighbours n.i for each area.
graph.file	Name of the file of the new graph in the INLA format.

Value

The return value is the name of the graph-file created.

Note

These are all the same function, and the two different names are due to backward-compatibility

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

[inla\(\)](#), [inla.surv\(\)](#), [hyperpar.inla\(\)](#)

graph.matrix	<i>Construct a neighbour-matrix from a graph</i>
--------------	--

Description

Construct a neighbour-matrix from a graph and display it

Usage

```
inla.matrix2graph(graph, ...)
```

```
inla.graph2matrix(graph, ...)
```

```
inla.spy(graph, ..., reordering = NULL, factor = 1, max.dim = NULL)
```

Arguments

graph	An inla.graph-object, a (sparse) symmetric matrix, a filename containing the graph, or a list or collection of characters and/or numbers defining the graph.
...	Additional arguments to inla.read.graph()
reordering	A possible reordering. Typical the one obtained from a inla-call, result\$misc\$reordering, or the result of inla.qreordering.
factor	A scaling of the inla.graph-object to reduce the size.
max.dim	Maximum dimension of the inla.graph-object plotted; if missing(factor) and max.dim is set, then factor is computed automatically to give the given max.dim.

Value

inla.graph2matrix returns a sparse symmetric matrix where the non-zero pattern is defined by the graph. The inla.spy function, plots a binary image of a graph. The reordering argument is typically the reordering used by inla, found in result\$misc\$reordering.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

[inla.read.graph\(\)](#), [inla.qreordering\(\)](#)

Examples

```
n = 50
Q = matrix(0, n, n)
idx = sample(1:n, 2*n, replace=TRUE)
Q[idx, idx] = 1
diag(Q) = 1
g = inla.read.graph(Q)
QQ = inla.graph2matrix(g)
inla.spy(QQ)
print(all.equal(as.matrix(Q), as.matrix(QQ)))

g.file = inla.write.graph(g, filename = tempfile())
inla.dev.new()
inla.spy(g.file)
inla.spy(g.file, reordering = inla.qreordering(g))

g = inla.read.graph(g.file)
inla.dev.new()
inla.spy(g)

inla.dev.new()
inla.spy(3, 1, "1 2 2 1 1 3 0")
inla.dev.new()
inla.spy(3, 1, "1 2 2 1 1 3 0", reordering = 3:1)
```

idx	<i>Convert indexes</i>
-----	------------------------

Description

Convert indexes given by triplet '(idx, group, replicate)' to the (one-dimensional) index used in the grouped and replicated model

Usage

```
inla.idx(
  idx,
  n = max(idx),
  group = rep(1, length(idx)),
  ngroup = max(group),
  replicate = rep(1, length(idx)),
  nrep = max(replicate)
)
```

Arguments

idx	The index within the basic model. (Legal values from 1' to n'.)
n	The length 'n' of the basic model.
group	The index within group. (Legal values from 1' to ngroup'.)
ngroup	Number of groups.
replicate	The index within replication. (Legal values from 1' to nrep'.)
nrep	Number of replications.

Value

`inla.idx` returns indexes in the range 1' to *nngroupnrep*' representing where the triplet '(idx,group,replicate)' is stored internally in the full grouped and replicated model.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
##TODO
```

inla

Bayesian analysis of structured additive models

Description

inla performs a full Bayesian analysis of additive models using Integrated Nested Laplace approximation

Usage

```
inla(
  formula = NULL,
  family = "gaussian",
  contrasts = NULL,
  data = NULL,
  quantiles = c(0.025, 0.5, 0.975),
  E = NULL,
  offset = NULL,
  scale = NULL,
  weights = NULL,
  Ntrials = NULL,
  strata = NULL,
  lp.scale = NULL,
  link.covariates = NULL,
  verbose = inla.getOption("verbose"),
  lincomb = NULL,
  selection = NULL,
  control.compute = list(),
  control.predictor = list(),
  control.family = list(),
  control.inla = list(),
  control.fixed = list(),
  control.mode = list(),
  control.expert = list(),
  control.hazard = list(),
  control.lincomb = list(),
  control.update = list(),
  control.lp.scale = list(),
  control.pardiso = list(),
  only.hyperparam = FALSE,
  inla.call = inla.getOption("inla.call"),
  inla.arg = inla.getOption("inla.arg"),
  num.threads = inla.getOption("num.threads"),
  keep = inla.getOption("keep"),
  working.directory = inla.getOption("working.directory"),
  silent = inla.getOption("silent"),
  inla.mode = inla.getOption("inla.mode"),
  safe = inla.getOption("safe"),
  debug = inla.getOption("debug"),
  .parent.frame = environment(formula)
)
```

Arguments

formula	A inla formula like $y \sim 1 + z + f(\text{ind}, \text{model} = "iid") + f(\text{ind2}, \text{weights}, \text{model} = "ar1")$. This is much like the formula for a <code>glm</code> except that smooth or spatial terms can be added to the right hand side of the formula. See <code>f()</code> for full details and the web site www.r-inla.org for several worked out examples. Each smooth or spatial term specified through <code>f</code> should correspond to separate column of the data frame <code>data</code> . The response variable, <code>y</code> can be a univariate response variable, a list or the output of the function <code>inla.surf</code> for survival analysis models.
family	A string indicating the likelihood family. The default is <code>gaussian</code> with identity link. See <code>names(inla.models())\$likelihood</code> for a list of possible alternatives and use <code>inla.doc()</code> for detailed docs for individual families.
contrasts	Optional contrasts for the fixed effects; see <code>?lm</code> or <code>?glm</code> for details.
data	A data frame or list containing the variables in the model. The data frame MUST be provided
quantiles	A vector of quantiles, $p(0), p(1), \dots$ to compute for each posterior marginal. The function returns, for each posterior marginal, the values $x(0), x(1), \dots$ such that $\text{Prob}(X < x(p)) = p$
E	Known component in the mean for the Poisson likelihoods defined as $E_i \exp(\eta_i)$ <p>where</p> η_i <p>is the linear predictor. If not provided it is set to <code>rep(1, n.data)</code>.</p>
offset	This argument is used to specify an a-priori known and fixed component to be included in the linear predictor during fitting. This should be <code>NULL</code> or a numeric vector of length either one or equal to the number of cases. One or more <code>offset()</code> terms can be included in the formula instead or as well, and if both are used, they are combined into a common offset. If the A-matrix is used in the linear predictor statement <code>control.predictor</code> , then the offset given in this argument is added to <code>eta*</code> , the linear predictor related to the observations, as <code>eta* = A eta + offset</code> , whereas an offset in the formula is added to <code>eta</code> , the linear predictor related to the formula, as <code>eta = ... + offset.formula</code> . So in this case, the offset defined here and in the formula has a different meaning and usage.
scale	Fixed (optional) scale parameters of the precision for Gaussian and Student-T response models. Default value is <code>rep(1, n.data)</code> .
weights	Fixed (optional) weights parameters of the likelihood, so the <code>log-likelihood[i]</code> is changed into <code>weights[i]*log-likelihood[i]</code> . Default value is <code>rep(1, n.data)</code> . WARNING: The normalizing constant for the likelihood is NOT re-computed, so ALL marginals (and the marginal likelihood) must be interpreted with great care.
Ntrials	A vector containing the number of trials for the binomial likelihood and variants, or the number of required successes for the <code>nbinomial2</code> likelihood. Default value is <code>rep(1, n.data)</code> .
strata	Fixed (optional) strata indicators for <code>tstrata</code> likelihood model and similar. The documentation for each likelihood will inform if this argument is required.

<code>lp.scale</code>	A vector with same length as the predictor going into the likelihood with either NA's or indices indexing the scaling coefficients. NA or a index less or equal to 0 means no scaling. The priors and properties of the scaling coefficients are set in <code>control.lp.scale</code>
<code>link.covariates</code>	A vector or matrix with covariates for link functions
<code>verbose</code>	Boolean indicating if the <code>inla</code> -program should run in a verbose mode (default <code>inla.getOption("verbose")</code>)
<code>lincomb</code>	Used to define linear combination of nodes in the latent field. The posterior distribution of such linear combination is computed by the <code>inla</code> function. See vignette <i>Short tutorials from old www-page</i> for information on how to define such linear combinations.
<code>selection</code>	This is a similar argument to the one in <code>inla.posterior.sample</code> and follow the same format. This argument allows to define a subset of the latent field for which to compute an approximated joint distribution. It will appear in <code>result\$selection</code> . See also <code>?inla.rjmargin</code> and the appropriate vignette.
<code>control.compute</code>	See <code>?control.compute</code>
<code>control.predictor</code>	See <code>?control.predictor</code>
<code>control.family</code>	See <code>?control.family</code>
<code>control.inla</code>	See <code>?control.inla</code>
<code>control.fixed</code>	See <code>?control.fixed</code>
<code>control.mode</code>	See <code>?control.mode</code>
<code>control.expert</code>	See <code>?control.expert</code>
<code>control.hazard</code>	See <code>?control.hazard</code>
<code>control.lincomb</code>	See <code>?control.lincomb</code>
<code>control.update</code>	See <code>?control.update</code>
<code>control.lp.scale</code>	See <code>?control.lp.scale</code>
<code>control.pardiso</code>	See <code>?control.pardiso</code>
<code>only.hyperparam</code>	If TRUE, then only the hyperparameters are computed.
<code>inla.call</code>	The path to, or the name of, the <code>inla</code> -program. This is program is installed together with the R-package, but, for example, a native compiled version can be used instead to improve the performance.
<code>inla.arg</code>	A string indicating ALL arguments to the ' <code>inla</code> ' program and do not include default arguments. (This is an expert option and not intended for normal usage.)
<code>num.threads</code>	Maximum number of threads the <code>inla</code> -program will use, or as ' <code>A:B</code> ' defining the number threads in the outer (A) and inner (B) layer for nested parallelism. If B is set to -1, then one can force some single function evaluations to be perfered in parallel, so <code>num.threads=4:-1</code> will locally behave like <code>num.threads=4:1</code> (if considered to be more efficient). If <code>B > 1</code> then <code>num.threads=A:B</code> and <code>num.threads=A:-B</code> are equivalent.

<code>keep</code>	A boolean variable indicating that the working files (ini file, data files and results files) should be kept. If TRUE and no <code>working.directory</code> is specified, the model-files are stored in the current directory called "inla.model" or "inla.model-NUMBER".
<code>working.directory</code>	A string giving the name of a non-existing directory where to store the model-files. Sometimes this argument is required if the temporary directory returned with <code>tempdir()</code> not writeable or has an encoding that is not supported.
<code>silent</code>	If equal to 1L or TRUE, then the inla-program would be "silent". If equal to 2L, then suppress also error messages from the inla-program.
<code>inla.mode</code>	Run inla in compact-mode, or the classic-mode. Default is to use the mode set by <code>inla.getOption("inla.mode")</code> which is default compact-mode.
<code>safe</code>	If TRUE, then enable possible restarts to improve initial values and Hessian if needed.
<code>debug</code>	If TRUE, print some debug output.
<code>.parent.frame</code>	Internal use only

Value

`inla` returns an object of class "inla". This is a list containing at least the following arguments:

<code>summary.fixed</code>	Matrix containing the mean and standard deviation (plus, possibly quantiles and cdf) of the fixed effects of the model.
<code>marginals.fixed</code>	A list containing the posterior marginal densities of the fixed effects of the model.
<code>summary.random</code>	List of matrices containing the mean and standard deviation (plus, possibly quantiles and cdf) of the smooth or spatial effects defined through <code>f()</code> .
<code>marginals.random</code>	A list containing the posterior marginal densities of the random effects defined through <code>f</code> .
<code>summary.hyperpar</code>	A matrix containing the mean and sd (plus, possibly quantiles and cdf) of the hyperparameters of the model
<code>marginals.hyperpar</code>	A list containing the posterior marginal densities of the hyperparameters of the model.
<code>summary.linear.predictor</code>	A matrix containing the mean and sd (plus, possibly quantiles and cdf) of the linear predictors η in the model
<code>marginals.linear.predictor</code>	If <code>compute=TRUE</code> in <code>control.predictor</code> , a list containing the posterior marginals of the linear predictors η in the model.
<code>summary.fitted.values</code>	A matrix containing the mean and sd (plus, possibly quantiles and cdf) of the fitted values $g^{-1}(\eta)$ obtained by transforming the linear predictors by the inverse of the link function. This quantity is only computed if <code>marginals.fitted.values</code> is computed. Note that if an observation is NA then the identity link is used. You can manually transform a marginal using <code>inla.marginal.transform()</code> or set the argument <code>link</code> in the <code>control.predictor</code> -list; see <code>?control.predictor</code>

<code>marginals.fitted.values</code>	If <code>compute=TRUE</code> in <code>control.predictor</code> , a list containing the posterior marginals of the fitted values $g^{-1}(\eta)$ obtained by transforming the linear predictors by the inverse of the link function. Note that if an observation is NA then the identity link is used. You can manually transform a marginal using <code>inla.marginal.transform()</code> or set the argument <code>link</code> in the <code>control.predictor</code> -list; see <code>?control.predictor</code>
<code>summary.lincomb</code>	If <code>lincomb != NULL</code> a list of matrices containing the mean and sd (plus, possibly quantiles and cdf) of all linear combinations defined.
<code>marginals.lincomb</code>	If <code>lincomb != NULL</code> a list of posterior marginals of all linear combinations defined.
<code>selection</code>	Provide the approximated joint distribution for the selection
<code>dic</code>	If <code>dic=TRUE</code> in <code>control.compute</code> , the deviance information criteria and effective number of parameters, otherwise NULL
<code>cpo</code>	If <code>cpo=TRUE</code> in <code>control.compute</code> , a list of three elements: <code>cpo\$cpo</code> are the values of the conditional predictive ordinate (CPO), <code>cpo\$pit</code> are the values of the probability integral transform (PIT) and <code>cpo\$failure</code> indicates whether some assumptions are violated. In short, if <code>cpo\$failure[i] > 0</code> then some assumption is violated, the higher the value (maximum 1) the more seriously.
<code>po</code>	If <code>po=TRUE</code> in <code>control.compute</code> , a list of one elements: <code>po\$po</code> are the values of the predictive ordinate (CPO) ($\pi(y_i y)$)
<code>residuals</code>	If <code>residuals=TRUE</code> in <code>control.compute</code> , a list of standardized residuals are provided, see <code>?control.compute</code> for details
<code>waic</code>	If <code>waic=TRUE</code> in <code>control.compute</code> , a list of two elements: <code>waic\$waic</code> is the Watanabe-Akaike information criteria, and <code>waic\$p.eff</code> is the estimated effective number of parameters
<code>mlik</code>	If <code>mlik=TRUE</code> in <code>control.compute</code> , the log marginal likelihood of the model (using two different estimates), otherwise NULL
<code>neffp</code>	Expected effective number of parameters in the model. The standard deviation of the expected number of parameters and the number of replicas for parameter are also returned
<code>mode</code>	A list of two elements: <code>mode\$theta</code> is the computed mode of the hyperparameters and <code>mode\$x</code> is the mode of the latent field given the modal value of the hyperparameters.
<code>call</code>	The matched call.
<code>formula</code>	The formula supplied
<code>nhyper</code>	The number of hyperparameters in the model
<code>cpu.used</code>	The cpu time used by the <code>inla</code> function

Author(s)

Havard Rue <hrue@r-inla.org> and Sara Martino

See Also

[f\(\)](#)

inla-class	<i>inla estimation object class</i>
------------	-------------------------------------

Description

The inla class is defined in the INLA package

See Also

[inla](#)

inla.agaussian	<i>Aggregate Gaussian into an equivalent observation</i>
----------------	--

Description

Aggregate Gaussians observed with the same mean and precision, into an equivalent triplet, for use with family="agaussian"

Usage

```
inla.agaussian(y, s = NULL)
```

Arguments

y	Repeated observations. If y is a matrix, then each row represents repeated observations. If y is a list, then each element of the list is a vector of repeated observations. If y is a vector, then the whole vector represents repeated observations. The optional scaling s, must have the same format as y, ie matrix or vector. NA's in y (and s) are removed and not used or counted. If s is given, then the NA-pattern in y and s must be the same.
s	Optional fixed scaling of the precisions. Must be in the same format as y, and have the same NA-pattern. See the documentation for details.

Value

The output is a inla.mdata-object ready for use with family="agaussian". See the example in the documentation.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
A = matrix(1:25,5,5)
inla.agaussian(A)

A[1,-1] = NA
A[2,-(2:3)] = NA
inla.agaussian(A)
```

inla.ar.pacf2phi	<i>Convert between parameterizations for the AR(p) model</i>
------------------	--

Description

These functions convert between the AR(p) coefficients `phi`, the partial autocorrelation coefficients `pacf` and the autocorrelation function `acf`. The `phi`-parameterization is the same as used for `arima`-models in R; see `?arima` and the parameter-vector `a` in `Details`.

Usage

```
inla.ar.pacf2phi(pac)

inla.ar.phi2pacf(phi)

inla.ar.phi2acf(phi, lag.max = length(phi))

inla.ar.pacf2acf(pac, lag.max = length(pac))
```

Arguments

<code>pac</code>	The partial autocorrelation coefficients
<code>phi</code>	The AR(p) parameters <code>phi</code>
<code>lag.max</code>	The maximum lag to compute the ACF for

Value

- `inla.ar.pacf2phi` returns `phi` for given `pacf`.
- `inla.ar.phi2pacf` returns `pac` for given `phi`.
- `inla.ar.phi2acf` returns `acf` for given `phi`.
- `inla.ar.pacf2acf` returns `acf` for given `pacf`.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
pac <- runif(5)
phi <- inla.ar.pacf2phi(pac)
pac2 <- inla.ar.phi2pacf(phi)
print(paste("Error:", max(abs(pac2 - pac))))
print("Correlation matrix (from pac)")
print(toeplitz(inla.ar.pacf2acf(pac)))
print("Correlation matrix (from phi)")
print(toeplitz(inla.ar.phi2acf(phi)))
```

inla.as.sparse	<i>Convert a matrix or sparse matrix into the sparse format used by INLA</i>
----------------	--

Description

Convert a matrix or sparse matrix into the sparse format used by INLA (dgTMatrix)

Usage

```
inla.as.sparse(...)
```

```
inla.as.dgTMatrix(A, unique = TRUE, na.rm = FALSE, zeros.rm = FALSE)
```

Arguments

...	The arguments. The matrix or sparse matrix, and the additional arguments
A	The matrix
unique	Logical. If TRUE, then ensure that the internal representation is unique and there are no duplicated entries. (Do not change this unless you know what you are doing.)
na.rm	Replace NA's in the matrix with zeros.
zeros.rm	Remove zeros in the matrix.

Value

inla.as.sparse and inla.as.dgTMatrix is the same function. The returned value is a sparse matrix in the dgTMatrix-format.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
A = matrix(1:9, 3, 3)
inla.as.sparse(A)
```

inla.as.wkt_tree.wkt	<i>Internal WKT handling</i>
----------------------	------------------------------

Description

[Deprecated] in favour of `fmesher::fm_wkt_as_wkt_tree()`. Conversion between WKT and a tree representation

Usage

```

inla.as.wkt_tree.wkt(x, ...)

inla.as.wkt.wkt_tree(x, pretty = FALSE, ...)

inla.wkt_tree_get_item(x, item, duplicate = 1)

inla.wkt_tree_set_item(x, item_tree, duplicate = 1)

```

Arguments

x	A WKT2 string, or a wkt_tree list structure
...	Unused
pretty	logical
item	character vector with item labels identifying a parameter item entry.
duplicate	For items that have more than one match, duplicate indicates the index number of the desired version. Default: 1
item_tree	An item tree identifying a parameter item entry

inla.barrier

Functions for defining the Barrier models

Description

Functions for defining Barrier models as an inla rgeneric model

Usage

```

inla.barrier.pcmatern(mesh, barrier.triangles, prior.range,
                      prior.sigma, range.fraction=0.2)
inla.barrier.polygon(mesh, barrier.triangles, Omega=NULL)
inla.barrier.q(fem, ranges, sigma=1)
inla.barrier.fem(mesh, barrier.triangles, Omega=NULL)

```

Arguments

mesh	The mesh to build the model on, from inla.mesh.2d
barrier.triangles	The numerical ids of the triangles that make up the barrier area
prior.range	2 parameters (range0, Prange) for the prior spatial range. If Prange is NA, then range0 is used as a fixed range value (not tested).
prior.sigma	2 parameters (sig0, Psig) for the prior marginal standard deviation sigma. If Psig is NA, then sig0 is used as a fixed sigma value (not tested).
range.fraction	The length of the spatial range inside the barrier area, as a fraction of the range parameter.
Omega	Advanced option for creating a set of permeable barriers (not documented)

Details

This model is described in the ArXiv preprint arXiv:1608.03787. For examples, see <https://haakonbakka.bitbucket.io/btopic107.html>.

Value

`inla.barrier.pcmatern` gives the (r)generic model object for fitting the model in INLA, `inla.barrier.polygon` gives the polygon around the barrier (mainly for plotting), `inla.barrier.q` is an internal method producing the Q matrix from a result of `inla.barrier.fem`, `inla.barrier.fem` is an internal method producing the Finite Element matrices.

Author(s)

Haakon Bakka <bakka@r-inla.org>

See Also

`inla.spde2.pcmatern`

`inla.barrier.pcmatern` *Functions for defining the Barrier models*

Description

Functions for defining Barrier models as an `inla` rgeneric model

Usage

```
inla.barrier.pcmatern(
  mesh,
  barrier.triangles,
  prior.range,
  prior.sigma,
  range.fraction = 0.2
)

inla.barrier.polygon(mesh, barrier.triangles, Omega = NULL)

inla.barrier.q(fem, ranges, sigma = 1, envir = NULL)

inla.barrier.fem(mesh, barrier.triangles, Omega = NULL)
```

Arguments

<code>mesh</code>	The mesh to build the model on, from <code>inla.mesh.2d</code>
<code>barrier.triangles</code>	The numerical ids of the triangles that make up the barrier area
<code>prior.range</code>	2 parameters (<code>range0</code> , <code>Prange</code>) for the prior spatial range. If <code>Prange</code> is NA, then <code>range0</code> is used as a fixed range value (not tested).
<code>prior.sigma</code>	2 parameters (<code>sig0</code> , <code>Psig</code>) for the prior marginal standard deviation sigma. If <code>Psig</code> is NA, then <code>sig0</code> is used as a fixed sigma value (not tested).

<code>range.fraction</code>	The length of the spatial range inside the barrier area, as a fraction of the range parameter.
<code>Omega</code>	Advanced option for creating a set of permeable barriers (not documented)
<code>fem</code>	represents the Barrier model or the Different Terrains (DT) model, by containing all the needed matrices to solve the SPDE
<code>ranges, sigma</code>	the hyperparameters that determine Q
<code>envir</code>	the environment used for caching (with <code>optimize=TRUE</code>), if any

Details

This model is described in the ArXiv preprint arXiv:1608.03787. For examples, see <https://haakonbakkagit.github.io/btopic128.html>

- `inla.barrier.pcmatern` This function creates the model component used in `inla(...)`
- `inla.barrier.polygon` This function constructs `SpatialPolygons` for the different subdomains (areas)
- `inla.barrier.q`: This function computes a specific precision matrix
- `inla.barrier.fem` This function computes the Finite Element matrices that are needed to compute the precision matrix Q later

Value

- `inla.barrier.pcmatern` gives the (rgeneric) model object for fitting the model in INLA
- `inla.barrier.polygon` gives the polygon around the barrier (mainly for plotting)
- `inla.barrier.q` is an internal method producing the Q matrix from a result of `inla.barrier.fem`,
- `inla.barrier.fem` is an internal method producing the Finite Element matrices.

Author(s)

Haakon Bakka <bakka@r-inla.org>

See Also

`inla.spde2.pcmatern`

`inla.binary.install` *Install alternative binary builds.*

Description

Install a new binary for `os` unless `missing(os)`, for which the `os` is chosen interactively among the available builds.

Usage

```
inla.binary.install(
  os = c("CentOS Linux-6", "CentOS Linux-7", "CentOS Linux-8", "CentOS Stream-8",
    "Rocky Linux-9", "Fedora-33", "Fedora-34", "Fedora Linux-35", "Fedora Linux-36",
    "Fedora Linux-37", "Fedora Linux-38", "Manjaro Linux", "Ubuntu-16.04",
    "Ubuntu-18.04", "Ubuntu-20.04", "Ubuntu-22.04"),
  path = NULL,
  verbose = TRUE,
  md5.check = TRUE,
  secure.http = TRUE
)
```

Arguments

<code>os</code>	If <code>os</code> is given, install binary build for this <code>os</code> . If <code>os</code> is not given, chose <code>os</code> interactively among available builds.
<code>path</code>	character. The install path. If <code>NULL</code> the path is derived from INLA package
<code>verbose</code>	Logical. Verbose output if <code>TRUE</code>
<code>md5.check</code>	Logical. If <code>TRUE</code> , stop if md5-checksum-file is not present or md5-checksum fail. If <code>FALSE</code> , ignore md5-checksum check.
<code>secure.http</code>	Logical. Use secure http (ie <code>https://</code>) or <code>http://</code>

Value

Return `TRUE` if installation was sucessful and `FALSE` if not.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
## Not run:
inla.binary.install()
inla.binary.install(os = "CentOS Linux-7")
inla.binary.install(os = "CentOS Linux-7", path = "~/local/bin/inla.binary")

## End(Not run)
```

inla.changelog

inla.changelog

Description

List the recent changes in the inla-program and its R-interface

Usage

```
inla.changelog()
```

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

[inla\(\)](#)

inla.collect.results *Collect results from a inla-call*

Description

inla.collect.results collect results from a inla-call

Usage

```
inla.collect.results(
  results.dir,
  debug = FALSE,
  only.hyperparam = FALSE,
  file.log = NULL,
  file.log2 = NULL,
  silent = inla.getOption("silent")
)
```

Arguments

results.dir	The directory where the results of the inla run are stored
debug	Logical. If TRUE some debugging information are printed
only.hyperparam	Binary variable indicating wheather only the results for the hyperparameters should be collected
file.log	Character. The filename, if any, of the logfile for the internal calculations
file.log2	Character. The filename, if any, of the logfile2 for the internal calculations
silent	Internal use only

Details

This function is mainly used inside inla to collect results after running the inla function. It can also be used to collect results into R after having run an inla section outside R.

Value

The function returns an object of class "inla", see the help file for inla for details.

inla.coxph	<i>Convert a Cox proportional hazard model into Poisson regression</i>
------------	--

Description

Tools to convert a Cox proportional hazard model into Poisson regression

Usage

```
inla.coxph(formula, data, control.hazard = list(), debug = FALSE, tag = "")

inla.rbind.data.frames(...)
```

Arguments

formula	The formula for the coxph model where the response must be a <code>inla.surv</code> -object.
data	All the data used in the formula, as a list.
control.hazard	Control the model for the baseline-hazard; see <code>?control.hazard</code> .
debug	Print debug-information
tag	An optional tag added to the names of the new variables created (to make them unique when combined with several calls of <code>inla.coxph</code> . Note that <code>E..coxph</code> is not included, as its usually merged into one vector over different expansions.
...	Data.frames to be <code>rbind</code> -ed, padding with NA.

Value

`inla.coxph` returns a list of new expanded variables to be used in the `inla`-call. Note that element `data` and `data.list` needs to be merged into a list to be passed as the `data` argument. See the example for details.

`inla.rbind.data.frames` returns the `rbinded` data.frames padded with NAs. There is a better implementation in `dplyr::bind_rows`, which is used if package `dplyr` is installed.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
## How the cbind.data.frames works:
df1 = data.frame(x=1:2, y=2:3, z=3:4)
df2 = data.frame(x=3:4, yy=4:5, zz=5:6)
inla.rbind.data.frames(df1, df2)

## Standard example of how to convert a coxph into a Poisson regression
n = 1000
x = runif(n)
lambda = exp(1+x)
y = rexp(n, rate=lambda)
event = rep(1,n)
data = list(y=y, event=event, x=x)
```

```

y.surv = inla.surv(y, event)
intercept1 = rep(1, n)
p = inla.coxph(y.surv ~ -1 + intercept1 + x,
               list(y.surv = y.surv, x=x, intercept1 = intercept1))

r = inla(p$formula,
         family = p$family,
         data=c(as.list(p$data), p$data.list),
         E = p$E)
summary(r)

## How to use this in a joint model
intercept2 = rep(1, n)
y = 1 + x + rnorm(n, sd=0.1)
df = data.frame(intercept2, x, y)

## new need to cbind the data.frames, and then add the list-part of
## the data
df.joint = c(as.list(inla.rbind.data.frames(p$data, df)), p$data.list)
df.joint$Y = cbind(df.joint$y..coxph, df.joint$y)

## merge the formulas, recall to add '-1' and to use the new joint
## reponse 'Y'
formula = update(p$formula, Y ~ intercept2 -1 + .)

rr = inla(formula,
          family = c(p$family, "gaussian"),
          data = df.joint,
          E = df.joint$E..coxph)

```

inla.cpo

Improved estimates for the CPO/PIT-values

Description

Improve the estimates of the CPO/PIT-values by recomputing the model-fit by removing data-points.

Usage

```

inla.cpo(
  result,
  force = FALSE,
  mc.cores = NULL,
  verbose = TRUE,
  recompute.mode = TRUE
)

```

Arguments

result	An object of class inla, ie a result of a call to inla()
force	If TRUE, then recompute all CPO/PIT values and not just those with result\$cpo\$failure > 0.

<code>mc.cores</code>	The number of cores to use in <code>parallel::mclapply</code> . If <code>is.null(mc.cores)</code> , then check <code>getOption("mc.cores")</code> and <code>inla.getOption("num.threads")</code> in that order.
<code>verbose</code>	Run in verbose mode?
<code>recompute.mode</code>	Should be mode (and the integration points) be recomputed when a data-point is removed or not?

Value

The object returned is the same as `result` but the new improved estimates of the CPO/PIT values replaced.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

[inla\(\)](#)

Examples

```
n = 10
y = rnorm(n)
r = inla(y ~ 1, data = data.frame(y), control.compute = list(cpo=TRUE))

rr = inla.cpo(r, force=TRUE)
```

inla.CRS

Create a coordinate reference system object

Description

[Deprecated] in favour of [fmesher::fm_CRS\(\)](#) Creates either a CRS object or an `inla.CRS` object, describing a coordinate reference system.

Usage

```
inla.CRS(..., args = NULL)
```

```
inla.wkt_predef()
```

Arguments

`...` Arguments passed on to `fmesher::fm_CRS(...)`.
`args` list of named proj4 arguments.

Value

Either an `sp::CRS` object or an `inla.CRS` object, depending on if the coordinate reference system described by the parameters can be expressed with a pure `sp::CRS` object or not.

An S3 `inla.CRS` object is a list, usually (but not necessarily) containing at least one element:

```
crs          The basic sp::CRS object

inla.wkt_predef returns a WKT2 string defining a projection
inla.wkt_predef returns a WKT2 string defining a projection
```

Functions

- `inla.wkt_predef()`: **[Deprecated]** in favour of `fmesher::fm_wkt_predef()`

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

`sp::CRS()`, `crs_wkt()`, `inla.sp_get_crs()` `plot.CRS()`, `inla.identical.CRS()`

Examples

```
if (require("sf") && require("sp")) {
  crs1 <- fmesher::fm_CRS("longlat_globe")
  crs2 <- fmesher::fm_CRS("lambert_globe")
  crs3 <- fmesher::fm_CRS("mollweide_norm")
  crs4 <- fmesher::fm_CRS("hammer_globe")
  crs5 <- fmesher::fm_CRS("sphere")
  crs6 <- fmesher::fm_CRS("globe")
}
## Not run:
names(inla.wkt_predef())

## End(Not run)

## Not run:
names(inla.wkt_predef())

## End(Not run)
```

inla.CRSargs

Show expanded CRS arguments

Description

Wrapper for `sp::CRS` and `inla.CRS` objects to extract the coordinate reference system argument string. 'r lifecycle::badge("deprecated")' in favour of `fmesher::fm_proj4string()`, or `fmesher::fm_wkt()` for WKT2 representations.

Usage

```

inla.CRSargs(x, ...)

inla.as.CRSargs.list(x, ...)

inla.as.list.CRSargs(x, ...)

inla.as.list.CRS(x, ...)

inla.as.CRS.list(x, ...)

```

Arguments

<code>x</code>	An <code>sp::CRS</code> or <code>inla.CRS</code> object (for <code>inla.CRSargs</code> and <code>inla.as.list.CRS</code>), a character string (for <code>inla.as.list.CRSargs</code>), or a list (for <code>inla.as.CRS.list</code> and <code>inla.as.CRSargs.list</code>).
<code>...</code>	Additional arguments passed on to other methods.

Details

- `inla.as.CRSargs.list`: CRS proj4 string for name=value pair list
- `inla.as.list.CRSargs`: List of name=value pairs from CRS proj4 string

Value

For `inla.CRSargs` and `inla.as.CRSargs.list`, a character string with PROJ.4 arguments.

For `inla.as.list.CRS` and `inla.as.list.CRSargs`, a list of name/value pairs.

For `inla.as.CRS.list`, a CRS or `inla.CRS` object.

Author(s)

Finn Lindgren finn.lindgren@gmail.com

See Also

[inla.CRS\(\)](#)

Examples

```

if (require("sf") && require("sp") && require("fmesher")) {
  crs0 <- fm_CRS("longlat_norm")
  p4s <- fm_proj4string(crs0)
  lst <- inla.as.list.CRSargs(p4s)
  crs1 <- inla.as.CRS.list(lst)
  lst$a <- 2
  crs2 <- fm_CRS(p4s, args = lst)
  print(fm_proj4string(crs0))
  print(fm_proj4string(crs1))
  print(fm_proj4string(crs2))
}

```

inla.dev.new	<i>Opens a new device</i>
--------------	---------------------------

Description

Open a new device using `dev.new()` unless using RStudio

Usage

```
inla.dev.new(...)
```

Arguments

... Optional arguments to `dev.new()`

Value

The value of `dev.new()` if not running RStudio, otherwise NULL

Author(s)

Havard Rue <hrue@r-inla.org>

inla.diameter	<i>Diameter of a point set</i>
---------------	--------------------------------

Description

Find an upper bound to the convex hull of a point set

Usage

```
inla.diameter(x, ...)
```

```
## Default S3 method:
inla.diameter(x, manifold = "", ...)
```

```
## S3 method for class 'inla.mesh.1d'
inla.diameter(x, ...)
```

```
## S3 method for class 'inla.mesh'
inla.diameter(x, ...)
```

```
## S3 method for class 'inla.mesh.segment'
inla.diameter(x, ...)
```

```
## S3 method for class 'inla.mesh.lattice'
inla.diameter(x, ...)
```

Arguments

<code>x</code>	A point set as an $n \times d$ matrix, or an <code>inla.mesh</code> related object.
<code>...</code>	Additional parameters passed on to other methods.
<code>manifold</code>	Character string specifying the manifold type. Default is to treat the point set with Euclidean R^d metrics. Use <code>manifold="S2"</code> for great circle distances on the unit sphere (this is set automatically for <code>inla.mesh</code> objects).

Details

- `inla.diameter.default` Calculate upper bound for the diameter of a point set, by encapsulating in a circular domain.

Value

A scalar, upper bound for the diameter of the convex hull of the point set.

Author(s)

Finn Lindgren finn.lindgren@gmail.com

Examples

```
inla.diameter(matrix(c(0, 1, 1, 0, 0, 0, 1, 1), 4, 2))
```

inla.doc

[View documentation](#)

Description

View documentation of latent, prior and likelihood models.

Usage

```
inla.doc(what, section, verbose = FALSE)
```

Arguments

<code>what</code>	What to view documentation about; name of latent model, name of prior, etc. (A regular expression.)
<code>section</code>	An optional section, like <code>names(inla.models())</code> , to look for the documentation. If missing, all sections are used.
<code>verbose</code>	Logical If TRUE then run in verbose mode

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

www.r-inla.org

Examples

```
## Not run: inla.doc("rw2")
## Not run: inla.doc("gaussian", section = "prior")
```

inla.external.lib	<i>Return the path to the cgeneric-library for a pre-compiled external package</i>
-------------------	--

Description

Return the path to the cgeneric-library for a pre-compiled external package

Usage

```
inla.external.lib(package)
```

Arguments

package the name of a package, given as a name or literal character string

Value

This function returns the complete path or NULL if file does not exists

Author(s)

Havard Rue <hrue@r-inla.org>

inla.extract.el	<i>Extract elements by matching name from container objects.</i>
-----------------	--

Description

Extract elements by wildcard name matching from a data.frame, list, or matrix.

Usage

```
inla.extract.el(M, ...)

## S3 method for class 'matrix'
inla.extract.el(M, match, by.row = TRUE, ...)

## S3 method for class 'data.frame'
inla.extract.el(M, match, by.row = TRUE, ...)

## S3 method for class 'list'
inla.extract.el(M, match, ...)
```

Arguments

M	A container object.
...	Additional arguments, not used.
match	A regex defining the matching criterion.
by.row	If TRUE, extract data by row, otherwise by column.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

inla.fmesher.smorg	<i>Compute various mesh related quantities.</i>
--------------------	---

Description

[Deprecated] Use the methods in the `fmesher` package instead; see details below.

Low level function for computing finite element matrices, spherical harmonics, B-splines, and point mappings with barycentric triangle coordinates.

Usage

```
inla.fmesher.smorg(
  loc,
  tv,
  fem = NULL,
  aniso = NULL,
  gradients = FALSE,
  sph0 = deprecated(),
  sph = deprecated(),
  bspline = NULL,
  points2mesh = NULL,
  splitlines = NULL,
  output = NULL,
  keep = FALSE
)
```

Arguments

loc	3-column triangle vertex coordinate matrix.
tv	3-column triangle vertex index matrix.
fem	[Deprecated] Use <code>fmesher::fm_fem()</code> instead. Maximum finite element matrix order to be computed.
aniso	[Deprecated] Use <code>fmesher::fm_fem()</code> instead. A two-element list with γ and v for an anisotropic operator $\nabla \cdot H \nabla$, where $H = \gamma I + vv^\top$.
gradients	[Deprecated] Use <code>fmesher::fm_fem()</code> instead. When TRUE, calculate derivative operator matrices dx, dy, and dz.
sph0	[Deprecated] Use <code>fmesher::fm_raw_basis()</code> instead.
sph	[Deprecated] Use <code>fmesher::fm_raw_basis()</code> instead.

bspline	[Deprecated] Use <code>fmesher::fm_raw_basis()</code> instead. Rotationally invariant B-splines on a sphere. 3-vector with number of basis functions <code>n</code> , basis degree <code>degree</code> , and a logical; TRUE uniform knot angles, FALSE for uniform spacing in $\sin(\text{latitude})$.
points2mesh	[Deprecated] Use <code>fmesher::fm_bary()</code> instead. 3-column matrix with points to be located in the mesh.
splitlines	[Deprecated] Use <code>fmesher::fm_split_lines()</code> or <code>fmesher::fmesher_split_lines()</code> instead. A list with elements <code>loc</code> (3-column coordinate matrix) and <code>idx</code> (2-column index matrix) describing line segments that are to be split into sub-segments at triangle boundaries.
output	Names of objects to be included in the output, if different from defaults.
keep	When TRUE, for debugging purposes keep the fmesher I/O files on disk.

Value

A list of generated named quantities.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

`inla.generate.colors` *Generate text RGB color specifications.*

Description

Generates a tex RGB color specification matrix based on a color palette.

Usage

```
inla.generate.colors(
  color,
  color.axis = NULL,
  color.n = 512,
  color.palette = cm.colors,
  color.truncate = FALSE,
  alpha = NULL
)
```

Arguments

<code>color</code>	character, matrix or vector
<code>color.axis</code>	The min/max limit values for the color mapping.
<code>color.n</code>	The number of colors to use in the color palette.
<code>color.palette</code>	A color palette function.
<code>color.truncate</code>	If TRUE, truncate the colors at the color axis limits.
<code>alpha</code>	Transparency/opaqueness values.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

inla.get.inlaEnv	<i>Return the internal environment used by INLA</i>
------------------	---

Description

A function which return the internal environment used by INLA

Usage

```
inla.get.inlaEnv()
```

Value

This function returns the internal environment used by INLA to keep internal variables.

Author(s)

Havard Rue <hrue@r-inla.org>

inla.group	<i>Group or cluster covariates</i>
------------	------------------------------------

Description

inla.group group or cluster covariates so to reduce the number of unique values

Usage

```
inla.group(x, n = 25, method = c("cut", "quantile"), idx.only = FALSE)
```

Arguments

x	The vector of covariates to group.
n	Number of classes or bins to group into.
method	Group either using bins with equal length intervals (method = "cut"), or equal distance in the probability' scale using the quantiles (method = "quantile").
idx.only	Option to return the index only and not the method.

Value

inla.group return the new grouped covariates where the classes are set to the median of all the covariates belonging to that group.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also[f\(\)](#)**Examples**

```
## this gives groups 3 and 8
x = 1:10
x.group = inla.group(x, n = 2)

## this is the intended use, to reduce the number of unique values in
## the of first argument of f()
n = 100
x = rnorm(n)
y = x + rnorm(n)
result = inla(y ~ f(inla.group(x, n = 20), model = "iid"), data=data.frame(y=y,x=x))
```

inla.group.cv

*Compute group.cv-values***Description**

From a fitted model, compute and add the `group.cv`-values

Usage

```
inla.group.cv(
  result,
  group.cv = NULL,
  num.level.sets = -1,
  strategy = c("posterior", "prior"),
  size.max = 32,
  groups = NULL,
  selection = NULL,
  friends = NULL,
  verbose = FALSE,
  epsilon = 0.005,
  prior.diagonal = 1e-04,
  keep = NULL,
  remove = NULL,
  remove.fixed = TRUE
)
```

Arguments

<code>result</code>	An object of class <code>inla</code> , ie a result of a call to <code>inla()</code> .
<code>group.cv</code>	If given, the groups are taken from this argument. <code>group.cv</code> must be the output of previous call to <code>inla.group.cv()</code> .
<code>num.level.sets</code>	Number of level.sets to use. The default value <code>-1</code> corresponds to leave-one-out cross-validation.
<code>strategy</code>	One of "posterior" or "prior". See the vignette for details.

size.max	The maximum size of a group. If the computed group-size is larger, it will be truncated to size.max.
groups	An (optional) predefined list of groups. See the vignette for details.
selection	An optional list of data-indices to use. If not given, then all data are used.
friends	An optional list of lists of indices to use a friends
verbose	Run with verbose output of some of the internals in the calculations. This option will also enable <code>inla(..., verbose=TRUE)</code> if its not enabled already.
epsilon	Two correlations with a difference less than epsilon, will be classified as identical.
prior.diagonal	When <code>strategy="prior"</code> , <code>prior.diagonal</code> is added to the diagonal of the prior precision matrix to avoid singularities
keep	For <code>strategy="prior"</code> , then this gives a vector of the name of model-components TO USE when computing the groups. See the vignette for details. Not both of keep and remove can be defined.
remove	For <code>strategy="prior"</code> , then this gives a vector of the name of model-components NOT TO USE when computing the groups. See the vignette for details. Not both of keep and remove can be defined.
remove.fixed	For <code>strategy="prior"</code> , this is the default option which is in effect if both keep and remove are NULL. If TRUE, it will remove (or condition on) all fixed effects when computing the groups. See the vignette for details.

Value

The object returned is list related to leave-group-out cross-validation. See the vignette for details.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

[control.compute\(\)](#)

inla.has_PROJ6

PROJ6 detection

Description

Detect whether PROJ6 is available for INLA. Deprecated and always returns TRUE..

Usage

```
inla.has_PROJ6()
```

```
inla.not_for_PROJ6(fun)
```

```
inla.not_for_PROJ4(fun)
```

```
inla.fallback_PROJ6(fun)
```

```
inla.requires_PROJ6(fun)
```

Arguments

fun The name of the calling function

Details

inla.has_PROJ6 is called to check if PROJ6&GDAL3 are available.

Value

For inla.has_PROJ6, always returns TRUE. Previously: logical; TRUE if PROJ6 is available, FALSE otherwise

Functions

- inla.has_PROJ6(): **[Deprecated]**
- inla.not_for_PROJ6(): **[Deprecated]** Called to warn about using old PROJ4 features even though PROJ6 is available
- inla.not_for_PROJ4(): **[Deprecated]** Called to give an error when calling methods that are only available for PROJ6
- inla.fallback_PROJ6(): **[Deprecated]** Called to warn about falling back to using old PROJ4 methods when a PROJ6 method hasn't been implemented
- inla.requires_PROJ6(): **[Deprecated]** Called to give an error when PROJ6 is required but not available

Examples

```
## Not run:
inla.has_PROJ6()

## End(Not run)
```

inla.hyperpar

Improved estimates for the hyperparameters (classic-mode only)

Description

Improve the estimates of the posterior marginals for the hyperparameters of the model using the grid integration strategy. (classic-mode only)

Usage

```
inla.hyperpar(
  result,
  skip.configurations = TRUE,
  verbose = FALSE,
  dz = 0.75,
  diff.logdens = 15,
  h = NULL,
  restart = FALSE,
  quantiles = NULL,
  keep = FALSE
)
```

Arguments

<code>result</code>	An object of class <code>inla</code> , ie a result of a call to <code>inla()</code> in classic mode
<code>skip.configurations</code>	A boolean variable; skip configurations if the values at the main axis are too small. (Default TRUE)
<code>verbose</code>	Boolean indicating whether the inla program should run in a verbose mode.
<code>dz</code>	Step length in the standardized scale used in the construction of the grid, default 0.75.
<code>diff.logdens</code>	The difference of the log.density for the hyperparameters to stop numerical integration using <code>int.strategy='grid'</code> . Default 15
<code>h</code>	The step-length for the gradient calculations for the hyperparameters. Default 0.01.
<code>restart</code>	A boolean defining whether the optimizer should start again to find the mode or if it should use the mode contained in the object
<code>quantiles</code>	A vector of quantiles, to compute for each posterior marginal.
<code>keep</code>	A boolean variable indicating the working files (ini file, data files and results files) should be kept

Value

The object returned is the same as object but the estimates of the hyperparameters are replaced by improved estimates.

Note

This function might take a long time or if the number of hyperparameters in the model is large. If it complains and says I cannot get enough memory, try to increase the value of the argument `dz` or decrease `diff.logdens`.

Author(s)

Havard Rue <hrue@r-inla.org>

References

See the references in `inla`

See Also

[inla\(\)](#)

inla.hyperpar.sample	<i>Produce samples from the approximated joint posterior for the hyperparameters</i>
----------------------	--

Description

Produce samples from the approximated joint posterior for the hyperparameters

Usage

```
inla.hyperpar.sample(n, result, intern = FALSE, improve.marginals = FALSE)
```

Arguments

<code>n</code>	Integer. Number of samples required.
<code>result</code>	An inla-object, f.ex the output from an inla-call.
<code>intern</code>	Logical. If TRUE then produce samples in the internal scale for the hyperparameter, if FALSE then produce samples in the user-scale. (For example log-precision (intern) and precision (user-scale))
<code>improve.marginals</code>	Logical. If TRUE, then improve the samples taking into account possible better marginal estimates for the hyperparameters in <code>result</code> .

Value

A matrix where each sample is a row. The contents of the column is described in the rownames.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
n = 100
r = inla(y ~ 1 + f(idx), data = data.frame(y=rnorm(n), idx = 1:n))
ns = 500
x = inla.hyperpar.sample(ns, r)

rr = inla.hyperpar(r)
xx = inla.hyperpar.sample(ns, rr, improve.marginals=TRUE)
```

inla.identical.CRS	<i>Test CRS and inla.CRS for equality</i>
--------------------	---

Description

Wrapper for identical, optionally testing only the CRS part of two objects Deprecated in favour of `fmesher::fm_crs_is_identical()`

Usage

```
inla.identical.CRS(...)
```

Arguments

... Arguments passed on to `fmesher::fm_crs_is_identical()`

inla.iidkd.sample	<i>Provide samples from the iidkd component (experimental)</i>
-------------------	--

Description

This function provide samples of the iidkd component using more interpretable parameters

Usage

```
inla.iidkd.sample(n = 10^4, result, name, return.cov = FALSE)
```

Arguments

n	Integer Number of samples to use
result	inla-object An object of class inla, ie a result of a call to inla()
name	Character The name of the iidkd component
return.cov	Logical Return samples of the covariance matrix instead of stdev/correlation matrix described below?

Value

A list of sampled matrices, with (default) correlations on the off-diagonal and standard-deviations on the diagonal

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

```
inla.doc("iidkd")
```

inla.knmodels *Spacetime interaction models*

Description

It implements the models in Knorr-Held, L. (2000) with three different constraint approaches: sum-to-zero, contrast or diagonal add.

Usage

```
inla.knmodels(
  formula,
  progress = FALSE,
  control.st = list(time, space, spacetime, graph, type = c(paste(1:4), paste0(2:4, "c")),
    paste0(2:4, "d")), diagonal = 1e-05, timeref = 1, spaceref = 1),
  ...,
  envir = parent.frame()
)
```

Arguments

- | | |
|------------|--|
| formula | The formula specifying the other model components, without the spacetime interaction term. The spacetime interaction term will be added accordingly to the specification in the <code>control.st</code> argument. See <code>inla</code> |
| progress | If it is to be shown the model fitting progress. Useful if more than one interaction type is being fitted. |
| control.st | <p>Named list of arguments to control the spacetime interaction. It should contain:</p> <ul style="list-style-type: none"> time to be used as the index set for the main temporal effect which will be considered for the constraints when it is the case. space to be used as the index set for the main spatial effect which will be considered for the constraints when it is the case. spacetime to be the index set for the spacetime interaction effect. graph to be the graph for the spatial neighbor structure to be used in a <code>f()</code> term for the main spatial random effect term or for building the spacetime interaction model. type to specify the spacetime interaction type. 1 to 4 corresponds to the four interaction types in Knorr-Held, L. (2000) with all the needed sum-to-zero constraints. 2c, 3c and 4c are the contrast version considering the first time or space constrained to be equal to zero. 2d, 3d and 4d are the corresponding versions when considering the diagonal add approach. diagonal to be the value to be added to the diagonal when using the diagonal add approach. timeref to specify the time point to be the reference time in the contrast parametrization. spaceref to specify the area to be the reference for the contrast parametrization. <p>... where additional arguments can be passed to <code>f()</code> function. Specification of the hyperparameter, fixed or random, initial value, prior and its parameters for the spacetime interaction. See <code>?inla.models</code> and look for</p> |

generic0. By default we scale it and use the PC-prior to set the prior using the pc.prec prior with param = c(0.5, 0.5). See documentation with ?inla.doc("pc.prec").

... Arguments to be passed to the [inla\(\)](#) function.
 envir Environment in which to evaluate the ... arguments.

Value

inla.knmodels returns an object of class "inla". or a list of objects of this class if it is asked to compute more than one interaction type at once. Note: when the model type is 2c, 3c, 4c, 2d, 3d or 4d, it also includes linear combinations summary.

Author(s)

Elias T. Krainski

See Also

[inla.knmodels.sample\(\)](#) to sample from

Examples

```
### define space domain as a grid
grid <- SpatialGrid(GridTopology(c(0,0), c(1, 1), c(4, 5)))
(n <- nrow(xy <- coordinates(grid)))

### build a spatial neighborhood list
jj <- lapply(1:n, function(i)
  which(sqrt((xy[i,1]-xy[,1])^2 + (xy[i,2]-xy[,2])^2)==1))

### build the spatial adjacency matrix
graph <- sparseMatrix(rep(1:n, sapply(jj, length)),
  unlist(jj), x=1, dims=c(n, n))

### some random data at 10 time point
dat <- inla.knmodels.sample(graph, m=10, tau.t=2, tau.s=2, tau.st=3)
str(dat)
sapply(dat$x, summary)

nd <- length(dat$x$eta)
dat$e <- runif(nd, 0.9, 1.1)*rgamma(n, 40, 2)
dat$y <- rpois(nd, dat$e*exp(dat$x$eta-3))
summary(dat$y)

### fit the type 4 considering three different approaches
tgraph <- sparseMatrix(i=c(2:10, 1:9), j=c(1:9, 2:10), x=1)
res <- inla.knmodels(y ~ f(time, model='bym2', graph=tgraph) +
  f(space, model='bym2', graph=graph),
  data=dat, family='poisson', E=dat$E, progress=TRUE,
  control.st=list(time=time, space=space,
    spacetime=spacetime, graph=graph, type=c(4, '4c')),
  control.compute=list(dic=TRUE, waic=TRUE, cpo=TRUE))
sapply(res, function(x)
  c(dic=x$dic$dic, waic=x$waic$waic, cpo=-sum(log(x$cpo$cpo))))
```

inla.knmodels.sample *Spacetime interaction models sampler function*

Description

It implements the sampling method for the models in Knorr-Held, L. (2000) considering the algorithm 3.1 in Rue & Held (2005) book.

Usage

```
inla.knmodels.sample(
  graph,
  m,
  type = 4,
  intercept = 0,
  tau.t = 1,
  phi.t = 0.7,
  tau.s = 1,
  phi.s = 0.7,
  tau.st = 1,
  ev.t = NULL,
  ev.s = NULL
)
```

Arguments

graph	Model graph definition
m	Time dimension.
type	Integer from 1 to 4 to identify one of the four interaction type.
intercept	A constant to be added to the linear predictor
tau.t	Precision parameter for the main temporal effect.
phi.t	Mixing parameter in the bym2 model assumed for the main temporal effect.
tau.s	Precision parameter for the main spatial effect.
phi.s	Mixing parameter in the bym2 model assumed for the main spatial effect.
tau.st	Precision parameter for the spacetime effect.
ev.t	Eigenvalues and eigenvectors of the temporal precision matrix structure.
ev.s	Eigenvalues and eigenvectors of the spatial precision matrix structure.

Value

A list with the following elements

time	The time index for each observation, with length equals $m \times n$.
space	The spatial index for each observation, with length equals $m \times n$.
spacetime	The spacetime index for each observation, with length equals $m \times n$.
x	A list with the following elements
t.iid	The unstructured main temporal effect part.

t.str	The structured main temporal effect part.
t	The main temporal effect with length equals 2m.
s.iid	The unstructured main spatial effect part.
s.str	The structured main spatial effect part.
s	The main spatial effect with length equals 2n.
st	The spacetime interaction effect with length m*n.
eta	The linear predictor with length n*m.

Author(s)

Elias T. Krainski

See Also[inla.knmodels\(\)](#) for model fitting

inla.ks.plot	<i>Kolmogorov-Smirnov Test Plots</i>
--------------	--------------------------------------

Description

Illustrate a one-sample Kolmogorov-Smirnov test by plotting the empirical distribution deviation.

Usage

```
inla.ks.plot(x, y, diff = TRUE, ...)
```

Arguments

x	a numeric vector of data values.
y	a cumulative distribution function such as 'pnorm'.
diff	logical, indicating if the normalised difference should be plotted. If FALSE, the absolute distribution functions are plotted.
...	additional arguments for ks.test() , ignored in the plotting. In particular, only two-sided tests are illustrated.

Details

In addition to the (normalised) empirical distribution deviation, lines for the K-S test statistic are drawn, as well as \pm two standard deviations around the expectation under the null hypothesis.

Value

A list with class "htest", as generated by [ks.test\(\)](#)

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[ks.test\(\)](#)

Examples

```
## Check for N(0,1) data
data = rowSums(matrix(runif(100*12)*2-1,100,12))/2
inla.ks.plot(data, pnorm)

## Not run:
## Check the goodness-of-fit of cross-validated predictions
result = inla(..., control.predictor=list(cpo=TRUE))
inla.ks.plot(result$pit, punif)

## End(Not run)
```

inla.likelihood	<i>Providing functions for sampling new data, evaluating pdf, cdf, and quantiles for new data.</i>
-----------------	--

Description

This function return function to compute the pdf,cdf,quantiles, or samples for new data using the likelihood from a inla-object.

Usage

```
inla.likelihood(type = c("d", "p", "r", "q", "s"), args)
```

Arguments

type	The returned function type. The definition is similar to "rnorm","dnorm","pnorm",and "dnorm".
args	It is usually a return value from "inla.likelihood.parser", which specifies parameters, link function and transformation function of hyperparameters.

Value

value goes here

Author(s)

Havard Rue <hrue@r-inla.org>

inla.list.models	<i>List available model components, likelihoods, priors, etc</i>
------------------	--

Description

List available model components, likelihoods, priors, etc. To read specific documentation for the individual elements, use [inla.doc\(\)](#).

The list is cat'ed with ... arguments.

This function is EXPERIMENTAL.

Usage

```
inla.list.models(section = names(inla.models()), ...)
```

Arguments

section	The section(s) to list, missing section will list all sections. <code>names(inla.models())</code> lists available sections.
...	Additional argument to cat

Value

Nothing is returned

Author(s)

Havard Rue

Examples

```
## Not run:
inla.list.models("likelihood")
inla.list.models(c("prior", "group"))
inla.list.models(file=file("everything.txt"))

#Show detailed doc for a specific prior/likelihood/latent model
inla.doc("binomial")

## End(Not run)
```

inla.matern.cov

Numerical evaluation of Matern and related covariance functions.

Description

Calculates covariance and correlation functions for Matern models and related oscillating SPDE models, on R^d and on the sphere, S^2 .

Usage

```
inla.matern.cov(
  nu,
  kappa,
  x,
  d = 1,
  corr = FALSE,
  norm.corr = FALSE,
  theta,
  epsilon = 1e-08
)
```

```
inla.matern.cov.s2(nu, kappa, x, norm.corr = FALSE, theta = 0, freq.max = NULL)
```

Arguments

nu	The Matern smoothness parameter.
kappa	The spatial scale parameter.
x	Distance values.
d	Space dimension; the domain is R^d .
corr	If TRUE, calculate correlations, otherwise calculate covariances. Only used for pure Matern models (i.e. with $\theta = 0$).
norm.corr	If TRUE, normalise by the estimated variance, giving approximate correlations.
theta	Oscillation strength parameter.
epsilon	Tolerance for detecting points close to distance zero.
freq.max	The maximum allowed harmonic order. Current default 40, to be changed to a dynamic choice based on error bounds.

Details

On R^d , the models are *defined* by the spectral density given by

$$S(w) = \frac{1}{(2\pi)^d (\kappa^4 + 2\kappa^2 \cos(\pi\theta) |w|^2 + |w|^4)^{(\nu+d/2)/2}}$$

On S^2 , the models are *defined* by the spectral coefficients

$$S(k) = \frac{2k+1}{4\pi (\kappa^4 + 2\kappa^2 \cos(\pi\theta) k(k+1) + k^2(k+1)^2)^{(\nu+1)/2}}$$

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

inla.mdata*Create an mdata-object for INLA*

Description

This defines an mdata-object for matrix valued response-families

Usage

```
inla.mdata(y, ...)  
  
## S3 method for class 'inla.mdata'  
print(x, ...)  
  
as.inla.mdata(object)  
  
is.inla.mdata(object)
```

Arguments

y	The response vector/matrix
...	Additional vectors/matrices of same length as y
x	An mdata object
object	Any R-object

Value

An object of class `inla.mdata`. There is method for `print`.
`is.inla.mdata` returns TRUE if object inherits from class `inla.mdata`, otherwise FALSE.
`as.inla.mdata` returns an object of class `inla.mdata`

Note

It is often required to set `Y=inla.mdata(...)` and then define the formula as `Y~...`, especially when used with `inla.stack`.

Author(s)

Havard Rue

See Also

[inla\(\)](#)

inla.mesh.1d

*Function space definition objects for 1D SPDE models.***Description****[Deprecated]** in favour of [fmesher::fm_mesh_1d\(\)](#)

Create a 1D mesh specification `inla.mesh.1d` object, that defines a function space for 1D SPDE models.

Usage

```
inla.mesh.1d(
  loc,
  interval = range(loc),
  boundary = NULL,
  degree = 1,
  free.clamped = FALSE,
  ...
)

inla.mesh.1d.fem(mesh)
```

Arguments

<code>loc</code>	B-spline knot locations.
<code>interval</code>	Interval domain endpoints.
<code>boundary</code>	Boundary condition specification. Valid conditions are <code>c('neumann', 'dirichlet', 'free', 'cyclic')</code> . Two separate values can be specified, one applied to each endpoint.
<code>degree</code>	The B-spline basis degree. Supported values are 0, 1, and 2.
<code>free.clamped</code>	If TRUE, for 'free' boundaries, clamp the basis functions to the interval endpoints.
<code>...</code>	Additional option, currently unused.
<code>mesh</code>	An <code>inla.mesh.1d</code> object

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

inla.mesh.1d.bary	<i>Mapping matrix for 1D meshes</i>
-------------------	-------------------------------------

Description

Calculates barycentric coordinates and weight matrices for `inla.mesh.1d()` objects.

Usage

```
inla.mesh.1d.bary(mesh, loc, method = c("linear", "nearest"))

inla.mesh.1d.A(mesh, loc, weights = NULL, derivatives = NULL, method = NULL)
```

Arguments

mesh	An <code>inla.mesh.1d()</code> object.
loc	Coordinate values.
method	Interpolation method. If not specified for <code>inla.mesh.1d.A</code> (recommended), it is determined by the mesh basis function properties.
weights	Weights to be applied to the A matrix rows.
derivatives	If TRUE, also compute derivative weight matrices dA and d2A.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

inla.mesh.2d	<i>High-quality triangulations</i>
--------------	------------------------------------

Description

[Deprecated] in favour of `fmesher::fm_mesh_2d_inla()`.

Create a triangle mesh based on initial point locations, specified or automatic boundaries, and mesh quality parameters.

Usage

```
inla.mesh.2d(
  loc = NULL,
  loc.domain = NULL,
  offset = NULL,
  n = NULL,
  boundary = NULL,
  interior = NULL,
  max.edge = NULL,
  min.angle = NULL,
  cutoff = 1e-12,
  max.n.strict = NULL,
```

```

    max.n = NULL,
    plot.delay = NULL,
    crs = NULL
  )

```

Arguments

<code>loc</code>	Matrix of point locations to be used as initial triangulation nodes. Can alternatively be a <code>SpatialPoints</code> or <code>SpatialPointsDataFrame</code> object.
<code>loc.domain</code>	Matrix of point locations used to determine the domain extent. Can alternatively be a <code>SpatialPoints</code> or <code>SpatialPointsDataFrame</code> object.
<code>offset</code>	The automatic extension distance. One or two values, for an inner and an optional outer extension. If negative, interpreted as a factor relative to the approximate data diameter (default=-0.10???)
<code>n</code>	The number of initial nodes in the automatic extensions (default=16)
<code>boundary</code>	A list of one or two <code>inla.mesh.segment()</code> objects describing domain boundaries.
<code>interior</code>	An <code>inla.mesh.segment()</code> object describing desired interior edges.
<code>max.edge</code>	The largest allowed triangle edge length. One or two values.
<code>min.angle</code>	The smallest allowed triangle angle. One or two values. (Default=21)
<code>cutoff</code>	The minimum allowed distance between points. Point at most as far apart as this are replaced by a single vertex prior to the mesh refinement step.
<code>max.n.strict</code>	The maximum number of vertices allowed, overriding <code>min.angle</code> and <code>max.edge</code> (default=-1, meaning no limit). One or two values, where the second value gives the number of additional vertices allowed for the extension.
<code>max.n</code>	The maximum number of vertices allowed, overriding <code>max.edge</code> only (default=-1, meaning no limit). One or two values, where the second value gives the number of additional vertices allowed for the extension.
<code>plot.delay</code>	On Linux (and Mac if appropriate X11 libraries are installed), specifying a non-negative numeric value activates a rudimentary plotting system in the underlying <code>fmesher</code> program, showing the triangulation algorithm at work, with waiting time factor <code>plot.delay</code> between each step. On all systems, specifying any negative value activates displaying the result after each step of the multi-step domain extension algorithm.
<code>crs</code>	An optional CRS or <code>inla.CRS</code> object

Value

An `inla.mesh` object.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

`inla.mesh.create()`, `inla.delaunay()`, `inla.nonconvex.hull()`

Examples

```
loc <- matrix(runif(10 * 2), 10, 2)

if (require("splancs")) {
  boundary <- list(
    inla.nonconvex.hull(loc, 0.1, 0.15),
    inla.nonconvex.hull(loc, 0.2, 0.2)
  )
  offset <- NULL
} else {
  boundary <- NULL
  offset <- c(0.1, 0.2)
}
mesh <- inla.mesh.2d(loc, boundary = boundary, offset = offset, max.edge = c(0.05, 0.1))

plot(mesh)
```

inla.mesh.assessment *Interactive mesh building and diagnostics*

Description

Assess the finite element approximation errors in a mesh for interactive R sessions. More detailed assessment tools are in [meshbuilder\(\)](#).

Usage

```
inla.mesh.assessment(mesh, spatial.range, alpha = 2, dims = c(500, 500))
```

Arguments

mesh	An inla.mesh
spatial.range	numeric; the spatial range parameter to use for the assessment
alpha	numeric; A valid inla.spde2.pcmatern alpha parameter
dims	2-numeric; the grid size

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

inla.mesh.2d, inla.mesh.create, meshbuilder

Examples

```
bnd <- inla.mesh.segment(cbind(
  c(0, 10, 10, 0, 0),
  c(0, 0, 10, 10, 0)
), bnd = TRUE)
mesh <- inla.mesh.2d(boundary = bnd, max.edge = 1)
out <- inla.mesh.assessment(mesh, spatial.range = 3, alpha = 2)
```

inla.mesh.basis	<i>Basis functions for inla.mesh</i>
-----------------	--------------------------------------

Description

[Deprecated] Use the `fmesher::fm_raw_basis()` instead.

Calculate basis functions on a 1d or 2d `inla.mesh()`

Usage

```
inla.mesh.basis(
  mesh,
  type = "b.spline",
  n = 3,
  degree = 2,
  knot.placement = "uniform.area",
  rot.inv = TRUE,
  boundary = "free",
  free.clamped = TRUE,
  ...
)
```

Arguments

mesh	An <code>inla.mesh.1d</code> or <code>inla.mesh</code> object.
type	<code>b.spline</code> (default) for B-spline basis functions, <code>sph.harm</code> for spherical harmonics (available only for meshes on the sphere)
n	For B-splines, the number of basis functions in each direction (for 1d meshes <code>n</code> must be a scalar, and for planar 2d meshes a 2-vector). For spherical harmonics, <code>n</code> is the maximal harmonic order.
degree	Degree of B-spline polynomials. See <code>inla.mesh.1d()</code> .
knot.placement	For B-splines on the sphere, controls the latitudinal placements of knots. <code>"uniform.area"</code> (default) gives uniform spacing in <code>sin(latitude)</code> , <code>"uniform.latitude"</code> gives uniform spacing in latitudes.
rot.inv	For spherical harmonics on a sphere, <code>rot.inv=TRUE</code> gives the rotationally invariant subset of basis functions.
boundary	Boundary specification, default is free boundaries. See <code>inla.mesh.1d()</code> for more information.
free.clamped	If <code>TRUE</code> and boundary is <code>"free"</code> , the boundary basis functions are clamped to 0/1 at the interval boundary by repeating the boundary knots.
...	Unused

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

`inla.mesh.1d()` `inla.mesh.2d()`

Examples

```

n <- 100
loc <- matrix(runif(n * 2), n, 2)
mesh <- inla.mesh.2d(loc, max.edge = 0.05)
basis <- inla.mesh.basis(mesh, n = c(4, 5))

proj <- inla.mesh.projector(mesh)
image(proj$x, proj$y, inla.mesh.project(proj, basis[, 7]))

if (require(rgl)) {
  plot(mesh, rgl = TRUE, col = basis[, 7], draw.edges = FALSE, draw.vertices = FALSE)
}

```

inla.mesh.boundary	<i>Constraint segment extraction for inla.mesh</i>
--------------------	--

Description

Constructs an list of `inla.mesh.segment` object from boundary or interior constraint information in an `inla.mesh()` object.

Usage

```

inla.mesh.boundary(mesh, grp = NULL)

inla.mesh.interior(mesh, grp = NULL)

```

Arguments

mesh	An <code>inla.mesh</code> object.
grp	Group indices to extract. If <code>NULL</code> , all boundary/interior constrain groups are extracted.

Value

A list of `inla.mesh.segment` objects.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.mesh.segment\(\)](#), [inla.mesh.create\(\)](#), [inla.mesh.create.helper\(\)](#)

Examples

```

loc <- matrix(runif(100 * 2) * 1000, 100, 2)
mesh <- inla.mesh.create.helper(points.domain = loc, max.edge = c(50, 500))
boundary <- inla.mesh.boundary(mesh)
interior <- inla.mesh.interior(mesh)

```

inla.mesh.components *Compute connected mesh subsets*

Description

Compute subsets of vertices and triangles in an inla.mesh object that are connected by edges.

Usage

```
inla.mesh.components(mesh)
```

Arguments

mesh An inla.mesh object

Value

A list with elements vertex and triangle, vectors of integer labels for which connected component they belong, and info, a data.frame with columns

component	Connected component integer label.
nV	The number of vertices in the component.
nT	The number of triangles in the component.
area	The surface area associated with the component. Component labels are not comparable across different meshes, but some ordering stability is guaranteed by initiating each component from the lowest numbered triangle whenever a new component is initiated.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.mesh.2d\(\)](#), [inla.mesh.create\(\)](#)

Examples

```
# Construct two simple meshes:
loc <- matrix(c(0, 1, 0, 1), 2, 2)
mesh1 <- inla.mesh.2d(loc = loc, max.edge = 0.1)
bnd <- inla.nonconvex.hull(loc, 0.3)
mesh2 <- inla.mesh.2d(boundary = bnd, max.edge = 0.1)

# Compute connectivity information:
conn1 <- inla.mesh.components(mesh1)
conn2 <- inla.mesh.components(mesh2)
# One component, simply connected mesh
conn1$info
# Two disconnected components
conn2$info
```

```
# Extract the subset mesh for the largest component:
# (Note: some information is lost, such as fixed segments,
# and boundary edge labels.)
maxi <- conn2$info$component[which.max(conn2$info$area)]
mesh3 <- inla.mesh.create(
  loc = mesh2$loc,
  tv = mesh2$graph$tv[conn2$triangle == maxi, , drop = FALSE]
)
```

inla.mesh.components *Compute connected mesh subsets*

Description

Compute subsets of vertices and triangles in an inla.mesh object that are connected by edges.

Usage

```
inla.mesh.components(mesh)
```

Value

A list with elements `vertex` and `triangle`, vectors of integer labels for which connected component they belong, and `info`, a data.frame with columns

<code>component</code>	Connected component integer label.
<code>nV</code>	The number of vertices in the component.
<code>nT</code>	The number of triangles in the component.
<code>area</code>	The surface area associated with the component. Component labels are not comparable across different meshes, but some ordering stability is guaranteed by initiating each component from the lowest numbered triangle whenever a new component is initiated.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

inla.mesh.2d, inla.mesh.create

Examples

```
# Construct two simple meshes:
loc <- matrix(c(0,1,0,1), 2, 2)
mesh1 <- inla.mesh.2d(loc = loc, max.edge=0.1)
bnd <- inla.nonconvex.hull(loc, 0.3)
mesh2 <- inla.mesh.2d(boundary = bnd, max.edge=0.1)

# Compute connectivity information:
conn1 <- inla.mesh.components(mesh1)
conn2 <- inla.mesh.components(mesh2)
# One component, simply connected mesh
```

```

conn1$info
# Two disconnected components
conn2$info

# Extract the subset mesh for the largest component:
# (Note: some information is lost, such as fixed segments,
# and boundary edge labels.)
maxi <- conn2$info$component[which.max(conn2$info$area)]
mesh3 <- inla.mesh.create(loc = mesh2$loc,
                          tv = mesh2$graph$tv[conn2$triangle == maxi,,drop=FALSE])

```

inla.mesh.create	<i>Low level function for high-quality triangulations</i>
------------------	---

Description

[Deprecated] in favour of `fmesher::fm_rcdt_2d_inla()`.

Create a constrained refined Delaunay triangulation (CRDT) for a set of spatial locations.

`inla.mesh.create` generates triangular meshes on subsets of R^2 and S^2 . Use the higher level wrapper function `inla.mesh.2d()` for greater control over mesh resolution and coarser domain extensions.

`inla.delaunay` is a wrapper function for obtaining the convex hull of a point set and calling `inla.mesh.create` to generate the classical Delaunay triangulation.

Usage

```

inla.mesh.create(
  loc = NULL,
  tv = NULL,
  boundary = NULL,
  interior = NULL,
  extend = (missing(tv) || is.null(tv)),
  refine = FALSE,
  lattice = NULL,
  globe = NULL,
  cutoff = 1e-12,
  plot.delay = NULL,
  data.dir = NULL,
  keep = (!missing(data.dir) && !is.null(data.dir)),
  timings = FALSE,
  quality.spec = NULL,
  crs = NULL
)

inla.delaunay(loc, ...)

```

Arguments

<code>loc</code>	Matrix of point locations. Can alternatively be a <code>SpatialPoints</code> or <code>SpatialPointsDataFrame</code> object.
<code>tv</code>	A triangle-vertex index matrix, specifying an existing triangulation.

boundary	A list of <code>inla.mesh.segment</code> objects, generated by <code>inla.mesh.segment()</code> , specifying boundary constraint segments.
interior	A list of <code>inla.mesh.segment</code> objects, generated by <code>inla.mesh.segment()</code> , specifying interior constraint segments.
extend	logical or list specifying whether to extend the data region, with parameters list("n") the number of edges in the extended boundary (default=8) list("offset") the extension distance. If negative, interpreted as a factor relative to the approximate data diameter (default=-0.10) Setting to FALSE is only useful in combination lattice or boundary.
refine	logical or list specifying whether to refine the triangulation, with parameters list("min.angle") the minimum allowed interior angle in any triangle. The algorithm is guaranteed to converge for min.angle at most 21 (default=21) list("max.edge") the maximum allowed edge length in any triangle. If negative, interpreted as a relative factor in an ad hoc formula depending on the data density (default=Inf) list("max.n.strict") the maximum number of vertices allowed, overriding min.angle and max.edge (default=-1, meaning no limit) list("max.n") the maximum number of vertices allowed, overriding max.edge only (default=-1, meaning no limit)
lattice	An <code>inla.mesh.lattice</code> object, generated by <code>inla.mesh.lattice()</code> , specifying points on a regular lattice.
globe	Subdivision resolution for a semi-regular spherical triangulation with equidistant points along equidistant latitude bands.
cutoff	The minimum allowed distance between points. Point at most as far apart as this are replaced by a single vertex prior to the mesh refinement step.
plot.delay	On Linux (and Mac if appropriate X11 libraries are installed), specifying a numeric value activates a rudimentary plotting system in the underlying <code>fmesh</code> program, showing the triangulation algorithm at work.
data.dir	Where to store the <code>fmesh</code> data files. Defaults to <code>tempdir()</code> if <code>keep</code> is FALSE, otherwise <code>"inla.mesh.data"</code> .
keep	TRUE if the data files should be kept in <code>data.dir</code> or deleted afterwards. Defaults to true if <code>data.dir</code> is specified, otherwise false. Warning: If <code>keep</code> is false, <code>data.dir</code> and its contents will be deleted (unless set to <code>tempdir()</code>).
timings	If TRUE, obtain timings for the mesh construction.
quality.spec	List of vectors of per vertex max.edge target specification for each location in loc, boundary/interior (segm), and lattice. Only used if refining the mesh.
crs	An optional CRS or <code>inla.CRS</code> object
...	Optional parameters passed on to <code>inla.mesh.create</code> .

Value

An `inla.mesh` object.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.mesh.2d\(\)](#), [inla.mesh.1d\(\)](#), [inla.mesh.segment\(\)](#), [inla.mesh.lattice\(\)](#), [inla.mesh.query\(\)](#)

Examples

```
loc <- matrix(runif(10 * 2), 10, 2)

mesh <- inla.delaunay(loc)
plot(mesh)

mesh <- inla.mesh.create(loc,
  interior = inla.mesh.segment(idx = 1:2),
  extend = TRUE,
  refine = list(max.edge = 0.1)
)
plot(mesh)

loc2 <- matrix(c(0, 1, 1, 0, 0, 0, 1, 1), 4, 2)
mesh2 <- inla.mesh.create(
  loc = loc,
  boundary = inla.mesh.segment(loc2),
  interior = inla.mesh.segment(idx = 1:2),
  quality.spec = list(segm = 0.2, loc = 0.05),
  refine = list(min.angle = 26)
)
plot(mesh2)
```

inla.mesh.deriv

Directional derivative matrices for functions on meshes.

Description

Calculates directional derivative matrices for functions on [inla.mesh\(\)](#) objects.

Usage

```
inla.mesh.deriv(mesh, loc)
```

Arguments

mesh	An inla.mesh() object.
loc	Coordinates where the derivatives should be evaluated.

Value

A	The projection matrix, $u(\text{loc}_i) = \sum_j A_{ij} w_i$
dx, dy, dz	Derivative weight matrices, $du/dx(\text{loc}_i) = \sum_j dx_{ij} w_i$, etc.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

inla.mesh.fem	<i>Finite element matrices</i>
---------------	--------------------------------

Description

Constructs finite element matrices for `inla.mesh()` and `inla.mesh.1d()` objects.

Usage

```
inla.mesh.fem(mesh, order = 2)
```

Arguments

mesh	An <code>inla.mesh()</code> or <code>inla.mesh.1d()</code> object.
order	The model order.

Value

A list of sparse matrices based on basis functions `psi_i`:

<code>c0</code>	$c0[i,j] = \langle \text{psi}_i, 1 \rangle$
<code>c1</code>	$c1[i,j] = \langle \text{psi}_i, \text{psi}_j \rangle$
<code>g1</code>	$g1[i,j] = \langle \text{grad psi}_i, \text{grad psi}_j \rangle$
<code>g2</code>	$g2 = g1 * c0^{-1} * g1$
<code>gk</code>	$gk = g1 * (c0^{-1} * g1)^{(k-1)}$, up to and including $k=\text{order}$

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

`inla.mesh.1d.fem()`

inla.mesh.lattice	<i>Lattice grids for inla.mesh</i>
-------------------	------------------------------------

Description

Construct a lattice grid for `inla.mesh()`

Usage

```
inla.mesh.lattice(
  x = seq(0, 1, length.out = 2),
  y = seq(0, 1, length.out = 2),
  z = NULL,
  dims = if (is.matrix(x)) {
    dim(x)
  } else {
    c(length(x), length(y))
  },
  units = NULL,
  crs = NULL
)
```

Arguments

x	vector or grid matrix of x-values
y	vector of grid matrix of y-values
z	if x is a matrix, a grid matrix of z-values
dims	the size of the grid, length 2 vector
units	One of c("default", "longlat", "longsinlat").
crs	An optional CRS or inla.CRS object

Value

An inla.mesh.lattice object.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.mesh\(\)](#)

Examples

```
lattice <- inla.mesh.lattice(seq(0, 1, length.out = 17), seq(0, 1, length.out = 10))

## Use the lattice "as-is", without refinement:
mesh <- inla.mesh.create(lattice = lattice, boundary = lattice$segm)
mesh <- inla.mesh.create(lattice = lattice, extend = FALSE)
plot(mesh)

## Refine the triangulation, with limits on triangle angles and edges:
mesh <- inla.mesh.create(
  lattice = lattice,
  refine = list(max.edge = 0.08),
  extend = FALSE
)
plot(mesh)

## Add an extension around the lattice, but maintain the lattice edges:
```

```

mesh <- inla.mesh.create(
  lattice = lattice,
  refine = list(max.edge = 0.08),
  interior = lattice$segm
)
plot(mesh)

## Only add extension:
mesh <- inla.mesh.create(lattice = lattice, refine = list(max.edge = 0.08))
plot(mesh)

```

inla.mesh.map.lim	<i>Coordinate mappings for inla.mesh projections.</i>
-------------------	---

Description

Calculates coordinate mappings for inla.mesh projections.

Usage

```

inla.mesh.map.lim(
  loc = NULL,
  projection = c("default", "longlat", "longsinlat", "mollweide")
)

inla.mesh.map(
  loc,
  projection = c("default", "longlat", "longsinlat", "mollweide"),
  inverse = TRUE
)

```

Arguments

loc	Coordinates to be mapped.
projection	The projection type.
inverse	If TRUE, loc are map coordinates and coordinates in the mesh domain are calculated. If FALSE, loc are coordinates in the mesh domain and the forward map projection is calculated.

Value

For inla.mesh.map.lim, a list:

xlim	X axis limits in the map domain
ylim	Y axis limits in the map domain

No attempt is made to find minimal limits for partial spherical domains.

Functions

- inla.mesh.map.lim(): Projection extent limit calculations

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.mesh.project\(\)](#)

inla.mesh.project	<i>Methods for projecting to/from an inla.mesh</i>
-------------------	--

Description

Calculate a lattice projection to/from an [inla.mesh\(\)](#). Deprecated in favour of `fmesher::fm_evaluate()` and `fmesher::fm_evaluator()`.

The call `inla.mesh.project(mesh, loc, field=..., ...)`, is a shortcut to `inla.mesh.project(inla.mesh.projector(mesh, loc), field)`.

Usage

```
inla.mesh.project(...)

## S3 method for class 'inla.mesh'
inla.mesh.project(mesh, loc = NULL, field = NULL, crs = NULL, ...)

## S3 method for class 'inla.mesh.1d'
inla.mesh.project(mesh, loc, field = NULL, ...)

## S3 method for class 'inla.mesh.projector'
inla.mesh.project(projector, field, ...)

inla.mesh.projector(...)

## S3 method for class 'inla.mesh'
inla.mesh.projector(
  mesh,
  loc = NULL,
  lattice = NULL,
  xlim = NULL,
  ylim = NULL,
  dims = c(100, 100),
  projection = NULL,
  crs = NULL,
  ...
)

## S3 method for class 'inla.mesh.1d'
inla.mesh.projector(mesh, loc = NULL, xlim = mesh$interval, dims = 100, ...)
```

Arguments

<code>...</code>	Additional arguments passed on to methods.
<code>mesh</code>	An <code>inla.mesh()</code> or <code>inla.mesh.1d()</code> object.
<code>loc</code>	Projection locations. Can be a matrix or a <code>SpatialPoints</code> or a <code>SpatialPointsDataFrame</code> object.
<code>field</code>	Basis function weights, one per mesh basis function, describing the function to be evaluated at the projection locations. Function values for on the mesh
<code>crs</code>	An optional CRS or <code>inla.CRS</code> object associated with <code>loc</code> and/or <code>lattice</code> .
<code>projector</code>	An <code>inla.mesh.projector</code> object.
<code>lattice</code>	An <code>inla.mesh.lattice()</code> object.
<code>xlim</code>	X-axis limits for a lattice. For R2 meshes, defaults to covering the domain.
<code>ylim</code>	Y-axis limits for a lattice. For R2 meshes, defaults to covering the domain.
<code>dims</code>	Lattice dimensions.
<code>projection</code>	One of <code>c("default", "longlat", "longsinlat", "mollweide")</code> .

Value

For `inla.mesh.project(mesh, ...)`, a list with projection information. For `inla.mesh.projector(mesh, ...)`, an `inla.mesh.projector` object. For `inla.mesh.project(projector, field, ...)`, a field projected from the mesh onto the locations given by the projector object.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.mesh\(\)](#), [inla.mesh.1d\(\)](#), [inla.mesh.lattice\(\)](#)

Examples

```
n <- 20
loc <- matrix(runif(n * 2), n, 2)
mesh <- inla.mesh.create(loc, refine = list(max.edge = 0.05))
proj <- inla.mesh.projector(mesh)
field <- cos(mesh$loc[, 1] * 2 * pi * 3) * sin(mesh$loc[, 2] * 2 * pi * 7)
image(proj$x, proj$y, inla.mesh.project(proj, field))

if (require(rgl)) {
  plot(mesh, rgl = TRUE, col = field, draw.edges = FALSE, draw.vertices = FALSE)
}
```

inla.mesh.query *High-quality triangulations*

Description

Query information about an inla.mesh object.

Usage

```
inla.mesh.query(mesh, ...)
```

Arguments

mesh	An inla.mesh object.
...	Query arguments. <ul style="list-style-type: none"> • tt.neighbours Compute neighbour triangles for triangles; list of vectors: list(triangles, orders) • vt.neighbours Compute neighbour triangles for vertices; list of vectors: list(vertices, orders)

Value

A list of query results.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.mesh.create\(\)](#), [inla.mesh.segment\(\)](#), [inla.mesh.lattice\(\)](#)

Examples

```
loc <- matrix(c(0.1, 0.15), 1, 2)
lattice <- inla.mesh.lattice(dims = c(10, 10))
mesh <- inla.mesh.create(loc = loc, lattice = lattice, extend = FALSE)

vt <- which(inla.mesh.query(mesh,
  vt.neighbours = list(
    mesh$idx$loc,
    4:6
  )
)$vt.neighbours)

mesh2 <- inla.mesh.create(mesh$loc,
  tv = mesh$graph$tv[vt, , drop = FALSE],
  refine = FALSE, extend = FALSE
)
```

inla.mesh.segment	<i>Constraint segments for inla.mesh</i>
-------------------	--

Description

[Deprecated] in favour of `fmesher::fm_seg()`

Constructs `inla.mesh.segment` objects that can be used to specify boundary and interior constraint edges in calls to `inla.mesh()`.

Usage

```
inla.mesh.segment(...)

## Default S3 method:
inla.mesh.segment(
  loc = NULL,
  idx = NULL,
  grp = NULL,
  is.bnd = TRUE,
  crs = NULL,
  ...
)

## S3 method for class 'inla.mesh.segment'
inla.mesh.segment(..., grp.default = 0)

inla.contour.segment(
  x = seq(0, 1, length.out = nrow(z)),
  y = seq(0, 1, length.out = ncol(z)),
  z,
  nlevels = 10,
  levels = pretty(range(z, na.rm = TRUE), nlevels),
  groups = seq_len(length(levels)),
  positive = TRUE,
  eps = NULL,
  crs = NULL
)
```

Arguments

<code>...</code>	Additional parameters. When joining segments, a list of <code>inla.mesh.segment</code> objects.
<code>loc</code>	Matrix of point locations, or <code>SpatialPoints</code> , or <code>sf/sfc</code> point object.
<code>idx</code>	Segment index sequence vector or index pair matrix. The indices refer to the rows of <code>loc</code> . If <code>loc==NULL</code> , the indices will be interpreted as indices into the point specification supplied to <code>inla.mesh.create()</code> . If <code>is.bnd==TRUE</code> , defaults to linking all the points in <code>loc</code> , as <code>c(1:nrow(loc), 1L)</code> , otherwise <code>1:nrow(loc)</code> .
<code>grp</code>	Vector of group labels for each segment. Set to <code>NULL</code> to let the labels be chosen automatically in a call to <code>inla.mesh.create()</code> .

<code>is.bnd</code>	TRUE if the segments are boundary segments, otherwise FALSE.
<code>crs</code>	An optional CRS or <code>inla.CRS</code> object
<code>grp.default</code>	When joining segments, use this group label for segments that have <code>grp=NULL</code> .
<code>x, y, z, nlevels, levels</code>	Parameters specifying a set of surface contours, with syntax described in contour() .
<code>groups</code>	Vector of group ID:s, one for each contour level.
<code>positive</code>	TRUE if the contours should encircle positive level excursions in a counter clock-wise direction.
<code>eps</code>	Tolerance for inla.simplify.curve() .

Value

An `inla.mesh.segment` object.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.mesh.create\(\)](#), [inla.mesh.2d\(\)](#)

Examples

```
## Create a square boundary and a diagonal interior segment
loc.bnd <- matrix(c(0, 0, 1, 0, 1, 1, 0, 1), 4, 2, byrow = TRUE)
loc.int <- matrix(c(0.9, 0.1, 0.1, 0.6), 2, 2, byrow = TRUE)
segm.bnd <- inla.mesh.segment(loc.bnd)
segm.int <- inla.mesh.segment(loc.int, is.bnd = FALSE)

## Points to be meshed
loc <- matrix(runif(10 * 2), 10, 2) * 0.9 + 0.05
mesh <- inla.mesh.create(loc,
  boundary = segm.bnd,
  interior = segm.int,
  refine = list()
)
plot(mesh)
## Not run:
mesh <- inla.mesh.create(loc, interior = list(segm.bnd, segm.int))
plot(mesh)

## End(Not run)
```

inla.models

*Valid models in INLA***Description**

This page describe the models implemented in inla, divided into sections: latent, group, scopy, mix, link, predictor, hazard, likelihood, prior, wrapper, lp.scale.

Usage

```
inla.models()
```

Value

Valid sections are: latent, group, scopy, mix, link, predictor, hazard, likelihood, prior, wrapper, lp.scale.

'latent'

Valid models in this section are:

Model 'linear'. Properties: `doc = 'Alternative interface to an fixed effect'`

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
pdf = 'linear'

```

Number of hyperparameters is 0.

Model 'iid'. Properties: `doc = 'Gaussian random effects in dim=1'`

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
pdf = 'indep'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 1001

```

name = log precision
short.name = prec
prior = loggamma

```

```

param = 1 5e-05
initial = 4
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'mec'. Properties: doc = 'Classical measurement error model'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
pdf = 'mec'

```

Number of hyperparameters is 4.

Hyperparameter 'theta1' hyperid = 2001

```

name = beta
short.name = b
prior = gaussian
param = 1 0.001
initial = 1
fixed = FALSE
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta2' hyperid = 2002

```

name = prec.u
short.name = prec
prior = loggamma
param = 1 1e-04
initial = 9.21034037197618
fixed = TRUE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta3' hyperid = 2003

```

name = mean.x
short.name = mu.x
prior = gaussian
param = 0 1e-04
initial = 0
fixed = TRUE
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta4' hyperid = 2004

```

name = prec.x

```

```

short.name = prec.x
prior = loggamma
param = 1 10000
initial = -9.21034037197618
fixed = TRUE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'meb'. Properties: doc = 'Berkson measurement error model'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
pdf = 'meb'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 3001

```

name = beta
short.name = b
prior = gaussian
param = 1 0.001
initial = 1
fixed = FALSE
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta2' hyperid = 3002

```

name = prec.u
short.name = prec
prior = loggamma
param = 1 1e-04
initial = 6.90775527898214
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'rgeneric'. Properties: doc = 'Generic latent model specified using R'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'

```

```
status = 'experimental'
```

```
pdf = 'rgeneric'
```

Number of hyperparameters is 0.

Model 'cgeneric'. Properties: doc = 'Generic latent model specified using C'

```
constr = 'FALSE'
```

```
nrow.ncol = 'FALSE'
```

```
augmented = 'FALSE'
```

```
aug.factor = '1'
```

```
aug.constr = 'NULL'
```

```
n.div.by = 'NULL'
```

```
n.required = 'TRUE'
```

```
set.default.values = 'TRUE'
```

```
status = 'experimental'
```

```
pdf = 'rgeneric'
```

Number of hyperparameters is 0.

Model 'rw1'. Properties: doc = 'Random walk of order 1'

```
constr = 'TRUE'
```

```
nrow.ncol = 'FALSE'
```

```
augmented = 'FALSE'
```

```
aug.factor = '1'
```

```
aug.constr = 'NULL'
```

```
n.div.by = 'NULL'
```

```
n.required = 'FALSE'
```

```
set.default.values = 'FALSE'
```

```
min.diff = '1e-05'
```

```
pdf = 'rw1'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 4001

```
name = log precision
```

```
short.name = prec
```

```
prior = loggamma
```

```
param = 1 5e-05
```

```
initial = 4
```

```
fixed = FALSE
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Model 'rw2'. Properties: doc = 'Random walk of order 2'

```
constr = 'TRUE'
```

```
nrow.ncol = 'FALSE'
```

```
augmented = 'FALSE'
```

```
aug.factor = '1'
```

```
aug.constr = 'NULL'
```

```
n.div.by = 'NULL'
```

```
n.required = 'FALSE'
```

```
set.default.values = 'FALSE'
```

```
min.diff = '0.001'
```

```
pdf = 'rw2'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 5001

```
name = log precision
```

```
short.name = prec
```

```
prior = loggamma
```

```
param = 1 5e-05
```

```
initial = 4
```

```
fixed = FALSE
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Model 'crw2'. Properties: **doc** = 'Exact solution to the random walk of order 2'

```
constr = 'TRUE'
```

```
nrow.ncol = 'FALSE'
```

```
augmented = 'FALSE'
```

```
aug.factor = '2'
```

```
aug.constr = '1'
```

```
n.div.by = 'NULL'
```

```
n.required = 'FALSE'
```

```
set.default.values = 'FALSE'
```

```
min.diff = '0.001'
```

```
pdf = 'crw2'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 6001

```
name = log precision
```

```
short.name = prec
```

```
prior = loggamma
```

```
param = 1 5e-05
```

```
initial = 4
```

```
fixed = FALSE
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Model 'seasonal'. Properties: **doc** = 'Seasonal model for time series'

```
constr = 'FALSE'
```

```
nrow.ncol = 'FALSE'
```

```
augmented = 'FALSE'
```

```
aug.factor = '1'
```

```
aug.constr = 'NULL'
```

```
n.div.by = 'NULL'
```

```
n.required = 'FALSE'
```

```
set.default.values = 'FALSE'
```

```
pdf = 'seasonal'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 7001

```

name = log precision
short.name = prec
prior = loggamma
param = 1 5e-05
initial = 4
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'besag'. Properties: doc = 'The Besag area model (CAR-model)'

```

constr = 'TRUE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'
pdf = 'besag'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 8001

```

name = log precision
short.name = prec
prior = loggamma
param = 1 5e-05
initial = 4
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'besag2'. Properties: doc = 'The shared Besag model'

```

constr = 'TRUE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = '1 2'
n.div.by = '2'
n.required = 'TRUE'
set.default.values = 'TRUE'
pdf = 'besag2'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 9001

```

name = log precision
short.name = prec
prior = loggamma
param = 1 5e-05
initial = 4

```



```

    fixed = FALSE
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 9002
    name = scaling parameter
    short.name = a
    prior = loggamma
    param = 10 10
    initial = 0
    fixed = FALSE
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Model 'bym'. Properties: doc = 'The BYM-model (Besag-York-Mollier model)'
    constr = 'TRUE'
    nrow.ncol = 'FALSE'
    augmented = 'TRUE'
    aug.factor = '2'
    aug.constr = '2'
    n.div.by = 'NULL'
    n.required = 'TRUE'
    set.default.values = 'TRUE'
    pdf = 'bym'
Number of hyperparameters is 2.
Hyperparameter 'theta1' hyperid = 10001
    name = log unstructured precision
    short.name = prec.unstruct
    prior = loggamma
    param = 1 5e-04
    initial = 4
    fixed = FALSE
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 10002
    name = log spatial precision
    short.name = prec.spatial
    prior = loggamma
    param = 1 5e-04
    initial = 4
    fixed = FALSE
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Model 'bym2'. Properties: doc = 'The BYM-model with the PC priors'
    constr = 'TRUE'
    nrow.ncol = 'FALSE'
    augmented = 'TRUE'

```

```

aug.factor = '2'
aug.constr = '2'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'
status = 'experimental'
pdf = 'bym2'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 11001

```

name = log precision
short.name = prec
prior = pc.prec
param = 1 0.01
initial = 4
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 11002

```

name = logit phi
short.name = phi
prior = pc
param = 0.5 0.5
initial = -3
fixed = FALSE
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'besagproper'. Properties: doc = 'A proper version of the Besag model'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'
status = 'experimental'
pdf = 'besagproper'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 12001

```

name = log precision
short.name = prec
prior = loggamma
param = 1 5e-04
initial = 2
fixed = FALSE

```

```

to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 12002

```

name = log diagonal
short.name = diag
prior = loggamma
param = 1 1
initial = 1
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'besagproper2'. Properties: **doc** = 'An alternative proper version of the Besag model'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'
status = 'experimental'
pdf = 'besagproper2'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 13001

```

name = log precision
short.name = prec
prior = loggamma
param = 1 5e-04
initial = 2
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 13002

```

name = logit lambda
short.name = lambda
prior = gaussian
param = 0 0.45
initial = 3
fixed = FALSE
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'fgn'. Properties: **doc** = 'Fractional Gaussian noise model'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'TRUE'

```

```

aug.factor = '5'
aug.constr = '1'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'TRUE'
order.default = '4'
order.defined = '3 4'
pdf = 'fgn'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 13101

```

name = log precision
short.name = prec
prior = pc.prec
param = 3 0.01
initial = 1
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 13102

```

name = logit H
short.name = H
prior = pcfnh
param = 0.9 0.1
initial = 2
fixed = FALSE
to.theta = function(x) log((2 * x - 1) / (2 * (1 - x)))
from.theta = function(x) 0.5 + 0.5 * exp(x) / (1 + exp(x))

```

Model 'fgn2'. Properties: doc = 'Fractional Gaussian noise model (alt 2)'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'TRUE'
aug.factor = '4'
aug.constr = '1'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'TRUE'
order.default = '4'
order.defined = '3 4'
pdf = 'fgn'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 13111

```

name = log precision
short.name = prec
prior = pc.prec
param = 3 0.01

```

```

initial = 1
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 13112
name = logit H
short.name = H
prior = pcfgnh
param = 0.9 0.1
initial = 2
fixed = FALSE
to.theta = function(x) log((2 * x - 1) / (2 * (1 - x)))
from.theta = function(x) 0.5 + 0.5 * exp(x) / (1 + exp(x))
Model 'ar1'. Properties: doc = 'Auto-regressive model of order 1 (AR(1))'
constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
pdf = 'ar1'

```

Number of hyperparameters is 3.

```

Hyperparameter 'theta1' hyperid = 14001
name = log precision
short.name = prec
prior = loggamma
param = 1 5e-05
initial = 4
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 14002
name = logit lag one correlation
short.name = rho
prior = normal
param = 0 0.15
initial = 2
fixed = FALSE
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta3' hyperid = 14003
name = mean
short.name = mean

```

```

prior = normal
param = 0 1
initial = 0
fixed = TRUE
to.theta = function(x) x
from.theta = function(x) x

```

Model 'ar1c'. Properties: doc = 'Auto-regressive model of order 1 w/covariates'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'TRUE'
status = 'experimental'
pdf = 'ar1c'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 14101

```

name = log precision
short.name = prec
prior = pc.prec
param = 1 0.01
initial = 4
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 14102

```

name = logit lag one correlation
short.name = rho
prior = pc.cor0
param = 0.5 0.5
initial = 2
fixed = FALSE
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1

```

Model 'ar'. Properties: doc = 'Auto-regressive model of order p (AR(p))'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'

```

```
pdf = 'ar'
```

Number of hyperparameters is 11.

Hyperparameter 'theta1' hyperid = 15001

```
name = log precision
short.name = prec
initial = 4
fixed = FALSE
prior = pc.prec
param = 3 0.01
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Hyperparameter 'theta2' hyperid = 15002

```
name = pacf1
short.name = pacf1
initial = 1
fixed = FALSE
prior = pc.cor0
param = 0.5 0.5
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
```

Hyperparameter 'theta3' hyperid = 15003

```
name = pacf2
short.name = pacf2
initial = 0
fixed = FALSE
prior = pc.cor0
param = 0.5 0.4
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
```

Hyperparameter 'theta4' hyperid = 15004

```
name = pacf3
short.name = pacf3
initial = 0
fixed = FALSE
prior = pc.cor0
param = 0.5 0.3
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
```

Hyperparameter 'theta5' hyperid = 15005

```
name = pacf4
short.name = pacf4
initial = 0
fixed = FALSE
prior = pc.cor0
param = 0.5 0.2
```

```

    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta6' hyperid = 15006
    name = pacf5
    short.name = pacf5
    initial = 0
    fixed = FALSE
    prior = pc.cor0
    param = 0.5 0.1
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta7' hyperid = 15007
    name = pacf6
    short.name = pacf6
    initial = 0
    fixed = FALSE
    prior = pc.cor0
    param = 0.5 0.1
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta8' hyperid = 15008
    name = pacf7
    short.name = pacf7
    initial = 0
    fixed = FALSE
    prior = pc.cor0
    param = 0.5 0.1
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta9' hyperid = 15009
    name = pacf8
    short.name = pacf8
    initial = 0
    fixed = FALSE
    prior = pc.cor0
    param = 0.5 0.1
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta10' hyperid = 15010
    name = pacf9
    short.name = pacf9
    initial = 0
    fixed = FALSE
    prior = pc.cor0
    param = 0.5 0.1

```



```

    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta11' hyperid = 15011
    name = pacf10
    short.name = pacf10
    initial = 0
    fixed = FALSE
    prior = pc.cor0
    param = 0.5 0.1
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Model 'ou'. Properties: doc = 'The Ornstein-Uhlenbeck process'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'FALSE'
    aug.factor = '1'
    aug.constr = 'NULL'
    n.div.by = 'NULL'
    n.required = 'FALSE'
    set.default.values = 'FALSE'
    pdf = 'ou'
Number of hyperparameters is 2.
Hyperparameter 'theta1' hyperid = 16001
    name = log precision
    short.name = prec
    prior = loggamma
    param = 1 5e-05
    initial = 4
    fixed = FALSE
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 16002
    name = log phi
    short.name = phi
    prior = normal
    param = 0 0.2
    initial = -1
    fixed = FALSE
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Model 'intslope'. Properties: doc = 'Intecept-slope model with Wishart-prior'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'FALSE'
    aug.factor = '1'

```

```

aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'TRUE'
status = 'experimental'
pdf = 'intslope'

```

Number of hyperparameters is 13.

Hyperparameter 'theta1' hyperid = 16101

```

name = log precision1
short.name = prec1
initial = 4
fixed = FALSE
prior = wishart2d
param = 4 1 1 0
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 16102

```

name = log precision2
short.name = prec2
initial = 4
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta3' hyperid = 16103

```

name = logit correlation
short.name = cor
initial = 4
fixed = FALSE
prior = none
param =
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1

```

Hyperparameter 'theta4' hyperid = 16104

```

name = gamma1
short.name = g1
initial = 1
fixed = TRUE
prior = normal
param = 1 36
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta5' hyperid = 16105

```

name = gamma2

```

```

    short.name = g2
    initial = 1
    fixed = TRUE
    prior = normal
    param = 1 36
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 16106
    name = gamma3
    short.name = g3
    initial = 1
    fixed = TRUE
    prior = normal
    param = 1 36
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 16107
    name = gamma4
    short.name = g4
    initial = 1
    fixed = TRUE
    prior = normal
    param = 1 36
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 16108
    name = gamma5
    short.name = g5
    initial = 1
    fixed = TRUE
    prior = normal
    param = 1 36
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 16109
    name = gamma6
    short.name = g6
    initial = 1
    fixed = TRUE
    prior = normal
    param = 1 36
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 16110
    name = gamma7

```

```

    short.name = g7
    initial = 1
    fixed = TRUE
    prior = normal
    param = 1 36
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 16111
    name = gamma8
    short.name = g8
    initial = 1
    fixed = TRUE
    prior = normal
    param = 1 36
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta12' hyperid = 16112
    name = gamma9
    short.name = g9
    initial = 1
    fixed = TRUE
    prior = normal
    param = 1 36
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta13' hyperid = 16113
    name = gamma10
    short.name = g10
    initial = 1
    fixed = TRUE
    prior = normal
    param = 1 36
    to.theta = function(x) x
    from.theta = function(x) x
Model 'generic'. Properties: doc = 'A generic model'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'FALSE'
    aug.factor = '1'
    aug.constr = 'NULL'
    n.div.by = 'NULL'
    n.required = 'TRUE'
    set.default.values = 'TRUE'
    pdf = 'generic0'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 17001

```
name = log precision
short.name = prec
prior = loggamma
param = 1 5e-05
initial = 4
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Model 'generic0'. Properties: doc = 'A generic model (type 0)'

```
constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'
pdf = 'generic0'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 18001

```
name = log precision
short.name = prec
prior = loggamma
param = 1 5e-05
initial = 4
fixed = FALSE
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Model 'generic1'. Properties: doc = 'A generic model (type 1)'

```
constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'
pdf = 'generic1'
```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 19001

```
name = log precision
short.name = prec
prior = loggamma
param = 1 5e-05
```

```

    initial = 4
    fixed = FALSE
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 19002
    name = beta
    short.name = beta
    initial = 2
    fixed = FALSE
    prior = gaussian
    param = 0 0.1
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) exp(x) / (1 + exp(x))
Model 'generic2'. Properties: doc = 'A generic model (type 2)'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'FALSE'
    aug.factor = '2'
    aug.constr = '2'
    n.div.by = 'NULL'
    n.required = 'TRUE'
    set.default.values = 'TRUE'
    pdf = 'generic2'
Number of hyperparameters is 2.
Hyperparameter 'theta1' hyperid = 20001
    name = log precision cmatrix
    short.name = prec
    initial = 4
    fixed = FALSE
    prior = loggamma
    param = 1 5e-05
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 20002
    name = log precision random
    short.name = prec.random
    initial = 4
    fixed = FALSE
    prior = loggamma
    param = 1 0.001
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Model 'generic3'. Properties: doc = 'A generic model (type 3)'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'

```

```

augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'
status = 'experimental'
pdf = 'generic3'

```

Number of hyperparameters is 11.

Hyperparameter 'theta1' hyperid = 21001

```

name = log precision1
short.name = prec1
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 21002

```

name = log precision2
short.name = prec2
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta3' hyperid = 21003

```

name = log precision3
short.name = prec3
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta4' hyperid = 21004

```

name = log precision4
short.name = prec4
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta5' hyperid = 21005

```

name = log precision5
short.name = prec5
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta6' hyperid = 21006

```

name = log precision6
short.name = prec6
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta7' hyperid = 21007

```

name = log precision7
short.name = prec7
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta8' hyperid = 21008

```

name = log precision8
short.name = prec8
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta9' hyperid = 21009

```

name = log precision9
short.name = prec9
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```


Hyperparameter 'theta10' hyperid = 21010

```
name = log precision10
short.name = prec10
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Hyperparameter 'theta11' hyperid = 21011

```
name = log precision common
short.name = prec.common
initial = 0
fixed = TRUE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Model 'spde'. Properties: doc = 'A SPDE model'

```
constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'
pdf = 'spde'
```

Number of hyperparameters is 4.

Hyperparameter 'theta1' hyperid = 22001

```
name = theta.T
short.name = T
initial = 2
fixed = FALSE
prior = normal
param = 0.1
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta2' hyperid = 22002

```
name = theta.K
short.name = K
initial = -2
fixed = FALSE
prior = normal
param = 0.1
```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta3' hyperid = 22003
    name = theta.KT
    short.name = KT
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 22004
    name = theta.OC
    short.name = OC
    initial = -20
    fixed = TRUE
    prior = normal
    param = 0 0.2
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) exp(x) / (1 + exp(x))
Model 'spde2'. Properties: doc = 'A SPDE2 model'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'FALSE'
    aug.factor = '1'
    aug.constr = 'NULL'
    n.div.by = 'NULL'
    n.required = 'TRUE'
    set.default.values = 'TRUE'
    pdf = 'spde2'
Number of hyperparameters is 100.
Hyperparameter 'theta1' hyperid = 23001
    name = theta1
    short.name = t1
    initial = 0
    fixed = FALSE
    prior = mvnorm
    param = 1 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta2' hyperid = 23002
    name = theta2
    short.name = t2
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta3' hyperid = 23003
    name = theta3
    short.name = t3
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 23004
    name = theta4
    short.name = t4
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 23005
    name = theta5
    short.name = t5
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 23006
    name = theta6
    short.name = t6
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 23007
    name = theta7
    short.name = t7
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 23008
    name = theta8
    short.name = t8
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 23009
    name = theta9
    short.name = t9
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 23010
    name = theta10
    short.name = t10
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 23011
    name = theta11
    short.name = t11
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta12' hyperid = 23012
    name = theta12
    short.name = t12
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta13' hyperid = 23013
    name = theta13
    short.name = t13
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta14' hyperid = 23014
    name = theta14
    short.name = t14
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta15' hyperid = 23015
    name = theta15
    short.name = t15
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta16' hyperid = 23016
    name = theta16
    short.name = t16
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta17' hyperid = 23017
    name = theta17
    short.name = t17
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta18' hyperid = 23018
    name = theta18
    short.name = t18
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta19' hyperid = 23019
    name = theta19
    short.name = t19
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta20' hyperid = 23020
    name = theta20
    short.name = t20
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta21' hyperid = 23021
    name = theta21
    short.name = t21
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta22' hyperid = 23022
    name = theta22
    short.name = t22
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta23' hyperid = 23023
    name = theta23
    short.name = t23
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta24' hyperid = 23024
    name = theta24
    short.name = t24
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta25' hyperid = 23025
    name = theta25
    short.name = t25
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta26' hyperid = 23026
    name = theta26
    short.name = t26
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta27' hyperid = 23027
    name = theta27
    short.name = t27
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta28' hyperid = 23028
    name = theta28
    short.name = t28
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta29' hyperid = 23029
    name = theta29
    short.name = t29
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta30' hyperid = 23030
    name = theta30
    short.name = t30
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta31' hyperid = 23031
    name = theta31
    short.name = t31
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta32' hyperid = 23032
    name = theta32
    short.name = t32
    initial = 0
    fixed = FALSE

```



```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta33' hyperid = 23033
    name = theta33
    short.name = t33
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta34' hyperid = 23034
    name = theta34
    short.name = t34
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta35' hyperid = 23035
    name = theta35
    short.name = t35
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta36' hyperid = 23036
    name = theta36
    short.name = t36
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta37' hyperid = 23037
    name = theta37
    short.name = t37
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta38' hyperid = 23038
    name = theta38
    short.name = t38
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta39' hyperid = 23039
    name = theta39
    short.name = t39
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta40' hyperid = 23040
    name = theta40
    short.name = t40
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta41' hyperid = 23041
    name = theta41
    short.name = t41
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta42' hyperid = 23042
    name = theta42
    short.name = t42
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta43' hyperid = 23043
    name = theta43
    short.name = t43
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta44' hyperid = 23044
    name = theta44
    short.name = t44
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta45' hyperid = 23045
    name = theta45
    short.name = t45
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta46' hyperid = 23046
    name = theta46
    short.name = t46
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta47' hyperid = 23047
    name = theta47
    short.name = t47
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta48' hyperid = 23048
    name = theta48
    short.name = t48
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta49' hyperid = 23049
    name = theta49
    short.name = t49
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta50' hyperid = 23050
    name = theta50
    short.name = t50
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta51' hyperid = 23051
    name = theta51
    short.name = t51
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta52' hyperid = 23052
    name = theta52
    short.name = t52
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta53' hyperid = 23053
    name = theta53
    short.name = t53
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta54' hyperid = 23054
    name = theta54
    short.name = t54
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta55' hyperid = 23055
    name = theta55
    short.name = t55
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta56' hyperid = 23056
    name = theta56
    short.name = t56
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta57' hyperid = 23057
    name = theta57
    short.name = t57
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta58' hyperid = 23058
    name = theta58
    short.name = t58
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta59' hyperid = 23059
    name = theta59
    short.name = t59
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta60' hyperid = 23060
    name = theta60
    short.name = t60
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta61' hyperid = 23061
    name = theta61
    short.name = t61
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta62' hyperid = 23062
    name = theta62
    short.name = t62
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta63' hyperid = 23063
    name = theta63
    short.name = t63
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta64' hyperid = 23064
    name = theta64
    short.name = t64
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta65' hyperid = 23065
    name = theta65
    short.name = t65
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta66' hyperid = 23066
    name = theta66
    short.name = t66
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta67' hyperid = 23067
    name = theta67
    short.name = t67
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta68' hyperid = 23068
    name = theta68
    short.name = t68
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta69' hyperid = 23069
    name = theta69
    short.name = t69
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta70' hyperid = 23070
    name = theta70
    short.name = t70
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta71' hyperid = 23071
    name = theta71
    short.name = t71
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta72' hyperid = 23072
    name = theta72
    short.name = t72
    initial = 0
    fixed = FALSE

```



```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta73' hyperid = 23073
    name = theta73
    short.name = t73
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta74' hyperid = 23074
    name = theta74
    short.name = t74
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta75' hyperid = 23075
    name = theta75
    short.name = t75
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta76' hyperid = 23076
    name = theta76
    short.name = t76
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta77' hyperid = 23077
    name = theta77
    short.name = t77
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta78' hyperid = 23078
    name = theta78
    short.name = t78
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta79' hyperid = 23079
    name = theta79
    short.name = t79
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta80' hyperid = 23080
    name = theta80
    short.name = t80
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta81' hyperid = 23081
    name = theta81
    short.name = t81
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta82' hyperid = 23082
    name = theta82
    short.name = t82
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta83' hyperid = 23083
    name = theta83
    short.name = t83
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta84' hyperid = 23084
    name = theta84
    short.name = t84
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta85' hyperid = 23085
    name = theta85
    short.name = t85
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta86' hyperid = 23086
    name = theta86
    short.name = t86
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta87' hyperid = 23087
    name = theta87
    short.name = t87
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta88' hyperid = 23088
    name = theta88
    short.name = t88
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta89' hyperid = 23089
    name = theta89
    short.name = t89
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta90' hyperid = 23090
    name = theta90
    short.name = t90
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta91' hyperid = 23091
    name = theta91
    short.name = t91
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta92' hyperid = 23092
    name = theta92
    short.name = t92
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta93' hyperid = 23093
    name = theta93
    short.name = t93
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta94' hyperid = 23094
    name = theta94
    short.name = t94
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta95' hyperid = 23095
    name = theta95
    short.name = t95
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta96' hyperid = 23096
    name = theta96
    short.name = t96
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta97' hyperid = 23097
    name = theta97
    short.name = t97
    initial = 0
    fixed = FALSE

```

```

    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta98' hyperid = 23098
    name = theta98
    short.name = t98
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta99' hyperid = 23099
    name = theta99
    short.name = t99
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta100' hyperid = 23100
    name = theta100
    short.name = t100
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Model 'spde3'. Properties: doc = 'A SPDE3 model'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'FALSE'
    aug.factor = '1'
    aug.constr = 'NULL'
    n.div.by = 'NULL'
    n.required = 'TRUE'
    set.default.values = 'TRUE'
    pdf = 'spde3'
Number of hyperparameters is 100.
Hyperparameter 'theta1' hyperid = 24001
    name = theta1
    short.name = t1

```

```

    initial = 0
    fixed = FALSE
    prior = mvnorm
    param = 1 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta2' hyperid = 24002
    name = theta2
    short.name = t2
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta3' hyperid = 24003
    name = theta3
    short.name = t3
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 24004
    name = theta4
    short.name = t4
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 24005
    name = theta5
    short.name = t5
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 24006
    name = theta6
    short.name = t6

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 24007
    name = theta7
    short.name = t7
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 24008
    name = theta8
    short.name = t8
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 24009
    name = theta9
    short.name = t9
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 24010
    name = theta10
    short.name = t10
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 24011
    name = theta11
    short.name = t11

```



```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta12' hyperid = 24012
    name = theta12
    short.name = t12
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta13' hyperid = 24013
    name = theta13
    short.name = t13
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta14' hyperid = 24014
    name = theta14
    short.name = t14
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta15' hyperid = 24015
    name = theta15
    short.name = t15
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta16' hyperid = 24016
    name = theta16
    short.name = t16

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta17' hyperid = 24017
    name = theta17
    short.name = t17
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta18' hyperid = 24018
    name = theta18
    short.name = t18
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta19' hyperid = 24019
    name = theta19
    short.name = t19
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta20' hyperid = 24020
    name = theta20
    short.name = t20
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta21' hyperid = 24021
    name = theta21
    short.name = t21

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta22' hyperid = 24022
    name = theta22
    short.name = t22
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta23' hyperid = 24023
    name = theta23
    short.name = t23
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta24' hyperid = 24024
    name = theta24
    short.name = t24
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta25' hyperid = 24025
    name = theta25
    short.name = t25
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta26' hyperid = 24026
    name = theta26
    short.name = t26

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta27' hyperid = 24027
    name = theta27
    short.name = t27
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta28' hyperid = 24028
    name = theta28
    short.name = t28
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta29' hyperid = 24029
    name = theta29
    short.name = t29
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta30' hyperid = 24030
    name = theta30
    short.name = t30
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta31' hyperid = 24031
    name = theta31
    short.name = t31

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta32' hyperid = 24032
    name = theta32
    short.name = t32
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta33' hyperid = 24033
    name = theta33
    short.name = t33
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta34' hyperid = 24034
    name = theta34
    short.name = t34
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta35' hyperid = 24035
    name = theta35
    short.name = t35
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta36' hyperid = 24036
    name = theta36
    short.name = t36

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta37' hyperid = 24037
    name = theta37
    short.name = t37
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta38' hyperid = 24038
    name = theta38
    short.name = t38
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta39' hyperid = 24039
    name = theta39
    short.name = t39
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta40' hyperid = 24040
    name = theta40
    short.name = t40
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta41' hyperid = 24041
    name = theta41
    short.name = t41

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta42' hyperid = 24042
    name = theta42
    short.name = t42
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta43' hyperid = 24043
    name = theta43
    short.name = t43
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta44' hyperid = 24044
    name = theta44
    short.name = t44
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta45' hyperid = 24045
    name = theta45
    short.name = t45
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta46' hyperid = 24046
    name = theta46
    short.name = t46

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta47' hyperid = 24047
    name = theta47
    short.name = t47
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta48' hyperid = 24048
    name = theta48
    short.name = t48
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta49' hyperid = 24049
    name = theta49
    short.name = t49
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta50' hyperid = 24050
    name = theta50
    short.name = t50
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta51' hyperid = 24051
    name = theta51
    short.name = t51

```



```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta52' hyperid = 24052
    name = theta52
    short.name = t52
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta53' hyperid = 24053
    name = theta53
    short.name = t53
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta54' hyperid = 24054
    name = theta54
    short.name = t54
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta55' hyperid = 24055
    name = theta55
    short.name = t55
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta56' hyperid = 24056
    name = theta56
    short.name = t56

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta57' hyperid = 24057
    name = theta57
    short.name = t57
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta58' hyperid = 24058
    name = theta58
    short.name = t58
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta59' hyperid = 24059
    name = theta59
    short.name = t59
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta60' hyperid = 24060
    name = theta60
    short.name = t60
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta61' hyperid = 24061
    name = theta61
    short.name = t61

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta62' hyperid = 24062
    name = theta62
    short.name = t62
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta63' hyperid = 24063
    name = theta63
    short.name = t63
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta64' hyperid = 24064
    name = theta64
    short.name = t64
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta65' hyperid = 24065
    name = theta65
    short.name = t65
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta66' hyperid = 24066
    name = theta66
    short.name = t66

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta67' hyperid = 24067
    name = theta67
    short.name = t67
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta68' hyperid = 24068
    name = theta68
    short.name = t68
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta69' hyperid = 24069
    name = theta69
    short.name = t69
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta70' hyperid = 24070
    name = theta70
    short.name = t70
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta71' hyperid = 24071
    name = theta71
    short.name = t71

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta72' hyperid = 24072
    name = theta72
    short.name = t72
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta73' hyperid = 24073
    name = theta73
    short.name = t73
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta74' hyperid = 24074
    name = theta74
    short.name = t74
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta75' hyperid = 24075
    name = theta75
    short.name = t75
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta76' hyperid = 24076
    name = theta76
    short.name = t76

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta77' hyperid = 24077
    name = theta77
    short.name = t77
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta78' hyperid = 24078
    name = theta78
    short.name = t78
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta79' hyperid = 24079
    name = theta79
    short.name = t79
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta80' hyperid = 24080
    name = theta80
    short.name = t80
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta81' hyperid = 24081
    name = theta81
    short.name = t81

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta82' hyperid = 24082
    name = theta82
    short.name = t82
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta83' hyperid = 24083
    name = theta83
    short.name = t83
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta84' hyperid = 24084
    name = theta84
    short.name = t84
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta85' hyperid = 24085
    name = theta85
    short.name = t85
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta86' hyperid = 24086
    name = theta86
    short.name = t86

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta87' hyperid = 24087
    name = theta87
    short.name = t87
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta88' hyperid = 24088
    name = theta88
    short.name = t88
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta89' hyperid = 24089
    name = theta89
    short.name = t89
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta90' hyperid = 24090
    name = theta90
    short.name = t90
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta91' hyperid = 24091
    name = theta91
    short.name = t91

```



```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta92' hyperid = 24092
    name = theta92
    short.name = t92
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta93' hyperid = 24093
    name = theta93
    short.name = t93
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta94' hyperid = 24094
    name = theta94
    short.name = t94
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta95' hyperid = 24095
    name = theta95
    short.name = t95
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta96' hyperid = 24096
    name = theta96
    short.name = t96

```

```

    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta97' hyperid = 24097
    name = theta97
    short.name = t97
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta98' hyperid = 24098
    name = theta98
    short.name = t98
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta99' hyperid = 24099
    name = theta99
    short.name = t99
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta100' hyperid = 24100
    name = theta100
    short.name = t100
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Model 'iid1d'. Properties: doc = 'Gaussian random effect in dim=1 with Wishart prior'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'

```

```

augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'TRUE'
pdf = 'iid123d'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 25001

```

name = precision
short.name = prec
initial = 4
fixed = FALSE
prior = wishart1d
param = 2 1e-04
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'iid2d'. Properties: doc = 'Gaussian random effect in dim=2 with Wishart prior'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'TRUE'
aug.factor = '1'
aug.constr = '1 2'
n.div.by = '2'
n.required = 'TRUE'
set.default.values = 'TRUE'
pdf = 'iid123d'

```

Number of hyperparameters is 3.

Hyperparameter 'theta1' hyperid = 26001

```

name = log precision1
short.name = prec1
initial = 4
fixed = FALSE
prior = wishart2d
param = 4 1 1 0
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 26002

```

name = log precision2
short.name = prec2
initial = 4
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)

```

```

    from.theta = function(x) exp(x)
Hyperparameter 'theta3' hyperid = 26003
    name = logit correlation
    short.name = cor
    initial = 4
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Model 'iid3d'. Properties: doc = 'Gaussian random effect in dim=3 with Wishart prior'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'TRUE'
    aug.factor = '1'
    aug.constr = '1 2 3'
    n.div.by = '3'
    n.required = 'TRUE'
    set.default.values = 'TRUE'
    pdf = 'iid123d'
Number of hyperparameters is 6.
Hyperparameter 'theta1' hyperid = 27001
    name = log precision1
    short.name = prec1
    initial = 4
    fixed = FALSE
    prior = wishart3d
    param = 7 1 1 1 0 0 0
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 27002
    name = log precision2
    short.name = prec2
    initial = 4
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta3' hyperid = 27003
    name = log precision3
    short.name = prec3
    initial = 4
    fixed = FALSE
    prior = none

```

```

    param =
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta4' hyperid = 27004
    name = logit correlation12
    short.name = cor12
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta5' hyperid = 27005
    name = logit correlation13
    short.name = cor13
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta6' hyperid = 27006
    name = logit correlation23
    short.name = cor23
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Model 'iid4d'. Properties: doc = 'Gaussian random effect in dim=4 with Wishart prior'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'TRUE'
    aug.factor = '1'
    aug.constr = '1 2 3 4'
    n.div.by = '4'
    n.required = 'TRUE'
    set.default.values = 'TRUE'
    pdf = 'iid123d'
Number of hyperparameters is 10.
Hyperparameter 'theta1' hyperid = 28001
    name = log precision1
    short.name = prec1
    initial = 4

```

```

    fixed = FALSE
    prior = wishart4d
    param = 11 1 1 1 1 0 0 0 0 0
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 28002
    name = log precision2
    short.name = prec2
    initial = 4
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta3' hyperid = 28003
    name = log precision3
    short.name = prec3
    initial = 4
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta4' hyperid = 28004
    name = log precision4
    short.name = prec4
    initial = 4
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta5' hyperid = 28005
    name = logit correlation12
    short.name = cor12
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta6' hyperid = 28006
    name = logit correlation13
    short.name = cor13
    initial = 0

```

```

    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta7' hyperid = 28007
    name = logit correlation14
    short.name = cor14
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta8' hyperid = 28008
    name = logit correlation23
    short.name = cor23
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta9' hyperid = 28009
    name = logit correlation24
    short.name = cor24
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta10' hyperid = 28010
    name = logit correlation34
    short.name = cor34
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Model 'iid5d'. Properties: doc = 'Gaussian random effect in dim=5 with Wishart prior'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'TRUE'

```

```

aug.factor = '1'
aug.constr = '1 2 3 4 5'
n.div.by = '5'
n.required = 'TRUE'
set.default.values = 'TRUE'
pdf = 'iid123d'

```

Number of hyperparameters is 15.

Hyperparameter 'theta1' hyperid = 29001

```

name = log precision1
short.name = prec1
initial = 4
fixed = FALSE
prior = wishart5d
param = 16 1 1 1 1 1 0 0 0 0 0 0 0 0 0
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 29002

```

name = log precision2
short.name = prec2
initial = 4
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta3' hyperid = 29003

```

name = log precision3
short.name = prec3
initial = 4
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta4' hyperid = 29004

```

name = log precision4
short.name = prec4
initial = 4
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta5' hyperid = 29005

```

name = log precision5

```



```

    short.name = prec5
    initial = 4
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta6' hyperid = 29006
    name = logit correlation12
    short.name = cor12
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta7' hyperid = 29007
    name = logit correlation13
    short.name = cor13
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta8' hyperid = 29008
    name = logit correlation14
    short.name = cor14
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta9' hyperid = 29009
    name = logit correlation15
    short.name = cor15
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta10' hyperid = 29010
    name = logit correlation23

```

```

    short.name = cor23
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta11' hyperid = 29011
    name = logit correlation24
    short.name = cor24
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta12' hyperid = 29012
    name = logit correlation25
    short.name = cor25
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta13' hyperid = 29013
    name = logit correlation34
    short.name = cor34
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta14' hyperid = 29014
    name = logit correlation35
    short.name = cor35
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta15' hyperid = 29015
    name = logit correlation45

```



```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta2' hyperid = 29102
    name = theta2
    short.name = theta2
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta3' hyperid = 29103
    name = theta3
    short.name = theta3
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 29104
    name = theta4
    short.name = theta4
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 29105
    name = theta5
    short.name = theta5
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 29106
    name = theta6
    short.name = theta6
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 29107
    name = theta7
    short.name = theta7
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 29108
    name = theta8
    short.name = theta8
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 29109
    name = theta9
    short.name = theta9
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 29110
    name = theta10
    short.name = theta10
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 29111
    name = theta11
    short.name = theta11
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta12' hyperid = 29112
    name = theta12
    short.name = theta12
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta13' hyperid = 29113
    name = theta13
    short.name = theta13
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta14' hyperid = 29114
    name = theta14
    short.name = theta14
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta15' hyperid = 29115
    name = theta15
    short.name = theta15
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta16' hyperid = 29116
    name = theta16
    short.name = theta16
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta17' hyperid = 29117
    name = theta17
    short.name = theta17
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta18' hyperid = 29118
    name = theta18
    short.name = theta18
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta19' hyperid = 29119
    name = theta19
    short.name = theta19
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta20' hyperid = 29120
    name = theta20
    short.name = theta20
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta21' hyperid = 29121
    name = theta21
    short.name = theta21
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta22' hyperid = 29122
    name = theta22
    short.name = theta22
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta23' hyperid = 29123
    name = theta23
    short.name = theta23
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta24' hyperid = 29124
    name = theta24
    short.name = theta24
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta25' hyperid = 29125
    name = theta25
    short.name = theta25
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta26' hyperid = 29126
    name = theta26
    short.name = theta26
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```



```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta27' hyperid = 29127
    name = theta27
    short.name = theta27
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta28' hyperid = 29128
    name = theta28
    short.name = theta28
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta29' hyperid = 29129
    name = theta29
    short.name = theta29
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta30' hyperid = 29130
    name = theta30
    short.name = theta30
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta31' hyperid = 29131
    name = theta31
    short.name = theta31
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta32' hyperid = 29132
    name = theta32
    short.name = theta32
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta33' hyperid = 29133
    name = theta33
    short.name = theta33
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta34' hyperid = 29134
    name = theta34
    short.name = theta34
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta35' hyperid = 29135
    name = theta35
    short.name = theta35
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta36' hyperid = 29136
    name = theta36
    short.name = theta36
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta37' hyperid = 29137
    name = theta37
    short.name = theta37
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta38' hyperid = 29138
    name = theta38
    short.name = theta38
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta39' hyperid = 29139
    name = theta39
    short.name = theta39
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta40' hyperid = 29140
    name = theta40
    short.name = theta40
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta41' hyperid = 29141
    name = theta41
    short.name = theta41
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta42' hyperid = 29142
    name = theta42
    short.name = theta42
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta43' hyperid = 29143
    name = theta43
    short.name = theta43
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta44' hyperid = 29144
    name = theta44
    short.name = theta44
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta45' hyperid = 29145
    name = theta45
    short.name = theta45
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta46' hyperid = 29146
    name = theta46
    short.name = theta46
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta47' hyperid = 29147
    name = theta47
    short.name = theta47
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta48' hyperid = 29148
    name = theta48
    short.name = theta48
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta49' hyperid = 29149
    name = theta49
    short.name = theta49
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta50' hyperid = 29150
    name = theta50
    short.name = theta50
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta51' hyperid = 29151
    name = theta51
    short.name = theta51
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta52' hyperid = 29152
    name = theta52
    short.name = theta52
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta53' hyperid = 29153
    name = theta53
    short.name = theta53
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta54' hyperid = 29154
    name = theta54
    short.name = theta54
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta55' hyperid = 29155
    name = theta55
    short.name = theta55
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta56' hyperid = 29156
    name = theta56
    short.name = theta56
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta57' hyperid = 29157
    name = theta57
    short.name = theta57
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta58' hyperid = 29158
    name = theta58
    short.name = theta58
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta59' hyperid = 29159
    name = theta59
    short.name = theta59
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta60' hyperid = 29160
    name = theta60
    short.name = theta60
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta61' hyperid = 29161
    name = theta61
    short.name = theta61
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta62' hyperid = 29162
    name = theta62
    short.name = theta62
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta63' hyperid = 29163
    name = theta63
    short.name = theta63
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta64' hyperid = 29164
    name = theta64
    short.name = theta64
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta65' hyperid = 29165
    name = theta65
    short.name = theta65
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta66' hyperid = 29166
    name = theta66
    short.name = theta66
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```



```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta67' hyperid = 29167
    name = theta67
    short.name = theta67
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta68' hyperid = 29168
    name = theta68
    short.name = theta68
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta69' hyperid = 29169
    name = theta69
    short.name = theta69
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta70' hyperid = 29170
    name = theta70
    short.name = theta70
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta71' hyperid = 29171
    name = theta71
    short.name = theta71
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta72' hyperid = 29172
    name = theta72
    short.name = theta72
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta73' hyperid = 29173
    name = theta73
    short.name = theta73
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta74' hyperid = 29174
    name = theta74
    short.name = theta74
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta75' hyperid = 29175
    name = theta75
    short.name = theta75
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta76' hyperid = 29176
    name = theta76
    short.name = theta76
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta77' hyperid = 29177
    name = theta77
    short.name = theta77
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta78' hyperid = 29178
    name = theta78
    short.name = theta78
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta79' hyperid = 29179
    name = theta79
    short.name = theta79
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta80' hyperid = 29180
    name = theta80
    short.name = theta80
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta81' hyperid = 29181
    name = theta81
    short.name = theta81
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta82' hyperid = 29182
    name = theta82
    short.name = theta82
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta83' hyperid = 29183
    name = theta83
    short.name = theta83
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta84' hyperid = 29184
    name = theta84
    short.name = theta84
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta85' hyperid = 29185
    name = theta85
    short.name = theta85
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta86' hyperid = 29186
    name = theta86
    short.name = theta86
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta87' hyperid = 29187
    name = theta87
    short.name = theta87
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta88' hyperid = 29188
    name = theta88
    short.name = theta88
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta89' hyperid = 29189
    name = theta89
    short.name = theta89
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta90' hyperid = 29190
    name = theta90
    short.name = theta90
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta91' hyperid = 29191
    name = theta91
    short.name = theta91
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta92' hyperid = 29192
    name = theta92
    short.name = theta92
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta93' hyperid = 29193
    name = theta93
    short.name = theta93
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta94' hyperid = 29194
    name = theta94
    short.name = theta94
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta95' hyperid = 29195
    name = theta95
    short.name = theta95
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta96' hyperid = 29196
    name = theta96
    short.name = theta96
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta97' hyperid = 29197
    name = theta97
    short.name = theta97
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta98' hyperid = 29198
    name = theta98
    short.name = theta98
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta99' hyperid = 29199
    name = theta99
    short.name = theta99
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta100' hyperid = 29200
    name = theta100
    short.name = theta100
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta101' hyperid = 29201
    name = theta101
    short.name = theta101
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta102' hyperid = 29202
    name = theta102
    short.name = theta102
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta103' hyperid = 29203
    name = theta103
    short.name = theta103
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta104' hyperid = 29204
    name = theta104
    short.name = theta104
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta105' hyperid = 29205
    name = theta105
    short.name = theta105
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta106' hyperid = 29206
    name = theta106
    short.name = theta106
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```



```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta107' hyperid = 29207
    name = theta107
    short.name = theta107
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta108' hyperid = 29208
    name = theta108
    short.name = theta108
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta109' hyperid = 29209
    name = theta109
    short.name = theta109
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta110' hyperid = 29210
    name = theta110
    short.name = theta110
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta111' hyperid = 29211
    name = theta111
    short.name = theta111
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta112' hyperid = 29212
    name = theta112
    short.name = theta112
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta113' hyperid = 29213
    name = theta113
    short.name = theta113
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta114' hyperid = 29214
    name = theta114
    short.name = theta114
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta115' hyperid = 29215
    name = theta115
    short.name = theta115
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta116' hyperid = 29216
    name = theta116
    short.name = theta116
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta117' hyperid = 29217
    name = theta117
    short.name = theta117
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta118' hyperid = 29218
    name = theta118
    short.name = theta118
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta119' hyperid = 29219
    name = theta119
    short.name = theta119
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta120' hyperid = 29220
    name = theta120
    short.name = theta120
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta121' hyperid = 29221
    name = theta121
    short.name = theta121
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta122' hyperid = 29222
    name = theta122
    short.name = theta122
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta123' hyperid = 29223
    name = theta123
    short.name = theta123
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta124' hyperid = 29224
    name = theta124
    short.name = theta124
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta125' hyperid = 29225
    name = theta125
    short.name = theta125
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta126' hyperid = 29226
    name = theta126
    short.name = theta126
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta127' hyperid = 29227
    name = theta127
    short.name = theta127
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta128' hyperid = 29228
    name = theta128
    short.name = theta128
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta129' hyperid = 29229
    name = theta129
    short.name = theta129
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta130' hyperid = 29230
    name = theta130
    short.name = theta130
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta131' hyperid = 29231
    name = theta131
    short.name = theta131
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta132' hyperid = 29232
    name = theta132
    short.name = theta132
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta133' hyperid = 29233
    name = theta133
    short.name = theta133
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta134' hyperid = 29234
    name = theta134
    short.name = theta134
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta135' hyperid = 29235
    name = theta135
    short.name = theta135
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta136' hyperid = 29236
    name = theta136
    short.name = theta136
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta137' hyperid = 29237
    name = theta137
    short.name = theta137
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta138' hyperid = 29238
    name = theta138
    short.name = theta138
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta139' hyperid = 29239
    name = theta139
    short.name = theta139
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta140' hyperid = 29240
    name = theta140
    short.name = theta140
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta141' hyperid = 29241
    name = theta141
    short.name = theta141
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta142' hyperid = 29242
    name = theta142
    short.name = theta142
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta143' hyperid = 29243
    name = theta143
    short.name = theta143
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta144' hyperid = 29244
    name = theta144
    short.name = theta144
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta145' hyperid = 29245
    name = theta145
    short.name = theta145
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta146' hyperid = 29246
    name = theta146
    short.name = theta146
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```



```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta147' hyperid = 29247
    name = theta147
    short.name = theta147
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta148' hyperid = 29248
    name = theta148
    short.name = theta148
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta149' hyperid = 29249
    name = theta149
    short.name = theta149
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta150' hyperid = 29250
    name = theta150
    short.name = theta150
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta151' hyperid = 29251
    name = theta151
    short.name = theta151
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta152' hyperid = 29252
    name = theta152
    short.name = theta152
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta153' hyperid = 29253
    name = theta153
    short.name = theta153
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta154' hyperid = 29254
    name = theta154
    short.name = theta154
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta155' hyperid = 29255
    name = theta155
    short.name = theta155
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta156' hyperid = 29256
    name = theta156
    short.name = theta156
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta157' hyperid = 29257
    name = theta157
    short.name = theta157
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta158' hyperid = 29258
    name = theta158
    short.name = theta158
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta159' hyperid = 29259
    name = theta159
    short.name = theta159
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta160' hyperid = 29260
    name = theta160
    short.name = theta160
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta161' hyperid = 29261
    name = theta161
    short.name = theta161
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta162' hyperid = 29262
    name = theta162
    short.name = theta162
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta163' hyperid = 29263
    name = theta163
    short.name = theta163
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta164' hyperid = 29264
    name = theta164
    short.name = theta164
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta165' hyperid = 29265
    name = theta165
    short.name = theta165
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta166' hyperid = 29266
    name = theta166
    short.name = theta166
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta167' hyperid = 29267
    name = theta167
    short.name = theta167
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta168' hyperid = 29268
    name = theta168
    short.name = theta168
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta169' hyperid = 29269
    name = theta169
    short.name = theta169
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta170' hyperid = 29270
    name = theta170
    short.name = theta170
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta171' hyperid = 29271
    name = theta171
    short.name = theta171
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta172' hyperid = 29272
    name = theta172
    short.name = theta172
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta173' hyperid = 29273
    name = theta173
    short.name = theta173
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta174' hyperid = 29274
    name = theta174
    short.name = theta174
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta175' hyperid = 29275
    name = theta175
    short.name = theta175
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta176' hyperid = 29276
    name = theta176
    short.name = theta176
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta177' hyperid = 29277
    name = theta177
    short.name = theta177
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta178' hyperid = 29278
    name = theta178
    short.name = theta178
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta179' hyperid = 29279
    name = theta179
    short.name = theta179
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta180' hyperid = 29280
    name = theta180
    short.name = theta180
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta181' hyperid = 29281
    name = theta181
    short.name = theta181
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta182' hyperid = 29282
    name = theta182
    short.name = theta182
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta183' hyperid = 29283
    name = theta183
    short.name = theta183
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta184' hyperid = 29284
    name = theta184
    short.name = theta184
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta185' hyperid = 29285
    name = theta185
    short.name = theta185
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta186' hyperid = 29286
    name = theta186
    short.name = theta186
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```



```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta187' hyperid = 29287
    name = theta187
    short.name = theta187
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta188' hyperid = 29288
    name = theta188
    short.name = theta188
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta189' hyperid = 29289
    name = theta189
    short.name = theta189
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta190' hyperid = 29290
    name = theta190
    short.name = theta190
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta191' hyperid = 29291
    name = theta191
    short.name = theta191
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta192' hyperid = 29292
    name = theta192
    short.name = theta192
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta193' hyperid = 29293
    name = theta193
    short.name = theta193
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta194' hyperid = 29294
    name = theta194
    short.name = theta194
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta195' hyperid = 29295
    name = theta195
    short.name = theta195
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta196' hyperid = 29296
    name = theta196
    short.name = theta196
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta197' hyperid = 29297
    name = theta197
    short.name = theta197
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta198' hyperid = 29298
    name = theta198
    short.name = theta198
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta199' hyperid = 29299
    name = theta199
    short.name = theta199
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta200' hyperid = 29300
    name = theta200
    short.name = theta200
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta201' hyperid = 29301
    name = theta201
    short.name = theta201
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta202' hyperid = 29302
    name = theta202
    short.name = theta202
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta203' hyperid = 29303
    name = theta203
    short.name = theta203
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta204' hyperid = 29304
    name = theta204
    short.name = theta204
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta205' hyperid = 29305
    name = theta205
    short.name = theta205
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta206' hyperid = 29306
    name = theta206
    short.name = theta206
    initial = 1048576
    fixed = FALSE
    prior = none
    param =

```

```

    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta207' hyperid = 29307
    name = theta207
    short.name = theta207
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta208' hyperid = 29308
    name = theta208
    short.name = theta208
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta209' hyperid = 29309
    name = theta209
    short.name = theta209
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta210' hyperid = 29310
    name = theta210
    short.name = theta210
    initial = 1048576
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Model '2diid'. Properties: doc = '(This model is obsolete)'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'FALSE'
    aug.factor = '1'
    aug.constr = '1 2'
    n.div.by = '2'

```

```

n.required = 'TRUE'
set.default.values = 'TRUE'
pdf = 'iid123d'

```

Number of hyperparameters is 3.

Hyperparameter 'theta1' hyperid = 30001

```

name = log precision1
short.name = prec1
initial = 4
fixed = FALSE
prior = loggamma
param = 1 5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 30002

```

name = log precision2
short.name = prec2
initial = 4
fixed = FALSE
prior = loggamma
param = 1 5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta3' hyperid = 30003

```

name = correlation
short.name = cor
initial = 4
fixed = FALSE
prior = normal
param = 0 0.15
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1

```

Model 'z'. Properties: **doc** = 'The z-model in a classical mixed model formulation'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'
pdf = 'z'
status = 'experimental'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 31001

```

name = log precision

```

```

short.name = prec
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'rw2d'. Properties: doc = 'Thin-plate spline model'

```

constr = 'TRUE'
nrow.ncol = 'TRUE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'TRUE'
pdf = 'rw2d'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 32001

```

name = log precision
short.name = prec
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'rw2diid'. Properties: doc = 'Thin-plate spline with iid noise'

```

constr = 'TRUE'
nrow.ncol = 'TRUE'
augmented = 'TRUE'
aug.factor = '2'
aug.constr = '2'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'TRUE'
status = 'experimental'
pdf = 'rw2diid'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 33001

```

name = log precision
short.name = prec
prior = pc.prec
param = 1.0.01
initial = 4

```

```

    fixed = FALSE
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 33002
    name = logit phi
    short.name = phi
    prior = pc
    param = 0.5 0.5
    initial = 3
    fixed = FALSE
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) exp(x) / (1 + exp(x))
Model 'slm'. Properties: doc = 'Spatial lag model'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'FALSE'
    aug.factor = '1'
    aug.constr = 'NULL'
    n.div.by = 'NULL'
    n.required = 'TRUE'
    set.default.values = 'TRUE'
    pdf = 'slm'
    status = 'experimental'
Number of hyperparameters is 2.
Hyperparameter 'theta1' hyperid = 34001
    name = log precision
    short.name = prec
    initial = 4
    fixed = FALSE
    prior = loggamma
    param = 1 5e-05
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 34002
    name = rho
    short.name = rho
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) 1 / (1 + exp(-x))
Model 'matern2d'. Properties: doc = 'Matern covariance function on a regular grid'
    constr = 'FALSE'
    nrow.ncol = 'TRUE'

```



```

augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'TRUE'
pdf = 'matern2d'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 35001

```

name = log precision
short.name = prec
initial = 4
fixed = FALSE
prior = loggamma
param = 1 5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 35002

```

name = log range
short.name = range
initial = 2
fixed = FALSE
prior = loggamma
param = 1 0.01
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'dmatern'. Properties: doc = 'Dense Matern field'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'TRUE'
set.default.values = 'TRUE'
status = 'experimental'
pdf = 'dmatern'

```

Number of hyperparameters is 3.

Hyperparameter 'theta1' hyperid = 35101

```

name = log precision
short.name = prec
initial = 3
fixed = FALSE
prior = pc.prec
param = 1 0.01

```

```

    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 35102
    name = log range
    short.name = range
    initial = 0
    fixed = FALSE
    prior = pc.range
    param = 1 0.5
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta3' hyperid = 35103
    name = log nu
    short.name = nu
    initial = -0.693147180559945
    fixed = TRUE
    prior = loggamma
    param = 0.5 1
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)

Model 'copy'. Properties: doc = 'Create a copy of a model component'
    constr = 'FALSE'
    nrow.ncol = 'FALSE'
    augmented = 'FALSE'
    aug.factor = '1'
    aug.constr = 'NULL'
    n.div.by = 'NULL'
    n.required = 'FALSE'
    set.default.values = 'FALSE'
    pdf = 'copy'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 36001
    name = beta
    short.name = b
    initial = 0
    fixed = TRUE
    prior = normal
    param = 1 10
    to.theta = function(x, REPLACE.ME.low, REPLACE.ME.high) {
        return(x)
        stopifnot(low < high) return(log(-(low - x) / (high - x)))
        return(log(x - low))
        stop("Condition not yet implemented")
    } else if (all(is.finite(c(low, high)))) {
    } else if (all(is.finite(c(low, high)))) {
    } else {
    }

```

```

from.theta = function(x, REPLACE.ME.low, REPLACE.ME.high) {
  return(x) } else if (all(is.finite(c(low, high)))) {
  stopifnot(low < high) return(low + exp(x) / (1 + exp(x)) * (high - low))
  return(low + exp(x)) } else {
  stop("Condition not yet implemented")
}

```

Model 'scopy'. Properties: **doc** = 'Create a scopy of a model component'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
status = 'experimental'
pdf = 'scopy'

```

Number of hyperparameters is 15.

Hyperparameter 'theta1' hyperid = 36101

```

name = beta1
short.name = b1
initial = 0.1
fixed = FALSE
prior = none
param =
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta2' hyperid = 36102

```

name = beta2
short.name = b2
initial = 0.1
fixed = FALSE
prior = none
param =
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta3' hyperid = 36103

```

name = beta3
short.name = b3
initial = 0.1
fixed = FALSE
prior = none
param =
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta4' hyperid = 36104

```

    name = beta4
    short.name = b4
    initial = 0.1
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 36105
    name = beta5
    short.name = b5
    initial = 0.1
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 36106
    name = beta6
    short.name = b6
    initial = 0.1
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 36107
    name = beta7
    short.name = b7
    initial = 0.1
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 36108
    name = beta8
    short.name = b8
    initial = 0.1
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 36109

```

```

    name = beta9
    short.name = b9
    initial = 0.1
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 36110
    name = beta10
    short.name = b10
    initial = 0.1
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 36111
    name = beta11
    short.name = b11
    initial = 0.1
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta12' hyperid = 36112
    name = beta12
    short.name = b12
    initial = 0.1
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta13' hyperid = 36113
    name = beta13
    short.name = b13
    initial = 0.1
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta14' hyperid = 36114

```

```

name = beta14
short.name = b14
initial = 0.1
fixed = FALSE
prior = none
param =
to.theta = function(x) x
from.theta = function(x) x
Hyperparameter 'theta15' hyperid = 36115
name = beta15
short.name = b15
initial = 0.1
fixed = FALSE
prior = none
param =
to.theta = function(x) x
from.theta = function(x) x
Model 'clinear'. Properties: doc = 'Constrained linear effect'
constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
pdf = 'clinear'
Number of hyperparameters is 1.
Hyperparameter 'theta' hyperid = 37001
name = beta
short.name = b
initial = 1
fixed = FALSE
prior = normal
param = 1 10
to.theta = function(x, REPLACE.ME.low, REPLACE.ME.high) {
  stopifnot(low < high) return(x)
  stopifnot(low < high) return(log(-(low - x) / (high - x)))
  return(log(x - low))
  stop("Condition not yet implemented")
}
from.theta = function(x, REPLACE.ME.low, REPLACE.ME.high) {
  stopifnot(low < high) return(x)
  stopifnot(low < high) return(low + exp(x) / (1 + exp(x)) * (high - low))
  return(low + exp(x))
  stop("Condition not yet implemented")
}

```

Model 'sigm'. Properties: `doc = 'Sigmoidal effect of a covariate'`

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
status = 'experimental'
pdf = 'sigm'

```

Number of hyperparameters is 3.

Hyperparameter 'theta1' hyperid = 38001

```

name = beta
short.name = b
initial = 1
fixed = FALSE
prior = normal
param = 1 10
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta2' hyperid = 38002

```

name = loghalflife
short.name = halflife
initial = 3
fixed = FALSE
prior = loggamma
param = 3 1
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta3' hyperid = 38003

```

name = logshape
short.name = shape
initial = 0
fixed = FALSE
prior = loggamma
param = 10 10
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'revsigm'. Properties: `doc = 'Reverse sigmoidal effect of a covariate'`

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'

```

```

n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
status = 'experimental'
pdf = 'sigm'

```

Number of hyperparameters is 3.

Hyperparameter 'theta1' hyperid = 39001

```

name = beta
short.name = b
initial = 1
fixed = FALSE
prior = normal
param = 1 10
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta2' hyperid = 39002

```

name = loghalflife
short.name = halflife
initial = 3
fixed = FALSE
prior = loggamma
param = 3 1
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta3' hyperid = 39003

```

name = logshape
short.name = shape
initial = 0
fixed = FALSE
prior = loggamma
param = 10 10
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'log1exp'. Properties: **doc** = 'A nonlinear model of a covariate'

```

constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
status = 'experimental'
pdf = 'log1exp'

```

Number of hyperparameters is 3.

Hyperparameter 'theta1' hyperid = 39011

```
name = beta
short.name = b
initial = 1
fixed = FALSE
prior = normal
param = 0.1
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta2' hyperid = 39012

```
name = alpha
short.name = a
initial = 0
fixed = FALSE
prior = normal
param = 0.1
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta3' hyperid = 39013

```
name = gamma
short.name = g
initial = 0
fixed = FALSE
prior = normal
param = 0.1
to.theta = function(x) x
from.theta = function(x) x
```

Model 'logdist'. Properties: `doc = 'A nonlinear model of a covariate'`

```
constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'
status = 'experimental'
pdf = 'logdist'
```

Number of hyperparameters is 3.

Hyperparameter 'theta1' hyperid = 39021

```
name = beta
short.name = b
initial = 1
fixed = FALSE
prior = normal
```

```

    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta2' hyperid = 39022
    name = alpha1
    short.name = a1
    initial = 0
    fixed = FALSE
    prior = loggamma
    param = 0.1 1
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta3' hyperid = 39023
    name = alpha2
    short.name = a2
    initial = 0
    fixed = FALSE
    prior = loggamma
    param = 0.1 1
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)

```

'group'

Valid models in this section are:

Model 'exchangeable'. Properties: doc = 'Exchangeable correlations'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 40001

```

    name = logit correlation
    short.name = rho
    initial = 1
    fixed = FALSE
    prior = normal
    param = 0 0.2
    to.theta = function(x, REPLACE.ME.ngroup) log((1 + x * (ngroup - 1)) / (1 - x))
    from.theta = function(x, REPLACE.ME.ngroup) (exp(x) - 1) / (exp(x) + ngroup -
1)

```

Model 'exchangeablepos'. Properties: doc = 'Exchangeable positive correlations'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 40101

```

    name = logit correlation
    short.name = rho
    initial = 1
    fixed = FALSE
    prior = pc.cor0
    param = 0.5 0.5

```

```

to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'ar1'. Properties: **doc** = 'AR(1) correlations'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 41001

```

name = logit correlation
short.name = rho
initial = 2
fixed = FALSE
prior = normal
param = 0 0.15
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1

```

Model 'ar'. Properties: **doc** = 'AR(p) correlations'

Number of hyperparameters is 11.

Hyperparameter 'theta1' hyperid = 42001

```

name = log precision
short.name = prec
initial = 0
fixed = TRUE
prior = pc.prec
param = 3 0.01
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 42002

```

name = pacf1
short.name = pacf1
initial = 2
fixed = FALSE
prior = pc.cor0
param = 0.5 0.5
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1

```

Hyperparameter 'theta3' hyperid = 42003

```

name = pacf2
short.name = pacf2
initial = 0
fixed = FALSE
prior = pc.cor0
param = 0.5 0.4
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1

```

Hyperparameter 'theta4' hyperid = 42004

```

name = pacf3
short.name = pacf3

```

```

initial = 0
fixed = FALSE
prior = pc.cor0
param = 0.5 0.3
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta5' hyperid = 42005
name = pacf4
short.name = pacf4
initial = 0
fixed = FALSE
prior = pc.cor0
param = 0.5 0.2
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta6' hyperid = 42006
name = pacf5
short.name = pacf5
initial = 0
fixed = FALSE
prior = pc.cor0
param = 0.5 0.1
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta7' hyperid = 42007
name = pacf6
short.name = pacf6
initial = 0
fixed = FALSE
prior = pc.cor0
param = 0.5 0.1
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta8' hyperid = 42008
name = pacf7
short.name = pacf7
initial = 0
fixed = FALSE
prior = pc.cor0
param = 0.5 0.1
to.theta = function(x) log((1 + x) / (1 - x))
from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta9' hyperid = 42009
name = pacf8
short.name = pacf8

```

```

    initial = 0
    fixed = FALSE
    prior = pc.cor0
    param = 0.5 0.1
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta10' hyperid = 42010
    name = pacf9
    short.name = pacf9
    initial = 0
    fixed = FALSE
    prior = pc.cor0
    param = 0.5 0.1
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Hyperparameter 'theta11' hyperid = 42011
    name = pacf10
    short.name = pacf10
    initial = 0
    fixed = FALSE
    prior = pc.cor0
    param = 0.5 0.1
    to.theta = function(x) log((1 + x) / (1 - x))
    from.theta = function(x) 2 * exp(x) / (1 + exp(x)) - 1
Model 'rw1'. Properties: doc = 'Random walk of order 1'
    Number of hyperparameters is 1.
Hyperparameter 'theta' hyperid = 43001
    name = log precision
    short.name = prec
    prior = loggamma
    param = 1 5e-05
    initial = 0
    fixed = TRUE
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Model 'rw2'. Properties: doc = 'Random walk of order 2'
    Number of hyperparameters is 1.
Hyperparameter 'theta' hyperid = 44001
    name = log precision
    short.name = prec
    prior = loggamma
    param = 1 5e-05
    initial = 0
    fixed = TRUE
    to.theta = function(x) log(x)

```

```
from.theta = function(x) exp(x)
```

Model 'besag'. Properties: doc = 'Besag model'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 45001

```
name = log precision
```

```
short.name = prec
```

```
prior = loggamma
```

```
param = 1 5e-05
```

```
initial = 0
```

```
fixed = TRUE
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Model 'iid'. Properties: doc = 'Independent model'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 46001

```
name = log precision
```

```
short.name = prec
```

```
prior = loggamma
```

```
param = 1 5e-05
```

```
initial = 0
```

```
fixed = TRUE
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

'scopy'

Valid models in this section are:

Model 'rw1'. Properties: doc = 'Random walk of order 1'

Number of hyperparameters is 0.

Model 'rw2'. Properties: doc = 'Random walk of order 2'

Number of hyperparameters is 0.

'mix'

Valid models in this section are:

Model 'gaussian'. Properties: doc = 'Gaussian mixture'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 47001

```
name = log precision
```

```
short.name = prec
```

```
prior = pc.prec
```

```
param = 1 0.01
```

```
initial = 0
```

```
fixed = FALSE
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Model 'loggamma'. Properties: doc = 'LogGamma mixture'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 47101

```
name = log precision
```

```
short.name = prec
```

```
prior = pc.mgamma
```

```
param = 4.8
```

```
initial = 4
```

```
fixed = FALSE
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Model 'mloggamma'. Properties: doc = 'Minus-LogGamma mixture'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 47201

```
name = log precision
```

```
short.name = prec
```

```
prior = pc.mgamma
```

```
param = 4.8
```

```
initial = 4
```

```
fixed = FALSE
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

'link'

Valid models in this section are:

Model 'default'. Properties: doc = 'The default link'

Number of hyperparameters is 0.

Model 'cloglog'. Properties: doc = 'The complementary log-log link'

Number of hyperparameters is 0.

Model 'ccloglog'. Properties: doc = 'The complement complementary log-log link'

Number of hyperparameters is 0.

Model 'loglog'. Properties: doc = 'The log-log link'

Number of hyperparameters is 0.

Model 'identity'. Properties: doc = 'The identity link'

Number of hyperparameters is 0.

Model 'inverse'. Properties: doc = 'The inverse link'

Number of hyperparameters is 0.

Model 'log'. Properties: doc = 'The log-link'

Number of hyperparameters is 0.

Model 'loga'. Properties: doc = 'The loga-link'

Number of hyperparameters is 0.

Model 'neglog'. Properties: doc = 'The negative log-link'

Number of hyperparameters is 0.

```

Model 'logit'. Properties: doc = 'The logit-link'
    Number of hyperparameters is 0.
Model 'probit'. Properties: doc = 'The probit-link'
    Number of hyperparameters is 0.
Model 'cauchit'. Properties: doc = 'The cauchit-link'
    Number of hyperparameters is 0.
Model 'tan'. Properties: doc = 'The tan-link'
    Number of hyperparameters is 0.
Model 'quantile'. Properties: doc = 'The quantile-link'
    Number of hyperparameters is 0.
Model 'pquantile'. Properties: doc = 'The population quantile-link'
    Number of hyperparameters is 0.
Model 'sslogit'. Properties: doc = 'Logit link with sensitivity and specificity'
    status = 'disabled'
    pdf = 'NA'
    Number of hyperparameters is 2.
Hyperparameter 'theta1' hyperid = 48001
    name = sensitivity
    short.name = sens
    prior = logitbeta
    param = 10 5
    initial = 1
    fixed = FALSE
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) exp(x) / (1 + exp(x))
Hyperparameter 'theta2' hyperid = 48002
    name = specificity
    short.name = spec
    prior = logitbeta
    param = 10 5
    initial = 1
    fixed = FALSE
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) exp(x) / (1 + exp(x))
Model 'logoffset'. Properties: doc = 'Log-link with an offset'
    pdf = 'logoffset'
    Number of hyperparameters is 1.
Hyperparameter 'theta' hyperid = 49001
    name = beta
    short.name = b
    prior = normal
    param = 0 100
    initial = 0
    fixed = TRUE

```



```

to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'logitoffset'. Properties: **doc** = 'Logit-link with an offset'

```

status = 'experimental'
pdf = 'logitoffset'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 49011

```

name = prob
short.name = p
prior = normal
param = -1 100
initial = -1
fixed = FALSE
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'robit'. Properties: **doc** = 'Robit link'

```

status = 'experimental'
pdf = 'robit'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 49021

```

name = log degrees of freedom
short.name = dof
initial = 1.6094379124341
fixed = TRUE
prior = pc.dof
param = 50 0.5
to.theta = function(x) log(x - 2)
from.theta = function(x) 2 + exp(x)

```

Model 'sn'. Properties: **doc** = 'Skew-normal link'

```

pdf = 'linksn'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 49031

```

name = skewness
short.name = skew
initial = 0.00123456789
fixed = FALSE
prior = pc.sn
param = 10
to.theta = function(x, skew.max = 0.988) log((1 + x / skew.max) / (1 - x / skew.max))
from.theta = function(x, skew.max = 0.988) skew.max * (2 * exp(x) / (1 + exp(x))
  - 1)

```

Hyperparameter 'theta2' hyperid = 49032

```

name = intercept
short.name = intercept
initial = 0

```

```

fixed = FALSE
prior = linksnintercept
param = 0 0
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'powerlogit'. Properties: **doc** = 'Power logit link'

```
pdf = 'powerlogit'
```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 49131

```

name = power
short.name = power
initial = 0.00123456789
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 49132

```

name = intercept
short.name = intercept
initial = 0
fixed = FALSE
prior = logitbeta
param = 1 1
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'test1'. Properties: **doc** = 'A test1-link function (experimental)'

```
pdf = 'NA'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 50001

```

name = beta
short.name = b
prior = normal
param = 0 100
initial = 0
fixed = FALSE
to.theta = function(x) x
from.theta = function(x) x

```

Model 'special1'. Properties: **doc** = 'A special1-link function (experimental)'

```
pdf = 'NA'
```

Number of hyperparameters is 11.

Hyperparameter 'theta1' hyperid = 51001

```

name = log precision
short.name = prec
initial = 0

```

```

    fixed = FALSE
    prior = loggamma
    param = 1 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta2' hyperid = 51002
    name = beta1
    short.name = beta1
    initial = 0
    fixed = FALSE
    prior = mvnnorm
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta3' hyperid = 51003
    name = beta2
    short.name = beta2
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 51004
    name = beta3
    short.name = beta3
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 51005
    name = beta4
    short.name = beta4
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 51006
    name = beta5
    short.name = beta5
    initial = 0

```

```

    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 51007
    name = beta6
    short.name = beta6
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 51008
    name = beta7
    short.name = beta7
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 51009
    name = beta8
    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 51010
    name = beta9
    short.name = beta9
    initial = 0
    fixed = FALSE
    prior = none
    param =
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 51011
    name = beta10
    short.name = beta10
    initial = 0

```

```

fixed = FALSE
prior = none
param =
  to.theta = function(x) x
  from.theta = function(x) x

```

Model 'special2'. Properties: **doc** = 'A special2-link function (experimental)'
pdf = 'NA'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 52001

```

name = beta
short.name = b
prior = normal
param = 0 10
initial = 0
fixed = FALSE
to.theta = function(x) x
from.theta = function(x) x

```

'predictor'

Valid models in this section are:

Model 'predictor'. Properties: **doc** = '(do not use)'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 53001

```

name = log precision
short.name = prec
initial = 13.8155105579643
fixed = TRUE
prior = loggamma
param = 1 1e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

'hazard'

Valid models in this section are:

Model 'rw1'. Properties: **doc** = 'A random walk of order 1 for the log-hazard'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 54001

```

name = log precision
short.name = prec
initial = 4
fixed = FALSE
prior = loggamma
param = 1 5e-05
to.theta = function(x) log(x)

```

```
from.theta = function(x) exp(x)
```

Model 'rw2'. Properties: **doc =** 'A random walk of order 2 for the log-hazard'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 55001

```
name = log precision
```

```
short.name = prec
```

```
initial = 4
```

```
fixed = FALSE
```

```
prior = loggamma
```

```
param = 1 5e-05
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Model 'iid'. Properties: **doc =** 'An iid model for the log-hazard'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 55501

```
name = log precision
```

```
short.name = prec
```

```
initial = 4
```

```
fixed = FALSE
```

```
prior = loggamma
```

```
param = 1 5e-05
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

'likelihood'

Valid models in this section are:

Model 'poisson'. Properties: **doc =** 'The Poisson likelihood'

```
survival = 'FALSE'
```

```
discrete = 'TRUE'
```

```
link = 'default log logoffset quantile test1 special1 special2'
```

```
pdf = 'poisson'
```

Number of hyperparameters is 0.

Model 'xpoisson'. Properties: **doc =** 'The Poisson likelihood (expert version)'

```
survival = 'FALSE'
```

```
discrete = 'TRUE'
```

```
link = 'default log logoffset quantile test1 special1 special2'
```

```
pdf = 'poisson'
```

Number of hyperparameters is 0.

Model 'cenpoisson'. Properties: **doc =** 'Then censored Poisson likelihood'

```
survival = 'FALSE'
```

```
discrete = 'TRUE'
```

```
link = 'default log logoffset test1 special1 special2'
```

```
pdf = 'cenpoisson'
```

Number of hyperparameters is 0.

Model 'cenpoisson2'. Properties: **doc** = 'Then censored Poisson likelihood (version 2)'

```
survival = 'FALSE'
discrete = 'TRUE'
link = 'default log logoffset test1 special1 special2'
pdf = 'cenpoisson2'
```

Number of hyperparameters is 0.

Model 'gpoisson'. Properties: **doc** = 'The generalized Poisson likelihood'

```
survival = 'FALSE'
discrete = 'TRUE'
link = 'default log logoffset'
pdf = 'gpoisson'
status = 'experimental'
```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 56001

```
name = overdispersion
short.name = phi
initial = 0
fixed = FALSE
prior = loggamma
param = 1 1
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Hyperparameter 'theta2' hyperid = 56002

```
name = p
short.name = p
initial = 1
fixed = TRUE
prior = normal
param = 1 100
to.theta = function(x) x
from.theta = function(x) x
```

Model 'poisson.special1'. Properties: **doc** = 'The Poisson.special1 likelihood'

```
survival = 'FALSE'
discrete = 'TRUE'
link = 'default log'
pdf = 'poisson-special'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 56100

```
name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
```

```

from.theta = function(x) exp(x) / (1 + exp(x))
Model '0poisson'. Properties: doc = 'New 0-inflated Poisson'
status = 'experimental'
survival = 'FALSE'
discrete = 'TRUE'
link = 'default log quantile'
link.simple = 'default logit cauchit probit cloglog ccloglog'
pdf = '0inflated'

```

Number of hyperparameters is 10.

Hyperparameter 'theta1' hyperid = 56201

```

name = beta1
short.name = beta1
initial = -4
fixed = FALSE
prior = normal
param = -4 10
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta2' hyperid = 56202

```

name = beta2
short.name = beta2
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta3' hyperid = 56203

```

name = beta3
short.name = beta3
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta4' hyperid = 56204

```

name = beta4
short.name = beta4
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x

```


Hyperparameter 'theta5' hyperid = 56205

```
name = beta5
short.name = beta5
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta6' hyperid = 56206

```
name = beta6
short.name = beta6
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta7' hyperid = 56207

```
name = beta7
short.name = beta7
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta8' hyperid = 56208

```
name = beta8
short.name = beta8
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta9' hyperid = 56209

```
name = beta9
short.name = beta9
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta10' hyperid = 56210

```
name = beta10
short.name = beta10
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Model '0poissonS'. Properties: doc = 'New 0-inflated Poisson Swap'

```
status = 'experimental'
survival = 'FALSE'
discrete = 'TRUE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog log sslogit logitoffset
       quantile pquantile robit sn powerlogit'
link.simple = 'default log'
pdf = '0inflated'
```

Number of hyperparameters is 10.

Hyperparameter 'theta1' hyperid = 56301

```
name = beta1
short.name = beta1
initial = -4
fixed = FALSE
prior = normal
param = -4 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta2' hyperid = 56302

```
name = beta2
short.name = beta2
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta3' hyperid = 56303

```
name = beta3
short.name = beta3
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta4' hyperid = 56304

```
name = beta4
short.name = beta4
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta5' hyperid = 56305

```
name = beta5
short.name = beta5
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta6' hyperid = 56306

```
name = beta6
short.name = beta6
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta7' hyperid = 56307

```
name = beta7
short.name = beta7
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta8' hyperid = 56308

```
name = beta8
short.name = beta8
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta9' hyperid = 56309

```
name = beta9
short.name = beta9
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta10' hyperid = 56310

```
name = beta10
short.name = beta10
initial = 0
fixed = FALSE
prior = normal
param = 0 10
to.theta = function(x) x
from.theta = function(x) x
```

Model 'bell'. Properties: doc = 'The Bell likelihood'

```
status = 'experimental'
survival = 'FALSE'
discrete = 'TRUE'
link = 'default log'
pdf = 'bell'
```

Number of hyperparameters is 0.

Model '0binomial'. Properties: doc = 'New 0-inflated Binomial'

```
status = 'experimental'
survival = 'FALSE'
discrete = 'TRUE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog log'
link.simple = 'default logit cauchit probit cloglog ccloglog'
pdf = '0inflated'
```

Number of hyperparameters is 10.

Hyperparameter 'theta1' hyperid = 56401

```
name = beta1
short.name = beta1
initial = -4
fixed = FALSE
prior = normal
param = -4 10
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta2' hyperid = 56402

```
name = beta2
short.name = beta2
```

```

    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta3' hyperid = 56403
    name = beta3
    short.name = beta3
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 56404
    name = beta4
    short.name = beta4
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 56405
    name = beta5
    short.name = beta5
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 56406
    name = beta6
    short.name = beta6
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 56407
    name = beta7
    short.name = beta7

```

```

    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 56408
    name = beta8
    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 56409
    name = beta9
    short.name = beta9
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 56410
    name = beta10
    short.name = beta10
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Model '0binomialS'. Properties: doc = 'New 0-inflated Binomial Swap'
    status = 'experimental'
    survival = 'FALSE'
    discrete = 'TRUE'
    link = 'default logit loga cauchit probit cloglog ccloglog loglog log'
    link.simple = 'default logit cauchit probit cloglog ccloglog'
    pdf = '0inflated'
Number of hyperparameters is 10.
Hyperparameter 'theta1' hyperid = 56501
    name = beta1
    short.name = beta1
    initial = -4

```

```

    fixed = FALSE
    prior = normal
    param = -4 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta2' hyperid = 56502
    name = beta2
    short.name = beta2
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta3' hyperid = 56503
    name = beta3
    short.name = beta3
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 56504
    name = beta4
    short.name = beta4
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 56505
    name = beta5
    short.name = beta5
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 56506
    name = beta6
    short.name = beta6
    initial = 0

```

```

    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 56507
    name = beta7
    short.name = beta7
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 56508
    name = beta8
    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 56509
    name = beta9
    short.name = beta9
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 56510
    name = beta10
    short.name = beta10
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 10
    to.theta = function(x) x
    from.theta = function(x) x
Model 'binomial'. Properties: doc = 'The Binomial likelihood'
    survival = 'FALSE'
    discrete = 'TRUE'
    link = 'default logit loga cauchit probit cloglog ccloglog loglog log sslogit logitoffset
           quantile pquantile robit sn powerlogit'

```


pdf = 'binomial'

Number of hyperparameters is 0.

Model 'xbinominal'. Properties: **doc** = 'The Binomial likelihood (expert version)'

survival = 'FALSE'

discrete = 'TRUE'

link = 'default logit loga cauchit probit cloglog ccloglog loglog log sslogit logitoffset
quantile pquantile robit sn powerlogit'

pdf = 'binomial'

status = 'experimental'

Number of hyperparameters is 0.

Model 'pom'. Properties: **doc** = 'Likelihood for the proportional odds model'

status = 'experimental'

survival = 'FALSE'

discrete = 'TRUE'

link = 'default identity'

pdf = 'pom'

Number of hyperparameters is 10.

Hyperparameter 'theta1' hyperid = 57101

name = theta1

short.name = theta1

initial = NA

fixed = FALSE

prior = dirichlet

param = 3

to.theta = function(x) x

from.theta = function(x) x

Hyperparameter 'theta2' hyperid = 57102

name = theta2

short.name = theta2

initial = NA

fixed = FALSE

prior = none

param =

to.theta = function(x) log(x)

from.theta = function(x) exp(x)

Hyperparameter 'theta3' hyperid = 57103

name = theta3

short.name = theta3

initial = NA

fixed = FALSE

prior = none

param =

to.theta = function(x) log(x)

from.theta = function(x) exp(x)

Hyperparameter 'theta4' hyperid = 57104

```

name = theta4
short.name = theta4
initial = NA
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
Hyperparameter 'theta5' hyperid = 57105
name = theta5
short.name = theta5
initial = NA
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
Hyperparameter 'theta6' hyperid = 57106
name = theta6
short.name = theta6
initial = NA
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
Hyperparameter 'theta7' hyperid = 57107
name = theta7
short.name = theta7
initial = NA
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
Hyperparameter 'theta8' hyperid = 57108
name = theta8
short.name = theta8
initial = NA
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
Hyperparameter 'theta9' hyperid = 57109

```

```

name = theta9
short.name = theta9
initial = NA
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta10' hyperid = 57110

```

name = theta10
short.name = theta10
initial = NA
fixed = FALSE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'bgev'. Properties: doc = 'The blended Generalized Extreme Value likelihood'

```

status = 'experimental'
survival = 'FALSE'
discrete = 'FALSE'
link = 'default identity log'
pdf = 'bgev'

```

Number of hyperparameters is 12.

Hyperparameter 'theta1' hyperid = 57201

```

name = spread
short.name = sd
initial = 0
fixed = FALSE
prior = loggamma
param = 1 3
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 57202

```

name = tail
short.name = xi
initial = -4
fixed = FALSE
prior = pc.gevtail
param = 7 0 0.5
to.theta = function(x, interval = c(REPLACE.ME.low, REPLACE.ME.high)) log(-(interval[1]
- x) / (interval[2] - x))
from.theta = function(x, interval = c(REPLACE.ME.low, REPLACE.ME.high)) interval[1]
+ (interval[2] - interval[1]) * exp(x) / (1.0 + exp(x))

```

Hyperparameter 'theta3' hyperid = 57203

```

    name = beta1
    short.name = beta1
    initial = NA
    fixed = FALSE
    prior = normal
    param = 0.300
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 57204
    name = beta2
    short.name = beta2
    initial = NA
    fixed = FALSE
    prior = normal
    param = 0.300
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 57205
    name = beta3
    short.name = beta3
    initial = NA
    fixed = FALSE
    prior = normal
    param = 0.300
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 57206
    name = beta4
    short.name = beta4
    initial = NA
    fixed = FALSE
    prior = normal
    param = 0.300
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 57207
    name = beta5
    short.name = beta5
    initial = NA
    fixed = FALSE
    prior = normal
    param = 0.300
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 57208

```

```

    name = beta6
    short.name = beta6
    initial = NA
    fixed = FALSE
    prior = normal
    param = 0 300
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 57209
    name = beta7
    short.name = beta7
    initial = NA
    fixed = FALSE
    prior = normal
    param = 0 300
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 57210
    name = beta8
    short.name = beta8
    initial = NA
    fixed = FALSE
    prior = normal
    param = 0 300
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 57211
    name = beta9
    short.name = beta9
    initial = NA
    fixed = FALSE
    prior = normal
    param = 0 300
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta12' hyperid = 57212
    name = beta10
    short.name = beta
    initial = NA
    fixed = FALSE
    prior = normal
    param = 0 300
    to.theta = function(x) x
    from.theta = function(x) x
Model 'gamma'. Properties: doc = 'The Gamma likelihood'

```

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default log quantile'
pdf = 'gamma'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 58001

```

name = precision parameter
short.name = prec
initial = 4.60517018598809
fixed = FALSE
prior = loggamma
param = 1 0.01
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'gammasurv'. Properties: **doc** = 'The Gamma likelihood (survival)'

```

survival = 'TRUE'
discrete = 'FALSE'
status = 'experimental'
link = 'default log neglog quantile'
pdf = 'gammasurv'

```

Number of hyperparameters is 11.

Hyperparameter 'theta1' hyperid = 58101

```

name = precision parameter
short.name = prec
initial = 0
fixed = FALSE
prior = loggamma
param = 1 0.01
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 58102

```

name = beta1
short.name = beta1
initial = -7
fixed = FALSE
prior = normal
param = -4 100
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta3' hyperid = 58103

```

name = beta2
short.name = beta2
initial = 0
fixed = FALSE
prior = normal

```

```

    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 58104
    name = beta3
    short.name = beta3
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 58105
    name = beta4
    short.name = beta4
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 58106
    name = beta5
    short.name = beta5
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 58107
    name = beta6
    short.name = beta6
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 58108
    name = beta7
    short.name = beta7
    initial = 0
    fixed = FALSE
    prior = normal

```

```

    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 58109
    name = beta8
    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x

```

```

Hyperparameter 'theta10' hyperid = 58110
    name = beta9
    short.name = beta9
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x

```

```

Hyperparameter 'theta11' hyperid = 58111
    name = beta10
    short.name = beta10
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x

```

```

Model 'gammajw'. Properties: doc = 'A special case of the Gamma likelihood'
    survival = 'FALSE'
    discrete = 'FALSE'
    link = 'default log neglog'
    pdf = 'gammajw'

```

Number of hyperparameters is 0.

```

Model 'gammajwsurv'. Properties: doc = 'A special case of the Gamma likelihood (survival)'
    survival = 'TRUE'
    discrete = 'FALSE'
    link = 'default log'
    pdf = 'gammajw'

```

Number of hyperparameters is 10.

```

Hyperparameter 'theta1' hyperid = 58200
    name = beta1
    short.name = beta1

```



```

    initial = -7
    fixed = FALSE
    prior = normal
    param = -4 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta2' hyperid = 58201
    name = beta2
    short.name = beta2
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta3' hyperid = 58202
    name = beta3
    short.name = beta3
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 58203
    name = beta4
    short.name = beta4
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 58204
    name = beta5
    short.name = beta5
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 58205
    name = beta6
    short.name = beta6

```

```

    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 58206
    name = beta7
    short.name = beta7
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 58207
    name = beta8
    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 58208
    name = beta9
    short.name = beta9
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 58209
    name = beta10
    short.name = beta10
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Model 'gammacount'. Properties: doc = 'A Gamma generalisation of the Poisson likelihood'
    survival = 'FALSE'
    discrete = 'FALSE'

```

```

link = 'default log'
status = 'experimental'
pdf = 'gammacount'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 59001

```

name = log alpha
short.name = alpha
initial = 0
fixed = FALSE
prior = pc.gammacount
param = 3
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'qkumar'. Properties: **doc** = 'A quantile version of the Kumar likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default logit loga cauchit'
pdf = 'qkumar'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 60001

```

name = precision parameter
short.name = prec
initial = 1
fixed = FALSE
prior = loggamma
param = 1 0.1
to.theta = function(x, sc = 0.1) log(x) / sc
from.theta = function(x, sc = 0.1) exp(sc * x)

```

Model 'qloglogistic'. Properties: **doc** = 'A quantile loglogistic likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default log neglog'
pdf = 'qloglogistic'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 60011

```

name = log alpha
short.name = alpha
initial = 1
fixed = FALSE
prior = loggamma
param = 25 25
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'qloglogisticsurv'. Properties: **doc** = 'A quantile loglogistic likelihood (survival)'

```

survival = 'TRUE'

```

```

discrete = 'FALSE'
link = 'default log neglog'
pdf = 'qloglogistic'

```

Number of hyperparameters is 11.

Hyperparameter 'theta1' hyperid = 60021

```

name = log alpha
short.name = alpha
initial = 1
fixed = FALSE
prior = loggamma
param = 25 25
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 60022

```

name = beta1
short.name = beta1
initial = -5
fixed = FALSE
prior = normal
param = -4 100
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta3' hyperid = 60023

```

name = beta2
short.name = beta2
initial = 0
fixed = FALSE
prior = normal
param = 0 100
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta4' hyperid = 60024

```

name = beta3
short.name = beta3
initial = 0
fixed = FALSE
prior = normal
param = 0 100
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta5' hyperid = 60025

```

name = beta4
short.name = beta4
initial = 0
fixed = FALSE

```

```

    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 60026
    name = beta5
    short.name = beta5
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 60027
    name = beta6
    short.name = beta6
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 60028
    name = beta7
    short.name = beta7
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 60029
    name = beta8
    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 60030
    name = beta9
    short.name = beta9
    initial = 0
    fixed = FALSE

```

```

prior = normal
param = 0 100
to.theta = function(x) x
from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 60031
  name = beta10
  short.name = beta10
  initial = 0
  fixed = FALSE
  prior = normal
  param = 0 100
  to.theta = function(x) x
  from.theta = function(x) x

```

Model 'beta'. Properties: **doc** = 'The Beta likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog'
pdf = 'beta'

```

Number of hyperparameters is 1.

```

Hyperparameter 'theta' hyperid = 61001
  name = precision parameter
  short.name = phi
  initial = 2.30258509299405
  fixed = FALSE
  prior = loggamma
  param = 1 0.1
  to.theta = function(x) log(x)
  from.theta = function(x) exp(x)

```

Model 'betabinomial'. Properties: **doc** = 'The Beta-Binomial likelihood'

```

survival = 'FALSE'
discrete = 'TRUE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
pdf = 'betabinomial'

```

Number of hyperparameters is 1.

```

Hyperparameter 'theta' hyperid = 62001
  name = overdispersion
  short.name = rho
  initial = 0
  fixed = FALSE
  prior = gaussian
  param = 0 0.4
  to.theta = function(x) log(x / (1 - x))
  from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'betabinomialna'. Properties: **doc** = 'The Beta-Binomial Normal approximation likelihood'

```

survival = 'FALSE'
discrete = 'TRUE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
pdf = 'betabinomialna'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 62101

```

name = overdispersion
short.name = rho
initial = 0
fixed = FALSE
prior = gaussian
param = 0 0.4
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'cbinomial'. Properties: doc = 'The clustered Binomial likelihood'

```

survival = 'FALSE'
discrete = 'TRUE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
status = 'experimental'
pdf = 'cbinomial'

```

Number of hyperparameters is 0.

Model 'nbinomial'. Properties: doc = 'The negBinomial likelihood'

```

survival = 'FALSE'
discrete = 'TRUE'
link = 'default log logoffset quantile'
pdf = 'nbinomial'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 63001

```

name = size
short.name = size
initial = 2.30258509299405
fixed = FALSE
prior = pc.mgamma
param = 7
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'nbinomial2'. Properties: doc = 'The negBinomial2 likelihood'

```

survival = 'FALSE'
discrete = 'TRUE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog'
pdf = 'nbinomial'

```

Number of hyperparameters is 0.

Model 'cennbinomial2'. Properties: doc = 'The CenNegBinomial2 likelihood (similar to cen-poisson2)'

```

status = 'experimental'

```

```

survival = 'FALSE'
discrete = 'TRUE'
link = 'default log logoffset quantile'
pdf = 'cennbinomial2'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 63101

```

name = size
short.name = size
initial = 2.30258509299405
fixed = FALSE
prior = pc.mgamma
param = 7
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'simplex'. Properties: **doc** = 'The simplex likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog'
pdf = 'simplex'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 64001

```

name = log precision
short.name = prec
initial = 4
fixed = FALSE
prior = loggamma
param = 1 5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'gaussian'. Properties: **doc** = 'The Gaussian likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default identity logit loga cauchit log logoffset'
pdf = 'gaussian'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 65001

```

name = log precision
short.name = prec
initial = 4
fixed = FALSE
prior = loggamma
param = 1 5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 65002


```

name = log precision offset
short.name = preoffset
initial = 72.0873067782343
fixed = TRUE
prior = none
param =
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'gaussianjw'. Properties: doc = 'The GaussianJW likelihood'

```

status = 'experimental'
survival = 'FALSE'
discrete = 'FALSE'
link = 'default logit probit'
pdf = 'gaussianjw'

```

Number of hyperparameters is 3.

Hyperparameter 'theta1' hyperid = 65101

```

name = beta1
short.name = beta1
initial = 0
fixed = FALSE
prior = normal
param = 0 100
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta2' hyperid = 65102

```

name = beta2
short.name = beta2
initial = 1
fixed = FALSE
prior = normal
param = 1 100
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta3' hyperid = 65103

```

name = beta3
short.name = beta3
initial = -1
fixed = FALSE
prior = normal
param = -1 100
to.theta = function(x) x
from.theta = function(x) x

```

Model 'agaussian'. Properties: doc = 'The aggregated Gaussian likelihood'

```

status = 'experimental'
survival = 'FALSE'

```

```

discrete = 'FALSE'
link = 'default identity logit loga cauchit log logoffset'
pdf = 'agaussian'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 66001

```

name = log precision
short.name = prec
initial = 4
fixed = FALSE
prior = loggamma
param = 1 5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'circularnormal'. Properties: **doc** = 'The circular Gaussian likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default tan'
pdf = 'circular-normal'
status = 'experimental'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 67001

```

name = log precision parameter
short.name = prec
initial = 2
fixed = FALSE
prior = loggamma
param = 1 0.01
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'wrappedcauchy'. Properties: **doc** = 'The wrapped Cauchy likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default tan'
pdf = 'wrapped-cauchy'
status = 'disabled'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 68001

```

name = log precision parameter
short.name = prec
initial = 2
fixed = FALSE
prior = loggamma
param = 1 0.005
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'iidgamma'. Properties: `doc = '(experimental)'`

```
survival = 'FALSE'
discrete = 'FALSE'
link = 'default identity'
pdf = 'iidgamma'
status = 'experimental'
```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 69001

```
name = logshape
short.name = shape
initial = 0
fixed = FALSE
prior = loggamma
param = 100 100
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Hyperparameter 'theta2' hyperid = 69002

```
name = lograte
short.name = rate
initial = 0
fixed = FALSE
prior = loggamma
param = 100 100
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Model 'iidlogitbeta'. Properties: `doc = '(experimental)'`

```
survival = 'FALSE'
discrete = 'FALSE'
link = 'default logit loga'
pdf = 'iidlogitbeta'
status = 'experimental'
```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 70001

```
name = log.a
short.name = a
initial = 1
fixed = FALSE
prior = loggamma
param = 1 1
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Hyperparameter 'theta2' hyperid = 70002

```
name = log.b
short.name = b
initial = 1
```

```

fixed = FALSE
prior = loggamma
param = 1 1
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'loggammafrailty'. Properties: **doc** = '(experimental)'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default identity'
pdf = 'loggammafrailty'
status = 'experimental'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 71001

```

name = log precision
short.name = prec
initial = 4
fixed = FALSE
prior = loggamma
param = 1 5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'logistic'. Properties: **doc** = 'The Logistic likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default identity'
pdf = 'logistic'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 72001

```

name = log precision
short.name = prec
initial = 1
fixed = FALSE
prior = loggamma
param = 1 5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'sn'. Properties: **doc** = 'The Skew-Normal likelihood'

```

status = 'experimental'
survival = 'FALSE'
discrete = 'FALSE'
link = 'default identity'
pdf = 'sn'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 74001

```

name = log precision

```

```

short.name = prec
initial = 4
fixed = FALSE
prior = loggamma
param = 1.5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 74002
  name = logit skew
  short.name = skew
  initial = 0.00123456789
  fixed = FALSE
  prior = pc.sn
  param = 10
  to.theta = function(x, skew.max = 0.988) log((1 + x / skew.max) / (1 - x / skew.max))
  from.theta = function(x, skew.max = 0.988) skew.max * (2 * exp(x) / (1 + exp(x))
    - 1)

```

Model 'gev'. Properties: **doc** = 'The Generalized Extreme Value likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default identity'
status = 'disabled: Use likelihood model 'bgev' instead; see inla.doc('bgev')'
pdf = 'gev'

```

Number of hyperparameters is 2.

```

Hyperparameter 'theta1' hyperid = 76001
  name = log precision
  short.name = prec
  initial = 4
  fixed = FALSE
  prior = loggamma
  param = 1.5e-05
  to.theta = function(x) log(x)
  from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 76002
  name = tail parameter
  short.name = tail
  initial = 0
  fixed = FALSE
  prior = gaussian
  param = 0.25
  to.theta = function(x) x
  from.theta = function(x) x

```

Model 'lognormal'. Properties: **doc** = 'The log-Normal likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'

```

```
link = 'default identity'
```

```
pdf = 'lognormal'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 77101

```
name = log precision
```

```
short.name = prec
```

```
initial = 0
```

```
fixed = FALSE
```

```
prior = loggamma
```

```
param = 1 5e-05
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Model 'lognormalsurv'. Properties: doc = 'The log-Normal likelihood (survival)'

```
survival = 'TRUE'
```

```
discrete = 'FALSE'
```

```
link = 'default identity'
```

```
pdf = 'lognormal'
```

Number of hyperparameters is 11.

Hyperparameter 'theta' hyperid = 78001

```
name = log precision
```

```
short.name = prec
```

```
initial = 0
```

```
fixed = FALSE
```

```
prior = loggamma
```

```
param = 1 5e-05
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Hyperparameter 'theta2' hyperid = 78002

```
name = beta1
```

```
short.name = beta1
```

```
initial = -7
```

```
fixed = FALSE
```

```
prior = normal
```

```
param = -4 100
```

```
to.theta = function(x) x
```

```
from.theta = function(x) x
```

Hyperparameter 'theta3' hyperid = 78003

```
name = beta2
```

```
short.name = beta2
```

```
initial = 0
```

```
fixed = FALSE
```

```
prior = normal
```

```
param = 0 100
```

```
to.theta = function(x) x
```

```
from.theta = function(x) x
```

```
Hyperparameter 'theta4' hyperid = 78004
  name = beta3
  short.name = beta3
  initial = 0
  fixed = FALSE
  prior = normal
  param = 0 100
  to.theta = function(x) x
  from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 78005
  name = beta4
  short.name = beta4
  initial = 0
  fixed = FALSE
  prior = normal
  param = 0 100
  to.theta = function(x) x
  from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 78006
  name = beta5
  short.name = beta5
  initial = 0
  fixed = FALSE
  prior = normal
  param = 0 100
  to.theta = function(x) x
  from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 78007
  name = beta6
  short.name = beta6
  initial = 0
  fixed = FALSE
  prior = normal
  param = 0 100
  to.theta = function(x) x
  from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 78008
  name = beta7
  short.name = beta7
  initial = 0
  fixed = FALSE
  prior = normal
  param = 0 100
  to.theta = function(x) x
  from.theta = function(x) x
```

Hyperparameter 'theta9' hyperid = 78009

```
name = beta8
short.name = beta8
initial = 0
fixed = FALSE
prior = normal
param = 0 100
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta10' hyperid = 78010

```
name = beta9
short.name = beta9
initial = 0
fixed = FALSE
prior = normal
param = 0 100
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta11' hyperid = 78011

```
name = beta10
short.name = beta10
initial = 0
fixed = FALSE
prior = normal
param = 0 100
to.theta = function(x) x
from.theta = function(x) x
```

Model 'exponential'. Properties: doc = 'The Exponential likelihood'

```
survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'exponential'
```

Number of hyperparameters is 0.

Model 'exponentialsurv'. Properties: doc = 'The Exponential likelihood (survival)'

```
survival = 'TRUE'
discrete = 'FALSE'
link = 'default log neglog'
pdf = 'exponential'
```

Number of hyperparameters is 10.

Hyperparameter 'theta1' hyperid = 78020

```
name = beta1
short.name = beta1
initial = -4
fixed = FALSE
prior = normal
```



```

    param = -1 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta2' hyperid = 78021
    name = beta2
    short.name = beta2
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta3' hyperid = 78022
    name = beta3
    short.name = beta3
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 78023
    name = beta4
    short.name = beta4
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 78024
    name = beta5
    short.name = beta5
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 78025
    name = beta6
    short.name = beta6
    initial = 0
    fixed = FALSE
    prior = normal

```

```

    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 78026
    name = beta7
    short.name = beta7
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 78027
    name = beta8
    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 78028
    name = beta9
    short.name = beta9
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 78029
    name = beta10
    short.name = beta10
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Model 'coxph'. Properties: doc = 'Cox-proportional hazard likelihood'
    survival = 'TRUE'
    discrete = 'TRUE'
    link = 'default log neglog'
    pdf = 'coxph'
    Number of hyperparameters is 0.

```

Model 'weibull'. Properties: `doc = 'The Weibull likelihood'`

```
survival = 'FALSE'
discrete = 'FALSE'
link = 'default log neglog quantile'
pdf = 'weibull'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 79001

```
name = log alpha
short.name = alpha
initial = -2
fixed = FALSE
prior = pc.alphaw
param = 5
to.theta = function(x, sc = 0.1) log(x) / sc
from.theta = function(x, sc = 0.1) exp(sc * x)
```

Model 'weibullsurv'. Properties: `doc = 'The Weibull likelihood (survival)'`

```
survival = 'TRUE'
discrete = 'FALSE'
link = 'default log neglog quantile'
pdf = 'weibull'
```

Number of hyperparameters is 11.

Hyperparameter 'theta' hyperid = 79101

```
name = log alpha
short.name = alpha
initial = -2
fixed = FALSE
prior = pc.alphaw
param = 5
to.theta = function(x, sc = 0.1) log(x) / sc
from.theta = function(x, sc = 0.1) exp(sc * x)
```

Hyperparameter 'theta2' hyperid = 79102

```
name = beta1
short.name = beta1
initial = -7
fixed = FALSE
prior = normal
param = -4 100
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta3' hyperid = 79103

```
name = beta2
short.name = beta2
initial = 0
fixed = FALSE
prior = normal
```

```

    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 79104
    name = beta3
    short.name = beta3
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 79105
    name = beta4
    short.name = beta4
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 79106
    name = beta5
    short.name = beta5
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 79107
    name = beta6
    short.name = beta6
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 79108
    name = beta7
    short.name = beta7
    initial = 0
    fixed = FALSE
    prior = normal

```

```

    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 79109
    name = beta8
    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 79110
    name = beta9
    short.name = beta9
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 79111
    name = beta10
    short.name = beta10
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Model 'loglogistic'. Properties: doc = 'The loglogistic likelihood'
    survival = 'FALSE'
    discrete = 'FALSE'
    link = 'default log neglog'
    pdf = 'loglogistic'
Number of hyperparameters is 1.
Hyperparameter 'theta' hyperid = 80001
    name = log alpha
    short.name = alpha
    initial = 1
    fixed = FALSE
    prior = loggamma
    param = 25 25
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)

```

Model 'loglogisticsurv'. Properties: `doc = 'The loglogistic likelihood (survival)'`

`survival = 'TRUE'`

`discrete = 'FALSE'`

`link = 'default log neglog'`

`pdf = 'loglogistic'`

Number of hyperparameters is 11.

Hyperparameter 'theta1' hyperid = 80011

`name = log alpha`

`short.name = alpha`

`initial = 1`

`fixed = FALSE`

`prior = loggamma`

`param = 25 25`

`to.theta = function(x) log(x)`

`from.theta = function(x) exp(x)`

Hyperparameter 'theta2' hyperid = 80012

`name = beta1`

`short.name = beta1`

`initial = -5`

`fixed = FALSE`

`prior = normal`

`param = -4 100`

`to.theta = function(x) x`

`from.theta = function(x) x`

Hyperparameter 'theta3' hyperid = 80013

`name = beta2`

`short.name = beta2`

`initial = 0`

`fixed = FALSE`

`prior = normal`

`param = 0 100`

`to.theta = function(x) x`

`from.theta = function(x) x`

Hyperparameter 'theta4' hyperid = 80014

`name = beta3`

`short.name = beta3`

`initial = 0`

`fixed = FALSE`

`prior = normal`

`param = 0 100`

`to.theta = function(x) x`

`from.theta = function(x) x`

Hyperparameter 'theta5' hyperid = 80015

`name = beta4`

`short.name = beta4`

```

    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 80016
    name = beta5
    short.name = beta5
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 80017
    name = beta6
    short.name = beta6
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 80018
    name = beta7
    short.name = beta7
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 80019
    name = beta8
    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 80020
    name = beta9
    short.name = beta9

```

```

initial = 0
fixed = FALSE
prior = normal
param = 0 100
to.theta = function(x) x
from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 80021
  name = beta10
  short.name = beta10
  initial = 0
  fixed = FALSE
  prior = normal
  param = 0 100
  to.theta = function(x) x
  from.theta = function(x) x

```

Model 'stochvol'. Properties: **doc** = 'The Gaussian stochvol likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'stochvolgaussian'

```

Number of hyperparameters is 1.

```

Hyperparameter 'theta' hyperid = 82001
  name = log precision
  short.name = prec
  initial = 500
  fixed = TRUE
  prior = loggamma
  param = 1 0.005
  to.theta = function(x) log(x)
  from.theta = function(x) exp(x)

```

Model 'stochvolns'. Properties: **doc** = 'The SkewNormal stochvol likelihood'

```

status = 'experimental'
survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'stochvolns'

```

Number of hyperparameters is 2.

```

Hyperparameter 'theta1' hyperid = 82101
  name = logit skew
  short.name = skew
  initial = 0.00123456789
  fixed = FALSE
  prior = pc.sn
  param = 10
  to.theta = function(x, skew.max = 0.988) log((1 + x / skew.max) / (1 - x / skew.max))

```



```

from.theta = function(x, skew.max = 0.988) skew.max * (2 * exp(x) / (1 + exp(x))
- 1)

```

Hyperparameter 'theta2' hyperid = 82102

```

name = log precision
short.name = prec
initial = 500
fixed = TRUE
prior = loggamma
param = 1 0.005
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'stochvolt'. Properties: **doc** = 'The Student-t stochvol likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'stochvolt'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 83001

```

name = log degrees of freedom
short.name = dof
initial = 4
fixed = FALSE
prior = pc.dof
param = 15 0.5
to.theta = function(x) log(x - 2)
from.theta = function(x) 2 + exp(x)

```

Model 'stochvolnig'. Properties: **doc** = 'The Normal inverse Gaussian stochvol likelihood'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'stochvolnig'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 84001

```

name = skewness
short.name = skew
initial = 0
fixed = FALSE
prior = gaussian
param = 0 10
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta2' hyperid = 84002

```

name = shape
short.name = shape
initial = 0

```

```

fixed = FALSE
prior = loggamma
param = 1 0.5
to.theta = function(x) log(x - 1)
from.theta = function(x) 1 + exp(x)

```

Model 'zeroinflatedpoisson0'. Properties: **doc** = 'Zero-inflated Poisson, type 0'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'zeroinflated'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 85001

```

name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'zeroinflatedpoisson1'. Properties: **doc** = 'Zero-inflated Poisson, type 1'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'zeroinflated'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 86001

```

name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'zeroinflatedpoisson2'. Properties: **doc** = 'Zero-inflated Poisson, type 2'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'zeroinflated'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 87001

```

name = log alpha
short.name = a
initial = 0.693147180559945

```

```

fixed = FALSE
prior = gaussian
param = 0.693147180559945 1
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'zeroinflatedcenpoisson0'. Properties: **doc** = 'Zero-inflated censored Poisson, type 0'

```

status = 'experimental'
survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'zeroinflated'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 87101

```

name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'zeroinflatedcenpoisson1'. Properties: **doc** = 'Zero-inflated censored Poisson, type 1'

```

status = 'experimental'
survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'zeroinflated'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 87201

```

name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'zeroinflatedbetabinomial0'. Properties: **doc** = 'Zero-inflated Beta-Binomial, type 0'

```

survival = 'FALSE'
discrete = 'TRUE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
pdf = 'zeroinflated'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 88001

```

name = overdispersion

```

```

short.name = rho
initial = 0
fixed = FALSE
prior = gaussian
param = 0 0.4
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Hyperparameter 'theta2' hyperid = 88002

```

name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'zeroinflatedbetabinomial1'. Properties: **doc** = 'Zero-inflated Beta-Binomial, type 1'

```

survival = 'FALSE'
discrete = 'TRUE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
pdf = 'zeroinflated'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 89001

```

name = overdispersion
short.name = rho
initial = 0
fixed = FALSE
prior = gaussian
param = 0 0.4
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Hyperparameter 'theta2' hyperid = 89002

```

name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Model 'zeroinflatedbinomial0'. Properties: **doc** = 'Zero-inflated Binomial, type 0'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
pdf = 'zeroinflated'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 90001

```
name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))
```

Model 'zeroinflatedbinomial1'. Properties: doc = 'Zero-inflated Binomial, type 1'

```
survival = 'FALSE'
discrete = 'FALSE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
pdf = 'zeroinflated'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 91001

```
name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))
```

Model 'zeroinflatedbinomial2'. Properties: doc = 'Zero-inflated Binomial, type 2'

```
survival = 'FALSE'
discrete = 'FALSE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
pdf = 'zeroinflated'
```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 92001

```
name = alpha
short.name = alpha
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Model 'zeroninflatedbinomial2'. Properties: doc = 'Zero and N inflated binomial, type 2'

```
survival = 'FALSE'
discrete = 'FALSE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
pdf = 'NA'
```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 93001

```
name = alpha1
short.name = alpha1
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Hyperparameter 'theta2' hyperid = 93002

```
name = alpha2
short.name = alpha2
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Model 'zeroinflatedbinomial3'. Properties: doc = 'Zero and N inflated binomial, type 3'

```
status = 'experimental'
survival = 'FALSE'
discrete = 'FALSE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
pdf = 'zeroinflated'
```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 93101

```
name = alpha0
short.name = alpha0
initial = 1
fixed = FALSE
prior = loggamma
param = 1 1
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Hyperparameter 'theta2' hyperid = 93102

```
name = alphaN
short.name = alphaN
initial = 1
fixed = FALSE
prior = loggamma
param = 1 1
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Model 'zeroinflatedbetabinomial2'. Properties: doc = 'Zero inflated Beta-Binomial, type 2'

```
survival = 'FALSE'
```

```

discrete = 'FALSE'
link = 'default logit loga cauchit probit cloglog ccloglog loglog robit sn'
pdf = 'zeroinflated'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 94001

```

name = log alpha
short.name = a
initial = 0.693147180559945
fixed = FALSE
prior = gaussian
param = 0.693147180559945 1
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 94002

```

name = beta
short.name = b
initial = 0
fixed = FALSE
prior = gaussian
param = 0 1
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'zeroinflatednbinomial0'. Properties: doc = 'Zero inflated negBinomial, type 0'

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'zeroinflated'

```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 95001

```

name = log size
short.name = size
initial = 2.30258509299405
fixed = FALSE
prior = pc.mgamma
param = 7
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta2' hyperid = 95002

```

name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))

```

```
from.theta = function(x) exp(x) / (1 + exp(x))
```

Model 'zeroinflatednbinomial1'. Properties: doc = 'Zero inflated negBinomial, type 1'

```
survival = 'FALSE'
```

```
discrete = 'FALSE'
```

```
link = 'default log'
```

```
pdf = 'zeroinflated'
```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 96001

```
name = log size
```

```
short.name = size
```

```
initial = 2.30258509299405
```

```
fixed = FALSE
```

```
prior = pc.mgamma
```

```
param = 7
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Hyperparameter 'theta2' hyperid = 96002

```
name = logit probability
```

```
short.name = prob
```

```
initial = -1
```

```
fixed = FALSE
```

```
prior = gaussian
```

```
param = -1 0.2
```

```
to.theta = function(x) log(x / (1 - x))
```

```
from.theta = function(x) exp(x) / (1 + exp(x))
```

Model 'zeroinflatednbinomial1strata2'. Properties: doc = 'Zero inflated negBinomial, type 1, strata 2'

```
status = 'experimental'
```

```
survival = 'FALSE'
```

```
discrete = 'FALSE'
```

```
link = 'default log'
```

```
pdf = 'zeroinflated'
```

Number of hyperparameters is 11.

Hyperparameter 'theta1' hyperid = 97001

```
name = log size
```

```
short.name = size
```

```
initial = 2.30258509299405
```

```
fixed = FALSE
```

```
prior = pc.mgamma
```

```
param = 7
```

```
to.theta = function(x) log(x)
```

```
from.theta = function(x) exp(x)
```

Hyperparameter 'theta2' hyperid = 97002

```
name = logit probability 1
```

```
short.name = prob1
```



```

initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))
Hyperparameter 'theta3' hyperid = 97003
  name = logit probability 2
  short.name = prob2
  initial = -1
  fixed = FALSE
  prior = gaussian
  param = -1 0.2
  to.theta = function(x) log(x / (1 - x))
  from.theta = function(x) exp(x) / (1 + exp(x))
Hyperparameter 'theta4' hyperid = 97004
  name = logit probability 3
  short.name = prob3
  initial = -1
  fixed = TRUE
  prior = gaussian
  param = -1 0.2
  to.theta = function(x) log(x / (1 - x))
  from.theta = function(x) exp(x) / (1 + exp(x))
Hyperparameter 'theta5' hyperid = 97005
  name = logit probability 4
  short.name = prob4
  initial = -1
  fixed = TRUE
  prior = gaussian
  param = -1 0.2
  to.theta = function(x) log(x / (1 - x))
  from.theta = function(x) exp(x) / (1 + exp(x))
Hyperparameter 'theta6' hyperid = 97006
  name = logit probability 5
  short.name = prob5
  initial = -1
  fixed = TRUE
  prior = gaussian
  param = -1 0.2
  to.theta = function(x) log(x / (1 - x))
  from.theta = function(x) exp(x) / (1 + exp(x))
Hyperparameter 'theta7' hyperid = 97007
  name = logit probability 6
  short.name = prob6

```

```

    initial = -1
    fixed = TRUE
    prior = gaussian
    param = -1 0.2
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) exp(x) / (1 + exp(x))
Hyperparameter 'theta8' hyperid = 97008
    name = logit probability 7
    short.name = prob7
    initial = -1
    fixed = TRUE
    prior = gaussian
    param = -1 0.2
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) exp(x) / (1 + exp(x))
Hyperparameter 'theta9' hyperid = 97009
    name = logit probability 8
    short.name = prob8
    initial = -1
    fixed = TRUE
    prior = gaussian
    param = -1 0.2
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) exp(x) / (1 + exp(x))
Hyperparameter 'theta10' hyperid = 97010
    name = logit probability 9
    short.name = prob9
    initial = -1
    fixed = TRUE
    prior = gaussian
    param = -1 0.2
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) exp(x) / (1 + exp(x))
Hyperparameter 'theta11' hyperid = 97011
    name = logit probability 10
    short.name = prob10
    initial = -1
    fixed = TRUE
    prior = gaussian
    param = -1 0.2
    to.theta = function(x) log(x / (1 - x))
    from.theta = function(x) exp(x) / (1 + exp(x))
Model 'zeroinflatednbinomial1strata3'. Properties: doc = 'Zero inflated negBinomial, type 1,
    strata 3'
    status = 'experimental'

```

```

survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'zeroinflated'

```

Number of hyperparameters is 11.

Hyperparameter 'theta1' hyperid = 98001

```

name = logit probability
short.name = prob
initial = -1
fixed = FALSE
prior = gaussian
param = -1 0.2
to.theta = function(x) log(x / (1 - x))
from.theta = function(x) exp(x) / (1 + exp(x))

```

Hyperparameter 'theta2' hyperid = 98002

```

name = log size 1
short.name = size1
initial = 2.30258509299405
fixed = FALSE
prior = pc.mgamma
param = 7
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta3' hyperid = 98003

```

name = log size 2
short.name = size2
initial = 2.30258509299405
fixed = FALSE
prior = pc.mgamma
param = 7
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta4' hyperid = 98004

```

name = log size 3
short.name = size3
initial = 2.30258509299405
fixed = TRUE
prior = pc.mgamma
param = 7
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Hyperparameter 'theta5' hyperid = 98005

```

name = log size 4
short.name = size4
initial = 2.30258509299405

```

```

    fixed = TRUE
    prior = pc.mgamma
    param = 7
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta6' hyperid = 98006
    name = log size 5
    short.name = size5
    initial = 2.30258509299405
    fixed = TRUE
    prior = pc.mgamma
    param = 7
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta7' hyperid = 98007
    name = log size 6
    short.name = size6
    initial = 2.30258509299405
    fixed = TRUE
    prior = pc.mgamma
    param = 7
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta8' hyperid = 98008
    name = log size 7
    short.name = size7
    initial = 2.30258509299405
    fixed = TRUE
    prior = pc.mgamma
    param = 7
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta9' hyperid = 98009
    name = log size 8
    short.name = size8
    initial = 2.30258509299405
    fixed = TRUE
    prior = pc.mgamma
    param = 7
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta10' hyperid = 98010
    name = log size 9
    short.name = size9
    initial = 2.30258509299405

```

```

    fixed = TRUE
    prior = pc.mgamma
    param = 7
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta11' hyperid = 98011
    name = log size 10
    short.name = size10
    initial = 2.30258509299405
    fixed = TRUE
    prior = pc.mgamma
    param = 7
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Model 'zeroinflatednbinomial2'. Properties: doc = 'Zero inflated negBinomial, type 2'
    survival = 'FALSE'
    discrete = 'FALSE'
    link = 'default log'
    pdf = 'zeroinflated'
Number of hyperparameters is 2.
Hyperparameter 'theta1' hyperid = 99001
    name = log size
    short.name = size
    initial = 2.30258509299405
    fixed = FALSE
    prior = pc.mgamma
    param = 7
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 99002
    name = log alpha
    short.name = a
    initial = 0.693147180559945
    fixed = FALSE
    prior = gaussian
    param = 2 1
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Model 't'. Properties: doc = 'Student-t likelihood'
    survival = 'FALSE'
    discrete = 'FALSE'
    link = 'default identity'
    pdf = 'student-t'
Number of hyperparameters is 2.
Hyperparameter 'theta1' hyperid = 100001

```

```

    name = log precision
    short.name = prec
    initial = 0
    fixed = FALSE
    prior = loggamma
    param = 1 5e-05
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 100002
    name = log degrees of freedom
    short.name = dof
    initial = 5
    fixed = FALSE
    prior = pc.dof
    param = 15 0.5
    to.theta = function(x) log(x - 2)
    from.theta = function(x) 2 + exp(x)
Model 'tstrata'. Properties: doc = 'A stratified version of the Student-t likelihood'
    survival = 'FALSE'
    discrete = 'FALSE'
    link = 'default identity'
    pdf = 'tstrata'
Number of hyperparameters is 11.
Hyperparameter 'theta1' hyperid = 101001
    name = log degrees of freedom
    short.name = dof
    initial = 4
    fixed = FALSE
    prior = pc.dof
    param = 15 0.5
    to.theta = function(x) log(x - 5)
    from.theta = function(x) 5 + exp(x)
Hyperparameter 'theta2' hyperid = 101002
    name = log precision1
    short.name = prec1
    initial = 2
    fixed = FALSE
    prior = loggamma
    param = 1 5e-05
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta3' hyperid = 101003
    name = log precision2
    short.name = prec2
    initial = 2

```

```

fixed = FALSE
prior = loggamma
param = 1 5e-05
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
Hyperparameter 'theta4' hyperid = 101004
  name = log precision3
  short.name = prec3
  initial = 2
  fixed = FALSE
  prior = loggamma
  param = 1 5e-05
  to.theta = function(x) log(x)
  from.theta = function(x) exp(x)
Hyperparameter 'theta5' hyperid = 101005
  name = log precision4
  short.name = prec4
  initial = 2
  fixed = FALSE
  prior = loggamma
  param = 1 5e-05
  to.theta = function(x) log(x)
  from.theta = function(x) exp(x)
Hyperparameter 'theta6' hyperid = 101006
  name = log precision5
  short.name = prec5
  initial = 2
  fixed = FALSE
  prior = loggamma
  param = 1 5e-05
  to.theta = function(x) log(x)
  from.theta = function(x) exp(x)
Hyperparameter 'theta7' hyperid = 101007
  name = log precision6
  short.name = prec6
  initial = 2
  fixed = FALSE
  prior = loggamma
  param = 1 5e-05
  to.theta = function(x) log(x)
  from.theta = function(x) exp(x)
Hyperparameter 'theta8' hyperid = 101008
  name = log precision7
  short.name = prec7
  initial = 2

```

```

    fixed = FALSE
    prior = loggamma
    param = 1.5e-05
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta9' hyperid = 101009
    name = log precision8
    short.name = prec8
    initial = 2
    fixed = FALSE
    prior = loggamma
    param = 1.5e-05
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta10' hyperid = 101010
    name = log precision9
    short.name = prec9
    initial = 2
    fixed = FALSE
    prior = loggamma
    param = 1.5e-05
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta11' hyperid = 101011
    name = log precision10
    short.name = prec10
    initial = 2
    fixed = FALSE
    prior = loggamma
    param = 1.5e-05
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Model 'nmix'. Properties: doc = 'Binomial-Poisson mixture'
    status = 'experimental'
    survival = 'FALSE'
    discrete = 'TRUE'
    link = 'default logit loga probit'
    pdf = 'nmix'
Number of hyperparameters is 15.
Hyperparameter 'theta1' hyperid = 101101
    name = beta1
    short.name = beta1
    initial = 2.30258509299405
    fixed = FALSE
    prior = normal

```



```

    param = 0 0.5
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta2' hyperid = 101102
    name = beta2
    short.name = beta2
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta3' hyperid = 101103
    name = beta3
    short.name = beta3
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta4' hyperid = 101104
    name = beta4
    short.name = beta4
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 101105
    name = beta5
    short.name = beta5
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 101106
    name = beta6
    short.name = beta6
    initial = 0
    fixed = FALSE
    prior = normal

```

```

    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 101107
    name = beta7
    short.name = beta7
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 101108
    name = beta8
    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 101109
    name = beta9
    short.name = beta9
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 101110
    name = beta10
    short.name = beta10
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 101111
    name = beta11
    short.name = beta11
    initial = 0
    fixed = FALSE
    prior = normal

```

```

    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta12' hyperid = 101112
    name = beta12
    short.name = beta12
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta13' hyperid = 101113
    name = beta13
    short.name = beta13
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta14' hyperid = 101114
    name = beta14
    short.name = beta14
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta15' hyperid = 101115
    name = beta15
    short.name = beta15
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Model 'nmixnb'. Properties: doc = 'NegBinomial-Poisson mixture'
    status = 'experimental'
    survival = 'FALSE'
    discrete = 'TRUE'
    link = 'default logit loga probit'
    pdf = 'nmixnb'

```

Number of hyperparameters is 16.

Hyperparameter 'theta1' hyperid = 101121

```

name = beta1
short.name = beta1
initial = 2.30258509299405
fixed = FALSE
prior = normal
param = 0 0.5
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta2' hyperid = 101122

```

name = beta2
short.name = beta2
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta3' hyperid = 101123

```

name = beta3
short.name = beta3
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta4' hyperid = 101124

```

name = beta4
short.name = beta4
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta5' hyperid = 101125

```

name = beta5
short.name = beta5
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x

```

Hyperparameter 'theta6' hyperid = 101126

```
name = beta6
short.name = beta6
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta7' hyperid = 101127

```
name = beta7
short.name = beta7
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta8' hyperid = 101128

```
name = beta8
short.name = beta8
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta9' hyperid = 101129

```
name = beta9
short.name = beta9
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta10' hyperid = 101130

```
name = beta10
short.name = beta10
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta11' hyperid = 101131

name = beta11
short.name = beta11
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x

Hyperparameter 'theta12' hyperid = 101132

name = beta12
short.name = beta12
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x

Hyperparameter 'theta13' hyperid = 101133

name = beta13
short.name = beta13
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x

Hyperparameter 'theta14' hyperid = 101134

name = beta14
short.name = beta14
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x

Hyperparameter 'theta15' hyperid = 101135

name = beta15
short.name = beta15
initial = 0
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x) x
from.theta = function(x) x

Hyperparameter 'theta16' hyperid = 101136

```

name = overdispersion
short.name = overdispersion
initial = 0
fixed = FALSE
prior = pc.gamma
param = 7
to.theta = function(x) log(x)
from.theta = function(x) exp(x)

```

Model 'gp'. Properties: doc = 'Generalized Pareto likelihood'

```

status = 'experimental'
survival = 'FALSE'
discrete = 'TRUE'
link = 'default quantile'
pdf = 'genPareto'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 101201

```

name = tail
short.name = xi
initial = -4
fixed = FALSE
prior = pc.gevtail
param = 7 0 0.5
to.theta = function(x, interval = c(REPLACE.ME.low, REPLACE.ME.high)) log(-(interval[1]
- x) / (interval[2] - x))
from.theta = function(x, interval = c(REPLACE.ME.low, REPLACE.ME.high)) interval[1]
+ (interval[2] - interval[1]) * exp(x) / (1.0 + exp(x))

```

Model 'dgp'. Properties: doc = 'Discrete generalized Pareto likelihood'

```

status = 'experimental'
survival = 'FALSE'
discrete = 'TRUE'
link = 'default quantile'
pdf = 'dgp'

```

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 101301

```

name = tail
short.name = xi
initial = 2
fixed = FALSE
prior = pc.gevtail
param = 7 0 0.5
to.theta = function(x, interval = c(REPLACE.ME.low, REPLACE.ME.high)) log(-(interval[1]
- x) / (interval[2] - x))
from.theta = function(x, interval = c(REPLACE.ME.low, REPLACE.ME.high)) interval[1]
+ (interval[2] - interval[1]) * exp(x) / (1.0 + exp(x))

```

Model 'logperiodogram'. Properties: **doc** = 'Likelihood for the log-periodogram'

```
survival = 'FALSE'
discrete = 'FALSE'
link = 'default identity'
pdf = 'NA'
```

Number of hyperparameters is 0.

Model 'tweedie'. Properties: **doc** = 'Tweedie distribution'

```
status = 'experimental'
survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'tweedie'
```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 102101

```
name = p
short.name = p
initial = 0
fixed = FALSE
prior = normal
param = 0 100
to.theta = function(x, interval = c(1.0, 2.0)) log(-(interval[1] - x) / (interval[2] - x))
from.theta = function(x, interval = c(1.0, 2.0)) interval[1] + (interval[2] - interval[1]) * exp(x) / (1.0 + exp(x))
```

Hyperparameter 'theta2' hyperid = 102201

```
name = dispersion
short.name = phi
initial = -4
fixed = FALSE
prior = loggamma
param = 100 100
to.theta = function(x) log(x)
from.theta = function(x) exp(x)
```

Model 'fmri'. Properties: **doc** = 'fmri distribution (special nc-chi)'

```
status = 'experimental'
survival = 'FALSE'
discrete = 'FALSE'
link = 'default log'
pdf = 'fmri'
```

Number of hyperparameters is 2.

Hyperparameter 'theta1' hyperid = 103101

```
name = precision
short.name = prec
initial = 0
fixed = FALSE
```



```

    prior = loggamma
    param = 10 10
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 103202
    name = dof
    short.name = df
    initial = 4
    fixed = TRUE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Model 'fmrisurv'. Properties: doc = 'fmri distribution (special nc-chi)'
    status = 'experimental'
    survival = 'TRUE'
    discrete = 'FALSE'
    link = 'default log'
    pdf = 'fmri'
Number of hyperparameters is 2.
Hyperparameter 'theta1' hyperid = 104101
    name = precision
    short.name = prec
    initial = 0
    fixed = FALSE
    prior = loggamma
    param = 10 10
    to.theta = function(x) log(x)
    from.theta = function(x) exp(x)
Hyperparameter 'theta2' hyperid = 104201
    name = dof
    short.name = df
    initial = 4
    fixed = TRUE
    prior = normal
    param = 0 1
    to.theta = function(x) x
    from.theta = function(x) x
Model 'gompertz'. Properties: doc = 'gompertz distribution'
    status = 'experimental'
    survival = 'FALSE'
    discrete = 'FALSE'
    link = 'default log neglog'
    pdf = 'gompertz'
Number of hyperparameters is 1.

```

Hyperparameter 'theta' hyperid = 105101

```
name = shape
short.name = alpha
initial = -1
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x, sc = 0.1) log(x) / sc
from.theta = function(x, sc = 0.1) exp(sc * x)
```

Model 'gompertzsurv'. Properties: doc = 'gompertz distribution'

```
status = 'experimental'
survival = 'TRUE'
discrete = 'FALSE'
link = 'default log neglog'
pdf = 'gompertz'
```

Number of hyperparameters is 11.

Hyperparameter 'theta1' hyperid = 106101

```
name = shape
short.name = alpha
initial = -10
fixed = FALSE
prior = normal
param = 0 1
to.theta = function(x, sc = 0.1) log(x) / sc
from.theta = function(x, sc = 0.1) exp(sc * x)
```

Hyperparameter 'theta2' hyperid = 106102

```
name = beta1
short.name = beta1
initial = -5
fixed = FALSE
prior = normal
param = -4 100
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta3' hyperid = 106103

```
name = beta2
short.name = beta2
initial = 0
fixed = FALSE
prior = normal
param = 0 100
to.theta = function(x) x
from.theta = function(x) x
```

Hyperparameter 'theta4' hyperid = 106104

```
name = beta3
```

```

    short.name = beta3
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 106105
    name = beta4
    short.name = beta4
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 106106
    name = beta5
    short.name = beta5
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 106107
    name = beta6
    short.name = beta6
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 106108
    name = beta7
    short.name = beta7
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 106109
    name = beta8

```

```

    short.name = beta8
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 106110
    name = beta9
    short.name = beta9
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 106111
    name = beta10
    short.name = beta10
    initial = 0
    fixed = FALSE
    prior = normal
    param = 0 100
    to.theta = function(x) x
    from.theta = function(x) x

```

'prior'

Valid models in this section are:

Model 'normal'. Number of parameters in the prior = 2
Model 'gaussian'. Number of parameters in the prior = 2
Model 'linksnintercept'. Number of parameters in the prior = 2
Model 'wishart1d'. Number of parameters in the prior = 2
Model 'wishart2d'. Number of parameters in the prior = 4
Model 'wishart3d'. Number of parameters in the prior = 7
Model 'wishart4d'. Number of parameters in the prior = 11
Model 'wishart5d'. Number of parameters in the prior = 16
Model 'loggamma'. Number of parameters in the prior = 2
Model 'gamma'. Number of parameters in the prior = 2
Model 'minuslogsqrtruncnormal'. Number of parameters in the prior = 2
Model 'logtnormal'. Number of parameters in the prior = 2
Model 'logtgaussian'. Number of parameters in the prior = 2
Model 'flat'. Number of parameters in the prior = 0
Model 'logflat'. Number of parameters in the prior = 0

Model 'logiflat'. Number of parameters in the prior = 0
Model 'mvnorm'. Number of parameters in the prior = -1
Model 'pc.alphaw'. Number of parameters in the prior = 1
Model 'pc.ar'. Number of parameters in the prior = 1
Model 'dirichlet'. Number of parameters in the prior = 1
Model 'none'. Number of parameters in the prior = 0
Model 'invalid'. Number of parameters in the prior = 0
Model 'betacorrelation'. Number of parameters in the prior = 2
Model 'logitbeta'. Number of parameters in the prior = 2
Model 'pc.prec'. Number of parameters in the prior = 2
Model 'pc.dof'. Number of parameters in the prior = 2
Model 'pc.cor0'. Number of parameters in the prior = 2
Model 'pc.cor1'. Number of parameters in the prior = 2
Model 'pc.fgnh'. Number of parameters in the prior = 2
Model 'pc.spde.GA'. Number of parameters in the prior = 4
Model 'pc.matern'. Number of parameters in the prior = 3
Model 'pc.range'. Number of parameters in the prior = 2
Model 'pc.sn'. Number of parameters in the prior = 1
Model 'pc.gamma'. Number of parameters in the prior = 1
Model 'pc.mgamma'. Number of parameters in the prior = 1
Model 'pc.gammacount'. Number of parameters in the prior = 1
Model 'pc.gevtail'. Number of parameters in the prior = 3
Model 'pc'. Number of parameters in the prior = 2
Model 'ref.ar'. Number of parameters in the prior = 0
Model 'pom'. Number of parameters in the prior = 0
Model 'jeffreystdf'. Number of parameters in the prior = 0
Model 'wishartkd'. Number of parameters in the prior = 211
Model 'expression:.'. Number of parameters in the prior = -1
Model 'table:.'. Number of parameters in the prior = -1

'wrapper'

Valid models in this section are:

Model 'joint'. Properties: **doc** = '(experimental)'
constr = 'FALSE'
nrow.ncol = 'FALSE'
augmented = 'FALSE'
aug.factor = '1'
aug.constr = 'NULL'
n.div.by = 'NULL'
n.required = 'FALSE'
set.default.values = 'FALSE'

pdf = 'NA'

Number of hyperparameters is 1.

Hyperparameter 'theta' hyperid = 102001

name = log precision

short.name = prec

initial = 0

fixed = TRUE

prior = loggamma

param = 1 5e-05

to.theta = function(x) log(x)

from.theta = function(x) exp(x)

'lp.scale'

Valid models in this section are:

Model 'lp.scale'. Properties: **pdf** = 'lp.scale'

Number of hyperparameters is 100.

Hyperparameter 'theta1' hyperid = 103001

name = beta1

short.name = b1

initial = 1

fixed = FALSE

prior = normal

param = 1 10

to.theta = function(x) x

from.theta = function(x) x

Hyperparameter 'theta2' hyperid = 103002

name = beta2

short.name = b2

initial = 1

fixed = FALSE

prior = normal

param = 1 10

to.theta = function(x) x

from.theta = function(x) x

Hyperparameter 'theta3' hyperid = 103003

name = beta3

short.name = b3

initial = 1

fixed = FALSE

prior = normal

param = 1 10

to.theta = function(x) x

from.theta = function(x) x

Hyperparameter 'theta4' hyperid = 103004

name = beta4

```

    short.name = b4
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta5' hyperid = 103005
    name = beta5
    short.name = b5
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta6' hyperid = 103006
    name = beta6
    short.name = b6
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta7' hyperid = 103007
    name = beta7
    short.name = b7
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta8' hyperid = 103008
    name = beta8
    short.name = b8
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta9' hyperid = 103009
    name = beta9

```

```

    short.name = b9
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta10' hyperid = 103010
    name = beta10
    short.name = b10
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta11' hyperid = 103011
    name = beta11
    short.name = b11
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta12' hyperid = 103012
    name = beta12
    short.name = b12
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta13' hyperid = 103013
    name = beta13
    short.name = b13
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta14' hyperid = 103014
    name = beta14

```



```

    short.name = b14
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta15' hyperid = 103015
    name = beta15
    short.name = b15
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta16' hyperid = 103016
    name = beta16
    short.name = b16
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta17' hyperid = 103017
    name = beta17
    short.name = b17
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta18' hyperid = 103018
    name = beta18
    short.name = b18
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta19' hyperid = 103019
    name = beta19

```

```

    short.name = b19
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta20' hyperid = 103020
    name = beta20
    short.name = b20
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta21' hyperid = 103021
    name = beta21
    short.name = b21
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta22' hyperid = 103022
    name = beta22
    short.name = b22
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta23' hyperid = 103023
    name = beta23
    short.name = b23
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta24' hyperid = 103024
    name = beta24

```

```

    short.name = b24
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta25' hyperid = 103025
    name = beta25
    short.name = b25
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta26' hyperid = 103026
    name = beta26
    short.name = b26
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta27' hyperid = 103027
    name = beta27
    short.name = b27
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta28' hyperid = 103028
    name = beta28
    short.name = b28
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta29' hyperid = 103029
    name = beta29

```

```

    short.name = b29
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta30' hyperid = 103030
    name = beta30
    short.name = b30
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta31' hyperid = 103031
    name = beta31
    short.name = b31
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta32' hyperid = 103032
    name = beta32
    short.name = b32
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta33' hyperid = 103033
    name = beta33
    short.name = b33
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta34' hyperid = 103034
    name = beta34

```

```

    short.name = b34
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta35' hyperid = 103035
    name = beta35
    short.name = b35
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta36' hyperid = 103036
    name = beta36
    short.name = b36
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta37' hyperid = 103037
    name = beta37
    short.name = b37
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta38' hyperid = 103038
    name = beta38
    short.name = b38
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta39' hyperid = 103039
    name = beta39

```

```

    short.name = b39
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta40' hyperid = 103040
    name = beta40
    short.name = b40
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta41' hyperid = 103041
    name = beta41
    short.name = b41
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta42' hyperid = 103042
    name = beta42
    short.name = b42
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta43' hyperid = 103043
    name = beta43
    short.name = b43
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta44' hyperid = 103044
    name = beta44

```

```

    short.name = b44
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta45' hyperid = 103045
    name = beta45
    short.name = b45
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta46' hyperid = 103046
    name = beta46
    short.name = b46
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta47' hyperid = 103047
    name = beta47
    short.name = b47
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta48' hyperid = 103048
    name = beta48
    short.name = b48
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta49' hyperid = 103049
    name = beta49

```

```

    short.name = b49
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta50' hyperid = 103050
    name = beta50
    short.name = b50
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta51' hyperid = 103051
    name = beta51
    short.name = b51
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta52' hyperid = 103052
    name = beta52
    short.name = b52
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta53' hyperid = 103053
    name = beta53
    short.name = b53
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta54' hyperid = 103054
    name = beta54

```



```

    short.name = b54
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta55' hyperid = 103055
    name = beta55
    short.name = b55
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta56' hyperid = 103056
    name = beta56
    short.name = b56
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta57' hyperid = 103057
    name = beta57
    short.name = b57
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta58' hyperid = 103058
    name = beta58
    short.name = b58
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta59' hyperid = 103059
    name = beta59

```

```

    short.name = b59
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta60' hyperid = 103060
    name = beta60
    short.name = b60
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta61' hyperid = 103061
    name = beta61
    short.name = b61
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta62' hyperid = 103062
    name = beta62
    short.name = b62
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta63' hyperid = 103063
    name = beta63
    short.name = b63
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta64' hyperid = 103064
    name = beta64

```

```

    short.name = b64
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta65' hyperid = 103065
    name = beta65
    short.name = b65
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta66' hyperid = 103066
    name = beta66
    short.name = b66
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta67' hyperid = 103067
    name = beta67
    short.name = b67
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta68' hyperid = 103068
    name = beta68
    short.name = b68
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta69' hyperid = 103069
    name = beta69

```

```

    short.name = b69
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta70' hyperid = 103070
    name = beta70
    short.name = b70
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta71' hyperid = 103071
    name = beta71
    short.name = b71
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta72' hyperid = 103072
    name = beta72
    short.name = b72
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta73' hyperid = 103073
    name = beta73
    short.name = b73
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta74' hyperid = 103074
    name = beta74

```

```

    short.name = b74
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta75' hyperid = 103075
    name = beta75
    short.name = b75
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta76' hyperid = 103076
    name = beta76
    short.name = b76
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta77' hyperid = 103077
    name = beta77
    short.name = b77
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta78' hyperid = 103078
    name = beta78
    short.name = b78
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta79' hyperid = 103079
    name = beta79

```

```

    short.name = b79
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta80' hyperid = 103080
    name = beta80
    short.name = b80
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta81' hyperid = 103081
    name = beta81
    short.name = b81
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta82' hyperid = 103082
    name = beta82
    short.name = b82
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta83' hyperid = 103083
    name = beta83
    short.name = b83
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta84' hyperid = 103084
    name = beta84

```

```

    short.name = b84
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta85' hyperid = 103085
    name = beta85
    short.name = b85
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta86' hyperid = 103086
    name = beta86
    short.name = b86
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta87' hyperid = 103087
    name = beta87
    short.name = b87
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta88' hyperid = 103088
    name = beta88
    short.name = b88
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta89' hyperid = 103089
    name = beta89

```

```

    short.name = b89
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta90' hyperid = 103090
    name = beta90
    short.name = b90
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta91' hyperid = 103091
    name = beta91
    short.name = b91
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta92' hyperid = 103092
    name = beta92
    short.name = b92
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta93' hyperid = 103093
    name = beta93
    short.name = b93
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta94' hyperid = 103094
    name = beta94

```



```

    short.name = b94
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta95' hyperid = 103095
    name = beta95
    short.name = b95
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta96' hyperid = 103096
    name = beta96
    short.name = b96
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta97' hyperid = 103097
    name = beta97
    short.name = b97
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta98' hyperid = 103098
    name = beta98
    short.name = b98
    initial = 1
    fixed = FALSE
    prior = normal
    param = 1 10
    to.theta = function(x) x
    from.theta = function(x) x
Hyperparameter 'theta99' hyperid = 103099
    name = beta99

```

```

short.name = b99
initial = 1
fixed = FALSE
prior = normal
param = 1 10
to.theta = function(x) x
from.theta = function(x) x
Hyperparameter 'theta100' hyperid = 103100
name = beta100
short.name = b100
initial = 1
fixed = FALSE
prior = normal
param = 1 10
to.theta = function(x) x
from.theta = function(x) x

```

Examples

```

## How to set hyperparameters to pass as the argument 'hyper'. This
## format is compatible with the old style (using 'initial', 'fixed',
## 'prior', 'param'), but the new style using 'hyper' takes precedence
## over the old style. The two styles can also be mixed. The old style
## might be removed from the code in the future...

## Only a subset need to be given
hyper <- list(theta = list(initial = 2))
## The 'name' can be used instead of 'theta', or 'theta1', 'theta2',...
hyper <- list(precision = list(initial = 2))
hyper <- list(precision = list(prior = "flat", param = numeric(0)))
hyper <- list(theta2 = list(initial = 3), theta1 = list(prior = "gaussian"))
## The 'short.name' can be used instead of 'name'
hyper <- list(rho = list(param = c(0, 1)))

```

inla.nmix.lambda.fitted

Estimate posterior distributions of fitted lambda values

Description

For use with 'nmix' and 'nmixnb' models. This function takes the information contained in an object returned by `inla()` and uses the contents to create fitted lambda values using the linear predictor for $\log(\lambda)$, the input covariate values, and samples from the posteriors of the model hyperparameters. Fitted values from the linear predictor are exponentiated, by default, before being returned.

Usage

```
inla.nmix.lambda.fitted(
  result,
  sample.size = 1000,
  return.posterior = FALSE,
  scale = "exp"
)
```

Arguments

- | | |
|------------------|--|
| result | The output object from a call to <code>inla()</code> , where the family argument has been set to 'nmix' or 'nmixnb'. For the function to work, the call to <code>inla()</code> should also include the argument <code>control.compute=list(config = TRUE)</code> . |
| sample.size | The size of the sample from the posteriors of the model hyperparameters. This sample size ends up being the size of the estimated posterior for a fitted lambda value. Default is 1000. Larger values are recommended. |
| return.posterior | A logical value for whether or not to return the full estimated posteriors for each fitted value (TRUE), or just a summary of the posteriors (FALSE). Default is FALSE. |
| scale | A character string, where the default string, "exp", causes values from the linear predictor to be exponentiated before being returned. The string, "log", causes values to be returned on the $\log(\lambda)$ scale. |

Value

- | | |
|------------------|--|
| fitted.summary | A data frame with summaries of estimated posteriors of fitted lambda values. The number of rows equals the number of rows in the data used to create the 'nmix' or 'nmixnb' model. There are six columns of summary statistics for each estimated posterior. Columns include an index, <code>mean.lambda</code> , <code>sd.lambda</code> , <code>quant025.lambda</code> , <code>median.lambda</code> , <code>quant975.lambda</code> , and <code>mode.lambda</code> . |
| fitted.posterior | A data frame containing samples that comprise the full estimated posteriors of fitted values. The number of rows equals the number of rows in the data used to create the 'nmix' or 'nmixnb' model. The number of columns equals one plus the number of samples specified by the <code>sample.size</code> argument. |

Note

This function is experimental.

Author(s)

Tim Meehan tmeehan@audubon.org

References

See documentation for families "nmix" and "nmixmb": `inla.doc("nmix")`

Examples

```
## an example analysis of an N-mixture model using simulated data
## set parameters
n <- 75                                # number of study sites
nrep.max <- 5                          # number of surveys per site
b0 <- 0.5                              # lambda intercept, expected abundance
b1 <- 2.0                              # effect of x1 on lambda
a0 <- 1.0                              # p intercept, detection probability
a2 <- 0.5                              # effect of x2 on p
size <- 3.0                            # size of theta
overdispersion <- 1 / size             # for negative binomial distribution

## make empty vectors and matrix
x1 <- c(); x2 <- c()
lambdas <- c(); Ns <- c()
y <- matrix(NA, n, nrep.max)

## fill vectors and matrix
for(i in 1:n) {
  x1.i <- runif(1) - 0.5
  lambda <- exp(b0 + b1 * x1.i)
  N <- rnbino(1, mu = lambda, size = size)
  x2.i <- runif(1) - 0.5
  eta <- a0 + a2 * x2.i
  p <- exp(eta) / (exp(eta) + 1)
  nr <- sample(1:nrep.max, 1)
  y[i, 1:nr] <- rbinom(nr, size = N, prob = p)
  x1 <- c(x1, x1.i); x2 <- c(x2, x2.i)
  lambdas <- c(lambdas, lambda); Ns <- c(Ns, N)
}

## bundle counts, lambda intercept, and lambda covariates
Y <- inla.mdata(y, 1, x1)

## run inla and summarize output
result <- inla(Y ~ 1 + x2,
  data = list(Y=Y, x2=x2),
  family = "nmixnb",
  control.fixed = list(mean = 0, mean.intercept = 0, prec = 0.01,
    prec.intercept = 0.01),
  control.family = list(hyper = list(theta1 = list(param = c(0, 0.01)),
    theta2 = list(param = c(0, 0.01)),
    theta3 = list(prior = "flat",
      param = numeric()))),
  control.compute=list(config = TRUE)) # important argument
summary(result)

## get and evaluate fitted values
lam.fits <- inla.nmix.lambda.fitted(result, 5000)$fitted.summary
plot(lam.fits$median.lambda, lambdas)
round(sum(lam.fits$median.lambda, 0); sum(Ns))
```

Description

[Deprecated] in favour of `fmesh::fm_nonconvex_hull_inla()` and `fmesh::fm_nonconvex_hull()`.

Constructs a nonconvex boundary for a point set using morphological operations.

Usage

```
inla.nonconvex.hull(
  points,
  convex = -0.15,
  concave = convex,
  resolution = 40,
  eps = NULL,
  crs = NULL
)

inla.nonconvex.hull.basic(
  points,
  convex = -0.15,
  resolution = 40,
  eps = NULL,
  crs = NULL
)
```

Arguments

points	2D point coordinates (2-column matrix). Can alternatively be a <code>SpatialPoints</code> or <code>SpatialPointsDataFrame</code> object.
convex	The desired extension radius. Also determines the smallest allowed convex curvature radius. Negative values are interpreted as fractions of the approximate initial set diameter.
concave	The desired minimal concave curvature radius. Default is <code>concave=convex</code> .
resolution	The internal computation resolution. A warning will be issued when this needs to be increased for higher accuracy, with the required resolution stated.
eps	The polygonal curve simplification tolerance used for simplifying the resulting boundary curve. See <code>inla.simplify.curve()</code> for details.
crs	An optional CRS or <code>inla.CRS</code> object

Details

Morphological dilation by `convex`, followed by closing by `concave`, with minimum concave curvature radius `concave`. If the dilated set has no gaps of width between

$$2convex(\sqrt{1 + 2concave/convex} - 1)$$

and `2concave`, then the minimum convex curvature radius is `convex`. Special case `concave=0` delegates to `inla.nonconvex.hull.basic`

The implementation is based on the identity

$$dilation(a) \& closing(b) = dilation(a + b) \& erosion(b)$$

where all operations are with respect to disks with the specified radii.

Value

An `inla.mesh.segment()` object.

Note

Requires `ndistF` from the `splancs` package.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

Examples

```
if (require(splancs)) {
  loc <- matrix(runif(20), 10, 2)
  boundary <- inla.nonconvex.hull(loc, convex = 0.2)
  lines(boundary, add = FALSE)
  points(loc)
}
```

inla.option

Set and get global options for INLA

Description

Set and get global options for INLA

Usage

```
inla.getOption(
  option = c("inla.call", "inla.arg", "fmesher.call", "fmesher.arg", "num.threads",
    "smtp", "safe", "pardiso.license", "keep", "verbose", "save.memory",
    "working.directory", "silent", "debug", "show.warning.graph.file",
    "scale.model.default", "short.summary", "inla.timeout", "fmesher.timeout",
    "inla.mode", "fmesher.evolution", "fmesher.evolution.warn",
    "fmesher.evolution.verbosity")
)

inla.setOption(...)
```

Arguments

option	<p>The option to get. If option = NULL then <code>inla.getOption</code> then <code>inla.getOption</code> will return a named list of current values, otherwise, option must be one of</p> <p>inla.call The path to the inla-program.</p> <p>inla.arg Additional arguments to <code>inla.call</code></p> <p>fmesher.call The path to the fmesher-program</p> <p>fmesher.arg Additional arguments to <code>fmesher.call</code></p> <p>num.threads Character string with the number of threads to use as A:B, see <code>?inla</code></p> <p>smtp Sparse matrix library to use, one of band, taucs (default) or pardiso</p>
--------	---

- safe** Run in safe-mode (ie try to automatically fix convergence errors) (default TRUE)
- pardiso.license** The full path to the PARDISO license file or a newline-separated string with license key(s)
- keep** Keep temporary files?
- verbose** Verbose output?
- save.memory** Save memory at the cost of (minor) accuracy and computing time?
- working.directory** The name of the working directory.
- silent** Run the inla-program in a silent mode?
- debug** Run the inla-program in a debug mode?
- cygwin** The home of the Cygwin installation (default "C:/cygwin") (Remote computing for Windows only) (No longer in use!)
- ssh.auth.sock** The ssh bind-adress (value of \$SSH_AUTH_SOCK int the Cygwin-shell). (Remote computing for Windows only)
- show.warning.graph.file** Give a warning for using the obsolete argument `graph.file` instead of `graph`
- scale.model.default** The default value of argument `scale.model` which optionally scale intrinsic models to have generalized unit average variance
- short.summary** Use a less verbose output for summary. Useful for Markdown documents.
- inla.timeout** The timeout limit, in whole seconds, for calls to the inla binary. Default is 0, meaning no timeout limit. Set to a positive integer to terminate inla calls if they run to long. Fractional seconds are rounded up to the nearest integer. This feature is EXPERIMENTAL and might change at a later stage.
- fmesher.timeout** The timeout limit, in whole seconds, for calls to the fmesher binary. Default is 0, meaning no timeout limit. Set to a positive integer to terminate fmesher calls that may enter infinite loops due to special geometry regularity. Fractional seconds are rounded up to the nearest integer.
- inla.mode** Which mode to use in INLA? Default is "compact". Other options are "classic" and "twostage".
- fmesher.evolution** Control use of fmesher methods during the transition to a separate fmesher package. Levels of `fmesher.evolution`:
 1L uses the intermediate `fm_*` methods in fmesher that were already available via `inlabru` from 2.8.0.
 2L (current default) uses the full range of fmesher package methods.
 Further levels may be added as the package development progresses.
- fmesher.evolution.warn** logical; whether to show warnings about deprecated use of legacy INLA methods with fmesher package replacements. When TRUE, shows deprecation messages for many CRS and mesh related methods, pointing to their `fm_*` replacements. Default is currently FALSE.
- fmesher.evolution.verbosity** logical or character; at what minimum severity to show warnings about deprecated use of legacy INLA methods with fmesher package replacements. When set to "default" (default), "soft", "warn", or "stop", indicates the minimum warning level used when `fmesher.evolution.warn` is TRUE.

... Option and value, like `option=value` or `option, value`; see the Examples

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
## set number of threads
inla.setOption("num.threads", "4:1")
## alternative format
inla.setOption(num.threads="4:1")
## check it
inla.getOption("num.threads")
```

inla.over_sp_mesh	<i>Check which mesh triangles are inside a polygon</i>
-------------------	--

Description

Wrapper for the `sp::over()` method to find triangle centroids or vertices inside `sp` polygon objects. Deprecated since 23.06.06 in favour of `inlabru::fm_contains()` when `inlabru` version `>= 2.7.0.9011` is installed, and since 23.08.02 in favour of `fmesh::fm_contains()` when `fmesh`.

Usage

```
inla.over_sp_mesh(x, y, type = c("centroid", "vertex"), ignore.CRS = FALSE)
```

Arguments

<code>x</code>	geometry (typically a <code>sp::SpatialPolygons()</code> object) for the queries
<code>y</code>	an <code>inla.mesh()</code> object
<code>type</code>	the query type; either 'centroid' (default, for triangle centroids), or 'vertex' (for mesh vertices)
<code>ignore.CRS</code>	logical; whether to ignore the coordinate system information in <code>x</code> and <code>y</code> (default FALSE)

Value

A vector of triangle indices (when `type` is 'centroid') or vertex indices (when `type` is 'vertex')

Author(s)

Haakon Bakka, <bakka@r-inla.org>, and Finn Lindgren <finn.lindgren@gmail.com>

Examples

```
# Create a polygon and a mesh
obj <- sp::SpatialPolygons(
  list(Polygons(
    list(Polygon(rbind(
      c(0, 0),
      c(50, 0),
      c(50, 50),
      c(0, 50)
    )))
  ),
  ID = 1
),
proj4string = fmesher::fm_CRS("longlat_globe")
)
mesh <- inla.mesh.create(globe = 2, crs = fmesher::fm_CRS("sphere"))

## 3 vertices found in the polygon
inla.over_sp_mesh(obj, mesh, type = "vertex")

## 3 triangles found in the polygon
inla.over_sp_mesh(obj, mesh)

## Multiple transformations can lead to slightly different results due to edge cases
## 4 triangles found in the polygon
inla.over_sp_mesh(
  obj,
  fmesher::fm_transform(mesh, crs = fmesher::fm_crs("mollweide_norm"))
)
```

inla.priors.used	<i>Print priors used</i>
------------------	--------------------------

Description

Print the priors used for the hyperparameters

Usage

```
inla.priors.used(result, digits = 6L)
```

Arguments

result	An inla-object, typically the output from an inla()-call
digits	The digits argument to the function format()

Details

This function provides a more human-friendly output of `result$all.hyper` of all the priors used for the hyperparameters. Since not all information about the model is encoded in this object, more hyperparameters than actually used, may be printed. In particular, `group.theta1` is printed even though the argument `group` in `f()` is not used. Similarly for `spde`-models, but the user should know that, for example, only the two first ones are actually used. Hopefully, this issue will be fixed in the future.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
r = inla(y ~ 1 + x, data = data.frame(y = 1:10, x = rep(1:5, 2)))
inla.priors.used(r)
```

inla.prune	<i>Prune the INLA-package</i>
------------	-------------------------------

Description

Prune the INLA-package by deleting binary files not supported by the running OS

Usage

```
inla.prune(ask = TRUE)
```

Arguments

ask	Logical. If TRUE, then ask for user confirmation before deleting. If FALSE, then delete without user confirmation.
-----	--

Value

No value is returned.

Author(s)

Havard Rue <hrue@r-inla.org>

inla.qstat	<i>Control and view a remote inla-queue</i>
------------	---

Description

Control and view a remote inla-queue of submitted jobs

inla.qstat show job(s) on the server, inla.qget fetch the results (and by default remove the files on the server), inla.qdel removes a job on the server and inla.qnuke remove all jobs on the server. inla.qlog fetches the logfile only.

The recommended procedure is to use `r=inla(..., inla.call="submit")` and then do `r=inla.qget(r)` at a later stage. If the job is not finished, then `r` will not be overwritten and this step can be repeated. The reason for this procedure, is that some information usually stored in the result object does not go through the remote server, hence have to be appended to the results that are retrieved from the server. Hence doing `r=inla(..., inla.call="submit")` and then later retrieve it using `r=inla.qget(1)`, say, then `r` does not contain all the usual information. All the main results are there, but administrative information which is required to call `inla.hyperpar` or `inla.rerun` are not there.

Usage

```
## S3 method for class 'inla.q'
summary(object, ...)

## S3 method for class 'inla.q'
print(x, ...)

inla.qget(id, remove = TRUE)

inla.qdel(id)

inla.qstat(id)

inla.qlog(id)

inla.qnuke()
```

Arguments

object	An inla.q-object which is the output from inla.qstat
...	other arguments.
x	An inla.q-object which is the output from inla.qstat
id	The job-id which is the output from inla when the job is submitted, the job-number or job-name. For inla.qstat, id is optional and if omitted all the jobs will be listed.
remove	Logical If FALSE, leave the job on the server after retrieval, otherwise remove it (default).

Value

inla.qstat returns an inla.q-object with information about current jobs.

Author(s)

Havard Rue

See Also

[inla\(\)](#)

Examples

```
## Not run:
r = inla(y~1, data = data.frame(y=rnorm(10)), inla.call="submit")
inla.qstat()
r = inla.qget(r, remove=FALSE)
inla.qdel(1)
inla.qnuke()

## End(Not run)
```

inla.reorderings	<i>Reorderings methods for sparse matrices</i>
------------------	--

Description

Provide the names of all implemented reordering schemes

Usage

```
inla.reorderings()
```

Value

The names of all available reorderings

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
inla.reorderings()
```

inla.rerun	<i>Rerun an analysis</i>
------------	--------------------------

Description

Rerun [inla\(\)](#) on an inla-object (output from `link{inla}`)

Usage

```
inla.rerun(object, plain = FALSE)
```

Arguments

object	An inla-object, ie the output from an inla-call
plain	Logical. If FALSE (default), then make changes in object to improve the performance

Value

This function will take the result in object, and rerun inla again. If plain is FALSE, start the optimization from the mode in object so that we can obtain an improvement the mode for the hyperparameters. Otherwise, start from the same configuration as for object. The returned value is an inla-object.

See Also

[inla\(\)](#)

Examples

```
r = inla(y ~ 1, data = data.frame(y=1:10))
r = inla.rerun(r)
```

inla.row.kron	<i>Row-wise Kronecker products</i>
---------------	------------------------------------

Description

Takes two Matrices and computes the row-wise Kronecker product. Optionally applies row-wise weights and/or applies an additional 0/1 row-wise Kronecker matrix product, as needed by [inla.spde.make.A\(\)](#).

Usage

```
inla.row.kron(M1, M2, repl = NULL, n.repl = NULL, weights = NULL)
```

Arguments

M1	A matrix that can be transformed into a sparse Matrix.
M2	A matrix that can be transformed into a sparse Matrix.
repl	An optional index vector. For each entry, specifies which replicate the row belongs to, in the sense used in inla.spde.make.A() .
n.repl	The maximum replicate index, in the sense used in inla.spde.make.A() .
weights	Optional scaling weights to be applied row-wise to the resulting matrix.

Value

A sparseMatrix object.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.spde.make.A\(\)](#)

inla.sample	<i>Generate samples, and functions thereof, from an approximated posterior of a fitted model</i>
-------------	--

Description

This function generate samples, and functions of those, from an approximated posterior of a fitted model (an inla-object)

The hyperparameters are sampled from the configurations used to do the numerical integration, hence if you want a higher resolution, you need to to change the `int.strategy` variable and friends. The latent field is sampled from the Gaussian approximation conditioned on the hyperparameters, but with a correction for the mean (default), and optional (and by default) corrected for the estimated skewness.

The log.density report is only correct when there is no constraints. With constraints, it correct the Gaussian part of the sample for the constraints.

After the sample is (optional) skewness corrected, the log.density is is not exact for correcting for constraints, but the error is very small in most cases.

Usage

```
inla.posterior.sample(
  n = 1L,
  result,
  selection = list(),
  intern = FALSE,
  use.improved.mean = TRUE,
  skew.corr = TRUE,
  add.names = TRUE,
  seed = 0L,
  num.threads = NULL,
  parallel.configs = TRUE,
  verbose = FALSE
)

inla.posterior.sample.eval(fun, samples, return.matrix = TRUE, ...)
```

Arguments

<code>n</code>	Number of samples.
<code>result</code>	The inla-object, ie the output from an inla-call. The inla-object must be created with <code>control.compute=list(config=TRUE)</code> .
<code>selection</code>	Select what part of the sample to return. By default, the whole sample is returned. <code>selection</code> is a named list with the name of the components of the sample, and what indices of them to return. Names include <code>APredictor</code> , <code>Predictor</code> , <code>(Intercept)</code> , and otherwise names in the formula. The values of the list, is interpreted as indices. If they are negative, they are interpreted as 'not', a zero is interpreted as 'all', and positive indices are interpreted as 'only'. The names of elements of each samples refer to the indices in the full sample. DO NOT USE this feature together with <code>inla.posterior.sample.eval</code> .

<code>intern</code>	Logical. If TRUE then produce samples in the internal scale for the hyperparameter, if FALSE then produce samples in the user-scale. (For example log-precision (intern) and precision (user-scale))
<code>use.improved.mean</code>	Logical. If TRUE then use the marginal mean values when constructing samples. If FALSE then use the mean in the Gaussian approximations.
<code>skew.corr</code>	Logical. If TRUE then correct samples for skewness, if FALSE, do not correct samples for skewness (ie use the Gaussian).
<code>add.names</code>	Logical. If TRUE then add name for each elements of each sample. If FALSE, only add name for the first sample. (This save space.)
<code>seed</code>	See the same argument in <code>?inla.qsample</code> for further information. In order to produce reproducible results, you ALSO need to make sure the RNG in R is in the same state, see example below. When seed is non-zero, <code>num.threads</code> is forced to "1:1" and <code>parallel.configs</code> is set to FALSE, since parallel sampling would not produce a reproducible sequence of pseudo-random numbers.
<code>num.threads</code>	The number of threads to use in the format 'A:B' defining the number threads in the outer (A) and inner (B) layer for nested parallelism. A '0' will be replaced intelligently. <code>seed!=0</code> requires serial computations.
<code>parallel.configs</code>	Logical. If TRUE and not on Windows, then try to run each configuration in parallel (not Windows) using A threads (see <code>num.threads</code>), where each of them is using B:0 threads.
<code>verbose</code>	Logical. Run in verbose mode or not.
<code>fun</code>	The function to evaluate for each sample. Upon entry, the variable names defined in the model are defined as the value of the sample. The list of names are defined in <code>result\$misc\$configs\$contents</code> where <code>result</code> is an <code>inla</code> -object. This includes predefined names for the linear predictor (<code>Predictor</code> and <code>APredictor</code>), and the intercept (<code>Intercept</code> or <code>Intercept</code>). The hyperparameters are defined as <code>theta</code> , no matter if they are in the internal scale or not. The function <code>fun</code> can also return a vector. To simplify usage, <code>fun</code> can also be a vector character's. In this case <code>fun</code> it is interpreted as (strict) variable names, and a function is created that return these variables: if argument <code>fun</code> equals <code>c("Intercept", "a[1:2]")</code> , then this is equivalent to <code>pass function() return(c(get('Intercept'), get('a[1:2]')))</code> .
<code>samples</code>	<code>samples</code> is the output from <code>inla.posterior.sample()</code>
<code>return.matrix</code>	Logical. If TRUE, then return the samples of <code>fun</code> as matrix, otherwise, as a list.
<code>...</code>	Additional arguments to <code>fun</code>

Value

`inla.posterior.sample` returns a list of the samples, where each sample is a list with names `hyperpar` and `latent`, and with their marginal densities in `logdens$hyperpar` and `logdens$latent` and the joint density is in `logdens$joint`. `inla.posterior.sample.eval` return a list or a matrix of `fun` applied to each sample.

Author(s)

Havard Rue <hrue@r-inla.org> and Cristian Chiuchiolu <cristian.chiuchiolu@kaust.edu.sa>

Examples

```

r = inla(y ~ 1 ,data = data.frame(y=rnorm(1)), control.compute = list(config=TRUE))
samples = inla.posterior.sample(2,r)

## reproducible results:
inla.seed = as.integer(runif(1)*.Machine$integer.max)
set.seed(12345)
x = inla.posterior.sample(10, r, seed = inla.seed, num.threads="1:1")
set.seed(12345)
xx = inla.posterior.sample(10, r, seed = inla.seed, num.threads="1.1")
all.equal(x, xx)

set.seed(1234)
n = 25
xx = rnorm(n)
yy = rev(xx)
z = runif(n)
y = rnorm(n)
r = inla(y ~ 1 + z + f(xx) + f(yy, copy="xx"),
        data = data.frame(y, z, xx, yy),
        control.compute = list(config=TRUE),
        family = "gaussian")
r.samples = inla.posterior.sample(10, r)

fun = function(...) {
  mean(xx) - mean(yy)
}
f1 = inla.posterior.sample.eval(fun, r.samples)

fun = function(...) {
  c(exp(Intercept), exp(Intercept + z))
}
f2 = inla.posterior.sample.eval(fun, r.samples)

fun = function(...) {
  return (theta[1]/(theta[1] + theta[2]))
}
f3 = inla.posterior.sample.eval(fun, r.samples)

## Predicting nz new observations, and
## comparing the estimated one with the true one
set.seed(1234)
n = 100
alpha = beta = s = 1
z = rnorm(n)
y = alpha + beta * z + rnorm(n, sd = s)
r = inla(y ~ 1 + z,
        data = data.frame(y, z),
        control.compute = list(config=TRUE),
        family = "gaussian")
r.samples = inla.posterior.sample(10^3, r)

## just return samples of the intercept
intercepts = inla.posterior.sample.eval("Intercept", r.samples)

nz = 3

```



```

znew = rnorm(nz)
fun = function(zz = NA) {
  ## theta[1] is the precision
  return (Intercept + z * zz +
          rnorm(length(zz), sd = sqrt(1/theta[1])))
}
par(mfrow=c(1, nz))
f1 = inla.posterior.sample.eval(fun, r.samples, zz = znew)
for(i in 1:nz) {
  hist(f1[i, ], n = 100, prob = TRUE)
  m = alpha + beta * znew[i]
  xx = seq(m-4*s, m+4*s, by = s/100)
  lines(xx, dnorm(xx, mean=m, sd = s), lwd=2)
}

##
## Be aware that using non-clean variable names might be a little tricky
##
n <- 100
X <- matrix(rnorm(n^2), n, 2)
x <- X[, 1]
xx <- X[, 2]
xxx <- x*xx

y <- 1 + 2*x + 3*xx + 4*xxx + rnorm(n, sd = 0.01)

r <- inla(y ~ X[, 1]*X[, 2],
  data = list(y = y, X = X),
  control.compute = list(config = TRUE))
print(round(dig = 4, r$summary.fixed[, "mean"]))

sam <- inla.posterior.sample(100, r)
sam.extract <- inla.posterior.sample.eval(
  (function(...) {
    beta.1 <- get("X[, 1]")
    beta.2 <- get("X[, 2]")
    beta.12 <- get("X[, 1]:X[, 2]")
    return(c(Intercept, beta.1, beta.2, beta.12))
  }), sam)
print(round(dig = 4, rowMeans(sam.extract)))

## a simpler form can also be used here, and in the examples below
sam.extract <- inla.posterior.sample.eval(
  c("Intercept", "X[, 1]", "X[, 2]", "X[, 1]:X[, 2]"), sam)
print(round(dig = 4, rowMeans(sam.extract)))

r <- inla(y ~ x + xx + xxx,
  data = list(y = y, x = x, xx = xx, xxx = xxx),
  control.compute = list(config = TRUE))

sam <- inla.posterior.sample(100, r)
sam.extract <- inla.posterior.sample.eval(
  (function(...) {
    return(c(Intercept, x, xx, xxx))
  }), sam)
print(round(dig = 4, rowMeans(sam.extract)))

```

```

sam.extract <- inla.posterior.sample.eval(c("Intercept", "x", "xx", "xxx"), sam)
print(round(dig = 4, rowMeans(sam.extract)))

r <- inla(y ~ x*xx,
          data = list(y = y, x = x, xx = xx),
          control.compute = list(config = TRUE))

sam <- inla.posterior.sample(100, r)
sam.extract <- inla.posterior.sample.eval(
  (function(...) {
    return(c(Intercept, x, xx, get("x:xx")))
  }), sam)
print(round(dig = 4, rowMeans(sam.extract)))

sam.extract <- inla.posterior.sample.eval(c("Intercept", "x", "xx", "x:xx"), sam)
print(round(dig = 4, rowMeans(sam.extract)))

```

inla.simplify.curve *Recursive curve simplification.*

Description

Attempts to simplify a polygonal curve by joining nearly colinear segments.

Usage

```
inla.simplify.curve(loc, idx, eps)
```

Arguments

loc	Coordinate matrix.
idx	Index vector into loc specifying a polygonal curve.
eps	Straightness tolerance.

Details

Uses a variation of the binary splitting Ramer-Douglas-Peucker algorithm, with a width `eps` ellipse instead of a rectangle, motivated by prediction ellipse for Brownian bridge.

Value

An index vector into `loc` specifying the simplified polygonal curve.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

Examples

```
theta <- seq(0, 2 * pi, length.out = 1000)
loc <- cbind(cos(theta), sin(theta))
idx <- inla.simplify.curve(loc = loc, idx = 1:nrow(loc), eps = 0.01)
print(c(nrow(loc), length(idx)))
plot(loc, type = "l")
lines(loc[idx, ], col = "red")
```

inla.spde.make.A

Observation/prediction matrices for mesh models.

Description

Constructs observation/prediction weight matrices for models based on [inla.mesh\(\)](#) and [inla.mesh.1d\(\)](#) objects.

Usage

```
inla.spde.make.A(
  mesh = NULL,
  loc = NULL,
  index = NULL,
  group = NULL,
  repl = 1L,
  n.spde = NULL,
  n.group = NULL,
  n.repl = NULL,
  group.mesh = NULL,
  weights = NULL,
  A.loc = NULL,
  A.group = NULL,
  group.index = NULL,
  block = NULL,
  n.block = NULL,
  block.rescale = c("none", "count", "weights", "sum"),
  ...
)
```

Arguments

mesh	An inla.mesh() or inla.mesh.1d() object specifying a function basis on a mesh domain. Alternatively, an inla.spde object that includes a mesh (e.g. from inla.spde2.matern()).
loc	Observation/prediction coordinates. mesh and loc defines a matrix A.loc of mapping weights between basis function weights and field values. If loc is NULL, A.loc is defined as <code>Diagonal(n.spde, 1)</code> .
index	For each observation/prediction value, an index into loc. Default is <code>seq_len(nrow(A.loc))</code> .
group	For each observation/prediction value, an index into the group model.
repl	For each observation/prediction value, the replicate index.

n.spde	The number of basis functions in the mesh model. (Note: may be different than the number of mesh vertices/nodes/knots.)
n.group	The size of the group model.
n.repl	The total number of replicates.
group.mesh	An optional inla.mesh.1d() object for the group model.
weights	Optional scaling weights to be applied row-wise to the resulting matrix.
A.loc	Optional precomputed observation/prediction matrix. A.loc can be specified instead of mesh+loc, optionally with index supplied.
A.group	Optional precomputed observation/prediction matrix for the group model. A.group can be specified instead of group and/or group.mesh, optionally with group.index supplied.
group.index	For each observation/prediction value, an index into the rows of A.group.
block	Optional indices specifying block groupings: Entries with the same block value are joined into a single row in the resulting matrix, and the block values are the row indices. This is intended for construction of approximate integration schemes for regional data problems. See inla.spde.make.block.A() for details.
n.block	The number of blocks.
block.rescale	Specifies what scaling method should be used when joining entries as grouped by a block specification. See inla.spde.make.block.A() for details.
...	Additional parameters. Currently unused.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.spde.make.index\(\)](#)

Examples

```
loc <- matrix(runif(10000 * 2) * 1000, 10000, 2)
mesh <- inla.mesh.2d(
  loc = loc,
  cutoff = 50,
  max.edge = c(50, 500)
)
A <- inla.spde.make.A(mesh, loc = loc)
```

`inla.spde.make.block.A`

Observation matrices for mesh models.

Description

Constructs observation/prediction weight matrices for numerical integration schemes for regional data problems. Primarily intended for internal use by [inla.spde.make.A\(\)](#).

Usage

```
inla.spde.make.block.A(
  A,
  block,
  n.block = max(block),
  weights = NULL,
  rescale = c("none", "count", "weights", "sum")
)
```

Arguments

A	A precomputed observation/prediction matrix for locations that are to be joined.
block	Indices specifying block groupings: Entries with the same block value are joined into a single row in the resulting matrix, and the block values are the row indices.
n.block	The number of blocks.
weights	Optional scaling weights to be applied row-wise to the input A matrix.
rescale	Specifies what scaling method should be used when joining the rows of the A matrix as grouped by the block specification. <ul style="list-style-type: none"> • 'none': Straight sum, no rescaling. • 'count': Divide by the number of entries in the block. • 'weights': Divide by the sum of the weight values within each block. • 'sum': Divide by the resulting row sums.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.spde.make.A\(\)](#)

inla.spde.make.index *SPDE model index vector generation*

Description

Generates a list of named index vectors for an SPDE model.

Usage

```
inla.spde.make.index(name, n.spde, n.group = 1, n.repl = 1, ...)
```

Arguments

name	A character string with the base name of the effect.
n.spde	The size of the model, typically from <code>spde\$n.spde</code> .
n.group	The size of the group model.
n.repl	The number of model replicates.
...	Additional parameters. Currently unused.

Value

A list of named index vectors.

name	Indices into the vector of latent variables
name.group	'group' indices
name.repl	Indices for replicates

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.spde.make.A\(\)](#), [inla.spde2.result\(\)](#)

Examples

```
loc <- matrix(runif(100 * 2), 100, 2)
mesh <- inla.mesh.create.helper(points.domain = loc, max.edge = c(0.1, 0.5))
spde <- inla.spde2.matern(mesh)
index <- inla.spde.make.index("spatial", spde$n.spde, n.repl = 2)
spatial.A <- inla.spde.make.A(mesh, loc,
  index = rep(1:nrow(loc), 2),
  repl = rep(1:2, each = nrow(loc))
)
y <- 10 + rnorm(100 * 2)
stack <- inla.stack(
  data = list(y = y),
  A = list(spatial.A),
  effects = list(c(index, list(intercept = 1))),
  tag = "tag"
)
data <- inla.stack.data(stack, spde = spde)
formula <- y ~ -1 + intercept + f(spatial,
  model = spde,
  replicate = spatial.repl
)
result <- inla(formula,
  family = "gaussian", data = data,
  control.predictor = list(A = inla.stack.A(stack))
)
spde.result <- inla.spde2.result(result, "spatial", spde)
```

inla.spde.models

List SPDE models supported by inla.spde objects

Description

List SPDE models supported by inla.spde objects

Usage

```
inla.spde.models(function.names = FALSE)

inla.spde1.models()

inla.spde2.models()
```

Arguments

`function.names` If FALSE, return list model name lists. If TRUE, return list of model object constructor function names.

Details

Returns a list of available SPDE model type name lists, one for each inla.spde model class (currently [inla.spde1\(\)](#) and [inla.spde2\(\)](#)).

Value

List of available SPDE model type name lists.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

Examples

```
## Not run:
## Display help for each supported inla.spde2 model:
for (model in inla.spde2.models()) {
  print(help(paste("inla.spde2.", model, sep = "")))
}

## Display help for each supported inla.spde* model:
models <- inla.spde.models()
for (type in names(models)) {
  for (model in models[[type]]) {
    print(help(paste("inla.", type, ".", model, sep = "")))
  }
}

## Display help for each supported inla.spde* model (equivalent to above):
for (model in inla.spde.models(function.names = TRUE)) {
  print(help(model))
}

## End(Not run)
```

inla.spde.precision *Precision matrices for SPDE models*

Description

Calculates the precision matrix for given parameter values based on an `inla.spde` model object.

Usage

```
inla.spde.precision(...)

inla.spde1.precision(spde, ...)

## S3 method for class 'inla.spde1'
inla.spde.precision(spde, ...)

inla.spde2.precision(
  spde,
  theta = NULL,
  phi0 = inla.spde2.theta2phi0(spde, theta),
  phi1 = inla.spde2.theta2phi1(spde, theta),
  phi2 = inla.spde2.theta2phi2(spde, theta),
  ...
)

## S3 method for class 'inla.spde2'
inla.spde.precision(
  spde,
  theta = NULL,
  phi0 = inla.spde2.theta2phi0(spde, theta),
  phi1 = inla.spde2.theta2phi1(spde, theta),
  phi2 = inla.spde2.theta2phi2(spde, theta),
  ...
)
```

Arguments

<code>...</code>	Additional parameters passed on to other methods.
<code>spde</code>	An <code>inla.spde</code> object.
<code>theta</code>	The parameter vector.
<code>phi0</code>	Internal parameter for a generic model. Expert option only.
<code>phi1</code>	Internal parameter for a generic model. Expert option only.
<code>phi2</code>	Internal parameter for a generic model. Expert option only.

Value

A sparse precision matrix.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.spde.models\(\)](#), [inla.spde2.generic\(\)](#), [inla.spde2.theta2phi0\(\)](#), [inla.spde2.theta2phi1\(\)](#),
[inla.spde2.theta2phi2\(\)](#)

inla.spde.result	<i>SPDE result extraction from INLA estimation results</i>
------------------	--

Description

Extract field and parameter values and distributions for an `inla.spde` SPDE effect from an `inla` result object.

Usage

```
inla.spde.result(...)

inla.spde1.result(inla, name, spde, do.transform = TRUE, ...)

## S3 method for class 'inla.spde1'
inla.spde.result(inla, name, spde, do.transform = TRUE, ...)

inla.spde2.result(inla, name, spde, do.transform = TRUE, ...)

## S3 method for class 'inla.spde2'
inla.spde.result(inla, name, spde, do.transform = TRUE, ...)
```

Arguments

<code>...</code>	Further arguments passed to and from other methods.
<code>inla</code>	An <code>inla</code> object obtained from a call to inla()
<code>name</code>	A character string with the name of the SPDE effect in the <code>inla</code> formula.
<code>spde</code>	The <code>inla.spde</code> object used for the effect in the <code>inla</code> formula. (Note: this could have been stored in the <code>inla</code> output, but isn't.) Usually the result of a call to inla.spde2.matern() .
<code>do.transform</code>	If TRUE, also calculate marginals transformed to user-scale. Setting to FALSE is useful for large non-stationary models, as transforming many marginal densities is time-consuming.

Value

For `inla.spde2` models, a list, where the nominal range and variance are defined as the values that would have been obtained with a stationary model and no boundary effects:

```
marginals.kappa      Marginal densities for kappa
marginals.log.kappa   Marginal densities for log(kappa)
marginals.log.range.nominal Marginal densities for log(range)
```

```

marginals.log.tau
    Marginal densities for log(tau)
marginals.log.variance.nominal
    Marginal densities for log(variance)
marginals.range.nominal
    Marginal densities for range
marginals.tau   Marginal densities for tau
marginals.theta
    Marginal densities for the theta parameters
marginals.values
    Marginal densities for the field values
marginals.variance.nominal
    Marginal densities for variance
summary.hyperpar
    The SPDE related part of the inla hyperpar output summary
summary.log.kappa
    Summary statistics for log(kappa)
summary.log.range.nominal
    Summary statistics for log(range)
summary.log.tau
    Summary statistics for log(tau)
summary.log.variance.nominal
    Summary statistics for log(kappa)
summary.theta   Summary statistics for the theta parameters
summary.values
    Summary statistics for the field values

```

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.spde.models\(\)](#), [inla.spde2.matern\(\)](#)

Examples

```

loc <- matrix(runif(100 * 2), 100, 2)
mesh <- inla.mesh.create.helper(points.domain = loc, max.edge = c(0.1, 0.5))
spde <- inla.spde2.matern(mesh)
index <- inla.spde.make.index("spatial", mesh$n, n.repl = 2)
spatial.A <- inla.spde.make.A(mesh, loc,
    index = rep(1:nrow(loc), 2),
    repl = rep(1:2, each = nrow(loc))
)
## Toy example with no spatial correlation (range=zero)
y <- 10 + rnorm(100 * 2)
stack <- inla.stack(
    data = list(y = y),
    A = list(spatial.A),
    effects = list(c(index, list(intercept = 1))),
    tag = "tag"
)

```

```

)
data <- inla.stack.data(stack, spde = spde)
formula <- y ~ -1 + intercept + f(spatial,
  model = spde,
  replicate = spatial.repl
)
result <- inla(formula,
  family = "gaussian", data = data,
  control.predictor = list(A = inla.stack.A(stack))
)
spde.result <- inla.spde.result(result, "spatial", spde)
plot(spde.result$marginals.range.nominal[[1]], type = "l")

```

inla.spde.sample	<i>Sample from SPDE models</i>
------------------	--------------------------------

Description

Old methods for sampling from a SPDE model. For new code, use [inla.spde.precision\(\)](#) and [inla.qsample\(\)](#) instead.

Usage

```

inla.spde.sample(...)

## Default S3 method:
inla.spde.sample(precision, seed = NULL, ...)

## S3 method for class 'inla.spde'
inla.spde.sample(spde, seed = NULL, ...)

```

Arguments

...	Parameters passed on to other methods.
precision	A precision matrix.
seed	The seed for the pseudo-random generator.
spde	An inla.spde object.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.spde.precision\(\)](#), [inla.qsample\(\)](#)

inla.spde1.create *Old SPDE model objects for INLA*

Description

Create an inla.spde1 model object.

Usage

```
inla.spde1.create(
  mesh,
  model = c("matern", "imatern", "matern.osc"),
  param = NULL,
  ...
)

inla.spde1.matern(mesh, ...)

inla.spde1.imatern(mesh, ...)

inla.spde1.matern.osc(mesh, ...)
```

Arguments

mesh	The mesh to build the model on, as an inla.mesh() object.
model	The name of the model.
param	Model specific parameters.
...	Additional parameters passed on to other methods.

Details

Note: This is an old spde object format retained for backwards compatibility. Please use [inla.spde2\(\)](#) models for new code.

This method constructs an object for SPDE models. Currently implemented:

model="matern"

$$\begin{aligned} (\kappa^2(u) - \Delta)^{\alpha/2}(\tau(u)) \\ x(u) = W(u) \end{aligned}$$

param:

- alpha = 1 or 2
- basis.T = Matrix of basis functions for $\log \tau(u)$
- basis.K = Matrix of basis functions for $\log \kappa^2(u)$

model="imatern"

$$\begin{aligned} (-\Delta)^{\alpha/2}(\tau(u)) \\ x(u) = W(u) \end{aligned}$$

param:

- $\alpha = 1$ or 2
- `basis.T` = Matrix of basis functions for $\log \tau(u)$

Value

An `inla.spde1` object.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.spde2.matern\(\)](#), [inla.mesh.2d\(\)](#), [inla.mesh.basis\(\)](#)

Examples

```
n <- 100
field.fcn <- function(loc) (10 * cos(2 * pi * 2 * (loc[, 1] + loc[, 2])))
loc <- matrix(runif(n * 2), n, 2)
## One field, 2 observations per location
idx.y <- rep(1:n, 2)
y <- field.fcn(loc[idx.y, ]) + rnorm(length(idx.y))

mesh <- inla.mesh.create(loc, refine = list(max.edge = 0.05))
spde <- inla.spde1.create(mesh, model = "matern")
data <- list(y = y, field = mesh$idx$loc[idx.y])
formula <- y ~ -1 + f(field, model = spde)
result <- inla(formula, data = data, family = "normal")

## Plot the mesh structure:
plot(mesh)

if (require(rgl)) {
  ## Plot the posterior mean:
  plot(mesh,
    rgl = TRUE,
    result$summary.random$field[, "mean"],
    color.palette = colorRampPalette(c("blue", "green", "red"))
  )
  ## Plot residual field:
  plot(mesh,
    rgl = TRUE,
    result$summary.random$field[, "mean"] - field.fcn(mesh$loc),
    color.palette = colorRampPalette(c("blue", "green", "red"))
  )
}
```

inla.spde2.generic	<i>Generic spde2 model creation.</i>
--------------------	--------------------------------------

Description

Creates and inla.spde2 object describing the internal structure of an 'spde2' model.

Usage

```
inla.spde2.generic(
  M0,
  M1,
  M2,
  B0,
  B1,
  B2,
  theta.mu,
  theta.Q,
  transform = c("logit", "log", "identity"),
  theta.initial = theta.mu,
  fixed = rep(FALSE, length(theta.mu)),
  theta.fixed = theta.initial[fixed],
  BLC = cbind(0, diag(nrow = length(theta.mu))),
  ...
)
```

Arguments

M0	The symmetric M0 matrix.
M1	The square M1 matrix.
M2	The symmetric M2 matrix.
B0	Basis definition matrix for ϕ_0 .
B1	Basis definition matrix for ϕ_2 .
B2	Basis definition matrix for ϕ_2 .
theta.mu	Prior expectation for the θ vector
theta.Q	Prior precision for the θ vector
transform	Transformation link for ϕ_2 . Valid settings are "logit", "log", and "identity"
theta.initial	Initial value for the θ vector. Default theta.mu
fixed	Logical vector. For every TRUE value, treat the corresponding theta value as known.
theta.fixed	Vector holding the values of fixed theta values. Default=theta.initial[fixed]
BLC	Basis definition matrix for linear combinations of theta.
...	Additional parameters, currently unused.
theta	parameter values to be mapped.

Value

For `inla.spde2.generic`, an `inla.spde2()` object.

For `inla.spde2.theta2phi0/1/2`, a vector of ϕ values.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

`inla.spde2.models()`, `inla.spde2.matern()`

<code>inla.spde2.matern</code>	<i>Matern SPDE model object for INLA</i>
--------------------------------	--

Description

Create an `inla.spde2` model object for a Matern model. Use `inla.spde2.pcmatern` instead for a PC prior for the parameters.

Usage

```
inla.spde2.matern(
  mesh,
  alpha = 2,
  param = NULL,
  constr = FALSE,
  extraconstr.int = NULL,
  extraconstr = NULL,
  fractional.method = c("parsimonious", "null"),
  B.tau = matrix(c(0, 1, 0), 1, 3),
  B.kappa = matrix(c(0, 0, 1), 1, 3),
  prior.variance.nominal = 1,
  prior.range.nominal = NULL,
  prior.tau = NULL,
  prior.kappa = NULL,
  theta.prior.mean = NULL,
  theta.prior.prec = 0.1,
  n.iid.group = 1,
  ...
)

inla.spde2.theta2phi0(spde, theta)

inla.spde2.theta2phi1(spde, theta)

inla.spde2.theta2phi2(spde, theta)
```

Arguments

mesh	The mesh to build the model on, as an <code>inla.mesh()</code> or <code>inla.mesh.1d()</code> object.
alpha	Fractional operator order, $0 < \alpha \leq 2$ supported. ($\nu = \alpha - d/2$)
param	Parameter, e.g. generated by <code>param2.matern.orig</code>
constr	If TRUE, apply an integrate-to-zero constraint. Default FALSE.
extraconstr.int	Field integral constraints.
extraconstr	Direct linear combination constraints on the basis weights.
fractional.method	Specifies the approximation method to use for fractional (non-integer) alpha values. 'parsimonious' gives an overall approximate minimal covariance error, 'null' uses approximates low-order properties.
B.tau	Matrix with specification of log-linear model for τ .
B.kappa	Matrix with specification of log-linear model for κ .
prior.variance.nominal	Nominal prior mean for the field variance
prior.range.nominal	Nominal prior mean for the spatial range
prior.tau	Prior mean for tau (overrides <code>prior.variance.nominal</code>)
prior.kappa	Prior mean for kappa (overrides <code>prior.range.nominal</code>)
theta.prior.mean	(overrides <code>prior.*</code>)
theta.prior.prec	Scalar, vector or matrix, specifying the joint prior precision for <i>theta</i> .
n.iid.group	If greater than 1, build an explicitly iid replicated model, to support constraints applied to the combined replicates, for example in a time-replicated spatial model. Constraints can either be specified for a single mesh, in which case it's applied to the average of the replicates (<code>ncol(A)</code> should be <code>mesh\$n</code> for 2D meshes, <code>mesh\$m</code> for 1D), or as general constraints on the collection of replicates (<code>ncol(A)</code> should be <code>mesh\$n * n.iid.group</code> for 2D meshes, <code>mesh\$m * n.iid.group</code> for 1D).
...	Additional parameters for special uses.
spde	An spde model object
theta	Parameters in the model's internal scale

Details

This method constructs a Matern SPDE model, with spatial scale parameter $\kappa(u)$ and variance rescaling parameter $\tau(u)$.

$$(\kappa^2(u) - \Delta)^{\alpha/2} (\tau(u) x(u)) = W(u)$$

Stationary models are supported for $0 < \alpha \leq 2$, with spectral approximation methods used for non-integer α , with approximation method determined by `fractional.method`.

Non-stationary models are supported for $\alpha = 2$ only, with

- $\log \tau(u) = B_0^\tau(u) + \sum_{k=1}^p B_k^\tau(u) \theta_k$
- $\log \kappa(u) = B_0^\kappa(u) + \sum_{k=1}^p B_k^\kappa(u) \theta_k$

The same parameterisation is used in the stationary cases, but with B_0^τ , B_k^τ , B_0^κ , and B_k^κ constant across u .

Integration and other general linear constraints are supported via the `constr`, `extraconstr.int`, and `extraconstr` parameters, which also interact with `n.iid.group`.

Value

An `inla.spde2` object.

Functions

- `inla.spde2.theta2phi0()`: Convert from theta vector to phi0 values in the internal `spde2` model representation
- `inla.spde2.theta2phi1()`: Convert from theta vector to phi1 values in the internal `spde2` model representation
- `inla.spde2.theta2phi2()`: Convert from theta vector to phi2 values in the internal `spde2` model representation

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

`inla.mesh.2d()`, `inla.mesh.create()`, `inla.mesh.1d()`, `inla.mesh.basis()`, `inla.spde2.pcmatern()`, `inla.spde2.generic()`

Examples

```
n <- 100
field.fcn <- function(loc) (10 * cos(2 * pi * 2 * (loc[, 1] + loc[, 2])))
loc <- matrix(runif(n * 2), n, 2)
## One field, 2 observations per location
idx.y <- rep(1:n, 2)
y <- field.fcn(loc[idx.y, ]) + rnorm(length(idx.y))

mesh <- inla.mesh.create(loc, refine = list(max.edge = 0.05))
spde <- inla.spde2.matern(mesh)
data <- list(y = y, field = mesh$idx$loc[idx.y])
formula <- y ~ -1 + f(field, model = spde)
result <- inla(formula, data = data, family = "normal")

## Plot the mesh structure:
plot(mesh)

if (require(rgl)) {
  col.pal <- colorRampPalette(c("blue", "cyan", "green", "yellow", "red"))
  ## Plot the posterior mean:
  plot(mesh,
        rgl = TRUE,
        result$summary.random$field[, "mean"],
        color.palette = col.pal)
```

```

    )
    ## Plot residual field:
    plot(mesh,
         rgl = TRUE,
         result$summary.random$field[, "mean"] - field.fcn(mesh$loc),
         color.palette = col.pal
    )
}

result.field <- inla.spde.result(result, "field", spde)
plot(result.field$marginals.range.nominal[[1]])

```

inla.spde2.matern.sd.basis

Approximate variance-compensating basis functions

Description

Calculates an approximate basis for tau and kappa for an inla.spde2.matern model where tau is a rescaling parameter.

Usage

```

inla.spde2.matern.sd.basis(
  mesh,
  B.sd,
  B.range,
  method = 1,
  local.offset.compensation = FALSE,
  alpha = 2,
  ...
)

```

Arguments

mesh	An inla.mesh() object.
B.sd	Desired basis for log-standard deviations.
B.range	Desired basis for spatial range.
method	Construction method selector. Expert option only.
local.offset.compensation	If FALSE, only compensate in the average for the tau offset.
alpha	The model alpha parameter.
...	Additional parameters passed on to internal inla.spde2.matern calls.

Value

List of basis specifications

B.tau	Basis for log(tau)
B.kappa	Basis for log(kappa)

Intended for passing on to [inla.spde2.matern\(\)](#).

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.spde2.matern\(\)](#)

inla.spde2.pcmatern *Matern SPDE model object with PC prior for INLA*

Description

Create an `inla.spde2` model object for a Matern model, using a PC prior for the parameters.

Usage

```
inla.spde2.pcmatern(
  mesh,
  alpha = 2,
  param = NULL,
  constr = FALSE,
  extraconstr.int = NULL,
  extraconstr = NULL,
  fractional.method = c("parsimonious", "null"),
  n.iid.group = 1,
  prior.range = NULL,
  prior.sigma = NULL
)
```

Arguments

<code>mesh</code>	The mesh to build the model on, as an inla.mesh() or inla.mesh.1d() object.
<code>alpha</code>	Fractional operator order, $0 < \alpha \leq 2$ supported, for $\nu = \alpha - d/2 > 0$.
<code>param</code>	Further model parameters. Not currently used.
<code>constr</code>	If TRUE, apply an integrate-to-zero constraint. Default FALSE.
<code>extraconstr.int</code>	Field integral constraints.
<code>extraconstr</code>	Direct linear combination constraints on the basis weights.
<code>fractional.method</code>	Specifies the approximation method to use for fractional (non-integer) alpha values. 'parsimonious' gives an overall approximate minimal covariance error, 'null' uses approximates low-order properties.
<code>n.iid.group</code>	If greater than 1, build an explicitly iid replicated model, to support constraints applied to the combined replicates, for example in a time-replicated spatial model. Constraints can either be specified for a single mesh, in which case it's applied to the average of the replicates (<code>ncol(A)</code> should be <code>mesh\$n</code> for 2D meshes, <code>mesh\$m</code> for 1D), or as general constraints on the collection of replicates (<code>ncol(A)</code> should be <code>mesh\$n * n.iid.group</code> for 2D meshes, <code>mesh\$m * n.iid.group</code> for 1D).

prior.range	A length 2 vector, with (range0, Prange) specifying that $P(\rho < \rho_0) = p_\rho$, where ρ is the spatial range of the random field. If Prange is NA, then range0 is used as a fixed range value.
prior.sigma	A length 2 vector, with (sigma0, Psigma) specifying that $P(\sigma > \sigma_0) = p_\sigma$, where σ is the marginal standard deviation of the field. If Psigma is NA, then sigma0 is used as a fixed range value.

Details

This method constructs a Matern SPDE model, with spatial range ρ and standard deviation parameter σ . In the parameterisation

$$(\kappa^2 - \Delta)^{\alpha/2}(\tau x(u)) = W(u)$$

the spatial scale parameter $\kappa = \sqrt{8\nu}/\rho$, where $\nu = \alpha - d/2$, and τ is proportional to $1/\sigma$.

Stationary models are supported for $0 < \alpha \leq 2$, with spectral approximation methods used for non-integer α , with approximation method determined by fractional.method.

Integration and other general linear constraints are supported via the constr, extraconstr.int, and extraconstr parameters, which also interact with n.iid.group.

The joint PC prior density for the spatial range, ρ , and the marginal standard deviation, σ , and is

$$\pi(\rho, \sigma) = \frac{d\lambda_\rho}{2} \rho^{-1-d/2} \exp(-\lambda_\rho \rho^{-d/2}) \lambda_\sigma \exp(-\lambda_\sigma \sigma)$$

where λ_ρ and λ_σ are hyperparameters that must be determined by the analyst. The practical approach for this in INLA is to require the user to indirectly specify these hyperparameters through

$$P(\rho < \rho_0) = p_\rho$$

and

$$P(\sigma > \sigma_0) = p_\sigma$$

where the user specifies the lower tail quantile and probability for the range (ρ_0 and p_ρ) and the upper tail quantile and probability for the standard deviation (σ_0 and p_σ).

This allows the user to control the priors of the parameters by supplying knowledge of the scale of the problem. What is a reasonable upper magnitude for the spatial effect and what is a reasonable lower scale at which the spatial effect can operate? The shape of the prior was derived through a construction that shrinks the spatial effect towards a base model of no spatial effect in the sense of distance measured by Kullback-Leibler divergence.

The prior is constructed in two steps, under the idea that having a spatial field is an extension of not having a spatial field. First, a spatially constant random effect ($\rho = \infty$) with finite variance is more complex than not having a random effect ($\sigma = 0$). Second, a spatial field with spatial variation ($\rho < \infty$) is more complex than the random effect with no spatial variation. Each of these extensions are shrunk towards the simpler model and, as a result, we shrink the spatial field towards the base model of no spatial variation and zero variance ($\rho = \infty$ and $\sigma = 0$).

The details behind the construction of the prior is presented in Fuglstad, et al. (2016) and is based on the PC prior framework (Simpson, et al., 2015).

Value

An inla.spde2 object.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

References

Fuglstad, G.-A., Simpson, D., Lindgren, F., and Rue, H. (2016) Constructing Priors that Penalize the Complexity of Gaussian Random Fields. arXiv:1503.00256

Simpson, D., Rue, H., Martins, T., Riebler, A., and Sørbye, S. (2015) Penalising model component complexity: A principled, practical approach to constructing priors. arXiv:1403.4630

See Also

[inla.mesh.2d\(\)](#), [inla.mesh.create\(\)](#), [inla.mesh.1d\(\)](#), [inla.mesh.basis\(\)](#), [inla.spde2.matern\(\)](#), [inla.spde2.generic\(\)](#)

Examples

```
## Spatial interpolation
n <- 100
field.fcn <- function(loc) (10 * cos(2 * pi * 2 * (loc[, 1] + loc[, 2])))
loc <- matrix(runif(n * 2), n, 2)
## One field, 2 observations per location
idx.y <- rep(1:n, 2)
y <- field.fcn(loc[idx.y, ]) + rnorm(length(idx.y))

mesh <- inla.mesh.2d(loc, max.edge = 0.05, cutoff = 0.01)
spde <- inla.spde2.pcmatern(mesh,
  prior.range = c(0.01, 0.1), prior.sigma = c(100, 0.1)
)
data <- list(y = y, field = mesh$idx$loc[idx.y])
formula <- y ~ -1 + f(field, model = spde)
result <- inla(formula, data = data, family = "normal")

## Plot the mesh structure:
plot(mesh)

if (require(rgl)) {
  col.pal <- colorRampPalette(c("blue", "cyan", "green", "yellow", "red"))
  ## Plot the posterior mean:
  plot(mesh,
    rgl = TRUE,
    result$summary.random$field[, "mean"],
    color.palette = col.pal
  )
  ## Plot residual field:
  plot(mesh,
    rgl = TRUE,
    result$summary.random$field[, "mean"] - field.fcn(mesh$loc),
    color.palette = col.pal
  )
}
```

```

result.field <- inla.spde.result(result, "field", spde)
par(mfrow = c(2, 1))
plot(result.field$marginals.range.nominal[[1]],
      type = "l", main = "Posterior density for range"
)
plot(inla.tmarginal(sqrt, result.field$marginals.variance.nominal[[1]]),
      type = "l", main = "Posterior density for std.dev."
)
par(mfrow = c(1, 1))

## Spatial model
set.seed(1234234)

## Generate spatial locations
nObs <- 200
loc <- matrix(runif(nObs * 2), nrow = nObs, ncol = 2)

## Generate observation of spatial field
nu <- 1.0
rhoT <- 0.2
kappaT <- sqrt(8 * nu) / rhoT
sigT <- 1.0
Sig <- sigT^2 * inla.matern.cov(
  nu = nu,
  kappa = kappaT,
  x = as.matrix(dist(loc)),
  d = 2,
  corr = TRUE
)
L <- t(chol(Sig))
u <- L %*% rnorm(nObs)

## Construct observation with nugget
sigN <- 0.1
y <- u + sigN * rnorm(nObs)

## Create the mesh and spde object
mesh <- inla.mesh.2d(loc,
  max.edge = 0.05,
  cutoff = 0.01
)
spde <- inla.spde2.pcmatern(mesh,
  prior.range = c(0.01, 0.05),
  prior.sigma = c(10, 0.05)
)

## Create projection matrix for observations
A <- inla.spde.make.A(
  mesh = mesh,
  loc = loc
)

## Run model without any covariates
idx <- 1:spde$n.spde
res <- inla(y ~ f(idx, model = spde) - 1,

```

```

    data = list(y = y, idx = idx, spde = spde),
    control.predictor = list(A = A)
  )

  ## Re-run model with fixed range
  spde.fixed <- inla.spde2.pcmatern(mesh,
    prior.range = c(0.2, NA),
    prior.sigma = c(10, 0.05)
  )

  res.fixed <- inla(y ~ f(idx, model = spde) - 1,
    data = list(y = y, idx = idx, spde = spde.fixed),
    control.predictor = list(A = A)
  )

```

inla.spTransform	<i>Wrapper method for <code>fmesher::fm_transform</code></i>
------------------	--

Description

[Deprecated] in favour of `fmesher::fm_transform()`. Handles transformation of various inla objects according to coordinate reference systems of `sf::crs`, `sp::CRS` or `inla.CRS` class.

Usage

```
inla.spTransform(x, CRSobj, ...)
```

Arguments

<code>x</code>	The object that should be transformed from it's current CRS to a new CRS
<code>CRSobj</code>	passed on as the <code>crs</code> argument to <code>fmesher::fm_transform()</code> .
<code>...</code>	Potential other arguments for <code>fmesher::fm_transform()</code> .

Value

The object is returned with its coordinates transformed

Author(s)

Finn Lindgren finn.lindgren@gmail.com

See Also

[inla.CRS\(\)](#)

Examples

```

if (require("sf") && require("sp") && require("fmesher")) {
  latt <- inla.mesh.lattice(-10:10, 40:60)
  mesh1 <- inla.mesh.create(
    lattice = latt, extend = FALSE, refine = FALSE,
    crs = fm_CRS("longlat_norm")
  )
  mesh2 <- fm_transform(mesh1, fm_crs("lambert_globe"))
  print(summary(mesh1))
  print(summary(mesh2))
}

```

inla.sp_get_crs	<i>Extract CRS information</i>
-----------------	--------------------------------

Description

[Deprecated] in favour of `fmesher::fm_CRS()`. Wrapper for `CRS(projargs)` (PROJ4) and `CRS(wkt)` for `sp::Spatial` objects.

This function is a convenience method to workaround PROJ4/PROJ6 differences, and the lack of a crs extraction method for `Spatial` objects.

Usage

```
inla.sp_get_crs(x)
```

Arguments

x	A <code>sp::Spatial</code> object
---	-----------------------------------

Value

A CRS object, or NULL if no valid CRS identified

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

Examples

```

## Not run:
if (interactive()) {
  s <- sp::SpatialPoints(matrix(1:6, 3, 2), proj4string = fmesher::fm_CRS("sphere"))
  inla.sp_get_crs(s)
}

## End(Not run)

```

inla.ssh.copy.id	<i>Setup remote computing</i>
------------------	-------------------------------

Description

Initialize the definition file and print the path to the internal script to transfer ssh-keys

Usage

```
inla.ssh.copy.id()

inla.remote()
```

Value

inla.remote is used once to setup the remote host information file (definition file) in the users home directory; see the FAQ entry on this issue for more information. inla.ssh.copy.id will return the path to the internal script to transfer ssh-keys.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
##See the FAQ entry on this issue on r-inla.org.
```

inla.stack.remove.unused	<i>Data stacking for advanced INLA models</i>
--------------------------	---

Description

Functions for combining data, effects and observation matrices into inla.stack objects, and extracting information from such objects.

Usage

```
inla.stack.remove.unused(stack)

inla.stack.compress(stack, remove.unused = TRUE)

inla.stack(..., compress = TRUE, remove.unused = TRUE)

inla.stack.sum(
  data,
  A,
  effects,
  tag = "",
```

```

    compress = TRUE,
    remove.unused = TRUE
  )

inla.stack.join(..., compress = TRUE, remove.unused = TRUE)

inla.stack.index(stack, tag)

inla.stack.LHS(stack)

inla.stack.RHS(stack)

inla.stack.data(stack, ...)

inla.stack.A(stack)

```

Arguments

<code>stack</code>	A <code>inla.data.stack</code> object, created by a call to <code>inla.stack</code> , <code>inla.stack.sum</code> , or <code>inla.stack.join</code> .
<code>remove.unused</code>	If TRUE, compress the model by removing rows of effects corresponding to all-zero columns in the A matrix (and removing those columns).
<code>...</code>	For <code>inla.stack.join</code> , two or more data stacks of class <code>inla.data.stack</code> , created by a call to <code>inla.stack</code> , <code>inla.stack.sum</code> , or <code>inla.stack.join</code> . For <code>inla.stack.data</code> , a list of variables to be joined with the data list.
<code>compress</code>	If TRUE, compress the model by removing duplicated rows of effects, replacing the corresponding A-matrix columns with a single column containing the sum.
<code>data</code>	A list or <code>codedata.frame</code> of named data vectors. Scalars are expanded to match the number of rows in the A matrices, or any non-scalar data vectors. An error is given if the input is inconsistent.
<code>A</code>	A list of observation matrices. Scalars are expanded to diagonal matrices matching the effect vector lengths. An error is given if the input is inconsistent or ambiguous.
<code>effects</code>	A collection of effects/predictors. Each list element corresponds to an observation matrix, and must either be a single vector, a list of vectors, or a <code>data.frame</code> . Single-element effect vectors are expanded to vectors matching the number of columns in the corresponding A matrix. An error is given if the input is inconsistent or ambiguous.
<code>tag</code>	A string specifying a tag for later identification.

Details

For models with a single effects collection, the outer list container for `A` and `effects` may be omitted.

Component size definitions:

- n_l effect blocks
- n_k effects
- n_i data values
- $n_{j,l}$ effect size for block l

- $n_j = \sum_{l=1}^{n_l} n_{j,l}$ total effect size

Input:

data (y^1, \dots, y^p) p vectors, each of length n_i

A (A^1, \dots, A^{n_l}) matrices of size $n_i \times n_{j,l}$

effects $((x^{1,1}, \dots, x^{n_k,1}), \dots, (x^{1,n_l}, \dots, x^{n_k,n_l}))$ collections of effect vectors of length $n_{j,l}$

$$\text{predictor}(y^1, \dots, y^p) \sim \sum_{l=1}^{n_l} A^l \sum_{k=1}^{n_k} g(k, x^{k,l}) = \tilde{A} \sum_{k=1}^{n_k} g(k, \tilde{x}^k)$$

where

$$\tilde{A} = \text{cbind}(A^1, \dots, A^{n_l})$$

and

$$\tilde{x}^k = \text{rbind}(x^{k,1}, \dots, x^{k,n_l})$$

and for each block l , any missing $x^{k,l}$ is replaced by an NA vector.

Value

A data stack of class `inla.data.stack`. Elements:

- data $= (y^1, \dots, y^p, \tilde{x}^1, \dots, \tilde{x}^{n_k})$
- A $= \tilde{A}$
- data.names List of data names, length p
- effect.names List of effect names, length n_k
- n.data Data length, n_i
- index List indexed by tags, each element indexing into $i = 1, \dots, n_i$

Functions

- `inla.stack.remove.unused()`: Remove unused entries from an existing stack
- `inla.stack.compress()`: Compress an existing stack by removing duplicates
- `inla.stack.sum()`: Create data stack as a sum of predictors
- `inla.stack.join()`: Join two or more data stacks
- `inla.stack.index()`: Extract tagged indices
- `inla.stack.LHS()`: Extract data associated with the "left hand side" of the model (e.g. the data itself, Ntrials, link, E)
- `inla.stack.RHS()`: Extract data associated with the "right hand side" of the model (all the covariates/predictors)
- `inla.stack.data()`: Extract data for an inla call, and optionally join with other variables
- `inla.stack.A()`: Extract the "A matrix" for `control.predictor`

Functions

- `inla.stack.remove.unused`: Remove unused entries from an existing stack
- `inla.stack.compress`: Compress an existing stack by removing duplicates
- `inla.stack`: Shorthand for `inla.stack.join` and `inla.stack.sum`
- `inla.stack.sum`: Create data stack as a sum of predictors
- `inla.stack.join`: Join two or more data stacks
- `inla.stack.index`: Extract tagged indices
- `inla.stack.LHS`: Extract data associated with the "left hand side" of the model (e.g. the data itself, `Ntrials`, `link`, `E`)
- `inla.stack.RHS`: Extract data associated with the "right hand side" of the model (all the covariates/predictors)
- `inla.stack.data`: Extract data for an `inla` call, and optionally join with other variables
- `inla.stack.A`: Extract the "A matrix" for `control.predictor`

See Also

[inla.spde.make.A\(\)](#), [inla.spde.make.index\(\)](#)

Examples

```
n <- 200
loc <- matrix(runif(n * 2), n, 2)
mesh <- inla.mesh.2d(
  loc.domain = loc,
  max.edge = c(0.05, 0.2)
)
proj.obs <- inla.mesh.projector(mesh, loc = loc)
proj.pred <- inla.mesh.projector(mesh, loc = mesh$loc)
spde <- inla.spde2.pcmatern(mesh,
  prior.range = c(0.01, 0.01),
  prior.sigma = c(10, 0.01)
)

covar <- rnorm(n)
field <- inla.qsample(n = 1, Q = inla.spde.precision(spde, theta = log(c(0.5, 1))))[, 1]
y <- 2 * covar + inla.mesh.project(proj.obs, field)

A.obs <- inla.spde.make.A(mesh, loc = loc)
A.pred <- inla.spde.make.A(mesh, loc = proj.pred$loc)
stack.obs <-
  inla.stack(
    data = list(y = y),
    A = list(A.obs, 1),
    effects = list(c(
      list(Intercept = 1),
      inla.spde.make.index("spatial", spde$n.spde)
    ),
    covar = covar
  ),
  tag = "obs"
)
stack.pred <-
```

```

    inla.stack(
      data = list(y = NA),
      A = list(A.pred),
      effects = list(c(
        list(Intercept = 1),
        inla.spde.make.index("spatial", mesh$n)
      )),
      tag = "pred"
    )
  stack <- inla.stack(stack.obs, stack.pred)

  formula <- y ~ -1 + Intercept + covar + f(spatial, model = spde)
  result1 <- inla(formula,
    data = inla.stack.data(stack.obs, spde = spde),
    family = "gaussian",
    control.predictor = list(
      A = inla.stack.A(stack.obs),
      compute = TRUE
    )
  )

  plot(y, result1$summary.fitted.values[inla.stack.index(stack.obs, "obs")$data, "mean"],
    main = "Observations vs posterior predicted values at the data locations"
  )

  result2 <- inla(formula,
    data = inla.stack.data(stack, spde = spde),
    family = "gaussian",
    control.predictor = list(
      A = inla.stack.A(stack),
      compute = TRUE
    )
  )

  field.pred <- inla.mesh.project(
    proj.pred,
    result2$summary.fitted.values[inla.stack.index(stack, "pred")$data, "mean"]
  )
  field.pred.sd <- inla.mesh.project(
    proj.pred,
    result2$summary.fitted.values[inla.stack.index(stack, "pred")$data, "sd"]
  )

  plot(field, field.pred, main = "True vs predicted field")
  abline(0, 1)
  image(inla.mesh.project(mesh,
    field = field,
    dims = c(200, 200)
  ),
    main = "True field"
  )
  image(inla.mesh.project(mesh,
    field = field.pred,
    dims = c(200, 200)
  ),
    main = "Posterior field mean"
  )

```

```

image(inla.mesh.project(mesh,
  field = field.pred.sd,
  dims = c(200, 200)
),
main = "Prediction standard deviation"
)
plot(field, (field.pred - field) / 1,
  main = "True field vs standardised prediction residuals"
)

```

inla.surv

Create a Survival Object for INLA

Description

Create a survival object, to be used as a response variable in a model formula for the `inla()` function for survival models.

Usage

```

inla.surv(
  time,
  event,
  time2,
  truncation,
  subject = NULL,
  cure = NULL,
  .special = NULL
)

## S3 method for class 'inla.surv'
plot(x, y, ...)

## S3 method for class 'inla.surv'
print(x, ...)

as.inla.surv(object, ...)

is.inla.surv(object)

```

Arguments

time	For right censored data, this is the follow up time. For interval data, this is the starting time for the interval. For in-interval event, this is the observed time (in the interval) for the event. For left censored data, this the censoring time.
event	The status indicator, 1=observed event, 0=right censored event, 2=left censored event, 3=interval censored event, and 4=observed event in an interval (left, right).
time2	Ending time for the interval censored data or an in-interval event.
truncation	Left truncation. If missing it is assumed to be 0. The lower limit for event=4.
subject	Patient number in multiple event data, not needed otherwise.

inla.update	<i>Upgrade the INLA-package</i>
-------------	---------------------------------

Description

Functions to upgrade the INLA-package to the current version.

Usage

```
inla.update(lib = NULL, testing = FALSE, ask = TRUE)
```

```
inla.upgrade(lib = NULL, testing = FALSE, ask = TRUE)
```

Arguments

lib	Location to install the library.
testing	If TRUE, then look for a test-version if the INLA-package.
ask	same argument as in <code>update.packages</code>

Value

`inla.upgrade` will update the INLA package to the current version, and `inla.update` do the same for backward compatibility. This function is simple wrapper for `update.packages` using the INLA repository.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

`update.packages`

inla.version	<i>Show the version of the INLA-package</i>
--------------	---

Description

Show the version of the INLA-package

Usage

```
inla.version(what = c("default", "version", "date"))
```

Arguments

what	What to show version of
------	-------------------------

Value

inla.version display the current version information using cat with default or info, or return other specific requests through the call.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
## Summary of all
inla.version()
## The building date
inla.version("date")
```

joint.marginal

Sample, transform and evaluate from a joint marginal approximation

Description

Sample, transform and evaluate from from a joint marginal approximation as returned using argument selection in inla.

Usage

```
inla.rjmarginal(n, jmarginal, constr)

inla.rjmarginal.eval(fun, samples, ...)

## S3 method for class 'inla.jmarginal'
print(x, ...)

## S3 method for class 'inla.jmarginal'
summary(object, ...)

## S3 method for class 'summary.inla.jmarginal'
print(x, ...)

inla.tjmarginal(jmarginal, A)

inla.1djmarginal(jmarginal)
```

Arguments

n	The number of samples
jmarginal	A marginal object given either by a inla object or result\$selection
constr	Optional linear constraints; see ?INLA::f and argument extraconstr
fun	A function which is evaluated for each sample, similar to inla.posterior.sample.eval: please see the documentation for this functions for details.

<code>samples</code>	The samples, as in the form of the output from <code>inla.rjmarginal</code>
<code>...</code>	Arguments passed on to other methods (printing and summarising)
<code>x</code>	Object to be printed
<code>object</code>	Object to be summarised
<code>A</code>	A matrix used for the linear combination

Value

THESE FUNCTIONS ARE EXPERIMENTAL FOR THE MOMENT (JULY 2020)

`inla.rjmarginal` returns a list with the samples in `samples` (matrix) and the corresponding log-densities in `log.density` (vector). Each column in `samples` contains one sample.

`inla.rjmarginal.eval` returns a matrix, where each row is the (vector) function evaluated at each sample.

`inla.tjmarginal` returns a `inla.jmarginal`-object of the linear combination defined by the matrix `A`.

`inla.1djmarginal` return the marginal densities from a joint approximation.

Author(s)

Cristian Chiuchio and Havard Rue <hrue@r-inla.org>

See Also

[inla\(\)](#)

Examples

```
n = 10
x = 1+rnorm(n)
xx = 3 + rnorm(n)
y = 1 + x + xx + rnorm(n)
selection = list(xx=1, x=1)
r = inla(y ~ 1 + x + xx,
        data = data.frame(y, x, xx),
        selection = selection)
ns = 100
xx = inla.rjmarginal(ns, r)

print(cbind(mean = r$selection$mean, sample.mean = rowMeans(xx$samples)))
print("cov matrix")
print(round(r$selection$cov.matrix, dig=3))
print("sample cov matrix")
print(round(cov(t(xx$samples)), dig=3))

skew = function(z) mean((z-mean(z))^3)/var(z)^1.5
print(round(cbind(skew = r$selection$skewness,
                 sample.skew = apply(xx$samples, 1, skew)), digits = 3))

## illustrating the eval function
n = 10
x = rnorm(n)
eta = 1 + x
y = eta + rnorm(n, sd=0.1)
```

```

selection = list(x = 1, '(Intercept)' = 1)
r = inla(y ~ 1 + x,
        data = data.frame(y, x),
        selection = selection)
xx = inla.rjMarginal(100, r)
xx.eval = inla.rjMarginal.eval(function() c(x, Intercept), xx)
print(cbind(xx$samples[, 1]))
print(cbind(xx.eval[, 1]))

constr <- list(A = matrix(1, ncol = nrow(xx$samples), nrow = 1), e = 1)
x <- inla.rjMarginal(10, r, constr = constr)

A <- matrix(rnorm(nrow(xx$samples)^2), nrow(xx$samples), nrow(xx$samples))
b <- inla.tjMarginal(r, A)
b.marg <- inla.1djMarginal(b)

```

jp

Joint-prior models

Description

A framework for defining joint priors in R

Usage

```
inla.jp.define(jp = NULL, ...)
```

Arguments

jp	The jp-function which returns the joint log-prior as a function of argument theta. There is an optional second argument that is a vector of theta-names. If second argument is not present, argument .theta.desc will be added.
...	Named list of variables that defines the environment of jp

Value

This allows joint priors to be defined in R.

This function is for internal use only.

Author(s)

Havard Rue <hrue@r-inla.org>

Kidney	<i>Kidney infection data</i>
--------	------------------------------

Description

Times of infection from the time to insertion of the catheter for 38 kindey patients using portable dialysis equipment

Format

A data frame with 76 observations on the following 9 variables.

time a numeric vector. Time to infection from the insertion of catheter

event a numeric vector. 1: time of infection 0: time of censoring

age a numeric vector. Age of the patient at the time of infection

sex a numeric vector. Sex of the patient 0: male 1:female

disease a numeric vector. Type of disease

dis1 a numeric vector. Dummy variable to codify the disease type.

dis2 a numeric vector. Dummy variable to codify the disease type.

dis3 a numeric vector. Dummy variable to codify the disease type.

ID a numeric vector. Patient code.

References

McGilchrist and C.W. Aisbett (1991), Regression with frailty in survival analysis, *Biometrics*, vol.47, pages 461–166.

D.J. Spiegelhalter and A. Thomas and N.G. Best and W.R. Gilks (1995) BUGS: Bayesian Inference Using Gibbs sampling, Version 0.50., MRC Biostatistics Unit, Cambridre, England.

lattice2node	<i>Functions to define mapping between a lattice and nodes</i>
--------------	--

Description

These functions define mapping in between two-dimensional indices on a lattice and the one-dimensional node representation used in inla.

Usage

```
inla.lattice2node.mapping(nrow, ncol)
```

```
inla.node2lattice.mapping(nrow, ncol)
```

```
inla.lattice2node(irow, icol, nrow, ncol)
```

```
inla.node2lattice(node, nrow, ncol)
```

```
inla.matrix2vector(a.matrix)
```

```
inla.vector2matrix(a.vector, nrow, ncol)
```

Arguments

nrow	Number of rows in the lattice.
ncol	Number of columns in the lattice.
irow	Lattice row index, between 1 and nrow
icol	Lattice column index, between 1 and ncol
node	The node index, between 1 and ncol*nrow
a.matrix	is a matrix to be mapped to a vector using internal representation defined by inla.lattice2node
a.vector	is a vector to be mapped into a matrix using the internal representation defined by inla.node2lattice

Details

The mapping from node to lattice follows the default R behaviour (which is column based storage), and `as.vector(A)` and `matrix(a, nrow, ncol)` can be used instead of `inla.matrix2vector` and `inla.vector2matrix`.

Value

`inla.lattice2node.mapping` returns the hole mapping as a matrix, and `inla.node2lattice.mapping` returns the hole mapping as `list(irow=..., icol=...)`. `inla.lattice2node` and `inla.node2lattice` provide the mapping for a given set of lattice indices and nodes. `inla.matrix2vector` provide the mapped vector from a matrix, and `inla.vector2matrix` provide the inverse mapped matrix from vector.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

[inla](#)

Examples

```
## write out the mapping using the two alternatives
nrow = 2
ncol = 3
mapping = inla.lattice2node.mapping(nrow,ncol)

for (i in 1:nrow){
  for(j in 1:ncol){
    print(paste("Alt.1: lattice index [", i,",", j,"] corresponds",
               "to node [", mapping[i,j],"]", sep=""))
  }
}

for (i in 1:nrow){
  for(j in 1:ncol){
    print(paste("Alt.2: lattice index [", i,",", j,"] corresponds to node [",
               inla.lattice2node(i,j,nrow,ncol), "]", sep=""))
  }
}
```

```

inv.mapping = inla.node2lattice.mapping(nrow,ncol)
for(node in 1:(nrow*ncol))
  print(paste("Alt.1: node [", node, "] corresponds to lattice index [",
              inv.mapping$irow[node], ", ",
              inv.mapping$icol[node], "]", sep=""))

for(node in 1:(nrow*ncol))
  print(paste("Alt.2: node [", node, "] corresponds to lattice index [",
              inla.node2lattice(node,nrow,ncol)$irow[1], ", ",
              inla.node2lattice(node,nrow,ncol)$icol[1], "]", sep=""))

## apply the mapping from matrix to vector and back
n = nrow*ncol
z = matrix(1:n,nrow,ncol)
z.vector = inla.matrix2vector(z) # as.vector(z) could also be used
print(mapping)
print(z)
print(z.vector)

## the vector2matrix is the inverse, and should give us the z-matrix
## back. matrix(z.vector, nrow, ncol) could also be used here.
z.matrix = inla.vector2matrix(z.vector, nrow, ncol)
print(z.matrix)

```

Leuk

The Leukemia data

Description

This the Leukemia data from Henderson et al (2003); see source.

Format

A data frame with 1043 observations on the following 9 variables.

time TODO
cens TODO
xcoord TODO
ycoord TODO
age TODO
sex TODO
wbc TODO
tpi TODO
district TODO

Source

This is the dataset from

Henderson, R. and Shimakura, S. and Gorst, D., 2002, Modeling spatial variation in leukemia survival data, JASA, 97, 460, 965–972.

Examples

```
data(Leuk)
```

```
lines.inla.mesh.segment
```

Draw inla.mesh.segment objects.

Description

Draws a `inla.mesh.segment()` object with generic or `rgl` graphics.

Usage

```
## S3 method for class 'inla.mesh.segment'
lines(
  x,
  loc = NULL,
  col = NULL,
  colors = c("black", "blue", "red", "green"),
  add = TRUE,
  xlim = NULL,
  ylim = NULL,
  rgl = FALSE,
  ...
)
```

Arguments

<code>x</code>	An <code>inla.mesh.segment()</code> object.
<code>loc</code>	Point locations to be used if <code>x\$loc</code> is <code>NULL</code> .
<code>col</code>	Segment color specification.
<code>colors</code>	Colors to cycle through if <code>col</code> is <code>NULL</code> .
<code>add</code>	If <code>TRUE</code> , add to the current plot, otherwise start a new plot.
<code>xlim</code>	X axis limits for a new plot.
<code>ylim</code>	Y axis limits for a new plot.
<code>rgl</code>	If <code>TRUE</code> , use <code>rgl</code> for plotting.
<code>...</code>	Additional parameters, passed on to graphics methods.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

`inla.mesh.segment()`

link

Link functions in INLA

Description

Define link-functions and its inverse

Usage

```
inla.link.cauchit(x, inverse = FALSE)
inla.link.invcauchit(x, inverse = FALSE)
inla.link.log(x, inverse = FALSE)
inla.link.invlog(x, inverse = FALSE)
inla.link.neglog(x, inverse = FALSE)
inla.link.invneglog(x, inverse = FALSE)
inla.link.logit(x, inverse = FALSE)
inla.link.invlogit(x, inverse = FALSE)
inla.link.probit(x, inverse = FALSE)
inla.link.invprobit(x, inverse = FALSE)
inla.link.robitt(x, df = 7, inverse = FALSE)
inla.link.invrobitt(x, df = 7, inverse = FALSE)
inla.link.loglog(x, inverse = FALSE)
inla.link.invloglog(x, inverse = FALSE)
inla.link.cloglog(x, inverse = FALSE)
inla.link.invcloglog(x, inverse = FALSE)
inla.link.ccloglog(x, inverse = FALSE)
inla.link.invccloglog(x, inverse = FALSE)
inla.link.tan(x, inverse = FALSE)
inla.link.invtan(x, inverse = FALSE)
inla.link.identity(x, inverse = FALSE)
```



```

inla.link.invidentity(x, inverse = FALSE)

inla.link.inverse(x, inverse = FALSE)

inla.link.invinverse(x, inverse = FALSE)

inla.link.invqpoisson(x, inverse = FALSE, quantile = 0.5)

inla.link.sn(x, intercept = 0.5, skew = 0, a = NULL, inverse = FALSE)

inla.link.invsn(x, intercept = 0.5, skew = 0, a = NULL, inverse = FALSE)

inla.link.invalid(x, inverse = FALSE)

inla.link.invalid(x, inverse = FALSE)

```

Arguments

x	The argument. A numeric vector.
inverse	Logical. Use the link (inverse=FALSE) or its inverse (inverse=TRUE)
df	The degrees of freedom for the Student-t
quantile	The quantile level for quantile links
intercept	The quantile level for the intercept in the Skew-Normal link
skew	The skewness in the Skew-Normal. Only one of skew and a can be given.
a	The a-parameter in the Skew-Normal. Only one of skew and a can be given.

Value

Return the values of the link-function or its inverse.

Note

The inv-functions are redundant, as `inla.link.invlog(x) = inla.link.log(x, inverse=TRUE)` and so on, but they are simpler to use a arguments to other functions.

Author(s)

Havard Rue <hrue@r-inla.org>

make.lincomb

Create linear combinations

Description

Create a linear combination or several linear combinations, as input to `inla(..., lincomb = <lincomb>)`

Usage

```

inla.make.lincomb(...)

inla.make.lincombs(...)

```

Arguments

... Arguments; see examples

Value

A structure to be passed on to `inla()` argument `lincomb`

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

TODO

Examples

```
##See the worked out examples and description in the OLD-FAQ
##vignette {vignette("old-faq", package="INLA")}
```

marginal

Functions which operates on marginals

Description

Density, distribution function, quantile function, random generation, hpd-interval, interpolation, expectations, mode and transformations of marginals obtained by `inla` or `inla.hyperpar()`. These functions computes the density (`inla.dmarginal`), the distribution function (`inla.pmarginal`), the quantile function (`inla.qmarginal`), random generation (`inla.rmarginal`), spline smoothing (`inla.smarginal`), computes expected values (`inla.emarginal`), computes the mode (`inla.mmarginal`), transforms the marginal (`inla.tmarginal`), and provide summary statistics (`inla.zmarginal`).

Usage

```
inla.smarginal(
  marginal,
  log = FALSE,
  extrapolate = 0,
  keep.type = FALSE,
  factor = 15L
)

inla.emarginal(fun, marginal, ...)

inla.dmarginal(x, marginal, log = FALSE)

inla.pmarginal(q, marginal, normalize = TRUE, len = 2048L)

inla.qmarginal(p, marginal, len = 2048L)
```

```

inla.hpdmarginal(p, marginal, len = 2048L)

inla.rmarginal(n, marginal)

inla.tmarginal(
  fun,
  marginal,
  n = 2048L,
  h.diff = .Machine[["double.eps"]](1/3),
  method = c("quantile", "linear")
)

inla.mmarginal(marginal)

inla.zmarginal(marginal, silent = FALSE)

inla.is.marginal(marginal)

```

Arguments

marginal	A marginal object from either <code>inla</code> or <code>inla.hyperpar()</code> , which is either <code>list(x=c(), y=c())</code> with density values <code>y</code> at locations <code>x</code> , or a <code>matrix(,n,2)</code> for which the density values are the second column and the locations in the first column. The <code>inla.hpdmarginal()</code> -function assumes a unimodal density.
log	Return density or interpolated density in log-scale?
extrapolate	How much to extrapolate on each side when computing the interpolation. In fraction of the range.
keep.type	If FALSE then return a <code>list(x=, y=)</code> , otherwise if TRUE, then return a matrix if the input is a matrix
factor	The number of points after interpolation is <code>factor</code> times the original number of points; which is argument <code>n</code> in <code>spline</code>
fun	A (vectorised) function like <code>function(x) exp(x)</code> to compute the expectation against, or which define the transformation <code>new = fun(old)</code>
...	Further arguments to be passed to function which expectation is to be computed.
x	Evaluation points
q	Quantiles
normalize	Renormalise the density after interpolation?
len	Number of locations used to interpolate the distribution function.
p	Probabilities
n	The number of observations. If <code>length(n) > 1</code> , the length is taken to be the number required.
h.diff	The step-length for the numerical differentiation inside <code>inla.tmarginal</code>
method	Which method should be used to layout points for where the transformation is computed.
silent	Output the result visually (TRUE) or just through the call.

Value

`inla.smarginal` returns `list=c(x=c(), y=c())` of interpolated values do extrapolation using the factor given, and the remaining function returns what they say they should do.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

[inla\(\)](#), [inla.hyperpar\(\)](#)

Examples

```
## a simple linear regression example
n = 10
x = rnorm(n)
sd = 0.1
y = 1+x + rnorm(n,sd=sd)
res = inla(y ~ 1 + x, data = data.frame(x,y),
          control.family=list(initial = log(1/sd^2L),fixed=TRUE))

## chose a marginal and compare the with the results computed by the
## inla-program
r = res$summary.fixed["x",]
m = res$marginals.fixed$x

## compute the 95% HPD interval
inla.hpdmarginal(0.95, m)

x = seq(-6, 6, length.out = 1000)
y = dnorm(x)
inla.hpdmarginal(0.95, list(x=x, y=y))

## compute the the density for exp(r), version 1
r.exp = inla.tmarginal(exp, m)
## or version 2
r.exp = inla.tmarginal(function(x) exp(x), m)

## to plot the marginal, we use the inla.smarginal, which interpolates (in
## log-scale). Compare with some samples.
plot(inla.smarginal(m), type="l")
s = inla.rmarginal(1000, m)
hist(inla.rmarginal(1000, m), add=TRUE, prob=TRUE)
lines(density(s), lty=2)

m1 = inla.emarginal(function(x) x, m)
m2 = inla.emarginal(function(x) x^2L, m)
stdev = sqrt(m2 - m1^2L)
q = inla.qmarginal(c(0.025,0.975), m)

## inla-program results
print(r)

## inla.marginal-results (they shouldn't be perfect!)
print(c(mean=m1, sd=stdev, "0.025quant" = q[1], "0.975quant" = q[2L]))
## using the buildt-in function
inla.zmarginal(m)
```

merge.inla

*Merge a mixture of inla-objects***Description**

The function `merge.inla` implements method `merge` for `inla`-objects. `merge.inla` is a wrapper for the function `inla.merge`. The interface is slightly different, `merge.inla` is more tailored for interactive use, whereas `inla.merge` is better in general code.

`inla.merge` is intended for merging a mixture of `inla`-objects, each run with the same formula and settings, except for a set of hyperparameters that are fixed to different values. Using this function, we can then integrate over these hyperparameters using (unnormalized) integration weights `prob`. The main objects to be merged, are the summary statistics and marginal densities (like for hyperparameters, fixed, random, etc). Not all entries in the object can be merged, and by default these are inherited from the first object in the list, while some are just set to `NULL`. Those objects that are merged, will be listed if run with option `verbose=TRUE`.

Note that merging hyperparameter in the user-scale is prone to discretization error in general, so it is more stable to convert the marginal of the hyperparameter from the merged internal scale to the user-scale. (This is not done by this function.)

Usage

```
## S3 method for class 'inla'
merge(x, y, ..., prob = rep(1, length(list(x, y, ...))), verbose = FALSE)

inla.merge(loo, prob = rep(1, length(loo)), mc.cores = NULL, verbose = FALSE)
```

Arguments

<code>x</code>	An <code>inla</code> -object to be merged
<code>y</code>	An <code>inla</code> -object to be merged
<code>...</code>	Additional <code>inla</code> -objects to be merged
<code>prob</code>	The mixture of (possibly unnormalized) probabilities
<code>verbose</code>	Turn on verbose-output or not
<code>loo</code>	List of <code>inla</code> -objects to be merged
<code>mc.cores</code>	The number of cores to use in <code>parallel::mclapply</code> . If <code>is.null(mc.cores)</code> , then check <code>getOption("mc.cores")</code> and <code>inla.getOption("num.threads")</code> in that order.

Value

A merged `inla`-object.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```

set.seed(123)
n = 100
y = rnorm(n)
y[1:10] = NA
x = rnorm(n)
z1 = runif(n)
z2 = runif(n)*n
idx = 1:n
idx2 = 1:n
lc1 = inla.make.lincomb(idx = c(1, 2, 3))
names(lc1) = "lc1"
lc2 = inla.make.lincomb(idx = c(0, 1, 2, 3))
names(lc2) = "lc2"
lc3 = inla.make.lincomb(idx = c(0, 0, 1, 2, 3))
names(lc3) = "lc3"
lc = c(lc1, lc2, lc3)
rr = list()
for (logprec in c(0, 1, 2))
  rr[[length(rr)+1]] = inla(y ~ 1 + x + f(idx, z1) + f(idx2, z2),
    lincomb = lc,
    control.family = list(hyper = list(prec = list(initial = logprec))),
    control.predictor = list(compute = TRUE, link = 1),
    data = data.frame(y, x, idx, idx2, z1, z2))
r = inla.merge(rr, prob = seq_along(rr), verbose=TRUE)
summary(r)

```

 meshbuilder

Interactive mesh building and diagnostics

Description

Interactively design and build a triangle mesh for use with SPDE models, and assess the finite element approximation errors. The R code needed to recreate the mesh outside the interactive Shiny app is also generated. Spatial objects can be imported from the global workspace.

Usage

```
meshbuilder()
```

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.mesh.2d\(\)](#), [inla.mesh.create\(\)](#)

Examples

```
## Not run:
meshbuilder()

## End(Not run)
```

Munich

*The Munich rent data***Description**

The Munich rent data

Format

A data frame with 2035 observations on the following 17 variables.

rent Net rent per square meter.

floor.size Size of the flat in square meters.

year Year of construction of the building in which the flat is located.

location Location index (in terms of subquarters).

Gute.Wohnlage Dummy variable for good locations / good neighborhoods.

Beste.Wohnlage Dummy variable for very good locations / very good neighborhoods.

Keine.Wvv Dummy for absence of warm water supply.

Keine.Zh Dummy for absence of central heating system.

Kein.Badkach Dummy for absence of flagging in the bathroom.

Besond.Bad Dummy for special features of the bathroom.

Gehobene.Kueche Dummy for more refined kitchen equipment.

zim1 Dummy for a flat with 1 room.

zim2 Dummy for a flat with 2 rooms.

zim3 Dummy for a flat with 3 rooms.

zim4 Dummy for a flat with 4 rooms.

zim5 Dummy for a flat with 5 rooms.

zim6 Dummy for a flat with 6 rooms.

Source

See Rue and Held (2005), Chapter 4.

References

Rue, H and Held, L. (2005) *Gaussian Markov Random Fields - Theory and Applications* Chapman and Hall

nwEngland

The New England map

Description

This map is used in association to the Leukemia data from Henderson et al (2003); see source.

Format

A SpatialPolygons object.

Source

This map are used to analyse the Leukaemia dataset from

Henderson, R. and Shimakura, S. and Gorst, D., 2002, Modeling spatial variation in leukemia survival data, JASA, 97, 460, 965–972.

Examples

```
data(Leuk)
plot(nwEngland)
```

Oral

~~ data name/kind ... ~~

Description

~~ A concise (1-5 lines) description of the dataset. ~~

Format

A data frame with 544 observations on the following 3 variables.

region a numeric vector

E a numeric vector

Y a numeric vector

References

Rue, H and Held, L. (2005) *Gaussian Markov Random Fields - Theory and Applications* Chapman and Hall

param2.matern.orig *Parameter settings for inla.spde2.matern models.*

Description

Construct parameter settings for `inla.spde2.matern` models.

Usage

```
param2.matern.orig(
  mesh,
  alpha = 2,
  B.tau = matrix(c(0, 1, 0), 1, 3),
  B.kappa = matrix(c(0, 0, 1), 1, 3),
  prior.variance.nominal = 1,
  prior.range.nominal = NULL,
  prior.tau = NULL,
  prior.kappa = NULL,
  theta.prior.mean = NULL,
  theta.prior.prec = 0.1
)
```

Arguments

<code>mesh</code>	The mesh to build the model on, as an <code>inla.mesh()</code> object.
<code>alpha</code>	Fractional operator order, $0 < \alpha \leq 2$ supported. ($\nu = \alpha - d/2$)
<code>B.tau</code>	Matrix with specification of log-linear model for τ .
<code>B.kappa</code>	Matrix with specification of log-linear model for κ .
<code>prior.variance.nominal</code>	Nominal prior mean for the field variance
<code>prior.range.nominal</code>	Nominal prior mean for the spatial range
<code>prior.tau</code>	Prior mean for tau (overrides <code>prior.variance.nominal</code>)
<code>prior.kappa</code>	Prior mean for kappa (overrides <code>prior.range.nominal</code>)
<code>theta.prior.mean</code>	(overrides <code>prior.*</code>)
<code>theta.prior.prec</code>	Scalar, vector or matrix, specifying the joint prior precision for <i>theta</i> .

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[inla.spde2.matern\(\)](#)

pardiso

Describe and check the PARDISO support in R-INLA

Description

`inla.pardiso()` describes the PARDISO support in R-INLA, how to get the license key and enable it in the R-INLA package. `inla.pardiso.check()` check if the PARDISO support is working.

Usage

```
inla.pardiso()
```

```
inla.pardiso.check()
```

Author(s)

Havard Rue <hrue@r-inla.org>

pc.alphaw

Utility functions for the PC prior for the alpha parameter in the Weibull likelihood

Description

Functions to evaluate, sample, compute quantiles and percentiles of the PC prior for the alpha parameter in the Weibull likelihood

Usage

```
inla.pc.ralphaw(n, lambda = 5)
```

```
inla.pc.dalphaw(alpha, lambda = 5, log = FALSE)
```

```
inla.pc.qalphaw(p, lambda = 5)
```

```
inla.pc.palphaw(q, lambda = 5)
```

Arguments

n	Number of observations
lambda	The rate parameter in the PC-prior
alpha	Vector of evaluation points, where $\alpha > 0$.
log	Logical. Return the density in natural or log-scale.
p	Vector of probabilities
q	Vector of quantiles

Details

This gives the PC prior for the alpha parameter for the Weibull likelihood, where alpha=1 is the base model.

Value

inla.pc.dalphaw gives the density, inla.pc.palphaw gives the distribution function, inla.pc.qalphaw gives the quantile function, and inla.pc.ralphaw generates random deviates.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

inla.doc("pc.alphaw")

Examples

```
x = inla.pc.ralphaw(100, lambda = 5)
d = inla.pc.dalphaw(x, lambda = 5)
x = inla.pc.qalphaw(0.5, lambda = 5)
inla.pc.palphaw(x, lambda = 5)
```

pc.ar

Utility functions for the PC prior for a an AR(p) model

Description

Functions to evaluate and sample from the PC prior for an AR(p) model

Usage

```
inla.pc.ar.rpacf(n = 1, p, lambda = 1)

inla.pc.ar.dpacf(pac, lambda = 1, log = TRUE)
```

Arguments

n	Number of observations
p	The order of the AR-model
lambda	The rate parameter in the prior
pac	A vector of partial autocorrelation coefficients
log	Logical. Return the density in natural or log-scale.

Value

inla.pc.ar.rpac generate samples from the prior, returning a matrix where each row is a sample of theta. inla.pc.ar.dpac evaluates the density of pac. Use inla.ar.pacf2phi, inla.ar.phi2pacf, inla.ar.pacf2acf and inla.ar.acf2pacf to convert between various parameterisations.

Author(s)

Havard Rue <hrue@r-inla.org>

pc.cor0

Utility functions for the PC prior for correlation in AR(1)

Description

Functions to evaluate, sample, compute quantiles and percentiles of the PC prior for the correlation in the Gaussian AR(1) model where the base-model is zero correlation.

Usage

```
inla.pc.rcor0(n, u, alpha, lambda)

inla.pc.dcor0(cor, u, alpha, lambda, log = FALSE)

inla.pc.qcor0(p, u, alpha, lambda)

inla.pc.pcor0(q, u, alpha, lambda)
```

Arguments

n	Number of observations
u	The upper limit (see Details)
alpha	The probability going above the upper limit (see Details)
lambda	The rate parameter (see Details)
cor	Vector of correlations
log	Logical. Return the density in natural or log-scale.
p	Vector of probabilities
q	Vector of quantiles

Details

The statement $\text{Prob}(|\text{cor}| > u) = \alpha$ is used to determine λ unless λ is given. Either λ must be given, or u AND α . The density is symmetric around zero.

Value

inla.pc.dcor0 gives the density, inla.pc.pcor0 gives the distribution function, inla.pc.qcor0 gives the quantile function, and inla.pc.rcor0 generates random deviates.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

inla.doc("pc.rho0")

Examples

```
cor = inla.pc.rcor0(100, lambda = 1)
d = inla.pc.dcor0(cor, lambda = 1)
cor = inla.pc.qcor0(c(0.3, 0.7), u = 0.5, alpha=0.01)
inla.pc.pcor0(cor, u = 0.5, alpha=0.01)
```

pc.cor1

*Utility functions for the PC prior for correlation in AR(1)***Description**

Functions to evaluate, sample, compute quantiles and percentiles of the PC prior for the correlation in the Gaussian AR(1) model where the base-model is correlation one.

Usage

```
inla.pc.rcor1(n, u, alpha, lambda)

inla.pc.dcor1(cor, u, alpha, lambda, log = FALSE)

inla.pc.qcor1(p, u, alpha, lambda)

inla.pc.pcor1(q, u, alpha, lambda)
```

Arguments

n	Number of observations
u	The upper limit (see Details)
alpha	The probability going above the upper limit (see Details)
lambda	The rate parameter (see Details)
cor	Vector of correlations
log	Logical. Return the density in natural or log-scale.
p	Vector of probabilities
q	Vector of quantiles

Details

The statement $\text{Prob}(\text{cor} > u) = \alpha$ is used to determine lambda unless lambda is given. Either lambda must be given, or u AND alpha.

Value

inla.pc.dcor1 gives the density, inla.pc.pcor1 gives the distribution function, inla.pc.qcor1 gives the quantile function, and inla.pc.rcor1 generates random deviates.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

`inla.doc("pc.rho1")`

Examples

```
cor = inla.pc.rcor1(100, lambda = 1)
d = inla.pc.dcor1(cor, lambda = 1)
cor = inla.pc.qcor1(c(0.3, 0.7), u = 0.5, alpha=0.75)
inla.pc.pcor1(cor, u = 0.5, alpha=0.75)
```

pc.cormat

Utility functions for the PC prior for a correlation matrix

Description

Functions to evaluate and sample from the PC prior for a correlation matrix.

The parameterisation of a correlation matrix of dimension p has dim parameters: θ which are in the interval $-\pi$ to π . The alternative parameterisation is through the off-diagonal elements r of the correlation matrix R . The functions `inla.pc.cormat.<A>2` convert between parameterisations $\langle A \rangle$ to parameterisations $\langle B \rangle$, where both $\langle A \rangle$ and $\langle B \rangle$ are one of θ , r and R , and p and dim .

Usage

```
inla.pc.cormat.dim2p(dim)

inla.pc.cormat.p2dim(p)

inla.pc.cormat.theta2R(theta)

inla.pc.cormat.R2theta(R)

inla.pc.cormat.r2R(r)

inla.pc.cormat.R2r(R)

inla.pc.cormat.r2theta(r)

inla.pc.cormat.theta2r(theta)

inla.pc.cormat.permute(R)

inla.pc.cormat.rtheta(n = 1, p, lambda = 1)

inla.pc.cormat.dtheta(theta, lambda = 1, log = FALSE)
```

Arguments

<code>dim</code>	The dimension of θ , the parameterisation of the correlation matrix
<code>p</code>	The dimension the correlation matrix

theta	A vector of parameters for the correlation matrix
R	A correlation matrix
r	The off diagonal elements of a correlation matrix
n	Number of observations
lambda	The rate parameter in the prior
log	Logical. Return the density in natural or log-scale.

Value

`inla.pc.cormat.rtheta` generate samples from the prior, returning a matrix where each row is a sample of `theta`. `inla.pc.cormat.dtheta` evaluates the density of `theta`. `inla.pc.cormat.permute` randomly permutes a correlation matrix, which is useful if an exchangeable sample of a correlation matrix is required.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
p = 4
print(paste("theta has length", inla.pc.cormat.p2dim(p)))
theta = inla.pc.cormat.rtheta(n=1, p=4, lambda = 1)
print("sample theta:")
print(theta)
print(paste("log.dens", inla.pc.cormat.dtheta(theta, log=TRUE)))
print("r:")
r = inla.pc.cormat.theta2r(theta)
print(r)
print("A sample from the non-exchangable prior, R:")
R = inla.pc.cormat.r2R(r)
print(R)
print("A sample from the exchangeable prior, R:")
R = inla.pc.cormat.permute(R)
print(R)
```

pc.ddof

PC-prior for dof in a standardized Student-t

Description

A function to evaluate the PC-prior for the degrees of freedom in a standardized Student-t distribution

Usage

```
inla.pc.ddof(dof, lambda, u, alpha, log = FALSE)
```

Arguments

dof	Degrees of freedom
lambda	The optional value of lambda, instead of defining it implicitly through u and alpha
u	The upper value of dof used to elicitate lambda, $\text{Prob}(\text{dof} < u) = \alpha$
alpha	The probability alpha used to elicitate lambda
log	Logical. Return the density or the log-density

Details

These functions implements the PC-prior for the dof in a standardized Student-t distribution (ie. with unit variance and $\text{dof} > 2$). Either lambda, or u AND alpha must be given. Due the internal tabulation, dof must be larger than 2.0025.

Value

`inla.pc.ddof` returns the prior density for given dof.

Author(s)

Havard Rue <hrue@r-inla.org>

pc.gamma

Utility functions for the PC prior for $\text{Gamma}(1/a, 1/a)$

Description

Functions to evaluate, sample, compute quantiles and percentiles of the PC prior for $\text{Gamma}(1/a, 1/a)$

Usage

```
inla.pc.rgamma(n, lambda = 1)

inla.pc.dgamma(x, lambda = 1, log = FALSE)

inla.pc.qgamma(p, lambda = 1)

inla.pc.pgamma(q, lambda = 1)
```

Arguments

n	Number of observations
lambda	The rate parameter (see Details)
x	Evaluation points
log	Logical. Return the density in natural or log-scale.
p	Vector of probabilities
q	Vector of quantiles

Details

This gives the PC prior for the $\text{Gamma}(1/a, 1/a)$ case, where $a=0$ is the base model.

Value

`inla.pc.dgamma` gives the density, `inla.pc.pgamma` gives the distribution function, `inla.pc.qgamma` gives the quantile function, and `inla.pc.rgamma` generates random deviates.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

`inla.doc("pc.gamma")`

Examples

```
x = inla.pc.rgamma(100, lambda = 1)
d = inla.pc.dgamma(x, lambda = 1)
x = inla.pc.qgamma(0.5, lambda = 1)
inla.pc.pgamma(x, lambda = 1)
```

pc.gammacount

Utility functions for the PC prior for the gammacount likelihood

Description

Functions to evaluate, sample, compute quantiles and percentiles of the PC prior for the gammacount likelihood

Usage

```
inla.pc.rgammacount(n, lambda = 1)

inla.pc.dgammacount(x, lambda = 1, log = FALSE)

inla.pc.qgammacount(p, lambda = 1)

inla.pc.pgammacount(q, lambda = 1)
```

Arguments

<code>n</code>	Number of observations
<code>lambda</code>	The rate parameter (see Details)
<code>x</code>	Evaluation points
<code>log</code>	Logical. Return the density in natural or log-scale.
<code>p</code>	Vector of probabilities
<code>q</code>	Vector of quantiles

Details

This gives the PC prior for the gammacount likelihood, which is the PC prior for a in $\text{Gamma}(a, 1)$ where $\text{Gamma}(1, 1)$ is the base model.

Value

`inla.pc.dgammacount` gives the density, `inla.pc.pgammacount` gives the distribution function, `inla.pc.qgammacount` gives the quantile function, and `inla.pc.rgammacount` generates random deviates.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

`inla.doc("pc.gammacount")`

Examples

```
x = inla.pc.rgammacount(100, lambda = 1)
d = inla.pc.dgammacount(x, lambda = 1)
x = inla.pc.qgammacount(0.5, lambda = 1)
inla.pc.pgammacount(x, lambda = 1)
```

pc.gevtail

Utility functions for the PC prior for the tail parameter in the GEV likelihood

Description

Functions to evaluate, sample, compute quantiles and percentiles of the PC prior for the tail parameter in the GEV likelihood

Usage

```
inla.pc.rgevtail(n, lambda = 7)

inla.pc.dgevtail(xi, lambda = 7, log = FALSE)

inla.pc.qgevtail(p, lambda = 7)

inla.pc.pgevtail(q, lambda = 7)
```

Arguments

<code>n</code>	Number of observations
<code>lambda</code>	The rate parameter in the PC-prior
<code>xi</code>	Vector of evaluation points, where $1 > xi > 0$.
<code>log</code>	Logical. Return the density in natural or log-scale.
<code>p</code>	Vector of probabilities
<code>q</code>	Vector of quantiles

Details

This gives the PC prior for the tail parameter for the GEV likelihood, where $\xi=0$ is the base model.

Value

`inla.pc.dgevtail` gives the density, `inla.pc.pgevtail` gives the distribution function, `inla.pc.qgevtail` gives the quantile function, and `inla.pc.rgevtail` generates random deviates.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

`inla.doc("pc.gevtail")`

Examples

```
xi = inla.pc.rgevtail(100, lambda = 7)
d = inla.pc.dgevtail(xi, lambda = 7)
xi = inla.pc.qgevtail(0.5, lambda = 7)
inla.pc.pgevtail(xi, lambda = 7)
```

pc.multvar

Multivariate PC priors

Description

Functions to evaluate and simulate from multivariate PC priors: The simplex and sphere case

Usage

```
inla.pc.multvar.h.default(x, inverse = FALSE, derivative = FALSE)
```

```
inla.pc.multvar.simplex.r(
  n = NULL,
  lambda = 1,
  h = inla.pc.multvar.h.default,
  b = NULL
)
```

```
inla.pc.multvar.simplex.d(
  x = NULL,
  lambda = 1,
  log = FALSE,
  h = inla.pc.multvar.h.default,
  b = NULL
)
```

```
inla.pc.multvar.sphere.r(
```

```

    n = NULL,
    lambda = 1,
    h = inla.pc.multvar.h.default,
    H = NULL
  )

  inla.pc.multvar.sphere.d(
    x = NULL,
    lambda = 1,
    log = FALSE,
    h = inla.pc.multvar.h.default,
    H = NULL
  )

```

Arguments

x	Samples to evaluate. If input is a matrix then each row is a sample. If input is a vector then this is the sample.
inverse	Compute the inverse of the h()-function.
derivative	Compute the derivative of the h()-function. (derivative of the inverse function is not used).
n	Number of samples to generate.
lambda	The lambda-parameter in the PC-prior.
h	The h()-function, defaults to <code>inla.pc.multvar.h.default</code> . See that code for an example of how to write a user-specific function.
b	The b-vector (gradient) in the expression for the simplex option, $d(x_i) = h(b^T x_i)$
log	Evaluate the density in log-scale or ordinary scale.
H	The H(essian)-matrix in the expression for the sphere option, $d(x_i) = h(1/2 * x_i^T H x_i)$. If H is a vector, then it is interpreted as the diagonal of a (sparse) diagonal matrix.

Details

These functions implements multivariate PC-priors of the simplex and sphere type.

Value

`inla.pc.multvar.simplex.r` generate samples from the simplex case, and `inla.pc.multvar.simplex.d` evaluate the density. `inla.pc.multvar.sphere.r` generate samples from the sphere case, and `inla.pc.multvar.sphere.d` evaluate the density. `inla.pc.multvar.h.default` implements the default h()-function and illustrate how to code your own specific one, if needed.

Author(s)

Havard Rue <hrue@r-inla.org>

pc.prec

*Utility functions for the PC prior for the precision***Description**

Functions to evaluate, sample, compute quantiles and percentiles of the PC prior for the precision in the Gaussian distribution.

Usage

```
inla.pc.rprec(n, u, alpha, lambda)

inla.pc.dprec(prec, u, alpha, lambda, log = FALSE)

inla.pc.qprec(p, u, alpha, lambda)

inla.pc.pprec(q, u, alpha, lambda)
```

Arguments

n	Number of observations
u	The upper limit (see Details)
alpha	The probability going above the upper limit (see Details)
lambda	The rate parameter (see Details)
prec	Vector of precisions
log	Logical. Return the density in natural or log-scale.
p	Vector of probabilities
q	Vector of quantiles

Details

The statement $\text{Prob}(1/\sqrt{\text{prec}} > u) = \alpha$ is used to determine λ unless λ is given. Either λ must be given, or u AND α .

Value

`inla.pc.dprec` gives the density, `inla.pc.pprec` gives the distribution function, `inla.pc.qprec` gives the quantile function, and `inla.pc.rprec` generates random deviates.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

`inla.doc("pc.prec")`

Examples

```
prec = inla.pc.rprec(100, lambda = 1)
d = inla.pc.dprec(prec, lambda = 1)
prec = inla.pc.qprec(0.5, u = 1, alpha=0.01)
inla.pc.pprec(prec, u = 1, alpha=0.01)
```

pc.sn	<i>Utility functions for the PC prior for skewness in the skew-normal linkfunction and likelihood</i>
-------	---

Description

Functions to evaluate, sample, compute quantiles and percentiles of the PC prior for the skewness in the skew-normal link-function and likelihood

Usage

```
inla.pc.rsn(n, lambda = 40)

inla.pc.dsn(skew, lambda = 40, log = FALSE)

inla.pc.qsn(p, lambda = 40)

inla.pc.psn(q, lambda = 40)
```

Arguments

n	number of observations
lambda	the rate parameter in the PC prior
skew	vector of evaluation points
log	logical. return the density in natural or log-scale.
p	vector of probabilities
q	vector of quantiles

Details

Defines the PC prior for the skewness for the skew-normal linkfunction and likelihood, where skew=0 is the base model. The skewness range from -0.99527... to 0.99527.... ca.

Value

inla.pc.dsn gives the density, inla.pc.psn gives the distribution function, inla.pc.qsn gives the quantile function, and inla.pc.rsn generates random deviates.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

inla.doc("pc.sn")

Examples

```
x = inla.pc.rsn(100, lambda = 40)
d = inla.pc.dsn(x, lambda = 40)
x = inla.pc.qsn(0.5, lambda = 40)
inla.pc.psn(x, lambda = 40)
```

plot.inla	<i>Default INLA plotting</i>
-----------	------------------------------

Description

Takes an inla object produced by inla and plot the results

Usage

```
## S3 method for class 'inla'
plot(
  x,
  plot.fixed.effects = TRUE,
  plot.lincomb = TRUE,
  plot.random.effects = TRUE,
  plot.hyperparameters = TRUE,
  plot.predictor = TRUE,
  plot.q = TRUE,
  plot.cpo = TRUE,
  plot.prior = FALSE,
  single = FALSE,
  postscript = FALSE,
  pdf = FALSE,
  prefix = "inla.plots/figure-",
  intern = FALSE,
  debug = FALSE,
  cex = 1.75,
  ...
)
```

Arguments

x	A fitted inla object produced by inla
plot.fixed.effects	Boolean indicating if posterior marginals for the fixed effects in the model should be plotted
plot.lincomb	Boolean indicating if posterior marginals for the linear combinations should be plotted

<code>plot.random.effects</code>	Boolean indicating if posterior mean and quantiles for the random effects in the model should be plotted
<code>plot.hyperparameters</code>	Boolean indicating if posterior marginals for the hyperparameters in the model should be plotted
<code>plot.predictor</code>	Boolean indicating if posterior mean and quantiles for the linear predictor in the model should be plotted
<code>plot.q</code>	Boolean indicating if precision matrix should be displayed
<code>plot.cpo</code>	Boolean indicating if CPO/PIT values should be plotted
<code>plot.prior</code>	Plot also the prior density for the hyperparameters
<code>single</code>	Boolean indicating if there should be more than one plot per page (FALSE) or just one (TRUE)
<code>postscript</code>	Boolean indicating if postscript files should be produced instead
<code>pdf</code>	Boolean indicating if PDF files should be produced instead
<code>prefix</code>	The prefix for the created files. Additional numbering and suffix is added.
<code>intern</code>	Plot also the hyperparameters in its internal scale.
<code>debug</code>	Write some debug information
<code>cex</code>	The cex parameter in <code>par()</code> . If set to NULL or 0, then default values will be used for graphics parameters
<code>...</code>	Additional arguments to <code>postscript()</code> , <code>pdf()</code> or <code>dev.new()</code> .

Value

The return value is a list of the files created (if any).

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

[inla\(\)](#)

Examples

```
## Not run:
result = inla(...)
plot(result)
plot(result, single = TRUE, plot.prior = TRUE)
plot(result, single = TRUE, pdf = TRUE, paper = "a4")

## End(Not run)
```

plot.inla.CRS	<i>Plot CRS and inla.CRS objects</i>
---------------	--------------------------------------

Description

Plot the outline of a CRS or inla.CRS projection, with optional graticules (transformed parallels and meridians) and Tissot indicatrices.

Usage

```
## S3 method for class 'inla.CRS'
plot(
  x,
  xlim = NULL,
  ylim = NULL,
  outline = TRUE,
  graticule = c(15, 15, 45),
  tissot = c(30, 30, 30),
  asp = 1,
  add = FALSE,
  eps = 0.05,
  ...
)

## S3 method for class 'CRS'
plot(
  x,
  xlim = NULL,
  ylim = NULL,
  outline = TRUE,
  graticule = c(15, 15, 45),
  tissot = c(30, 30, 30),
  asp = 1,
  add = FALSE,
  eps = 0.05,
  ...
)
```

Arguments

x	A CRS or inla.CRS() object.
xlim	Optional x-axis limits.
ylim	Optional y-axis limits.
outline	Logical, if TRUE, draw the outline of the projection.
graticule	Vector of length at most 3, to plot meridians with spacing graticule[1] degrees and parallels with spacing graticule[2] degrees. graticule[3] optionally specifies the spacing above and below the first and last parallel. When graticule[1]==0 no meridians are drawn, and when graticule[2]==0 no parallels are drawn. Use graticule=NULL to skip drawing a graticule.

tissot	Vector of length at most 3, to plot Tissot's indicatrices with spacing tissot[1] degrees and parallels with spacing tissot[2] degrees. tissot[3] specifies a scaling factor. Use tissot=NULL to skip drawing a Tissot's indicatrices.
asp	The aspect ratio for the plot, default 1.
add	If TRUE, add the projection plot to an existing plot.
eps	Clipping tolerance for rudimentary boundary clipping
...	Additional arguments passed on to the internal calls to plot and lines.

Author(s)

Finn Lindgren finn.lindgren@gmail.com

See Also

[inla.CRS\(\)](#)

Examples

```
if (require("sf") && require("sp")) {
  for (projtype in c("longlat_norm", "lambert_norm", "mollweide_norm", "hammer_norm")) {
    plot(fmesher::fm_CRS(projtype), main = projtype)
  }
}

if (require("sf") && require("sp")) {
  oblique <- c(0, 45, 45, 0)
  for (projtype in c("longlat_norm", "lambert_norm", "mollweide_norm", "hammer_norm")) {
    INLA:::plot.inla.CRS(fmesher::fm_CRS(projtype), oblique = oblique, main = paste("oblique", projtype))
  }
}
```

plot.inla.mesh

Draw a triangulation mesh object

Description

Plots an [inla.mesh\(\)](#) object using either standard graphics or with rgl.

Usage

```
## S3 method for class 'inla.mesh'
plot(
  x,
  col = "white",
  t.sub = 1:nrow(mesh$graph$tv),
  add = FALSE,
  lwd = 1,
  xlim = range(mesh$loc[, 1]),
  ylim = range(mesh$loc[, 2]),
  main = NULL,
  rgl = FALSE,
```

```

    size = 2,
    draw.vertices = FALSE,
    vertex.color = "black",
    draw.edges = TRUE,
    edge.color = rgb(0.3, 0.3, 0.3),
    draw.segments = draw.edges,
    ...
)

```

Arguments

<code>x</code>	An <code>inla.mesh()</code> object.
<code>col</code>	Color specification. A single named color, a vector of scalar values, or a matrix of RGB values. Requires <code>rgl=TRUE</code> .
<code>t.sub</code>	Optional triangle index subset to be drawn.
<code>add</code>	If TRUE, adds to the current plot instead of starting a new one.
<code>lwd</code>	Line width for triangle edges.
<code>xlim</code>	X-axis limits.
<code>ylim</code>	Y-axis limits.
<code>main</code>	The main plot title. If not specified, a default title is generated based on the mesh type.
<code>rgl</code>	When TRUE, generates an <code>rgl</code> plot instead of a generic graphics plot. Allows 3D plotting and color surface plotting.
<code>size</code>	Size of vertex points in <code>rgl</code> plotting. See <code>rgl.material</code> .
<code>draw.vertices</code>	If TRUE, draw triangle vertices.
<code>vertex.color</code>	Color specification for all vertices.
<code>draw.edges</code>	If TRUE, draw triangle edges.
<code>edge.color</code>	Color specification for all edges.
<code>draw.segments</code>	If TRUE, draw boundary and interior constraint edges more prominently.
<code>...</code>	Further graphics parameters, interpreted by the respective plotting systems.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

`plot.inla.trimesh()`

Examples

```

mesh <- inla.mesh.create(globe = 10)
plot(mesh)

if (require(rgl)) {
  plot(mesh, rgl = TRUE, col = mesh$loc[, 1])
}

```

plot.inla.trimesh *Low level triangulation mesh plotting*

Description

Plots a triangulation mesh using `rgl`.

Usage

```
## S3 method for class 'inla.trimesh'
plot(
  x,
  S,
  color = NULL,
  color.axis = NULL,
  color.n = 512,
  color.palette = cm.colors,
  color.truncate = FALSE,
  alpha = NULL,
  lwd = 1,
  specular = "black",
  draw.vertices = TRUE,
  draw.edges = TRUE,
  edge.color = rgb(0.3, 0.3, 0.3),
  ...
)
```

Arguments

<code>x</code>	A 3-column triangle-to-vertex index map matrix.
<code>S</code>	A 3-column vertex coordinate matrix.
<code>color</code>	Color specification. A single named color, a vector of scalar values, or a matrix of RGB values.
<code>color.axis</code>	The min/max limit values for the color mapping.
<code>color.n</code>	The number of colors to use in the color palette.
<code>color.palette</code>	A color palette function.
<code>color.truncate</code>	If TRUE, truncate the colors at the color axis limits.
<code>alpha</code>	Transparency/opaqueeness values. See <code>rgl.material</code> .
<code>lwd</code>	Line width for edges. See <code>rgl.material</code> .
<code>specular</code>	Specular color. See <code>rgl.material</code> .
<code>draw.vertices</code>	If TRUE, draw triangle vertices.
<code>draw.edges</code>	If TRUE, draw triangle edges.
<code>edge.color</code>	Edge color specification.
<code>...</code>	Additional parameters passed to and from other methods.

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

See Also

[plot.inla.mesh\(\)](#)

PRborder	<i>The PRborder data</i>
----------	--------------------------

Description

A data matrix with Longitude and Latitude coordinates for the boundary of Parana State.

Format

Longtiude The Longtiude coordinate

Latitude The Latitude coordinate

See Also

PRprec

print.inla	<i>Print an INLA fit</i>
------------	--------------------------

Description

Print an INLA fit

Usage

```
## S3 method for class 'inla'
print(x, digits = 3L, ...)
```

Arguments

x	An inla-object (output from an inla() -call).
digits	Number of digits to print
...	other arguments.

Value

None

Author(s)

Havard Rue

See Also

[inla\(\)](#)

PRprec

*The PRprec data***Description**

A data frame with daily rainfall in the Parana State.

Format

A data frame TODO

Altitude TODO

Latitude TODO

Longitude TODO

d0101 Daily rainfall at day "mmdd"

d0102 Daily rainfall at day "mmdd"

d0103 Daily rainfall at day "mmdd"

d0104 Daily rainfall at day "mmdd"

d0105 Daily rainfall at day "mmdd"

d0106 Daily rainfall at day "mmdd"

d0107 Daily rainfall at day "mmdd"

d0108 Daily rainfall at day "mmdd"

d0109 Daily rainfall at day "mmdd"

d0110 Daily rainfall at day "mmdd"

d0111 Daily rainfall at day "mmdd"

d0112 Daily rainfall at day "mmdd"

d0113 Daily rainfall at day "mmdd"

d0114 Daily rainfall at day "mmdd"

d0115 Daily rainfall at day "mmdd"

d0116 Daily rainfall at day "mmdd"

d0117 Daily rainfall at day "mmdd"

d0118 Daily rainfall at day "mmdd"

d0119 Daily rainfall at day "mmdd"

d0120 Daily rainfall at day "mmdd"

d0121 Daily rainfall at day "mmdd"

d0122 Daily rainfall at day "mmdd"

d0123 Daily rainfall at day "mmdd"

d0124 Daily rainfall at day "mmdd"

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d0509 Daily rainfall at day "mmdd"
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d0731 Daily rainfall at day "mmdd"
d0801 Daily rainfall at day "mmdd"
d0802 Daily rainfall at day "mmdd"
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d0830 Daily rainfall at day "mmdd"
d0831 Daily rainfall at day "mmdd"
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d1003 Daily rainfall at day "mmdd"
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d1120 Daily rainfall at day "mmdd"
d1121 Daily rainfall at day "mmdd"
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d1123 Daily rainfall at day "mmdd"
d1124 Daily rainfall at day "mmdd"
d1125 Daily rainfall at day "mmdd"
d1126 Daily rainfall at day "mmdd"
d1127 Daily rainfall at day "mmdd"
d1128 Daily rainfall at day "mmdd"
d1129 Daily rainfall at day "mmdd"
d1130 Daily rainfall at day "mmdd"
d1201 Daily rainfall at day "mmdd"
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See Also

PRborder

qinv

Computes (parts of) the inverse of a SPD sparse matrix

Description

This routine use the GMRFLib implementation which compute parts of the inverse of a SPD sparse matrix. The diagonal and values for the neighbours in the inverse, are provided.

Usage

```
inla.qinv(Q, constr, reordering = INLA::inla.reorderings(), num.threads = NULL)
```

Arguments

Q	A SPD matrix, either as a (dense) matrix or sparseMatrix.
constr	Optional linear constraints; see ?INLA::f and argument extraconstr
reordering	The type of reordering algorithm to be used for TAUCS; either one of the names listed in inla.reorderings() or the output from inla.qreordering(Q). The default is "auto" which try several reordering algorithm and use the best one for this particular matrix.
num.threads	Maximum number of threads the inla-program will use, or as 'A:B' defining the number threads in the outer (A) and inner (B) layer for nested parallelism.

Value

`inla.qinv` returns a `sparseMatrix` of type `dgTMatrix` with the diagonal and values for the neighbours in the inverse. Note that the full inverse is NOT provided!

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
## dense matrix example
n = 10
A = matrix(runif(n^2), n, n)
Q = A %*% t(A)
print(mean(abs(inla.qinv(Q) - solve(Q))))

## sparse matrix example
rho = 0.9
Q = toeplitz(c(1+rho^2, -rho, rep(0, n-3), -rho)) / (1-rho^2)
Q = inla.as.dgTMatrix(Q)
Q.inv = inla.qinv(Q)

## compute the marginal variances as a vector from a precision matrix
marginal.variances = diag(inla.qinv(Q))

## read the sparse matrix from a file in the 'i, j, value' format
filename = tempfile()
write(t(cbind(Q@i+1L, Q@j+1L, Q@x)), ncol=3, file=filename)
Qinv = inla.qinv(filename)
unlink(filename)
```

qreordering

Compute the reordering using the GMRFLib implementation

Description

This function compute the reordering (or find the best reordering) using the GMRFLib implementation

Usage

```
inla.qreordering(graph, reordering = inla.reorderings())
```

Arguments

<code>graph</code>	A (inla-)graph object
<code>reordering</code>	The name of the reordering algorithm to be used; either one of the names listed in <code>inla.reorderings()</code> . The default is "auto" which try several reordering algorithm and use the best one for this particular matrix.

Value

`inla.qreordering` returns a list with the name of the reordering algorithm used or found, the reordering code for the reordering algorithm, the actual reordering and its inverse.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
g = system.file("demodata/germany.graph", package="INLA")
r = inla.qreordering(g)
m = inla.graph2matrix(g)
r = inla.qreordering(m)
```

qsample

Generate samples from a GMRF using the GMRFLib implementation

Description

This function generate samples from a GMRF using the GMRFLib implementation

Usage

```
inla.qsample(
  n = 1L,
  Q,
  b,
  mu,
  sample,
  constr,
  reordering = INLA::inla.reorderings(),
  seed = 0L,
  logdens = ifelse(missing(sample), FALSE, TRUE),
  compute.mean = ifelse(missing(sample), FALSE, TRUE),
  num.threads = if (seed == 0L) "0:0" else NULL,
  selection = NULL,
  verbose = inla.getOption("verbose"),
  .debug = FALSE
)
```

Arguments

<code>n</code>	Number of samples. Only used if <code>missing(sample)</code>
<code>Q</code>	The precision matrix or a filename containing it.
<code>b</code>	The linear term
<code>mu</code>	The mu term
<code>sample</code>	A matrix of optional samples where each column is a sample. If set, then evaluate the log-density for each sample only.

constr	Optional linear constraints; see ?INLA::f and argument extraconstr
reordering	The type of reordering algorithm to be used for TAUCS; either one of the names listed in <code>inla.reorderings()</code> or the output from <code>inla.qreordering(Q)</code> . The default is "auto" which try several reordering algorithm and use the best one for this particular matrix.
seed	Control the RNG. If <code>seed=0L</code> then GMRFLib will set the seed intelligently/at 'random', and this is and should be the default behaviour. If <code>seed < 0L</code> then the saved state of the RNG will be reused if possible, otherwise, GMRFLib will set the seed intelligently/at 'random'. If <code>seed > 0L</code> then this value is used as the seed for the RNG. PLEASE NOTE1: If <code>seed!=0</code> then the computations will run in serial mode, over-riding whatever is set in <code>num.threads</code> (a warning might be issued). PLEASE NOTE2: If the PARDISO sparse matrix library is used, continuity of the samples with respect to small changes in the precision matrix, can be expected but is not guaranteed. If this feature is required, please use the TAUCS sparse matrix library.
logdens	If TRUE, compute also the log-density of each sample. Note that the output format then change.
compute.mean	If TRUE, compute also the (constrained) mean. Note that the output format then change.
num.threads	Maximum number of threads the inla-program will use, or as 'A:B' defining the number threads in the outer (A) and inner (B) layer for nested parallelism. <code>seed!=0</code> requires serial computations.
selection	A vector of indices of each sample to return. NULL means return the whole sample. (Note that the log-density returned, is for the whole sample.) The use of selection cannot be combined with the use of sample.
verbose	Logical. Run in verbose mode or not.
.debug	Logical. Internal debug-mode.

Value

The log-density has form $-1/2(x-\mu)^T Q (x-\mu) + b^T x$

If `logdens` is FALSE, then `inla.qsample` returns the samples in a matrix, where each column is a sample. If `logdens` or `compute.mean` is TRUE, then a list with names `sample`, `logdens` and `mean` is returned. The samples are stored in the matrix `sample` where each column is a sample, and the log densities of each sample are stored as the vector `logdens`. The mean (include corrections for the constraints, if any) is store in the vector `mean`.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
g = system.file("demodata/germany.graph", package="INLA")
Q = inla.graph2matrix(g)
diag(Q) = dim(Q)[1L]
x = inla.qsample(10, Q)
## Not run: matplot(x)
x = inla.qsample(10, Q, logdens=TRUE)
## Not run: matplot(x$sample)
```

```

n = 3
Q = diag(n)
ns = 2

## sample and evaluate a sample
x = inla.qsample(n, Q=Q, logdens=TRUE)
xx = inla.qsample(Q=Q, sample = x$sample)
print(x$logdens - xx$logdens)

## the use of a constraint
constr = list(A = matrix(rep(1, n), 1, n), e = 0)
x = inla.qsample(n, Q=Q, constr=constr)
print(constr$A %*% x)

## control the RNG (require serial mode)
x = inla.qsample(n, Q=Q, seed = 123, num.threads="1:1")
## restart from same seed, only sample 1
xx = inla.qsample(n=1, Q=Q, seed = 123, num.threads="1:1")
## continue from the save state, sample the remaining 2
xxx = inla.qsample(n=n-1, Q=Q, seed = -1, num.threads="1:1")
## should be 0
print(x - cbind(xx, xxx))

```

qsolve

Solves linear SPD systems

Description

This routine use the GMRFLib implementation to solve linear systems with a SPD matrix.

Usage

```

inla.qsolve(
  Q,
  B,
  reordering = inla.reorderings(),
  method = c("solve", "forward", "backward")
)

```

Arguments

Q	A SPD matrix, either as a (dense) matrix or sparse-matrix
B	The right hand side matrix, either as a (dense) matrix or sparse-matrix.
reordering	The type of reordering algorithm to be used for TAUCS; either one of the names listed in <code>inla.reorderings()</code> or the output from <code>inla.qreordering(Q)</code> . The default is "auto" which try several reordering algorithm and use the best one for this particular matrix (using the TAUCS library).
method	The system to solve, one of "solve", "forward" or "backward". Let $Q = L L^T$, where L is lower triangular (the Cholesky triangle), then <code>method="solve"</code> solves $L L^T X = B$ or equivalently $Q X = B$, <code>method="forward"</code> solves $L X = B$, and <code>method="backward"</code> solves $L^T X = B$.

Value

`inla.qsolve` returns a matrix X , which is the solution of $Q X = B$, $L X = B$ or $L^T X = B$ depending on the value of `method`.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
n = 10
nb <- n-1
QQ = matrix(rnorm(n^2), n, n)
QQ <- QQ %*% t(QQ)

Q = inla.as.sparse(QQ)
B = matrix(rnorm(n*nb), n, nb)

X = inla.qsolve(Q, B, method = "solve")
XX = inla.qsolve(Q, B, method = "solve", reordering = inla.qreordering(Q))
print(paste("err solve1", sum(abs( Q %*% X - B))))
print(paste("err solve2", sum(abs( Q %*% XX - B))))

## the forward and backward solve is tricky, as after permutation and with Q=LL', then L is
## lower triangular, but L in the original ordering is not lower triangular. if the rhs is iid
## noise, this is not important. to control the reordering, then the 'taucs' library must be
## used.
inla.setOption(smtp = 'taucs')

## case 1. use the matrix as is, no reordering
r <- "identity"
L = t(chol(Q))
X = inla.qsolve(Q, B, method = "forward", reordering = r)
XX = inla.qsolve(Q, B, method = "backward", reordering = r)
print(paste("err forward ", sum(abs(L %*% X - B))))
print(paste("err backward", sum(abs(t(L) %*% XX - B))))

## case 2. use a reordering from the library
r <- inla.qreordering(Q)
im <- r$ireordering
m <- r$reordering
print(cbind(idx = 1:n, m, im) )
Qr <- Q[im, im]
L = t(chol(Qr))[m, m]

X = inla.qsolve(Q, B, method = "forward", reordering = r)
XX = inla.qsolve(Q, B, method = "backward", reordering = r)
print(paste("err forward ", sum(abs( L %*% X - B))))
print(paste("err backward", sum(abs( t(L) %*% XX - B))))
```

Description

Construct a graph-object from a file or a matrix; write graph-object to file

Usage

```
inla.read.graph(..., size.only = FALSE)

inla.write.graph(
  graph,
  filename = "graph.dat",
  mode = c("binary", "ascii"),
  ...
)

## S3 method for class 'inla.graph'
plot(x, y, ...)

## S3 method for class 'inla.graph'
summary(object, ...)

## S3 method for class 'inla.graph.summary'
print(x, ...)
```

Arguments

...	Additional arguments. In <code>inla.read.graph</code> , then it is the graph definition (object, matrix, character, filename), plus extra arguments. In <code>inla.write.graph</code> it is extra arguments to <code>inla.read.graph</code> .
size.only	Only read the size of the graph
graph	An <code>inla.graph</code> -object, a (sparse) symmetric matrix, a filename containing the graph, a list or collection of characters and/or numbers defining the graph, or a neighbours list with class <code>nb</code> (see <code>spdep::card</code> and <code>spdep::poly2nb</code> for for details of <code>nb</code> and an example a function returning an <code>nb</code> object
filename	The filename of the graph.
mode	The mode of the file; <code>ascii</code> -file or a (gzip-compressed) binary.
x	An <code>inla.graph</code> -object
y	Not used
object	An <code>inla.graph</code> -object

Value

The output of `inla.read.graph`, is an `inla.graph` object, with elements

n	is the size of the graph
nnbs	is a vector with the number of neighbours
nbs	is a list-list with the neighbours
cc	list with connected component information <ul style="list-style-type: none"> • <code>id</code> is a vector with the connected component id for each node (starting from 1)

- `nis` the number of connected components
- `nodesis` a list-list of nodes belonging to each connected component
- `meanis` a factor with one level for each connected component of size larger than one, otherwise NA

Methods implemented for `inla.graph` are `summary` and `plot`. The method `plot` require the libraries `Rgraphviz` and `graph` from the Bioconductor-project, see <https://www.bioconductor.org>.

Author(s)

Havard Rue <hrue@r-inla.org>

See Also

[inla.spy\(\)](#)

Examples

```
## a graph from a file
g.file1 <- tempfile() # E.g. "g.dat"
cat("3 1 1 2 2 1 1 3 0\n", file = g.file1)
g = inla.read.graph(g.file1)
## writing an inla.graph-object to file
g.file2 = inla.write.graph(g, mode="binary", filename = tempfile())
## re-reading it from that file
gg = inla.read.graph(g.file2)
summary(g)
summary(gg)

## Not run:
plot(g)
inla.spy(g)
## when defining the graph directly in the call,
## we can use a mix of character and numbers
g = inla.read.graph(c(3, 1, "1 2 2 1 1 3", 0))
inla.spy(c(3, 1, "1 2 2 1 1 3 0"))
inla.spy(c(3, 1, "1 2 2 1 1 3 0"), reordering=3:1)
inla.write.graph(c(3, 1, "1 2 2 1 1 3 0"))

## building a graph from adjacency matrix
adjacent = matrix(0, nrow = 4, ncol = 4)
adjacent[1,4] = adjacent[4,1] = 1
adjacent[2,4] = adjacent[4,2] = 1
adjacent[2,3] = adjacent[3,2] = 1
adjacent[3,4] = adjacent[4,3] = 1
g = inla.read.graph(adjacent)
plot(g)
summary(g)

## End(Not run)
```

rgeneric.define	<i>rgeneric models</i>
-----------------	------------------------

Description

A framework for defining latent models in R

Usage

```
inla.rgeneric.ar1.model(  
  cmd = c("graph", "Q", "mu", "initial", "log.norm.const", "log.prior", "quit"),  
  theta = NULL  
)  
  
inla.rgeneric.ar1.model.opt(  
  cmd = c("graph", "Q", "mu", "initial", "log.norm.const", "log.prior", "quit"),  
  theta = NULL  
)  
  
inla.rgeneric.iid.model(  
  cmd = c("graph", "Q", "mu", "initial", "log.norm.const", "log.prior", "quit"),  
  theta = NULL  
)  
  
inla.rgeneric.define(  
  model = NULL,  
  debug = FALSE,  
  compile = TRUE,  
  optimize = FALSE,  
  ...  
)  
  
inla.rgeneric.wrapper(  
  cmd = c("graph", "Q", "mu", "initial", "log.norm.const", "log.prior", "quit"),  
  model,  
  theta = NULL  
)  
  
inla.rgeneric.q(  
  rmodel,  
  cmd = c("graph", "Q", "mu", "initial", "log.norm.const", "log.prior", "quit"),  
  theta = NULL  
)
```

Arguments

cmd	An allowed request
theta	Values of theta
model	The definition of the model; see <code>inla.rgeneric.ar1.model</code>
debug	Logical. Enable debug output

<code>compile</code>	Logical. Compile the definition of the model or not.
<code>optimize</code>	Logical. With this option TRUE, then <code>model</code> pass only the values of <code>Q</code> and not the whole matrix. Please see the vignette for details and <code>inla.rgeneric.ar1.model.opt</code> for an example.
<code>...</code>	Named list of variables that defines the environment of <code>model</code>
<code>rmodel</code>	The rgeneric model-object, the output of <code>inla.rgeneric.define</code>

Value

This allows a latent model to be defined in R. See `inla.rgeneric.ar1.model` and `inla.rgeneric.iid.model` and the documentation for worked out examples of how to define latent models in this way. This will be somewhat slow and is intended for special cases and prototyping. The function `inla.rgeneric.wrapper` is for internal use only.

Author(s)

Havard Rue <hrue@r-inla.org>

Salm

Extra-Poisson variation in dose-response study

Description

Breslow (1984) analyses some mutagenicity assay data (shown below) on salmonella in which three plates have been processed at each dose i of quinoline and the number of revertant colonies of TA98 Salmonella measured

Format

A data frame with 18 observations on the following 3 variables.

y number of salmonella bacteria

dose dose of quinoline (mg per plate)

rand indicator

Source

WinBUGS/OpenBUGS manual Examples VOL.I

Examples

```
data(Salm)
```

scale.model	<i>Scale an intrinsic GMRF model</i>
-------------	--------------------------------------

Description

This function scales an intrinsic GMRF model so the geometric mean of the marginal variances is one

Usage

```
inla.scale.model.internal(Q, constr = NULL, eps = sqrt(.Machine$double.eps))

inla.scale.model(Q, constr = NULL, eps = sqrt(.Machine$double.eps))
```

Arguments

Q	A SPD matrix, either as a (dense) matrix or sparseMatrix
constr	Linear constraints spanning the null-space of Q; see ?INLA::f and argument extraconstr
eps	A small constant added to the diagonal of Q if constr

Value

inla.scale.model returns a sparseMatrix of type dgTMatrix scaled so the geometric mean of the marginal variances (of the possible non-singular part of Q) is one, for each connected component of the matrix.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
## Q is singular
data(Germany)
g = system.file("demodata/germany.graph", package="INLA")
Q = -inla.graph2matrix(g)
diag(Q) = 0
diag(Q) = -rowSums(Q)
n = dim(Q)[1]
Q.scaled = inla.scale.model(Q, constr = list(A = matrix(1, 1, n), e=0))
print(diag(MASS::ginv(as.matrix(Q.scaled))))

## Q is singular with 3 connected components
g = inla.read.graph("6 1 2 2 3 2 2 1 3 3 2 1 2 4 1 5 5 1 4 6 0")
print(paste("Number of connected components", g$cc$n))
Q = -inla.graph2matrix(g)
diag(Q) = 0
diag(Q) = -rowSums(Q)
n = dim(Q)[1]
Q.scaled = inla.scale.model(Q, constr = list(A = matrix(1, 1, n), e=0))
print(diag(MASS::ginv(as.matrix(Q.scaled))))
```

```
## Q is non-singular with 3 connected components. no constraints needed
diag(Q) = diag(Q) + 1
Q.scaled = inla.scale.model(Q)
print(diag(MASS::ginv(as.matrix(Q.scaled))))
```

Scotland

*Conditional Autoregressive (CAR) model for disease mapping***Description**

The rate of lip cancer in 56 counties in Scotland is recorder. The data set includes the observed and expected cases (based on the population and its age and sex distribution in the country), a covariate measuring the percentage of the population engaged in agriculture, fishing or forestry and the "position" of each county expressed as a list of adjacent counties

Format

A data frame with 56 observations on the following 4 variables.

Counts The number of lip cancer registered

E The expected number of lip cancer

X The percentage of the population engaged in agriculture, fishing or forestry

Region The county

Source

OpenBUGS Example manual, GeoBUGS

References

Clayton and Kaldor (1987) and Breslow and Clayton (1993)

Examples

```
data(Scotland)
```

Seeds

*Factorial design***Description**

Proportion of seeds that germinated on each of 21 plates arranged according to a 2 by 2 factorial layout by seed and type of root extract

Format

A data frame with 21 observations on the following 5 variables.

r number of germinated seeds per plate

n number of total seeds per plate

x1 seed type

x2 root extracted

plate indicator for the plate

Source

WinBUGS/OpenBUGS Manual Example, Vol. I

Examples

```
data(Seeds)
```

SPDEtoy

toy simulated data set for the SPDE tutorial

Description

Simulated data set on 200 location points. The simulation process is made at the introduction of the SPDE tutorial.

Format

A data frame with 200 observations on the following 3 variables.

s1 First element of the coordinates

s2 Second element of the coordinates

y data simulated at the locations

Source

SPDE tutorial

Examples

```
data(SPDEtoy)
```

summary.inla

*Summary for a INLA fit***Description**

Takes a fitted inla or surv.inla object produced by inla or surv.inla and produces a summary from it.

Usage

```
## S3 method for class 'inla'
summary(object, digits = 3L, include.lincomb = TRUE, ...)

## S3 method for class 'summary.inla'
print(x, digits = 3L, ...)
```

Arguments

object	a fitted inla object as produced by inla.
digits	Integer Number of digits
include.lincomb	Logcial Include the summary for the the linear combinations or not
...	other arguments.
x	a summary.inla object produced by summary.inla

Details

Posterior mean and standard deviation (together with quantiles or cdf) are printed for the fixed effects in the model.

For the random effects the function summary() prints the posterior mean and standard deviations for the hyperparameters

If the option short.summary is set to TRUE using inla.setOption, then a less verbose summary variant will be used, which might be more suitable for Markdown documents.

Value

summary.inla returns an object of class summary.inla, a list of components to print.

Author(s)

Sara Martino and Havard Rue

See Also

[inla\(\)](#)

summary.inla.mesh	<i>Summarizing triangular mesh objects</i>
-------------------	--

Description

Construct and print inla.mesh object summaries

Usage

```
## S3 method for class 'inla.mesh'
summary(object, verbose = FALSE, ...)

## S3 method for class 'summary.inla.mesh'
print(x, ...)
```

Arguments

object	an object of class "inla.mesh", usually a result of a call to inla.mesh.create() or inla.mesh.2d() .
verbose	If TRUE, produce a more detailed output.
...	further arguments passed to or from other methods.
x	an object of class "summary.inla.mesh", usually a result of a call to summary.inla.mesh() .

Author(s)

Finn Lindgren <finn.lindgren@gmail.com>

summary.scopy	<i>Computes the mean and stdev for the spline from scopy</i>
---------------	--

Description

This function computes the mean and stdev for the spline function that is implicate from an scopy model component

Usage

```
inla.summary.scopy(result, name, by = 0.05, range = c(0, 1))
```

Arguments

result	An inla-object, ie the output from an inla() call
name	The name of the scopy model component see ?inla::f and argument extraconstr
by	The resolution of the results, in the scale where distance between two nearby locations is 1
range	The range of the locations, in (from, to)

Value

A `data.frame` with locations, mean and stdev. if name is not found, NULL is returned.

Author(s)

Havard Rue <hrue@r-inla.org>

Examples

```
## see example in inla.doc("scopy")
```

Surg	<i>Surgical: Institutional ranking</i>
------	--

Description

This example considers mortality rates in 12 hospitals performing cardiac surgery in babies

Format

A data frame with 12 observations on the following 3 variables.

n Number of deaths

r Total number of cases

hospital a factor with levels A B C D E F G H I J K L

Source

WinBUGS/OpenBUGS Manual Examples Vol. I

Examples

```
data(Surg)
```

SurvSim	<i>Survival data</i>
---------	----------------------

Description

Simulated data set for Weibull survival model

Format

A data frame with 100 observations on the following 3 variables.

y a numeric vector of survival times

cens a numeric vector of event indicator (0=censored 1=failure)

x a numeric vector of covariate

Tokyo

*Binomial time series***Description**

Recorded days of rain above 1 mm in Tokyo for 2 years, 1983:84

Format

A data frame with 366 observations on the following 3 variables.

y number of days with rain

n total number of days

time day of the year

Source

<http://www.math.ntnu.no/~hrue/GMRF-book/tokyo.rainfall.data.dat>

References

Rue, H and Held, L. (2005) *Gaussian Markov Random Fields - Theory and Applications* Chapman and Hall

Examples

```
data(Tokyo)
```

Zambia

*Semiparametric regression***Description**

Undernutrition of children in each region of Zambia is measured through a score computed on the basis of some anthropometric measures. The data set contains also other information about each child.

Format

A data frame with 4847 observations on the following 10 variables.

hazstd standardised Z score of stunting

bmi body mass index of the mother

age age of the child in months

district district where the child lives

rcw mother employment status with categories "working" (1) and "not working" (-1)

edu1 mother's education status with categories "complete primary but incomplete secondary" (edu1=1), "complete secondary or higher" (edu2=1) and "no education or incomplete primary" (edu1=edu2=-1)

edu2 see above

tpr locality of the domicile with categories "urban" (1) and "rural" (-1)

sex gender of the child with categories "male" (1) and "female" (-1)

edu DO NOT KNOW; check source

Source

BayesX Manual <http://www.stat.uni-muenchen.de/~bayesx/bayesx.html>

Examples

```
data(Zambia)
```


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