

LogNormal

Parametrisation

The LogNormal has density

$$f(y) = \frac{1}{y\sqrt{2\pi}} \sqrt{\tau} \exp\left(-\frac{1}{2}\tau(\log y - \mu)^2\right), \quad y > 0$$

where

$\tau > 0$ is the precision parameter,

μ is the mean parameter.

Link-function

The parameter μ is linked to the linear predictor as:

$$\eta = \mu$$

Hyperparameters

The τ parameter is represented as

$$\theta = \log \tau$$

and the prior is defined on θ .

Specification

- `family="lognormal"` for regression models and `family="lognormalsurv"` for survival models.
- Required arguments: `y`. Given in a format by using `inla.surv()` function for `"lognormal.surv"`

Hyperparameter spesification and default values

lognormal

doc The log-Normal likelihood

hyper

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)

survival FALSE

discrete FALSE

link default identity

pdf lognormal

lognormalsurv

doc The log-Normal likelihood (survival)

hyper

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)

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

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

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

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
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
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
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
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
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
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
survival TRUE
discrete FALSE
link default identity
pdf lognormal

```

Example

In the following example we estimate the parameters in a simulated case

```

n = 300
x = c(scale(runif(n)))
eta = 1+2.2*x
y = exp(rnorm(n, mean = eta, sd = 1))
data = list(y=y, event=rep(1, n), x=x)
formula = inla.surv(y, event) ~ 1 + x
r=inla(formula, family ="lognormalsurv", data=data)
summary(r)

data = data.frame(y, x)
formula = y ~ 1 + x
r=inla(formula, family ="lognormal", data=data)
summary(r)

```

Notes

- lognormalsurv can be used for right censored, left censored, interval censored data. A general framework to represent time is given by `inla.surv`. If the observed times y are large/huge, then this can cause numerical overflow, and if you encounter this problem, try to scale the observations, like `time = time / max(time)`.