Student-t with strata

Parametrization

This model is an extention to the Student-t, where different strata have their own precisions but the degrees-of-freedom parameter is common.

The Student-t likelihood is defined so that

$$\sqrt{w\ \tau_s}(y-\eta) \sim T_\nu$$

for continuous response y where

τ_s : is the precision parameter, depending on the stratum s

w : is a fixed weight $w > 0$

η : is the linear predictor

T_ν : is a standardized Student-t with ν degrees of freedom such that its variace is 1 for any value of ν, common for all strata.

Link-function

Identity

Hyperparameters

This likelihood $N_s + 1$ hyperparameters

$$\begin{aligned} \theta_1 &= \log(\nu - 2) \\ \theta_2 &= \log(\tau_1) \\ \theta_3 &= \log(\tau_2) \\ etc.... & \\ \theta_{N_s+1} &= \log(\tau_{N_s}) \end{aligned}$$

where N_s is the number of strata defined. The current implementation limits N_s to 10, but this is easy to fix if needed. The prior is defined on $\theta = (\theta_1, \theta_2, \ldots)$.

Specification

- `family="tstrata"`
- Required argument: y and w (keyword `weights`, default to 1), and `inla()-argument` "`strata`" which is either a integer vector with elements $1, 2, \ldots, N_s$, or factor for which the levels defines the strata.

Hyperparameter spesification and default values

doc `A stratified version of the Student-t likelihood`

hyper

theta1

hyperid `101001`

name log degrees of freedom
short.name dof
output.name.intern dof_intern for tstrata
output.name degrees of freedom for tstrata
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)

theta2

hyperid 101002
name log precision1
short.name prec1
output.name Prec for tstrata strata
output.name.intern Log prec for tstrata strata
initial 2
fixed FALSE
prior loggamma
param 1 5e-05
to.theta function(x) log(x)
from.theta function(x) exp(x)

theta3

hyperid 101003
name log precision2
short.name prec2
output.name Prec for tstrata strata[2]
output.name.intern Log prec for tstrata strata[2]
initial 2
fixed FALSE
prior loggamma
param 1 5e-05
to.theta function(x) log(x)
from.theta function(x) exp(x)

theta4

hyperid 101004
name log precision3
short.name prec3
output.name Prec for tstrata strata[3]
output.name.intern Log prec for tstrata strata[3]
initial 2
fixed FALSE
prior loggamma
param 1 5e-05

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

theta5

hyperid `101005`
name `log precision4`
short.name `prec4`
output.name `Prec for tstrata strata[4]`
output.name.intern `Log prec for tstrata strata[4]`
initial `2`
fixed `FALSE`
prior `loggamma`
param `1 5e-05`
to.theta `function(x) log(x)`
from.theta `function(x) exp(x)`

theta6

hyperid `101006`
name `log precision5`
short.name `prec5`
output.name `Prec for tstrata strata[5]`
output.name.intern `Log prec for tstrata strata[5]`
initial `2`
fixed `FALSE`
prior `loggamma`
param `1 5e-05`
to.theta `function(x) log(x)`
from.theta `function(x) exp(x)`

theta7

hyperid `101007`
name `log precision6`
short.name `prec6`
output.name `Prec for tstrata strata[6]`
output.name.intern `Log prec for tstrata strata[6]`
initial `2`
fixed `FALSE`
prior `loggamma`
param `1 5e-05`
to.theta `function(x) log(x)`
from.theta `function(x) exp(x)`

theta8

hyperid `101008`
name `log precision7`
short.name `prec7`
output.name `Prec for tstrata strata[7]`
output.name.intern `Log prec for tstrata strata[7]`

initial 2
fixed FALSE
prior loggamma
param 1 5e-05
to.theta function(x) log(x)
from.theta function(x) exp(x)

theta9

hyperid 101009
name log precision8
short.name prec8
output.name Prec for tstrata strata[8]
output.name.intern Log prec for tstrata strata[8]
initial 2
fixed FALSE
prior loggamma
param 1 5e-05
to.theta function(x) log(x)
from.theta function(x) exp(x)

theta10

hyperid 101010
name log precision9
short.name prec9
output.name Prec for tstrata strata[9]
output.name.intern Log prec for tstrata strata[9]
initial 2
fixed FALSE
prior loggamma
param 1 5e-05
to.theta function(x) log(x)
from.theta function(x) exp(x)

theta11

hyperid 101011
name log precision10
short.name prec10
output.name Prec for tstrata strata[10]
output.name.intern Log prec for tstrata strata[10]
initial 2
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 `tstrata`

Example

Notes

None