LogNormal

Parametrisation

The LogNormal has density

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

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 family = lognormal.surv

Hyperparameter spesification and default values

lognormal

hyper

theta

hyperid 77101
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)`

survival FALSE

discrete FALSE

link default identity

pdf lognormal

lognormalsurv

hyper

theta

hyperid 78001

name log precision

short.name prec

initial 2

fixed FALSE

prior loggamma

param 1 5e-05

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

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

survival TRUE

discrete FALSE

link default identity

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Example

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

```
## these should give the same results
n = 300
x = runif(n)
eta = 1+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 observatios, like `time = time / max(time)`.