

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 family = `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
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    to.theta function(x) log(x)
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survival TRUE
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```

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)`.