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

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

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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

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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 observatios, like `time = time / max(time)`.