LogLogistic likelihoods

Parametrisation

The LogLogistic distribution has cumulative distribution function

$$F_0(y) = \frac{1}{1 + \lambda y^{-\alpha}}, \qquad y > 0$$

or

$$F_1(y) = \frac{1}{1 + (\lambda y)^{-\alpha}}, \qquad y > 0$$

where

$\alpha > 0$ is a shape parameter, and

$\lambda > 0$ is a scale parameter.

The subscript indicated variant 0 and 1.

Link-functions

The parameter λ is linked to the linear predictor, by default as

$$\lambda = \exp(\eta)$$

Hyperparameters

The α parameter is represented as

$$\theta = \log \alpha$$

and the prior is defined on θ.

Specification

- `family` equals `loglogistic` (regression) or `loglogisticsurv` (survival)
- `variant=0` (default) or 1 (chosing between parameterisation F_0 or F_1).
- Required arguments: y (regression) or an `inla.surv`-object using `inla.surv()`

Hyperparameter spesification and default values

Regression:

doc The loglogistic likelihood

hyper

theta

hyperid 80001
name log alpha
short.name alpha
initial 1
fixed FALSE
prior loggamma
param 25 25

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

status changed:Oct.25.2017

survival TRUE

discrete FALSE

link default log neglog

pdf loglogistic

Survival:

doc The loglogistic likelihood (survival)

hyper

theta

hyperid 80011
name log alpha
short.name alpha
initial 1
fixed FALSE
prior loggamma
param 25 25
to.theta `function(x) log(x)`
from.theta `function(x) exp(x)`

status changed:Oct.25.2017

survival TRUE

discrete FALSE

link default log neglog

pdf loglogistic

Example

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

```
rloglogistic = function(n,  beta,  alpha = 1)
{
    p = runif(n)
    return (beta* (((1-p)/p)^(-1/alpha)))
}

n = 1000
alpha = 2
x = runif(n)
eta = 1+x
beta = exp(eta)
```

```
y = rloglogistic(n, beta = beta, alpha = alpha)
event = rep(1,n)
data = list(y=y, event=event, x=x)
formula=inla.surv(y,event) ~ x
r=inla(formula, family ="loglogistic", data=data, verbose=T)
```

Notes