Exponential

Parametrisation

The Exponential distribution is

$$\text{Prob}(y) = \lambda \exp(-\lambda y) \qquad \lambda > 0$$

for responses $y > 0$.
In survival analysis, models are generally specified through the hazard function. For exponential model, the baseline hazard is constant over time and the hazard function is:

$$h(y) = \lambda$$

Link-function

The parameter λ is linked to the linear predictor as:

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

Hyperparameters

None.

Specification

- family = `exponential` for regression models and family = `exponential.surv` for survival models.
- Required arguments: y (to be given in a format by using `inla.surv()` for survival models)

Hyperparameter spesification and default values

doc The Exponential likelihood

hyper

survival FALSE

discrete FALSE

link default log

pdf exponential

Example

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

```
n = 1000
x = rnorm(n, sd = 0.5)
lambda = exp(1+x)
y = rexp(n, rate=lambda)
event = rep(1,n)
data = list(y=y, event=event, x=x)
formula = inla.surv(y,event) ~ x
model = inla(formula, family ="exponential.surv", data=data)
```

```
summary(model)

formula = y ~ x
model = inla(formula, family ="exponential", data=data)
summary(model)


n = 1000
x = rnorm(n, sd = 0.5)
lambda = 1/exp(1+x)
yy = rexp(n, rate=lambda)
ys <-  rexp(n, rate = exp(1))
y <- pmin(yy, ys)
event <- as.numeric(ys > yy)

data = list(y=y, event=event, x=x)
summary(inla(inla.surv(y,event) ~ x,
             family ="exponential.surv",
             control.family = list(link = list(model = "neglog")),
             data=data))

library(survival)
summary(survreg(Surv(y, event) ~ x, data=data, dist="exponential"))
```

Notes