Randomly Censored Poisson (Experimental)

Parametrisation

The Poisson distribution is

$$\text{Prob}(y) = \frac{\lambda^y}{y!} \exp(-\lambda)$$

for responses $y = 0, 1, 2, \ldots$, where λ is the expected value.

The randomly-censored Poisson allow the observations to have a known or unknown censoring: `event`$= 1$ its observed as is, with `event`$= 0$ its right censored, so the likelihood is

$$\text{Prob}(Y \geq y) = \sum_{y' \geq y} \frac{\lambda^{y'}}{y'!} \exp(-\lambda),$$

and for `event` $\neq 0, 1$, then its randomly censored where

$$\text{Prob}(\text{event} = 1) = p(\cdot)$$

and

$$\text{Prob}(\text{event} = 0) = 1 - p(\cdot)$$

where $p(\cdot)$ depends on covariates

$$\text{logit}(p(\cdot)) = \text{offset} + \sum_{i=1} \beta_i x_i$$

Link-function

The mean λ is linked to the linear predictor by

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

where $E > 0$ is a known constant (or $\log(E)$ is the offset of η).

Hyperparameters

$\beta_1, \beta_2, \ldots$ if in use. Maximum 10.

Specification

- `family="rcpoisson"`
- Data are given as an `inla.mdata`-object, with format

$$\text{inla.mdata}(y, E, \text{event}, \text{offset}, x_1, x_2, \ldots)$$

  where maximum 10 covariates can be given. Each argument is a vector. Note that the four first columns are required, and the covariates can be omitted if there are none.

Example

In the following example we estimate the parameters in a simulated example with Poisson responses.

```
n=100
a = 1
b = 1
z = rnorm(n)
eta = a + b*z
E = sample(1:10, n, replace=TRUE)
lambda = E*exp(eta)
y = rpois(n, lambda = lambda)

data = list(y=y,z=z)
formula = y ~ 1+z
result = inla(formula, family = "poisson", data = data, E=E)
summary(result)
```

Notes