

Censored Poisson (version 2)

Parametrisation

The Poisson distribution is

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

for responses $y = 0, 1, 2, \dots$, where λ is the expected value. The censored version is that response values in the interval $L \leq y \leq H$ are censored (and reported as $y = L$, say), whereas other values are reported as is.

Link-function

The mean-parameter is λ and is linked to the linear predictor η by

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

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

Hyperparameters

None.

Specification

- `family="cenpoisson2"`
- Required arguments: y , E , L and H . The vector of the triplet (y_i, L_i, H_i) must be given as a `inla.mdata`-object. L and H are vectors of same length as y hence the censoring can be different for each observation. L and H must be integer valued or `Inf`.
 $L[i] = \text{Inf}$ and/or $H[i] = \text{Inf}$ are allowed, which is equivalent to $L[i] = -1$ and/or $H[i] = -1$. See the example for details.
 $L[i] = \text{Inf}$ (or -1) implies no interval censoring. $H[i] = \text{Inf}$ (or -1) and $0 \leq L[i] < \infty$ implies right censoring.

Example

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

```
n <- 300
a <- 0
b <- 1
x <- rnorm(n, sd = 0.3)
eta = a + b*x
low = sample(c(0, 1, 4, Inf), n, replace = TRUE)
high <- low + sample(c(0, 1, 2, Inf), n, replace = TRUE)

E = sample(1:10, n, replace=TRUE)
lambda = E*exp(eta)
y = rpois(n, lambda = lambda)

censored = which(y >= low & y <= high)
y[censored] = low[censored]

r = inla(inla.mdata(cbind(y, low, high)) ~ 1 + x,
        family = "cenpoisson2",
```

```
data = data.frame(y, low, high, x),  
E=E)  
summary(r)
```

Notes

For censored values, then y must be one arbitrary value in the interval; **NA** does not work!!!