Censored Poisson

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 censored version is that observations $y \leq C$ are censored and not reported (like, y is reported to always 0), whereas if $y > C$ then y is reported. The cencoring value, C, is a parameter in this distribution.

Link-function

The mean-parameter is λ and 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

None.

Specification

- family $=$ `cenpoisson`

- Required arguments: y, E and C (family-argument `cenpoisson.C=<C>`).

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
C = 5
E = sample(1:10, n, replace=TRUE)
lambda = E*exp(eta)
y = rpois(n, lambda = lambda)
y[y <= C] = 0

data = list(y=y,z=z)
formula = y ~ 1+z
result = inla(formula, family = "cenpoisson", data = data, E=E,
    control.family = list(cenpoisson.C = C))
summary(result)
```

Notes

For censored values, then y must be one arbitrary value between 0 and C; `NA` does not work!