

# Censored Poisson

## Parametrisation

The Poisson distribution is

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

for responses  $y = 0, 1, 2, \dots$ , where  $\lambda$  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 censoring value,  $C$ , is a parameter in this distribution.

## Link-function

The mean-parameter is  $\lambda$  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  $\eta$ ).

## 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(cpoisson.C = C))
summary(result)
```

## Notes

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