Binomial

Parametrisation

The Binomial distribution is

$$\text{Prob}(y) = \binom{n}{y} p^n (1-p)^{n-y}$$

for responses $y = 0, 1, 2, \ldots, n$, where

n: number of trials.

p: probability of success in each trial.

Link-function

The mean and variance of y are given as

$$\mu = np \qquad \text{and} \qquad \sigma^2 = np(1-p)$$

and the probability p is linked to the linear predictor by

$$p(\eta) = \frac{\exp(\eta)}{1 + \exp(\eta)}$$

Hyperparameters

None.

Hyperparameter spesification and default values

doc The Binomial likelihood

hyper

survival FALSE

discrete TRUE

link default logit cauchit probit cloglog loglog log sslogit logitoffset quantile

pdf binomial

Specification

- family $=$ `binomial`

- Required arguments: y and n (keyword `Ntrials`)

Example

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

```
n=100
a = 1
b = 1
z = rnorm(n)
eta = a + b*z
```

```
Ntrials = sample(c(1,5,10,15), size=n, replace=TRUE)
prob = exp(eta)/(1 + exp(eta))
y = rbinom(n, size=Ntrials, prob = prob)

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

Notes

If the response is a `factor` it must be converted to $\{0, 1\}$ before calling `inla()`, as this conversion is not done automatic (as for example in `glm()`).