

Binomial

Parametrisation

The Binomial distribution is

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

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

n : number of trials.

p : probability of success in each trial.

Link-function

The mean and variance of y are given as

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

and the probability p is linked to the linear predictor by

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

Hyperparameters

None.

Hyperparameter specification and default values

doc The Binomial likelihood

hyper

survival FALSE

discrete TRUE

link default logit cauchit probit cloglog loglog log sslogit logitoffset quantile pquantile

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()`).