

## Simplex

### Parametrisation

The Simplex distribution has the following density

$$\pi(y) = \frac{\sqrt{(s\tau)}}{\sqrt{2\pi[y(1-y)]^3}} \exp \left\{ \frac{-(s\tau)(y-\mu)^2}{2y(1-y)\mu^2(1-\mu)^2} \right\}$$

has a continuous responses  $0 < y < 1$  where

$\mu$  : is the mean,

$\tau$  : is a precision parameter, and

$s$ : is a fixed scaling,  $s > 0$ .

For the simplex distribution we have

$$E(y) = \mu$$

### Link-function

The linear predictor  $\eta$  is linked to the mean  $\mu$  using a default logit-link,

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

### Hyperparameter

The hyperparameter is the precision parameter  $\tau$ , which is represented as

$$\tau = \exp(\theta)$$

and the prior is defined on  $\theta$ .

### Specification

- family = simplex
- Required arguments:  $y$ .

### Hyperparameter specification and default values

hyper

theta

name log precision

short.name prec

initial 4

fixed FALSE

prior loggamma

param 1 5e-05

to.theta function(x) log(x)

from.theta function(x) exp(x)

survival FALSE

**discrete** FALSE

**link** default logit probit cloglog

**pdf** simplex

## Example

In the following example we estimate the parameters in a simulated example.

```
## this library is found at
## http://www.commanster.eu/rcode.html
library(rmutil)

n = 1000
x = rnorm(n, sd = 0.2)
eta = 1 + x
mu = exp(eta)/(1+exp(eta))

s = 0.3
y = rsimplex(n, m = mu, s = s)

r = inla(y ~ 1 + x, data = data.frame(y, x),
         family = "simplex")
## prec = 1/s
summary(r)
```

## Notes

None.