

## Logistic

### Parametrisation

The logistic distribution is

$$f(y) = \frac{\kappa \exp(-\kappa(y - \mu))}{(1 + \exp(-\kappa(y - \mu)))^2}$$

for continuously responses  $y$  where

$\mu$ : is the the mean

$\kappa = \tau s \pi / \sqrt{3}$ : where  $\tau$  is the precision

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

### Link-function

The mean and variance of  $y$  are given as

$$\mu \quad \text{and} \quad \sigma^2 = \frac{1}{s\tau}$$

and the mean is linked to the linear predictor by

$$\mu = \eta$$

### Hyperparameters

The precision is represented as

$$\theta = \log \tau$$

and the prior is defined on  $\theta$ .

### Specification

- family = `logistic`
- Required arguments:  $y$  and  $s$  (keyword `scale`)

The scalings have default value 1.

### Hyperparameter spesification and default values

**doc** The Logistic likelihoood

**hyper**

**theta**

**hyperid** 72001

**name** log precision

**short.name** prec

**initial** 1

**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 identity
```

```
pdf logistic
```

### Example

```
rlogistic = function(n, mean = 0, sd = 1)
{
  p = runif(n)
  A = pi/sqrt(3)
  tauA = A/sd^2
  return ((tauA * mean - log((1-p)/p))/tauA)
}

n = 1000
z = rnorm(n, sd=0.1)
eta = 1 + z
y = rlogistic(n, mean = eta, sd = 1)

r = inla(y ~ 1 + z, data = data.frame(y, z), family = "logistic",
        control.compute = list(cpo=TRUE))
```

### Notes

None.