

# Wrapped Cauchy

## Parametrisation

The wrapped Cauchy distribution has density

$$f(y) = \frac{1}{2\pi} \frac{1 - (s\rho)^2}{1 + (s\rho)^2 - 2(s\rho) \cos(y - \mu)}$$

for continuously responses  $y$  where  $|y| \leq \pi$  and  $|\mu| \leq \pi$ . Here,

$\mu$  is a measure of location,

$\rho$  is a measure of the precision ( $0 < \rho < 1$ ),

$s$  is a fixed scaling ( $0 < s \leq 1$ ).

## Link-function

The “mean” of  $y$  is given as  $\mu$  and the mean is linked to the linear predictor as

$$\mu = 2 \arctan(\eta)$$

(Link function “tan”)

## Hyperparameters

The “precision”  $\rho$  is represented as

$$\rho = \frac{\exp(\theta)}{1 + \exp(\theta)}$$

and the prior is defined on  $\theta$ .

## Specification

- family = `wrappedcauchy`
- Required arguments:  $y$  and  $s$  (argument `scale`).

The scalings have default value 1.

## Hyperparameter spesification and default values

**hyper**

**theta**

**name** log precision parameter

**short.name** prec

**initial** 2

**fixed** FALSE

**prior** loggamma

**param** 1 0.005

**to.theta** function(x) log(x/(1-x))

**from.theta** function(x) exp(x)/(1+exp(x))

**survival** FALSE

**discrete** FALSE

**link** default tan

**pdf** wrapped-cauchy

**status** disabled

### **Example**

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

### **Notes**

**This likelihood is currently disabled.**