# 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  $|y| \le \pi$  and  $|\mu| \le \pi$ . Here,

 $\mu$  is a measure of location,

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

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

### 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

 $\operatorname{\mathbf{doc}}$  The wrapped Cauchy likelihoood

hyper

### theta

hyperid 68001

name log precision parameter

short.name prec

output.name Precision parameter for the Wrapped Cauchy observations

output.name.intern Log precision parameter for the Wrapped Cauchy observations 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.