

## Circular Normal (von Mises distribution)

### Parametrisation

The circular/wrapped Normal or von Mises distribution, has density

$$f(y) = \frac{1}{2\pi I_0(\kappa s)} \exp(\kappa s \cos(y - \mu)),$$

for continuously responses  $y$  where  $0 \leq y < 2\pi$  and  $0 \leq \mu < 2\pi$ . Here,  $\mu$  is a measure of location, and

$\kappa$  is a measure of the precision, and

$s$  is a fixed scaling (default 1),  $s > 0$ .

### Link-function

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

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

(Link function “tan”)

### Hyperparameters

The “precision”  $\kappa$  is represented as

$$\theta = \log \kappa$$

and the prior is defined on  $\theta$ .

### Specification

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

The scaling have default value 1.

### Hyperparameter spesification and default values

**hyper**

**theta**

**name** log precision parameter

**short.name** prec

**initial** 4

**fixed** FALSE

**prior** loggamma

**param** 1 0.005

**to.theta**

**from.theta**

**survival** FALSE

**discrete** FALSE

**link** default tan

**pdf** circular-normal

**Example**

In the following example we estimate the parameters in a simulated example with circular Normal responses.

**Notes**

None.