# Generalised Extreme Value (GEV) distribution

### Parametrisation

The GEV distribution is defined through the cumulative distribution function

$$F(y; \eta, \tau, \xi) = \exp\left(-\left[1 + \xi\sqrt{\tau s}(y - \eta)\right]^{-1/\xi}\right)$$

for

$$1 + \xi \sqrt{\tau s}(y - \eta) > 0$$

and for a continuously response y where

 $\eta$ : is the linear predictor

 $\tau$ : is the "precision"

s: is a fixed scaling, s > 0.

## Link-function

The linear predictor is given in the parameterisation of the GEV distribution.

# Hyperparameters

The GEV-models has two hyperparameters. The "precision" is represented as

$$\theta_1 = \log \tau$$

and the prior is defined on  $\theta_1$ . The shape parameter  $\xi$  is represented as

$$\theta_2 = \xi$$

and the prior is defined on  $\theta_2$ . <sup>1</sup>

#### Specification

- family="gev"
- Required arguments: y and s (keyword scale)
- The scaling  $\xi_s$  is given by the argument gev.scale.xi and is default set to 0.1.

The weights has default value 1.

<sup>&</sup>lt;sup>1</sup>Internally, the parameter  $\theta_2$  is scaled with a fixed scaling  $\xi_s$  (default 0.1), to improve the numerics as the natural "scale" of  $\xi$  is small. For this reason the  $\theta_2(=\xi)$  reported in result\$mode\$theta will appear as  $\theta_2/\xi_s$ . For the same reason, if you define the mode using control.mode = list(theta = ..., ...) then the element representing  $\theta_2$  should be given as  $\theta_2/\xi_s$ .

```
Hyperparameter spesification and default values
doc The Generalized Extreme Value likelihood
hyper
    theta1
         hyperid 76001
         name log precision
         short.name prec
         output.name precision for GEV observations
         output.name.intern log precision for GEV observations
         initial 4
         fixed FALSE
         prior loggamma
         param 1 5e-05
         to.theta function(x) log(x)
         from.theta function(x) exp(x)
    theta2
         hyperid 76002
         name tail parameter
         short.name tail
         output.name tail parameter for GEV observations
         output.name.intern tail parameter for GEV observations
         initial 0
         fixed FALSE
         prior gaussian
         param 0 25
         to.theta function(x) x
         from.theta function(x) x
survival FALSE
discrete FALSE
link default identity
status disabled: Use likelihood model 'bgev' instead; see inla.doc('bgev')
pdf gev
Example
In the following example, we estimate the parameters of the GEV distribution on some simulated
rgev = function(n=1, xi = 0, mu = 0.0, sd = 1.0) {
    u = runif(n)
    if (xi == 0) {
```

 $x = -\log(-\log(u))$ 

} else {

## Notes

None.