Generalised Extreme Value (GEV) distribution

Parametrisation

The GEV distribution is defined through the cummulative distribution function

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

for

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

and for a continuously response y where

η: is the linear predictor

τ: is the "precision"

w: is a fixed weight, $w > 0$.

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 θ_1. The shape parameter ξ is represented as

$$\xi = s\theta_2$$

where $s > 0$ is a chosen fixed scaling, and the prior is defined on θ_2.

Specification

- family = `gev`
- Required arguments: y and w (keyword `weights`)
- The scaling s is given by the argument `scale.xi.gev` and is default set to 0.01, and provides an more appropriate scale for θ_2.

The weights has default value 1.

Hyperparameter spesification and default values

hyper

theta1

name precision
short.name prec
initial 4
fixed FALSE
prior loggamma

param c(1, 1e-05)

theta2

name GEVparameter

short.name gev

initial 0

fixed FALSE

prior gaussian

param c(0, 6.25)

survival FALSE

discrete FALSE

Example

In the following example, we estimate the parameters of the GEV distribution on some simulated data.

```
rgev = function(n=1, xi = 0, mu = 0.0, sd = 1.0) {
    u = runif(n)
    if (xi == 0) {
        x = -log(-log(u))
    } else {
        x = ((-log(u))^(-xi) - 1.0)/xi
    }
    return (x*sd + mu)
}

n = 100
z = rnorm(n)
sd.y = 0.5
xi = 0
y = 1+z + rgev(n, xi=xi, sd = sd.y)

formula = y ~ 1 + f(inla.group(z), model="rw1")
data = data.frame(y,z)

r = inla(formula, data = data, family = "gev",
        control.data = list(gev.scale.xi = 0.01,
                ## just to show how to set an initial value
                hyper = list(prec=list(initial=2))))
```

Notes

None.