Description of the function gev_dp, which performs MCMC sampling for the model proposed in "Nonparametric Spatial Models for Extremes: Application to Extreme Temperature Data".

**Statistical model**

The marginal distribution at location \#j is GEV with

\[
\begin{align*}
\text{location} &= p[j,1] \\
\text{scale} &= \exp(p[j,2]) \\
\text{shape} &= p[j,3]
\end{align*}
\]

If \text{varyparam}[l] = \text{TRUE}, then \(p[l]\) varies by spatial location. In this case, it has Gaussian process prior with mean \(\mu[l]\), standard deviation \(\sigma[l]\), and exponential spatial correlation with range \(\rho[l]\). These parameters have priors:

\[
\begin{align*}
\mu[l] &\sim \text{N}(\text{pri.mn}[l], \text{pri.sd}[l]) \\
\sigma[l]^2 &\sim \text{InvGamma}(\text{as}[l], \text{bs}[l]) \\
\rho[l] &\sim \text{Unif}(0, \text{mx.rho})
\end{align*}
\]

If \text{varyparam}[l] = \text{FALSE}, then \(p[l]\) is the same for all sites, and has \(\text{N}(\text{pri.mn}[l], \text{pri.sd}[l])\) prior.

The copula model for the residuals is a mixture of \(nk\) Gaussian processes with spatial ranges \(\rho[1], \ldots, \rho[nk]\) which have priors \(\rho[j] \sim \text{Unif}(0, \text{mx.rho})\).

**gev_dp function**

The function to perform MCMC sampling for this model is gev_dp.

Its inputs are

- \text{y}: data (\#sites x \#time points matrix)
- \text{x}: spatial coordinates (\#sites x 2 matrix)
- \text{varyparam}: allow the loc, scale and shape to vary by location?
- \text{nk}: the number of mixture components in the DP (nk=1 is the usual Gaussian copula)
- \text{iters}: number of MCMC samples
- \text{burn}: number of samples to discard
- \text{display}: how often to display results
- \text{thin}: Degree of thinning
pri.mn: Prior mean of the GEV parameters
pri.sd: Prior sd of the GEV parameters
max_rho Prior upper bound on the spatial range

Its outputs are

params Posterior samples of p. $p[m,j,l]$ is the sample at MCMC iteration $m$ and site $j$ for parameter $l$.

mn Posterior samples for mu

sd Posterior samples for sigma

range Posterior samples for range

rho Posterior samples for rho