

Multivariate generalized Pareto distributions

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Statistical inference for extremes has been a subject of intensive research over the past couple of decades. One approach is based on modelling exceedances of a random variable over a high threshold with the generalized Pareto (GP) distribution. This has proved to be an important way to apply extreme value theory in practice and is widely used. We introduce a multivariate analogue of the GP distribution and show that it is characterized by each of following two properties: first, exceedances asymptotically have a multivariate GP distribution if and only if maxima asymptotically are extreme value distributed; and second, the multivariate GP distribution is the only one which is preserved under change of exceedance levels. We also discuss a bivariate example and lower-dimensional marginal distributions.

Keywords: generalized Pareto distribution; multivariate extreme value theory; multivariate Pareto distribution; non-homogeneous Poisson process; peaks-over-threshold method