Modelling k-sample multivariate extremes with application to extreme temperature analysis

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Abstract

The joint modelling of extremal events has been a subject of considerable attention both theoretically and in applications. Despite of the interest in the comovement of tail events, all approaches known in the literature consider only a spectral distribution function whereas in some applications k independent sources of information are available, each being characterized by a certain covariate x_k. Just as there is an obvious rationale for not modelling multivariate extreme values through univariate techniques, there are also strong reasons for not modelling individually the spectral density corresponding to each of the samples. Particularly, such approach would be ineffective in assessing the role that the covariate x_k would play in the interaction of extremes. This paper proposes a semiparametric formulation through which a family of k spectral densities is linked through an exponential tilt and constrained to satisfy a set of marginal moment conditions. Empirical likelihood inference and estimation for this spectral density ratio model is here obtained. An application is given wherein we contrast extreme temperatures under forest-cover versus open-site over 14 different locations in Switzerland.

Keywords

Atmospheric temperature, Empirical likelihood, Exponential tilt, Forest microclimates, Multivariate extreme values, Spectral distribution, Semiparametric modelling.

References

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