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Nonparametric estimation of multivariate extreme-value copulas

Gordon Gudendorf, Johan Segers

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Extreme-value copulas arise in the asymptotic theory for componentwise maxima of independent random samples. An extreme-value copula is determined by its Pickands dependence function, which is a function on the unit simplex subject to certain shape constraints that arise from an integral transform of an underlying measure called spectral measure. Multivariate extensions are provided of certain rank-based nonparametric estimators of the Pickands dependence function. The shape constraint that the estimator should itself be a Pickands dependence function is enforced by replacing an initial estimator by its best least-squares approximation in the set of Pickands dependence functions having a discrete spectral measure supported on a sufficiently fine grid. Weak convergence of the standardized estimators is demonstrated and the finite-sample performance of the estimators is investigated by means of a simulation experiment.

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