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Nonparametric estimation of extreme value copulas in arbitrary dimensions

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Abstract.
Extreme-value copulas arise in the representation of the multivariate distribution of componentwise maxima of indepedent and identically distributed samples. Due to the multivariate expression of extreme-value copulas, their estimation is equivalent to the estimation of the Pickands dependence function. In the bivariate case, there exist several estimators for estimating the Pickands dependence function in the case of known marginals. [see for example J. Pickands, Multivariate extreme-value distributions, *Bull. Internat. Statist. Inst. 49 (1981) pp. 859-878*; P.Deheuvels, On the limiting behavior of the Pickands estimator for bivariate extreme-value distributions, *Statist. Probab. Lett. 12 (1991) pp. 429-439; P. Hall, N.Tajvidi, Distribution and dependence function estimation for bivariate extreme-value distribution, Bernoulli 6 (2000) pp. 835-844*; P. Capéraà, A.L. Fougères, C. Genest, A nonparametric estimation procedure for bivariate extreme-value copulas, *Biometrika 84 (1997) pp. 567-577*]. A recent paper of Zhang D., Wells M.T. and Peng L.[Nonparametric estimation of the dependence function for a multivariate extreme-value distribution, *Journal of Multivariate Analysis 99(4),pp. 577-588*] extends the Capéraà-Fougères-Genest-estimator to higher dimensions.

Extending some results from Segers (2007)[Nonparametric inference for bivariate extreme–value copulas. *In M.Ahsanulah and S. Kirmani (Eds), Extreme Value Distributions, Chapter 9, pp. 181-203. Nova Science Publishers, Inc.*] to higher dimensions, we can rewrite the Zhang-Wells-Peng-estimator in an elegant way, which allows us to estimate the Pickands dependence function and the associated weight functions using a linear regression model. The properties of the newly proposed estimator are illustrated by a small simulation study.