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# An M-Estimator of Tail Dependence

Let $X_1, X_2 \ldots, X_n$ be a $d$-dimensional random sample from a distribution function $F$. Assume that $F$ is in the max-domain of attraction of an extreme-value distribution and assume that the dependence structure of the extreme-value comes from some parametric family. We propose an M-estimator of the unknown vector of parameters. The estimator is defined as the value of the parameter vector that minimizes the distance between the vector of weighted integrals of the tail dependence function on the one hand and empirical counterparts of these integrals on the other hand.

We show that the estimator, with probability tending to one, exists and is a unique, global solution of the minimization problem. Under natural conditions we prove that the estimator is consistent and asymptotically normal. Since the differentiability of the tail dependence function is not required, the method applies to discrete models as well.

The finite sample behavior of the estimator and its applicability are demonstrated on examples. A special case of this estimator, when d = 2, and the number of equations cannot exceed the number of parameters, is the one proposed in J.H.J. Einmahl, A. Krajina and J. Segers [Bernoulli, 14(4), 2008, 1003-1026].