

NEW DOCTORAL DEGREES

IN THE DEPARTMENT OF MATHEMATICS
UNIVERSITY OF OSIJEK

Dr. Andrea Krajina received her PhD from Tilburg University, Tilburg, The Netherlands, on April 23, 2010, with the dissertation entitled “AN M-ESTIMATOR OF MULTIVARIATE TAIL DEPENDENCE”; supervisors: Dr. John H.J. Einmahl and Dr. Johan Segers.

Abstract

Extreme value theory is the part of probability and statistics that provides the theoretical background for modeling events that almost never happen. The estimation of the dependence between two or more such unlikely events (tail dependence) is the topic of this thesis.

The tail dependence structure is modeled by the stable tail dependence function. In Chapter 2 a semiparametric model is considered in which the stable tail dependence function is parametrically modeled. A method of moments estimator of the unknown parameter is proposed, where an integral of a nonparametric, rank based estimator of the stable tail dependence function is matched with the corresponding parametric version.

This estimator is applied in Chapter 3 to estimate the tail dependence structure of the family of meta-elliptical distributions.

The estimator introduced in Chapter 2 is extended in two respects in Chapter 4: (i) the number of variables is arbitrary; (ii) the number of moment equations can exceed the dimension of the parameter space. This estimator is defined as the value of the parameter vector that minimizes the distance between a vector of weighted integrals of the tail dependence function on the one hand and empirical counterparts of these integrals on the other hand. The method, not being likelihood based, applies to discrete and continuous models alike. Under minimal conditions all estimators introduced are consistent and asymptotically normal. The performance and applicability of the estimators is demonstrated by examples.

Published papers

- [1] D. Jukić, D. Marković, M. Ribičić, **A. Krajina**, *On the choice of initial approximation of the least squares estimate in some growth models of exponential type*, Proceedings of the 9th International Conference on Operational Research, Trogir, October 2–4, 2002, pp. 47–55.
- [2] J. H. J. Einmahl, **A. Krajina**, J. Segers, *A Method of Moments Estimator of Tail Dependence*, Bernoulli **14**(2008), 1003–1026.
- [3] **A. Krajina**, *A Method of Moments Estimator of Tail Dependence in Elliptical Copula Models*, Journal of Statistical Planning and Inference, revise and resubmit.