DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
UNIVERSITY OF SOUTHERN DENMARK, ODENSE

Mathematics seminar

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Bias-corrected estimation of the stable tail dependence function

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Abstract

Many problems involving extreme events are inherently multivariate. For instance, de Haan and de Ronde (1998) estimate the probability that a storm will cause a sea wall near the town of Petten (the Netherlands) to collapse because of a dangerous combination of sea level and wave height. Other examples can be found in actuarial science, finance, environmental science and geology, to name but a few. A fundamental question that arises when studying more than one variable is that of extremal dependence. Similarly to classical statistics one can summarise extremal dependency in a number of well-chosen coefficients that give a representative picture of the dependency structure. Here, the prime example of such a dependency measure is the coefficient of tail dependence (Ledford and Tawn, 1997). Alternatively, a full characterisation of the extremal dependence between variables can be obtained from functions like e.g. the stable tail dependence function, the spectral distribution function or the Pickands dependence function. We refer to Beirlant et al. (2004) and de Haan and Ferreira (2006), and the references therein, for more details. As is common in extreme value statistics, the classical estimators are affected by bias, which often complicates their practical application. In this paper we will focus on bias-corrected estimation of the stable tail dependence function. We establish the asymptotic behaviour of the new estimator under suitable assumptions. The finite sample performance of the proposed estimator is evaluated by means of an extensive simulation study where a comparison with alternatives from the recent literature is provided.

Host: Martin Svensson