MICHIGAN STATE UNIVERSITY
Department of Statistics and Probability

COLLOQUIUM

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Trimming the Hill estimator: robustness, optimality and adaptivity
&
Spatial impact of extreme heat waves

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10:20 AM - 11:10 AM
Refreshments 10:00 AM
C405 Wells Hall

Abstracts:

Trimming the Hill estimator: robustness, optimality and adaptivity:
We introduce a trimmed version of the Hill estimator for the index of a heavy-tailed distribution, which is robust to perturbations in the extreme order statistics. In the ideal Pareto setting, the estimator is essentially finite-sample efficient among all unbiased estimators with a given strict upper break-down point. For general heavy-tailed models, we establish the asymptotic normality of the estimator under second order conditions and discuss its minimax optimal rate in the Hall class. We introduce the so-called trimmed Hill plot, which can be used to select the number of top order statistics to trim. We also develop an automatic, data-driven procedure for the choice of trimming. This results in a new type of robust estimator that can adapt to the unknown level of contamination in the extremes. As a by-product we also obtain a methodology for identifying extreme outliers in heavy tailed data. The competitive performance of the trimmed Hill and adaptive trimmed Hill estimators is illustrated with simulations.

Spatial impact of extreme heat waves:
We introduce a novel technique to analyze the impact of extreme heat waves over US both as a time series and a spatial model. Model diagnostics reveal that the generalized Pareto distribution, GPD serves as an efficient tool in modeling the peaks over threshold for the so-obtained time series. The scale parameter of the GPD distribution is obtained as a transform of spline basis functions corresponding to covariates like El-Ninho and Season of occurrence. Return levels which estimate the probability of return of extreme heat waves in m years have also been reported.

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