

STANFORD UNIVERSITY
DEPARTMENT OF STATISTICS
DEPARTMENTAL SEMINAR

Example: 4:15 p.m., Tuesday, July 31, 2007
Sequoia Hall Room 200
(Cookies at 3:45 in 1st Floor Lounge)

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**Max-domain of attraction for log-concave
densities and smooth tail index estimation**

Both parametric distribution functions appearing in extreme value theory – the generalized extreme value distribution and the generalized Pareto distribution – have log-concave densities if the extreme value index γ lies in $[-1, 0]$. It is shown that all distribution functions F having a log-concave density function belong to the max-domain of attraction of the generalized extreme value distribution.

Given an i.i.d. sample X_1, \dots, X_n where X_i has a log-concave density f , the distribution function \hat{F}_n derived from the log-concave NPMLE \hat{f}_n is asymptotically equivalent to the empirical distribution function \mathbb{F}_n . Replacing the order statistics in tail index estimators by the quantiles of \hat{F}_n leads to “smoothed” estimators of γ . Monte Carlo simulations suggest that for finite n these new estimators are highly accurate and well superior to their non-smoothed counterparts. If time permits, we discuss some problems in deriving asymptotical results.

Based on joint work with Samuel Müller, University of Western Australia.