



Measures of serial extremal dependence and their estimation

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(Submitted on 25 Mar 2013)

The goal of this paper is two-fold: 1. We review classical and recent measures of serial extremal dependence in a strictly stationary time series as well as their estimation. 2. We discuss recent concepts of heavy-tailed time series, including regular variation and max-stable processes. Serial extremal dependence is typically characterized by clusters of exceedances of high thresholds in the series. We start by discussing the notion of extremal index of a univariate sequence, i.e. the reciprocal of the expected cluster size, which has attracted major attention in the extremal value literature. Then we continue by introducing the extremogram which is an asymptotic autocorrelation function for sequences of extremal events in a time series. In this context, we discuss regular variation of a time series. This notion has been useful for describing serial extremal dependence and heavy tails in a strictly stationary sequence. We briefly discuss the tail process coined by Basrak and Segers to describe the dependence structure of regularly varying sequences in a probabilistic way. Max-stable processes with Frechet marginals are an important class of regularly varying sequences. Recently, this class has attracted attention for modeling and statistical purposes. We apply the extremogram to max-stable processes. Finally, we discuss estimation of the extremogram both in the time and frequency domains.

Subjects: **Statistics Theory (math.ST)**

Cite as: [arXiv:1303.6349](#) [math.ST]

(or [arXiv:1303.6349v1](#) [math.ST] for this version)

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From: Yuwei Zhao [[view email](#)]

[v1] Mon, 25 Mar 2013 23:31:45 GMT (777kb)

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