

Extreme tail estimation, concentration and adaptivity

Abstract:

We describe an adaptive version of the Hill estimator based on Lepski's model selection method. This simple data-driven index selection method is shown to satisfy an oracle inequality and is checked to achieve the lower bound recently derived by Carpentier and Kim. In order to establish the oracle inequality, we derive non-asymptotic variance bounds and concentration inequalities for Hill estimators. These concentration inequalities are derived from Talagrand's concentration inequality for smooth functions of independent exponentially distributed random variables combined with three tools of Extreme Value Theory: the quantile transform, Karamata's representation of slowly varying functions, and Rényi's characterisation for the order statistics of exponential samples. The performance of this computationally and conceptually simple method is illustrated using Monte-Carlo simulations.

Joint work with M. Thomas