COSMOSTATS 2023 - Bridging the Gap: Statistical Modeling of Cosmology Extremes



Contribution ID: 28

Type: not specified

Empirical Bayes Inference for the Peaks Over a Threshold Method

Wednesday, 13 September 2023 16:00 (1h 30m)

The Block Maxima and Peaks over a Threshold (POT) methods are the most popular statistical procedures used to analyse univariate extremes by means of the Generalised Extreme Value (GEV) and Generalised Pareto (GP) distributions, respectively. Exploiting the three-parameters GEV family of distributions as an asymptotic approximation for the underlying data distribution when this is computed for suitably large values, one can deduce the so-called censored-likelihood inferential procedure for extremes. Unlike the POT method that uses only the threshold excedances of a sample, the censored likelihood is a valid alternative as it relies on the entire dataset. We propose a Bayesian inferential approach for the estimation of extreme events based on the GEV censored-likelihood. We show its practical utility and compare its performance with well-known competitors.

Joint work with Simone Padoan (Bocconi University) and Nicola Sartori (University of Padova).

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