Statistical Extreme Value Theory and Applications: an Appealing and Challenging Topic

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In the field of *Extreme Value Theory* (EVT), and more generally in almost all areas of *Statistics*, the ordering of the available sample is of primordial importance. Such an importance enabled us to have access to a broad statistical methodology and associated distributional theory related to ordered samples, as can be seen in several books on *order statistics* (OSs) and on extreme OSs, among which we refer [1]. There exists, on one side a natural interest by ordering: The extreme values are important as an expression of the worst or the best that one can find in a sample (minimal temperatures, high levels of dams, minimal life times in reliability theory). Alternatively, a set of observations can be deliberately ordered, to facilitate the statistical analysis we want to perform. EVT helps us to control potentially disastrous events, of high relevance to society and with a high social impact. Domains of application of EVT are quite diverse. We mention the fields of biostatistics, dynamical systems, environment, finance, hydrology, insurance, meteorology, seismology and structural engineering, among many others. Statistics of univariate extremes (SUE), as well as multivariate and spatial extremes, have recently faced a huge development, partially due to the fact that rare events can have catastrophic consequences for human activities, through their impact on natural and constructed environments. In the eighties there has been a shift from the area of parametric statistics of extremes, based on probabilistic asymptotic results in EVT, towards semi-parametric or even non-parametric approaches. But parametric modeling is becoming again quite popular, particularly in spatial applications of EVT. This talk is essentially on SUE, and it is partially based on the books [2] and [5], in Portuguese, as well as on the review articles [3] and [4].

References

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