

# A new proposal for robust estimation of the extremal index

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## Abstract

The extremal index is a parameter defined in the framework of Extreme Value Theory', which measures the degree of dependence among exceedances above high fixed thresholds. When the extremal index exists and those exceedances occur in clusters, the extremal index ( $EI$ ) is related to the dimension of the clusters and, in the limit distribution, it coincides with the reciprocal of the mean clusters dimension. There are different  $EI$  estimators according to the method used in the identification of those clusters. Some of them use the sample mean in the estimation of the cluster dimension. The present proposal is based on the "runs" estimator. It considers a negative binomial as the limit distribution of the number of exceedances that occur before a non-exceedance observation. Then, the  $EI$  is estimated by the reciprocal of the constant term of a negative binomial regression. The procedure makes use of robust estimators for counting processes, with known properties. Thus the negative binomial distribution is integrated in the estimation of the mean, while small deviations from the assumptions are controlled, including the occurrence of atypical cluster size values. A simulation study explores and compares the present robust proposal with other estimators.

## Keywords

Extremal index, Robustness, Estimation, Negative binomial regression, Simulation.

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