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Assessing the performance of confidence intervals for high quantiles of Burr XII and Inverse Burr mixtures

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Abstract
Recent research in the area of univariate mixture modeling indicated that the finite mixture models based on Burr and Inverse Burr component distributions perform well in the modeling of heavy-tail insurance data. Mixture models are able to capture the multimodality which is quite a common characteristic of insurance losses. Through an extensive simulation study, we assess the performance of three different [methods] in building the confidence intervals for high quantiles of the mixtures of Burr and Inverse Burr distributions. First, we provide mathematical justification for linking the tail of the k-Burr and k-Inverse Burr mixtures to the maximum domain of attraction of the Frechet distribution which allows us to employ the Generalized Pareto Distribution (GPD) in the estimation of high quantiles and their corresponding confidence intervals. Then, we compare these results to those obtained using order statistics and the bootstrap methods. We also modified the existing Peak Over Threshold (POT) algorithm for the efficient computation of the confidence intervals in the upper tail of these mixture models. A real data set on Danish Fire Losses is used to illustrate the application of these methods in practice.

Keywords Extreme value theory; Frechet distribution; Generalized Pareto Distribution; Mixture models; Quantiles

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