



Efficient likelihood-based inference for the generalized Pareto distribution

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Abstract

It is well known that inference for the generalized Pareto distribution (GPD) is a difficult problem since the GPD violates the classical regularity conditions in the maximum likelihood method. For parameter estimation, most existing methods perform satisfactorily only in the limited range of parameters. Furthermore, the interval estimation and hypothesis tests have not been studied well in the literature. In this article, we develop a novel framework for inference for the GPD, which works successfully for all values of shape parameter k . Specifically, we propose a new method of parameter estimation and derive some asymptotic properties. Based on the asymptotic properties, we then develop new confidence intervals and hypothesis tests for the GPD. The numerical results are provided to show that the proposed inferential procedures perform well for all choices of k .

Keywords Asymptotic normality · Interval estimation · Hypothesis testing · Non-regularity problem · Extreme value · Peaks over threshold

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