Gumbel distribution with heavy tails and applications to environmental data

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Abstract

In this paper, we introduce a new extension to the extreme value type-1 (Gumbel) distribution, by constructing a slash type distribution. The result is a distribution with greater kurtosis than the Gumbel distribution. Properties of the distribution such as moments, moment generating function and kurtosis and asymmetry coefficients for the distribution are studied. Maximum likelihood estimation and moments estimators are applied and a simulation study is presented to illustrate parameter recovery. Results of applications to two real data sets, one from a wind velocity study and the other from snow accumulation indicate that the new model seems to perform better in the presence of atypical observations.

Key Words: Gumbel distribution; Slash distribution; Kurtosis; Maximum likelihood; wind velocity; snow accumulation.

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