

Title:

Parametric and Nonparametric Analysis of Temporal Trend in Extreme Values with Applications to Wind Storm Losses and Temperature Data

Abstract:

A topic of major current interest in extreme-value analysis is the investigation of temporal trends. For example, the potential influence of 'greenhouse' effects may result in severe storms becoming gradually more frequent, or in maximum temperatures gradually increasing, with time. One approach to evaluating these possibilities is to fit, to data, a parametric model for temporal parameter variation, as well as a model describing the marginal distribution of data at any given point in time. In this talk we discuss some parametric trend models and illustrate the methods by application to a dataset on windstorm losses in south of Sweden. We shall also discuss difficulties which might arise in formulating structural trend-models. Motivated by datasets on windstorm severity and maximum temperature, we suggest a nonparametric approach to estimating temporal trends when fitting parametric models to extreme values from a weakly-dependent time series.

We illustrate the method through applications to time series where the marginal distributions are approximately Pareto, generalised-Pareto, extreme-value or Gaussian. We introduce time-varying probability plots to assess goodness of fit, we discuss local-likelihood approaches to fitting the marginal model within a window, and we propose temporal cross-validation for selecting window width. In cases where both location and scale are estimated together, the Gaussian distribution is shown to have special features that permit it to play a universal role as a 'nominal' model for the marginal distribution.