



## **Nonparametric bootstrap confidence intervals for deterministic trends in temperature time series data**

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In this paper we extend the methodology of Bühlmann (1998) who proposes sieve bootstrap confidence intervals for constructing confidence intervals for deterministic trends in dependent time series in a nonparametric way. We demonstrate that instead of the sieve bootstrap one can also use the block bootstrap to allow for nonlinear dependencies in the underlying process. We also extend the framework to a panel data setup. One of the appealing features of the bootstrap in this setting is that it can easily deliver simultaneous confidence intervals over parts of the time span of the data, thereby allowing one to investigate whether significant increasing or decreasing trends exist without assuming a parametric form for the trend. We apply these methods to study the presence of significant increasing/decreasing trends in long temperature time series data series for various European cities over a period ranging from 1830 to 2006.