

## Trend analysis and resampling in time series

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The detection and estimation of trend in a time series arises in a number of important environmental applications as well as in Hydrology and Climatology just to mention a few.

There is not a precise definition of trend, but it is usually spoken of as a nonrandom (deterministic) smooth function representing long-term movement or systematic variations in a series. In this study, we consider a series of observations of a random variable collected over some period of time, and we would like to determine if their values generally increase or decrease, in a monotonic way. We would also like to describe the amount or rate of that change, in terms of changes in some central value of the distribution such as a mean or median.

Many studies have been developed and special attention has been given to environmental and hydrological time series. The presence of autocorrelation and missing observations in this kind of time series is very common and affects the significance and power of the classical trend tests, both parametric and non-parametric.

This presentation starts with a review of some parametric and non parametric tests for trend in time series and its limitations and weakness. Then, one will describe the more recent bootstrap-based approach of these tests.

A comparison is established between an approach based on subsampling and others already developed. In order to evaluate the performance of this method, a simulation study was conducted taking a real time series for the base. A set of underlying slopes, values of autocorrelation and different fractions of randomly missing data were considered. In case of missing observations, their estimation was performed by an appropriate imputation (i.e. interpolation) method available in R software.

Finally, some new directions of this work will be highlighted.

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This presentation shows some work done in collaboration with Clara Cordeiro (UALG and CEAL).

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