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CIDMA CENTRO DE I&D EM MATEMÁTICA E APLICAÇÕES CENTER FOR R&D IN MATHEMATICS AND APPLICATIONS

SPE Sociedade Portuguesa de Estatística

Seminário

Grupo de Probabilidades e Estatística

16 de fevereiro de 2022 14:30 Sala 11.2.32 DMat

Contributions to the study of time series with trend and breaks

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Abstract

Several situations present in the data interfere in time series analysis, such as breakpoints or autocorrelation. This can affect the quality of a model, its estimated components and forecasts, with impact in areas as diverse as the environmental and economic time series.

This talk introduces a set of methodologies developed to address these kinds of issues: The first proposal explores bootstrap based tests combining trend tests – parametric and non-parametric – with a resampling technique for dependent data. Through a simulation study, we analyze the method's performance to overcome some weaknesses under serial correlation and missing data.

The second study proposes using breakpoint analysis with strucchange R package to find the best time horizon to include in a forecasting method.

Finally, a strategy supported by statistical methods is presented to detect an anomalous increase or decrease in water consumption. The basis of the approach is a combination of methods to analyse billed consumption time series. In the first place, the series is decomposed using Seasonal-Trend decomposition based on Loess. Next, breakpoint analysis is performed on the seasonally adjusted time series. Breakpoints define the search for decreasing or increasing changes in the segments through the Mann-Kendall test and Sen's slope estimator.

This seminar is supported by CIDMA – Center for Research and Development in Mathematics and Applications through FCT – Fundação para a Ciência e a Tecnologia, within projects UIDB/04106/2020 and UIDP/04106/2020.

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