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EXPONENTIAL SMOOTHING AND RESAMPLING TECHNIQUES IN TIME SERIES PREDICTION

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Abstract

Time series analysis deals with records that are collected over time. The objectives of time series analysis depend on the applications, but one of the main goals is to predict future values of the series. These values depend, usually in a stochastic manner, on the observations available at present. Such dependence has to be considered when predicting the future from its past, taking into account trend, seasonality and other features of the data. Some of the most successful forecasting methods are based on the concept of exponential smoothing. There are a variety of methods that fall into the exponential smoothing family, each having the property that forecasts are weighted combinations of past observations. But time series analysis needs proper statistical modeling. The model that better describes the behavior of the series in study can be crucial in obtaining “good” forecasts.

Departures from the true underlying distribution can adversely affect those forecasts. Resampling techniques have been considered in many situations to overcome that difficulty. For time series, several authors have proposed bootstrap methodologies. Here we will present an automatic procedure built in \mathbb{R} language that first selects the best exponential smoothing model (among a set of possibilities) for fitting the data, followed by a bootstrap approach for obtaining forecasts. A real data set has been used to illustrate the performance of the proposed procedure.

Keywords: time series; bootstrap; exponential smoothing; forecasting; accuracy measures.

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