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Pattern matching for multivariate time series forecasting

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The aim of pattern matching is to identify specific patterns in historical time series data to predict future values. Many pattern matching methods are non-parametric and based on finding nearest neighbors. This type of method is founded on the assumption that past patterns can be repeated and provide informations about future trends. Most of the methods proposed in the literature are univariate. In some applications, other time series are available and their use can improve the forecasting results. Certain methods exist to deal with this type of context, such as the MV-kWNN approach, which predicts the future of several time series with temporal dependencies using pattern matching. To deal with the case of uncorrelated time series, we propose a new method called Weighted Nearest Neighbors for multivariate time series (WNN_{multi}). This method allows to extend the search area from nearest neighbors to other curves, with the aim of finding similar behavior in other individuals at different times. Once the k nearest neighbors have been found, the prediction is obtained either by averaging the futures or using Gaussian processes. To evaluate the performance of this model, we use data from the Spanish electricity market, where the objective is to predict electricity consumption using also the price of electricity (and vice versa). In this type of application where the time series are heterogeneous, normalization is necessary to be able to compare and use different time series. We compare the results with other methods for multivariate time series forecasting.

Type of presentation

Talk

Classification

Both methodology and application

Keywords

Time series forecasting, Pattern matching, Gaussian processes

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