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Forecasting water demand

The tutorial lecture considers selected issues related to water demand forecasting. At the urban level, the forecasting is applied to the efficient management of water resources and as a part of the system that controls pressure in the water distribution system. At the household level, the forecasting is exploited by the decision support system, encouraging consumers to save water. Theoretical preliminaries to time series are presented together with a brief overview of the most known forecasting models. The online availability of water demand data is assumed. The concepts of growing and sliding windows are presented to illustrate different modes of learning models. Practical methods to deal with missing values and outliers are also presented. In addition, it is shown how to recognize stationarity, linearity and other features of water demand time series. The knowledge of these features helps to select the most effective forecasting model for the given time series. Different methods of dealing with seasonality in time series are presented, including autoregression, seasonal adjustment, and the application of dummy variables. An example of combining forecasts generated by different models is presented. All theoretical presentations are illustrated by practical examples.