PM10 Prediction and Forecasting Using CART: A Case Study for Pleven, Bulgaria

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Abstract : Ambient air pollution with fine particulate matter (PM10) is a systematic permanent problem in many countries around the world. The accumulation of a large number of measurements of both the PM10 concentrations and the accompanying atmospheric factors allow for their statistical modeling to detect dependencies and forecast future pollution. This study applies the classification and regression trees (CART) method for building and analyzing PM10 models. In the empirical study, average daily air data for the city of Pleven, Bulgaria for a period of 5 years are used. Predictors in the models are seven meteorological variables, time variables, as well as lagged PM10 variables and some lagged meteorological variables, delayed by 1 or 2 days with respect to the initial time series, respectively. The degree of influence of the predictors in the models is determined. The selected best CART models are used to forecast future PM10 concentrations for two days ahead after the last date in the modeling procedure and show very accurate results.

Keywords : cross-validation, decision tree, lagged variables, short-term forecasting

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