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Objective. Due to the harmful effects of the traffic induced nitric oxide on human health, it is important to have reliable methods enabling the prediction of its concentrations several hours in advance, so that the public authorities could avoid the harmful consequences of severe air pollution episodes. The aim of the paper is to predict NO and NO2 concentrations four days in advance comparing two artificial intelligence learning methods, namely, Multi-Layer Perceptron (MLP) and Support Vector Machines (SVM) on two kinds of spatial embedding of the temporal time-series.
Material and methods. Hourly values of NO and NO2 concentrations, as well as meteorological variables were recorded in a cross-road monitoring station with heavy traffic in Szeged in order to build a model for predicting NO and NO2 concentrations several hours in advance. Two effective learning methods namely, Multi-Layer Perceptron and Support Vector Regression (SVR) were used to provide efficient non-linear models for NO and NO2 times series predictions. Multi-Layer Perceptron is widely used to predict these time series, but Support Vector Regression has not yet been applied for predicting NO and NO2 concentrations.
Results. According to the experiments, the applied forecasting techniques can perform well for the prediction of NO and NO2 concentrations. While MLP improved the results of the best reference algorithms by 5-11 % for NO prediction, it could not improve those for NO2 prediction. SVR showed 20-30 % improvement for NO prediction and 2-14 % for NO2 prediction.
Conclusions. Undoubtedly, the application of machine learning techniques mentioned above can be relatively simple and is worth using. Concerning the NO predictions, the non-linear learning methods give significantly better predictions than the reference linear methods. In the case of NO2 the improvement of the prediction is considerable; however, it is less notable than for NO.