

Performance comparison of Malaysian air pollution index prediction using nonlinear autoregressive exogenous artificial neural network and support vector machine

ABSTRACT

This paper compares the performance of Nonlinear Autoregressive Exogenous (NARX) Neural Network and Support Vector Machine (SVM) regression model to predict the Air Pollutant Index (API) in Malaysia. Two models namely the NARX and SVM regression were developed using the API and air quality time series data from three monitoring stations: Pasir Gudang, TTDI Jaya and Larkin. Hourly data of API and air quality parameters collected in year 2016 and 2018 were utilized to produce one step ahead API prediction. The air quality parameters consist of the NO₂, SO₂, CO, O₃, PM_{2.5}, PM₁₀ concentration as well as three meteorological parameters which are wind speed, wind direction and ambient temperature. The NARX model was realized using a series-parallel feed-forward network. For the SVM regression model, different kernel functions: Linear, Quadratic, Cubic, Fine Gaussian, Medium Gaussian and Coarse Gaussian were evaluated. The performance of NARX and SVM regression was measured using the Root Mean Square Error (RMSE) and Coefficient of Determination (R²) values. Results show that the NARX model outperformed the SVM regression model in both 2016 and 2018 data respectively.