Air Quality Prediction System in Silesian Voivodship in the southern Poland

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The paper presents an attempt to analyze the influence of meteorological factors on the emergency of episodes of high concentrations of air pollution in zones and agglomerations Silesian Voivodship in the southern of Poland. The study analyzed the air pollution principal causes and identified the best subset of features: meteorological data and air pollutants concentration, in order to predict its short-range concentration. The data comes from data acquisition stations belongs to Automatic Monitoring of Air Quality. The emergence of high concentration of air pollutants depends on the number of meteorological factors as well as on dispersion parameters like thermodynamic stability or the mixing layer and environmental conditions. The relation between weather conditions and levels of air pollutants are nonlinear and usual descriptive statistics might be non reliable. The system analyzes the data using data mining as artificial neural networks, including self-organizing Kohenen network with exhaustion and fuzzy sets. The system creates the forecast using Fuzzy Case Base Reason (CBR) method. In addition to the data acquisition stations, data is input using the results of the numerical weather prediction. The forecast includes hourly calculated prediction values of the concentration PM10, SO_2, NO_2, O_3 and Air Quality Index (AQI). The final aim of the research have the implementation of a prognostic tool able to reduce the risk for the air pollution concentrations to be above the alarm thresholds fixed by the law.