Assessment of prediction accuracy in autonomous air quality models

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ABSTRACT

In the study, a long-term set of data collected at the air monitoring station located in Lodz (central Poland) was analysed. Two air pollutants—O₃ and CO—were chosen in order to carry out the prediction procedure. The prediction was performed using regression neural networks. The modelled concentrations were compared to the actual ones in order to assess the prediction accuracy. Approximation errors were calculated for the entire range of concentrations and also separately for several concentration sub ranges. The following measures of error were considered: the mean absolute error, the mean squared error, the root mean squared error, the mean absolute relative error, Pearson’s correlation coefficient and Willmott’s indexes of agreement. Values of errors and their variabilities in different ranges were analysed. It was stated that only some error measures properly reflect the difficulties in modelling concentrations in the entire range of concentrations as well as in different sub ranges of concentrations. The use of a single error measure may lead to incorrect interpretation.

Keywords: Air pollutants; Air monitoring; Concentration modelling; Approximation error; Neural models

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