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Title: The evaluation on artificial neural networks (ANN) and multiple linear regressions (MLR) models over particulate matter (PM10) variability during haze and non-haze episodes: A decade case study

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Abstract: The comprehensives of particulate matter studies are needed in predicting future haze occurrences in Malaysia. This paper presents the application of Artificial Neural Networks (ANN) and Multiple Linear Regressions (MLR) coupled with sensitivity analysis (SA) in order to recognize the pollutant relationship status over particulate matter (PM10) in eastern region. Eight monitoring studies were used, involving 14 input parameters as independent variables including meteorological factors. In order to investigate the efficiency of ANN and MLR performance, two different weather circumstances were selected; haze and non-haze. The performance evaluation was characterized into two steps. Firstly, two models were developed based on ANN and MLR which denoted as full model, with all parameters (14 variables) were used as the input. SA was used as additional feature to rank the most contributed parameter to PM10 variations in both situations. Next, the model development was evaluated based on selected model, where only significant variables were selected as input. Three mathematical indices were introduced (R-2, RMSE and SSE) to compare on both techniques. From the findings, ANN performed better in full and selected model, with both models were completely showed a significant result during hazy and non-hazy. On top of that, UVb and carbon monoxide were both variables that mutually predicted by ANN and MLR during hazy and non-hazy days, respectively. The precise predictions were required in helping any related agency to emphasize on pollutant that essentially contributed to PM10 variations, especially during haze period.

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