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The impact analysis of traffic and meteorological factors on air pollution risk in Taiwan, Taipei City

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Air pollution has always been one of the serious issues around the world, not only related to the large-scale climate environment, but also related to local-scale vehicles-caused air pollutants in the city. Generally, diesel-burning vehicles emit NO_x , SO_2 , CO ; gasoline burning vehicles emit CO , CO_2 , NO_x respectively. The common air pollutants CO and NO_x are widely regarded as the primary traffic-caused air pollutants. Therefore in this study, we take vehicle detector data including car speed, car volume, lane occupy as well as meteorological data and the air pollutants concentration in consider. Firstly, we use the Stepwise Regression Model(SRM) to select the significant factors for the target air pollutants and predict them with multivariate linear regression. Secondly, we also combine Long Short-Terms Memory (LSTM) Model to simulate the highly nonlinear and unstationary complex chemical interaction between air pollutants. In this study we got high model accuracy performance in primary pollutants prediction (CO , NO_x) by including the vehicle detector data with both Multivariate linear regression Model and LSTM model which conclude that the vehicle detector data can significantly improve the quality of model prediction. This process select the statistically significant factors of the pollutants, and also establishes a neural network model including traffic, meteorological factors and air quality which contribute to the air pollutants risk management of government agency.

Keywords: traffic pollutants, air quality, stepwise regression, LSTM model