Title :   Geographically Weighted Regression Model for Spatial Interpolation of PM2.5 Concentrations in Northern Thailand

Author(s) :   1.   Mr. Thiraphat Oatthanithi   **Student ID :**   640510384

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Advisor(s) :   1.   Associate Professor Dr.   Sompop Moonchai

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ABSTRACT

This study investigates the relationship between PM2.5 concentration at monthly and weekly scales and meteorological factors, including air pressure, maximum temperature, and relative humidity, in the upper northern region of Thailand. Data were collected from 15 air quality monitoring stations operated by the Pollution Control Department and meteorological stations of the Thai Meteorological Department during March and April of 2023–2024. Pearson correlation analysis was performed to assess these relationships. Additionally, spatial interpolation of PM2.5 concentration at unmeasured locations was conducted using the geographically weighted regression (GWR) model with Gaussian and exponential kernel functions.

The findings reveal a strong correlation between PM2.5 concentration and air pressure and relative humidity, while the correlation with maximum temperature is comparatively weaker. By dividing the dataset into training and testing subsets, the study found that spatial estimation of PM2.5 concentration using air pressure and relative humidity as predictor variables resulted in a mean absolute percentage error (MAPE) ranging from 30\% to 42\%, indicating moderate accuracy.

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