

Analysis of Forecasting PM_{2.5} Concentrations in DKI Jakarta Using Multi-Input Single-Output Transfer Function Method

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Keywords: Multi-input, PM_{2.5}, Relative Humidity, Temperature, Transfer Function.

ABSTRACT

Particulate Matter (PM) 2.5 is tiny particles or droplets in the air that smaller or equal to 2.5 μm which is one of the parameters of air pollution [1]. One of the sources of PM_{2.5} is vehicle exhaust. So the large number of vehicle in DKI Jakarta affects the high PM_{2.5} concentration in the region. In recent years, PM_{2.5} concentrations in DKI Jakarta have increased far above the threshold value setted by WHO, it means that air quality conditions in DKI Jakarta are getting worse. High concentration of PM_{2.5} can cause adverse health effect for humans including respiratory problems and cardiovascular diseases [2].

PM_{2.5} concentrations are also can influenced by meteorological factors, for example air temperature and relative humidity. Air temperature has a correlation to the level of air pollution because the air layer inversion interacts with heat and pollutants into air pollution [3]. The humid air tends to trigger the occurrence of particle deposition because particle pollutants are related to water vapor in the air and form larger particles [4].

It is necessary to forecast PM_{2.5} concentrations because it can be uses as a basis for setting useful policies for the community to carry out prevention. PM_{2.5} concentration forecasting can be done with time series modeling. Modeling PM_{2.5} concentrations which is known to be influenced by meteorological parameters requires a multivariate time series model. The multi-input single-output transfer function model is one of the multivariate time series models that can be used for forecasting PM_{2.5} concentrations. In the multi-input single-output transfer function model there is an output series (y_t) which is PM_{2.5} concentrations which is influenced by several input series (x_{jt}) which are air temperature and relative humidity.

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