

ABSTRACT

Good air quality is essential to preserve and sustain life. Air quality also greatly affects the quality of oxygen needed by humans. One of the most influential factors on oxygen quality is air pollution. Indonesia's capital city, Jakarta, is ranked 9th for air quality and urban pollution. Information about air quality in an area is certainly needed by humans, such as the DKI Jakarta area. People need to know information about air quality to be more concerned about the effects of air pollution on their health. This research aims to provide information about air quality in DKI Jakarta.

The air quality information needed is the air quality index. Therefore, classification of the air quality index is carried out in this study. In addition to classification, a regression process is also carried out which will produce predictions and forecasts in the future. The process is carried out using machine learning algorithms with the Extreme Learning Machine (ELM) and Kernel Extreme Learning Machine (K-ELM) methods. The Extreme Learning Machine (ELM) method is used because this method has the advantages of faster learning, easy to apply to complex problems and applied to real life. Kernel Extreme Learning Machine (K-ELM) is one of the evolutions of the Extreme Learning Machine (ELM) method. The significant difference between the Kernel ELM method and the previous ELM is the utilization of the kernel function in the hidden layer.

The dataset used for this research comes from Jakarta Open Data and Jakarta Low Emission. The dataset contains air quality data in five areas of DKI Jakarta from 2017 to 2022. This research proves that the use of machine learning with the Extreme Learning Machine (ELM) and Kernel Extreme Learning Machine (K-ELM) methods is effective for performing classification and regression processes. In the classification process, the Extreme Learning Machine (ELM) method shows excellent performance with a high accuracy of 96%. The matrix evaluation results show that the Kernel Extreme Learning Machine (K-ELM) algorithm is superior in performing the prediction process with the most optimal RMSE of 0.041, the most optimal MSE of 0.002, the most optimal MAE of 0.019, and the most optimal R-squared of 0.083. For forecasting, the Kernel Extreme Learning Machine (K-ELM) algorithm is also superior with the most optimal RMSE of 0.034, the most optimal MSE of 0.001, and the most optimal MAE of 0.023. The implementation of visualization into this website successfully provides DKI Jakarta air quality information to the public.

Keywords: Air Quality, Classification, ELM, K-ELM, Regression