ABSTRACT

Greenhouse gases (GHGs) that pollute the air have negative impacts on the environment and human health. In the previous system, measurements of CO_2 and $PM_{2.5}$ were conducted, along with PM2.5 prediction using ANN in the Bandung Raya region, resulting in RMSE and MAPE values of 8.32 µg/m3 and 37% for GKU, and 12.49 µg/m3 and 15% for DELI, indicating a relatively large RMSE value. In this system, the addition of CO_2, CH_4, and O_3 parameters at the TULT station was carried out by implementing passive measurement methods and active sensors. Measurement data were automatically validated using the windowing outlier method with Robotic Process Automation (RPA), proving to be effective and twice as fast as manual validation, resulting in monitoring documents. Subsequently, an optimized prediction model was constructed using deep learning with the LSTM algorithm. The LSTM prediction model was evaluated by comparing predicted values with actual values, yielding RMSE values of 0.089923 for CO_2, 0.060467 for CH_4, and 0.036242 for O_3. The LSTM model demonstrated a reduction in RMSE values and was used for forecasting measurable gases for the next hour. Testing indicated that the measurement and prediction data reported through the monitoring dashboard, visualized using the Website Biru Langit, had good accessibility and adequate performance as an air quality monitoring system in the Bandung Raya region.

Keywords: Air Quality Monitoring, Greenhouse Gases, Robotic Process Automation, Deep Learning, LSTM