

ABSTRACT

Air pollution is a major concern that significantly impacts human health and the environment, especially in densely populated and economically active areas like Java, Indonesia. Air pollution is primarily caused by motor vehicles and industrial activities, leading to higher concentrations of harmful pollutants such as carbon monoxide (CO), nitrogen oxides (NOx), and particulate matter (PM10). In this study, an Artificial Neural Network (ANN) model is employed to forecast air quality classifications across Java Island, utilizing time-based features and spatial analysis. The model achieves an impressive accuracy and an F1-score of 92.19%, demonstrating its capability in capturing the intricate dynamics of air quality. These results highlight the potential of the ANN model in supporting effective policy-making, crisis management, and the development of environmentally sustainable infrastructure.

Keywords: *Air quality, Artificial Neural Network, Prediction, Time-based feature expansion, Spatial analysis, Java Island*