ABSTRACT

Traffic congestion in Bandung City is a significant problem, especially at intersections with high vehicle volumes. This study developed a real-time vehicle detection and counting system based on the YOLOv8 algorithm, which was integrated into an adaptive traffic light simulation. The methodology used follows the CRISP-DM approach, which includes the following stages: business understanding, data understanding, data preparation, modeling, evaluation, and deployment. The dataset used is a combination of CCTV recordings from Bandung City intersections and open-source data from Roboflow, with three main object classifications: cars, motorcycles, and large vehicles. The model training process was conducted using Google Colab with the Ultralytics YOLOv8 library. The model performance evaluation showed good results with high precision, recall, and F1-score values, indicating the effectiveness of YOLOv8 in detecting and counting vehicles under various conditions. The developed system was also implemented on a web interface using Streamlit, enabling interactive visualization of detection results. The research results indicate that the integration of this system can serve as the basis for more adaptive and data-driven traffic management in urban environments.

Keywords: Traffic congestion, YOLOv8, vehicle detection, computer vision, adaptive traffic lights, CRISP-DM, Streamlit