ABSTRACT

The development of computer sensing technology has significantly contributed to road traffic monitoring. This research aims to build a highway traffic density monitoring application that utilizes object detection algorithms such as YOLO (You Only Look Once). The system is designed to detect, classify, and monitor the volume of vehicles by using YOLO technology, with the special exception of motorcycle detection. The web-based application provides an interactive interface for users to monitor traffic density and display data visualizations. Users can access real-time information that aids decision-making related to traffic management. The project implementation uses a web application architecture with the backend utilizing Flask or Django, and the frontend using HTML, CSS, and JavaScript. The application can be accessed through any internet-connected device, is expected to make a significant contribution in improving traffic management, reducing congestion, and increasing road safety by presenting accurate and easy-to-understand information about traffic conditions. Tests were conducted by comparing the performance of YOLOv5s and YOLOv5m in detecting objects on images or videos of highways, with the specific exception of detecting motorcycles. After evaluation, it was decided to use YOLOv5m as it proved to be more effective in detecting objects in traffic. The test accuracy is expressed as the percentage of TP (True Positive) and TN (True Negative) to the total predictions, with an accuracy result of 76.9%. The average confidence percentage of the tests was 69.81%, demonstrating the effectiveness of YOLOv5m in detecting objects in diverse traffic conditions, with the notable exception of motor vehicles.

Keywords: You Only Look Once, YOLO, Highway, Automatic Detection