ABSTRACT

As one of the countries with the highest number of motorcycle users in the world, helmet violations among motorcyclists remain a significant road safety issue in Indonesia. Although various efforts such as police checkpoints and the implementation of the Electronic Traffic Law Enforcement (ETLE) system have been applied, these approaches still face limitations in terms of coverage, efficiency, and accuracy. This study aims to implement the latest object detection model in the YOLO series, YOLOv12, using CCTV image datasets from the city of Bandung and additional data from Roboflow to detect helmet violations. Experimental results show that YOLOv12 is capable of detecting helmet violations with strong performance across diverse image conditions, supported by an F1-score of 0.903, mAP@0.5 of 0.944, and an inference time of 31.6 ms. However, compared to YOLOv10 and YOLOv11, YOLOv12 slightly lags behind in inference speed.

Keywords: *object detection, helmet violation, traffic surveillance, YOLOv10, YOLOv11, YOLOv12*