Deteksi Penggunaan Sabuk Pengaman pada Pengemudi dan Penumpang Mobil dari Corner-Top CCTV Menggunakan YOLOv8

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Abstract

One of the most common traffic violations in Indonesia is the failure to use seatbelts in four-wheeled vehicles. To address this issue, various solutions have been implemented, including Electronic Traffic Law Enforcement (ETLE). ETLE systems detect seatbelt violations by analyzing footage from dashboard cameras or roadside CCTV. However, the effectiveness of these systems is often limited by the placement and angle of the CCTV cameras. Therefore, this study aims to develop a model capable of detecting seatbelt use by drivers and passengers using images captured by Corner-Top CCTV cameras. The approach employed in this study is a two-stage detection method, where the windshield is detected first, followed by the seatbelt detection use in the next stage. This study employs YOLOv8, a state-of-the-art object detection algorithm known for balancing accuracy and efficiency. The windshield detection model achieved a precision of 92.7%, recall of 84.3%, mAP50 of 90.3%, and mAP50-95 of 63.1%. The seatbelt detection model recorded a precision of 89.5%, recall of 100%, mAP50 of 97.7%, and mAP50-95 of 54.1% for the Seatbelt class, while the No Seatbelt class showed a precision of 100%, recall of 78.4%, mAP50 of 89.2%, and mAP50-95 of 46.7%.

Keywords: seatbelt, yolov8, cctv, object detection, etle