An Advanced YOLOv8 for Vehicle Detection in Intelligent Traffic Management

Authors : A. Degale Desta, Cheng Jian

Abstract : Background: Vehicle detection accuracy is critical to intelligent transportation systems and autonomous driving. The state-of-the-art object identification technology YOLOv8 has shown significant gains in efficiency and detection accuracy. This study uses the BDD100K dataset, which is renowned for its extensive and varied annotations, to assess how well YOLOv8 performs in vehicle detection. Objectives: The primary objective of this research is to assess YOLOv8's performance in intelligent transportation system vehicle identification and its ability to accurately identify cars in urban environments for safety prioritization. Methods: The primary objective of this research is to assess YOLOv8's performance in intelligent transportation system vehicle identification and its ability to accurately identify cars in urban environments for safety prioritization. Results: The results show that YOLOv8 achieves high mAP, recall, precision, and F1-score values, indicating state-of-the-art performance. This suggests that YOLOv8 can identify cars in complex urban environments with a high degree of accuracy and reliable results in a variety of traffic scenarios. Conclusion: The results indicate that YOLOv8 is a useful tool for enhancing vehicle detection accuracy in intelligent transportation systems, hence advancing urban public safety and security. The model's demonstrated performance shows how well it may be incorporated into autonomous driving applications to improve situational awareness and responsiveness.

Keywords : vehicle detection, YOLOv8, BDD100K, object detection, deep learning
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