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Review Report

A YOLO-Based Smart Helmet Detection Model for Enhancing Public Safety

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ABSTRACT

Due to a significant increase in helmet non-use, two-wheeler riders have been involved in more road accidents in recent years, which have resulted in serious injuries and fatalities. This paper presents GuardianEye, a real-time intelligent helmet detection system that uses the YOLOv5 (You Only Look Once version 5) object detection algorithm to address this important safety concern. Through live video surveillance, the system can determine whether a motorcyclist is wearing a helmet, allowing for prompt interventions and aiding traffic law enforcement. The YOLOv5 model achieves high accuracy in a variety of lighting and background conditions after being trained on a dataset that includes photos of riders wearing and not wearing helmets. Python and OpenCV are used to implement the model, which is then tested in real-time situations. The outcomes show that GuardianEye operates with both high precision and quick detection speed, which qualifies it for use in traffic-heavy urban settings. To increase road safety, the system can be further integrated with databases maintained by law enforcement, e-challan generators, or automatic alert systems. This project aims to support the development of smart city infrastructure with AI-powered surveillance tools and shows how computer vision and deep learning can significantly improve public safety.

Keywords: Road safety, object detection, deep learning, computer vision, smart surveillance, traffic violations, helmet detection, YOLOv5, real-time monitoring, and smart cities.

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