Improving Road Safety With Artificial Intelligence: A Low-Cost AI-CCTV Intervention for Detecting Vehicular Danger

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Car accidents and the subsequent vehicular danger are a significant global issue. While Advanced Driver-Assistance Systems (ADAS) mounted in vehicles have reduced on-road hazards, they aren't fast enough to prevent the majority of crashes. While ADAS systems react within 2.5 seconds, preventive systems need to perform within 0.6 seconds to avert a vehicle crash. Furthermore, these preventative systems are costly to purchase and maintain and not all cars are able to mount an ADAS. This project proposes a machine learning methodology that rapidly detects vehicles driving at high speed or changing lanes abnormally and alerts nearby drivers. Unlike vehicle-mounted systems, this cost-effective system can be directly installed on Closed Circuit Television (CCTV) cameras. The system uses Cascade Classifier to perform rapid, high-quality detection even in low-resolution CCTV videos. In addition to Cascade Classifier, the algorithm uses Haar-based thresholds designed for vehicle detection and ROI (Region of Interest) with geometrical plotting to annotate multiple car lanes and classify automotives with potential danger. Whenever the program detects potential danger, it alerts all cars around it through Twilio, a message sending API. Overall, this machine learning methodology shows promise in rapidly detecting potential vehicular danger and alerting drivers in its vicinity, providing an effective solution to mitigate the risk of car accidents.

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