Automated Vehicle Detection and Counting System

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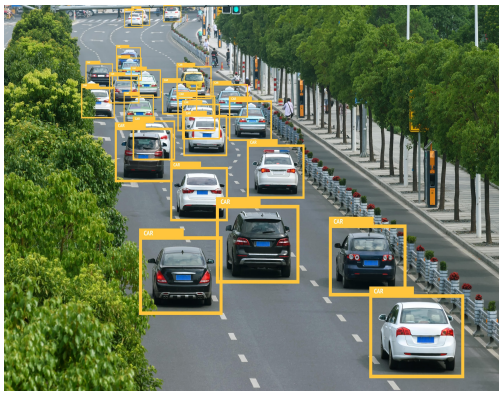
Overview

Abstract

- The Automated Vehicle Detection and Counting System offers a robust and efficient solution for monitoring vehicular traffic.
- By automating the process of vehicle detection and counting, it contributes to enhanced traffic management, road safety, and informed urban planning.



Introduction

- The Automated Vehicle Counting System focuses on to detect and classify the vehicles on the road and count the number of vehicles traveling through a road.
- Vehicle detection and statistics in highway monitoring video scenes are of considerable significance to intelligent traffic management and control of the highway.

Existing Method

- Inductive Loop Sensors: These are embedded in the road surface at intersections or along highways. When a vehicle passes over the loop, changes in the inductance are detected, allowing the system to count the number of passing vehicles. They are reliable but require road construction work.

- Magnetic Sensors: Similar to inductive loops, magnetic sensors detect changes in the magnetic field caused by passing vehicles. They are often used in parking lots and toll booths.

- Advanced machine learning and deep learning techniques, such as Convolutional Neural Networks (CNNs), can be employed to develop sophisticated vehicle detection and counting systems using video camera feeds. These systems can be highly accurate and adaptable.

Proposed Method

- Data Collection:Collect continuous video footage from the cameras.
- Preprocessing:Normalize the video feed for lighting conditions and contrast;Crop the frames to focus on the road area of interest.
- Object Detection:Utilize state-of-the-art object detection models such as YOLO (You Only Look Once), or SSD (Single Shot MultiBox Detector) to identify vehicles in each frame.
- Object Tracking:Implement object tracking algorithms (SORT - Simple Online and Realtime Tracking) to track vehicles across consecutive frames.
- Vehicle Counting:Count the unique IDs assigned to tracked vehicles as they pass through the monitored area.

Problem Statement

- Accurate Detection: Develop a system that can accurately detect vehicles of various types.
- Real-time Tracking: Create a solution that can track the movement of detected vehicles continuously in real-time, ensuring accurate monitoring of vehicle trajectories and velocities.
- Classification: Implement a classification mechanism that can distinguish between different vehicle categories, allowing for more detailed and precise traffic analysis.
- Counting: Develop a reliable vehicle counting mechanism that provides accurate and real-time data on the number of vehicles passing through specific points or areas, considering both entry and exit counts.

SDG

- SDG 11: Sustainable Cities and Communities: The automated system aids in managing traffic flow, reducing congestion, and enhancing urban mobility, thereby contributing to the development of sustainable and resilient cities.

- SDG 9: Industry, Innovation, and Infrastructure: By employing advanced technology for vehicle detection and monitoring, this system contributes to the development of robust infrastructure and promotes innovation in the transportation sector.

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