Date of Submission: 10/07/2024
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Branch/Specialisation: MTech(integrated) - Artificial Intelligence [Dept: Computational Intelligence]
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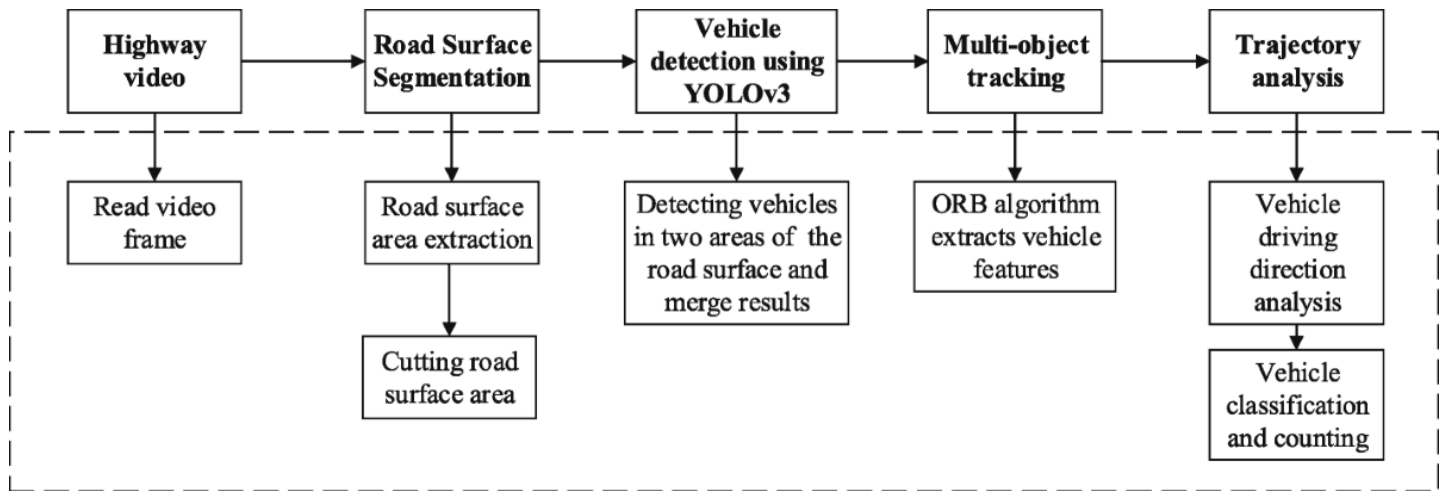# VEHICLE CUT-IN DETECTION

INTRODUCTION

Vehicle detection is a crucial aspect of road safety, and it has been a long-lasting dream of robotics researchers. The goal is to develop a vehicle-mounted driver assistance system that can alert the driver about an impending collision

FUNCTIONAL REQUIREMENTS

The functional requirements for a vehicle detection system include:
- Opening the camera
- Watching the preview
- Training the dataset
- Checking the CSV file
- Changing settings

BLOCK DIAGRAM OF VEHICLE CUT-IT DETECTION

Highway video	→	Road Surface Segmentation	→	Vehicle detection using YOLOv3	→	Multi-object tracking	→	Trajectory analysis
Read video frame		Road surface area extraction		Detecting vehicles in two areas of the road surface and merge results		ORB algorithm extracts vehicle features		Vehicle driving direction analysis
		Cutting road surface area						Vehicle classification and counting

Components:

1. Loop Detector: Control module that processes signals from the loop.
2. Loop: Metal detector installed in the driveway to detect vehicles.

Flow:

1. Vehicle passes over the Loop.
2. Loop detects metal and sends signal to Loop Detector.
3. Loop Detector processes signal and triggers action (e.g., opens/closes gate).

Types of Loops:

1. Saw-Cut or Cut-In Loop (for existing roadways)
2. Direct Burial or Pave-Over Loop (for new installations)

HOW TO RUN

1. Install OpenCV using pip install opencv-python
2. Save the code in a file named **vehicle_cut_in_detection.py**
3. Run the code using python vehicle_cut_detection.py
4. The program will display a window showing the video feed from the default camera. It will draw a green bounding rectangle around the detected vehicle.
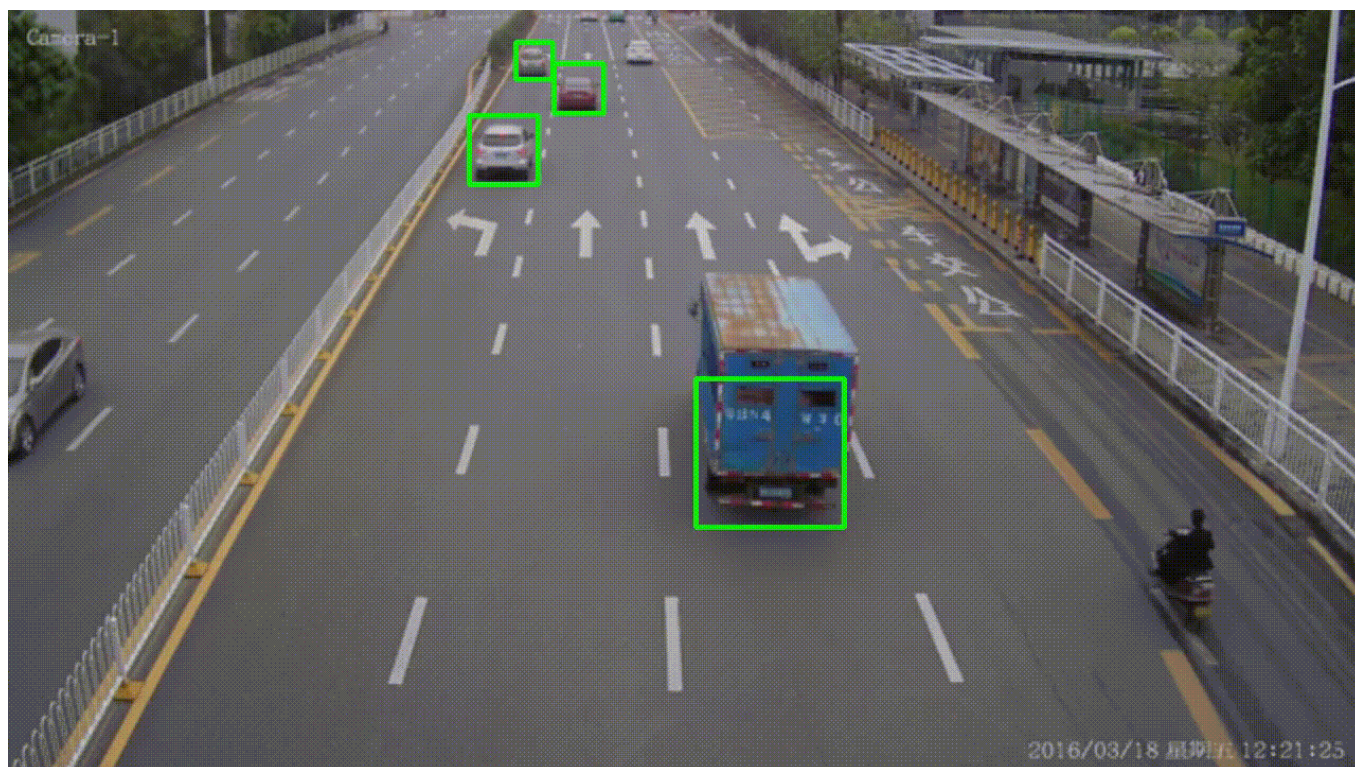
CODE

https://github.com/Milli-17/vehicle_cut_in_detection/blob/main/code

POWERPOINT PRESENTATION

https://github.com/Milli-17/vehicle_cut_in_detection/blob/main/Vehicle-Cut-in-Detection.pptx

OUTPUT

https://github.com/Milli-17/vehicle_cut_in_detection/blob/main/output.mp4

RESULTS AND REFLECTIONS

Overall, participating in Intel's Industrial Training Program was an invaluable experience. It provided practical skills, industry insights, and the opportunity to work on cutting-edge technology. The project not only enhanced my understanding of the use of python but also equipped me with the knowledge to tackle real-world challenges in the tech industry. Intel's Industrial Training Program offers a unique blend of theoretical knowledge and practical experience, preparing students for careers in technology. The skills and knowledge gained through this experience will undoubtedly be beneficial in my future endeavors in the field of technology.

CONCLUSION

Vehicle cut-in detection can offer numerous benefits and insights, especially in the context of autonomous driving, traffic management, and driver assistance systems. Here are some key conclusions we can draw from implementing and analyzing such detection systems:
1. Enhanced Road Safety
2. Insights for Autonomous Vehicles
3. Traffic Management
4. Improvement Over Time