Creating a future-ready workforce

College Name

Park college of engineering and technology

Student Name :Sruthikka.S
Student ID :au712221104022

PROJECT SHOWCASE

Project Title

vehicle speed estimation system

agenda

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Abstract

- The need to accurately estimate the speed of road vehicles is becoming increasingly important for at least two main reasons. First, the number of speed cameras installed worldwide has been growing in recent years, as the introduction and enforcement of appropriate speed limits are considered one of the most effective means to increase the road safety. Second, traffic monitoring and forecasting in road networks plays a fundamental role to enhance traffic, emissions and energy consumption in smart cities, being the speed of the vehicles one of the most relevant parameters of the traffic state.
- Among the technologies available for the accurate detection of vehicle speed, the use of vision-based systems brings great challenges to be solved, but also great potential advantages, such as the drastic reduction of costs due to the absence of expensive range sensors, and the possibility of identifying vehicles accurately.
- This paper provides a review of vision-based vehicle speed estimation. The terminology and the application domains are described and a complete taxonomy of a large selection of works that categorizes all stages involved is proposed. An overview of performance evaluation metrics and available datasets is provided. Finally, current limitations and future directions are discussed.

Problem Statement

- **BACKGROUND**

Background In recent years many researchers have worked on video cameras which are considered as a sensor device for capturing and recognizing moving vehicle. Video based systems can capture a large variety of information which is less expensive to install and maintain cameras. It is not easy for a single moving camera to quickly capture information.

- **METHODOLOGY**

Methodology The speed of the vehicle in each frame is calculated using the position of the vehicle in each frame, so the next step is to find the spots Bounding, and the centre of gravity. Bubble centroid distance is important to understand the moving vehicle in consecutive frames and therefore is known as the frame rate for motion capture, the speed calculation becomes possible. This information must be recorded in a continuous array cell in the same size as the camera image captured because the distance travelled by the centroid is needed. Specific coordinate will be used to determine the vehicle estimated speed, tracking, and distance travelled by the vehicle.

End users

- User Interface*: Develop a user-friendly interface if needed. You could create a GUI using libraries like Tkint or PyQt, allowing users to interact with the application more intuitively.
- Packaging*: Package your application into an executable file for easy distribution. Tools like PyInstall or cx_ Freeze can help you create standalone executables that users can run without needing to install Python or any dependencies.
- Error Handling*: Implement error handling to gracefully handle any unexpected situations that may arise during runtime. This ensures a smoother user experience and helps in troubleshooting issues.
- Documentation*: Provide clear documentation or user manual explaining how to use the application, including any necessary setup steps and troubleshooting tips.

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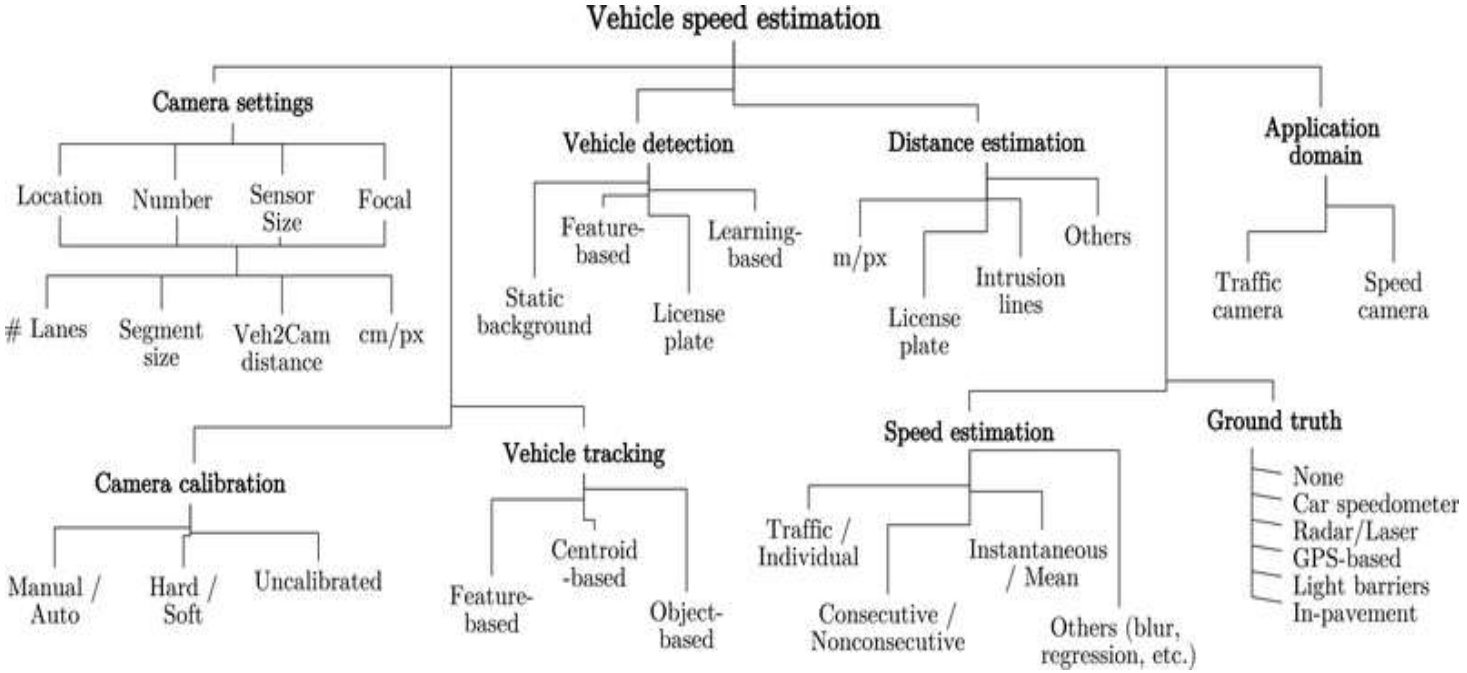
Solution & Proportion

- Real-Time Detection*: Detect and track vehicles in real-time from video streams or recorded footage.
- Speed Calculation*: Measure the speed of detected vehicles based on their movement within the video frame.
- Accuracy*: Implement algorithms to accurately determine the speed of vehicles, considering factors like frame rate, distance between frames, and object size.
- Multiple Vehicle Tracking*: Ability to track and calculate speed for multiple vehicles simultaneously, if needed.
- User Interface*: Provide a user-friendly interface for interacting with the system, displaying video feed, detected vehicles, and their speeds.

Project Overview

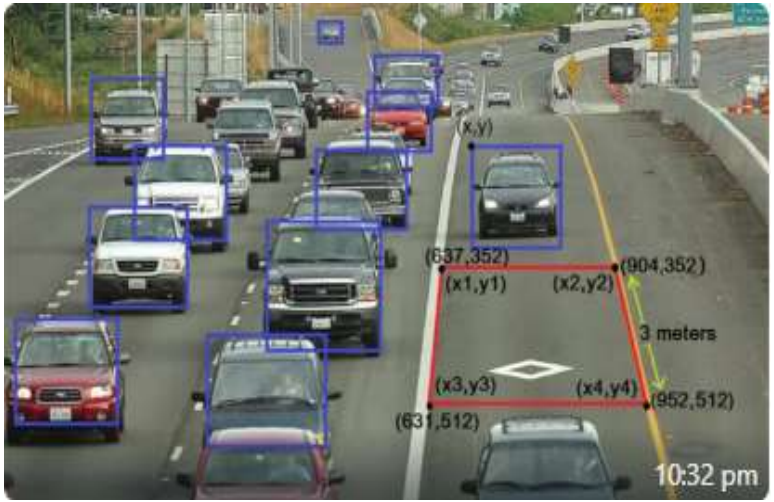


Modelling Approach

- Data Collection*: Gather a dataset of video footage containing vehicles moving at various speeds. The dataset should cover different lighting conditions, weather conditions, and traffic scenarios.
- Preprocessing*: Preprocess the video data to enhance quality and reduce noise. This may involve resizing frames, converting to grayscale, and applying filters for noise reduction.
- Vehicle Detection*: Use object detection techniques to identify and localize vehicles within each frame. Popular object detection models like YOLO (You Only Look Once) or SSD (Single Shot MultiBox Detector) can be used for this purpose.
- Motion Estimation*: Track the movement of detected vehicles across frames to estimate their speed. This can be done by comparing the positions of vehicles in consecutive frames and calculating the displacement over time.

Results

- Various legal issues arise from such cameras and the laws involved in how cameras can be placed and what evidence is necessary to prosecute a driver varies considerably in different legal systems.
- In some areas the cameras themselves have been ruled illegal. Other issues surround the actual type approval of cameras.



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Thank You!