

REAL-TIME MOVING VEHICLE DETECTION, TRACKING, AND COUNTING SYSTEM IMPLEMENTED WITH OPENCV

Shivam gupta

Btech ECE

IIITnr

Raipur, India

Shivamg17101@iiitnr.edu.in

Shweta jagitanath himdhar

Btech ECE

IIITnr

Raipur, India

Shweta17101@iiitnr.edu.in

Ashwini kumar

Btech ECE

IIITnr

Raipur, India

Ashwini17101@iiitnr.edu.in

Poonam kodapi

Btech ECE

IIITnr

Raipur, India

Poonam17101@iiitnr.edu.in

ABSTRACT- Moving vehicle detection, tracking, and counting are very critical for traffic flow monitoring, planning, and controlling. Video-based solution, comparing to other techniques, does not disturb traffic flow and is easily installed. By analyzing the traffic video sequence recorded from a video camera, this paper presents a video-based solution applied with adaptive subtracted background technology in combination with virtual detector. Experimental results, implemented in Visual python code with OpenCV development kits, indicate that the proposed method can detect, track, and count moving vehicles accurately.

INTRODUCTION- Expressways, highways and roads are becoming overcrowded with increasing of large number of vehicles. Intelligent transportation systems (ITS), applied to collect, cognize, and manage information about transportation flows from various sources, are emerging worldwide to make transportation more efficient, reliable, cleaner and safer. The requirement to detect, track, and count the moving vehicle is getting very important for traffic flow monitoring, planning, and controlling.

The vehicle detections can be traditionally achieved through inductive loop detector, infrared detector, radar detector or video-based solution. Compared to other techniques, the video-based solutions based on surveillance camera mounted outdoor are easily influenced by environments such as weather, illumination, shadow, etc. However, because video-based systems can offer several advantages over other methods such as traffic flow undisturbed, easily installed, conveniently modified, etc., they have drawn significant attention from researchers in the past decade.

A traditional computer vision method for moving object detection in video-based system is so-called “background subtraction” or computing the difference between a background model and current frame, which demands to estimate a robust background to deal with the changing object. For this reason, in the case of vehicle detection on road, an adaptive rather than static background is needed for real-time road situations .

SYSTEM DESIGN

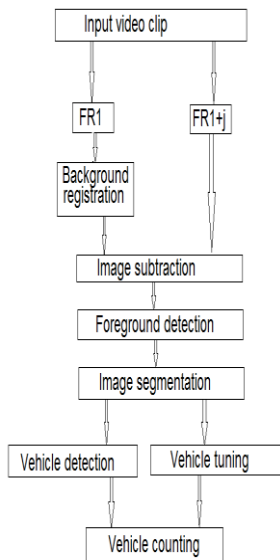
This system structure is computationally efficient and can run in a real-time basis while retaining very respectable detection rates. However, this kind of systems contain some inevitable problems caused by the object occlusion where larger vehicle with partially occluded smaller vehicle are typically considered as one object because foreground detection methods are not intrinsically designed to segregate multiple occluded vehicle. In another case, the appearance of larger vehicle or vehicle's shadow occluding the adjacent lanes also is known to trigger false detection. Consequently, the merit of using computer vision as a surveillance tool has been limited by focusing strictly on building reliable systems that can perform in real-time.

OVERVIEW OF THE RELATED WORK

An overview of the moving vehicle detection in a video sequence. The system makes use of an existing video sequence. The first frame is considered as the reference frame. The

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subsequent frames are taken as the input frames. They are compared and the background is eliminated. If a vehicle is present in the input frame, it'll be retained. The detected vehicle is thus tracked by various techniques.



OPEN CV

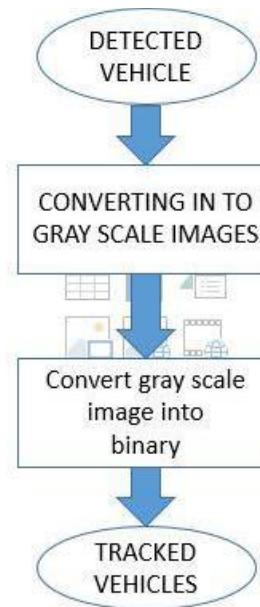
Open CV is an open source project an important part of the library as the implementation of those crafty data structures and algorithms you can find in Open CV. Therefore, the source codes for the tutorials are part of the library. Computer vision is a rapidly growing field, partly as a result of both cheaper and more capable cameras, partly because of affordable processing power, and partly because vision algorithms are starting to mature. Open CV itself has played a role in the growth of computer vision by enabling thousands of people to do more productive work in vision. With its focus on real-time vision, Open CV helps students and professionals efficiently implement projects and jump-start research by providing them with a computer vision and machine learning infrastructure that was previously available only in a few mature research labs

VEHICLE DETECTION

Adaptive background subtraction uses the current frame and the reference image. Difference between the current frame and the reference frame is above the threshold is considered as moving vehicle. Optical flow method can detect the moving vehicle even when the camera moves, but it needs more time for its computational complexity, and it is very sensitive to the noise. The motion area usually appears quite noisy in real images and optical flow estimation involves only local computation. So the optical flow method cannot detect the exact contour of the moving vehicle.

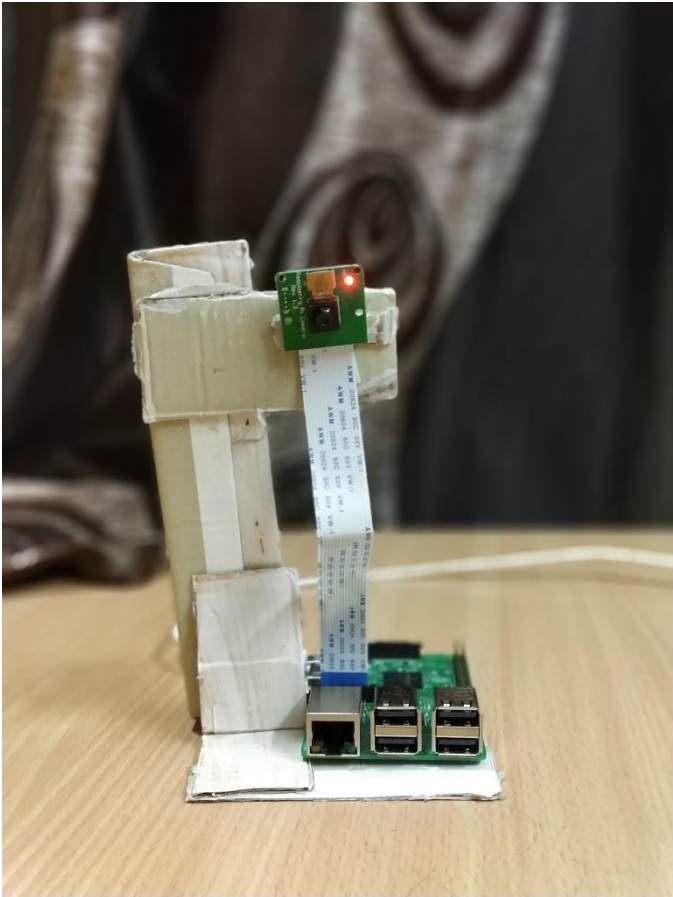
VEHICLE TRACKING

Vehicle Tracking Vehicle tracking involves continuously identifying the detected vehicle in video sequence and is done by specifically marking the boundary around the detected vehicle. Vehicle tracking is a challenging problem. Difficulties in tracking vehicles can arise due to abrupt vehicle motion, changing appearance patterns of the vehicle and the scene, non-rigid vehicle structures, vehicle to-vehicle and vehicle-to-scene occlusions, and camera motion.



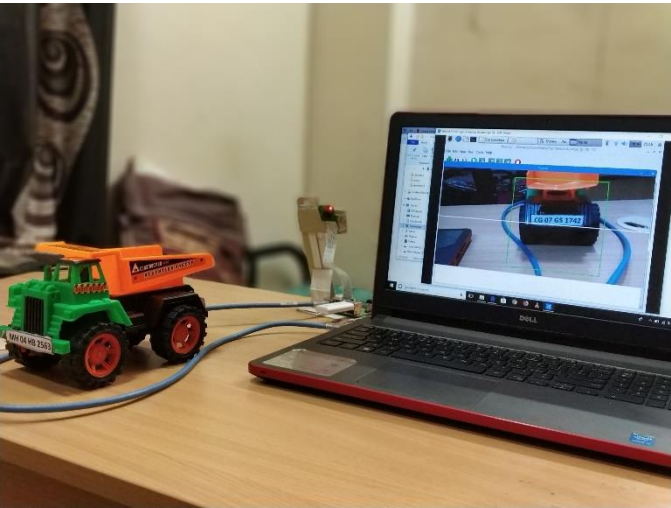
HARDWARE

1. The **Raspberry Pi** is a series of small single board computers developed in the United Kingdom by the raspberry pi foundation to promote the teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It does not include peripherals (such as keyboard, mice and cases). However, some accessories have been included in several official and unofficial bundles.
2. The **Raspberry Pi Camera Module** is a 5 megapixel custom designed add-on for Raspberry Pi, featuring a fixed focus lens. It's capable of 2592 x 1944 pixel static images, and also supports 1080p30, 720p60 and 640x480p60/90 video.



Here raspberrypi's work is to do the image processing and the camera module is recording the video and we are tracking the vehicles through their no. plates.

EXPERIMENTAL PROTOTYPE



CONCLUSION

A system has been developed to detect and count dynamic vehicles on highways efficiently. The system effectively combines simple domain knowledge about vehicle classes with time domain statistical measures to identify target vehicles in the presence of partial occlusions and ambiguous poses, and the background clutter is effectively rejected. The computational complexity of our algorithm is linear in the size of a video frame and the number of vehicles detected. As we have considered traffic on highways there is no question of shadow of any cast such as trees but sometimes due to occlusions two vehicles are merged together and treated as a single entity.

Several future enhancements can be made to the system. The detection and tracking and counting of moving vehicle can be extended to real-time live video feeds. Apart from the detection and extraction, process of recognition can also be done. By using recognition techniques, the vehicle in question can be classified. Recognition techniques would require an additional database to match with the given vehicle. The system is designed for the detection and tracking and counting of a multiple moving vehicle.

ACKNOWLEDGMENT

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REFERENCES

1. en.wikipedia.org/wiki/Raspberry_Pi
2. www.raspberrypi.org
3. [Stack exchange.org](https://stackoverflow.com)
4. [Github.com](https://github.com)