A Project Report

On

TRAFFIC CONTROL SYSTEM USING OPENCV

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TRAFFIC CONTROL SYSTEM USING OPENCV

ABSTRACT:

In-country like India, billions of people start and end each working day stuck in traffic or commuting on congested trains and buses. To overcome the problems of traditional traffic control systems, there is a shift in adaption to an Adaptive traffic control system. This proposed model of camera-based traffic monitoring and processing system which reduces the cycle time and possesses special provisions for vehicles.

KEYWORDS— OpenCV, Traffic monitoring; Traffic congestion detection; Traffic Management System.

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INTRODUCTION

OVERVIEW:

Congestion of traffic has been a matter of routine in any existing metropolitan region with an overwhelming population but minimal infrastructure. Traffic Congestion is a critical problem with dire causes and consequences on the road. Radical population growth and low public quality transportation have caused vehicles to expand massively. Poorly controlled traffic, apart from infrastructure, creates congestion that could survive for hours. Only to a certain degree can a pre-defined timing scheme for traffic control ease the problem. It must surpass its value as a fixed delay unit irrespective of the traffic volume on the pre-defined timer signal that leads to more traffic build-up on other lanes of the intersections. So, our proposed model reduces the time complexity of operation and based on detection of density of vehicles going to perform the traffic signal operations.

APPLICATIONS:

- Traveler information services
- Emergency management services
- Vehicle safety
- Control system
- Public transport services

ADVANTAGES AND DISADVANTAGES:

- The Traffic controlling get easier
- Emergency vehicles
- Vehicle’s detection etc.
- Failure of camera system
- The accuracy may not appropriate

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LITERATURE SURVEY

SNO	Title of the paper	DESCRIPTION	AUTHOR	LIMITATION
1.	Real-Time Adaptive Traffic Control System for Smart Cities	The fundamental concept behind having an adaptive traffic control system is to construct a traffic management system in such a way that it functions in response to real-time traffic patterns. We also come across existing traffic light system situations where, if there is no vehicle on a specific lane and heavy traffic on another lane, for a specified time, the traffic signal on the latter lane is green while the other remains red at the very same time.	Shyam Shankaran R Logesh Rajendran	there is currently no National ITS Plan or ITS Architecture that has been established.
2.	Density Based Smart Traffic Control System for Congregating Traffic Information	This paper proposes a system which will measure the traffic based on the density of the vehicles within the particular longitude and latitude. n providing the efficient traffic management system also provides the subscriber about the famous places, Hotels, and Events occurring near the traffic.	Amaresh A M Kavya Shivanand Bhat Ashwini G Bhagyashree J Aishwarya P	This system cannot determine when it has two ambulances in two different ways at the same time when it reaches the neutral point. This problem can be solved by inserting deadlock handling techniques in traffic control3.

3.	Optimal LQG Control of Networked Systems Under Traffic-Correlated Delay and Dropout	This approach provides a pathway to determine the required networking capabilities to achieve a guaranteed quality-of-control for systems operating over a shared-traffic network. Numerical evaluations are performed using realistic stochastic models for delay and dropout.	Dipankar Maity d H. Mamduhi , Sandra Hirche Karl H. Johansson	Transmission delay and packet dropout are inevitable network-induced phenomena that severely compromise the control performance of network control systems. The real-time network traffic is a major dynamic parameter that directly influences delay and reliability of transmission channels, and thus, acts as an unavoidable source of induced coupling among all network sharing systems
4.	Two-Level Hierarchical Model-Based Predictive Control for Large-Scale Urban Traffic Networks	In this paper, we propose a two-level hierarchical control framework for large-scale urban traffic networksAt the upper level, based on decomposing a heterogeneous traffic network into several homogeneous subnetworks, a higher level optimization problem using the concept of macroscopic fundamental diagram is formulated to deal with the traffic demand-balance problem. At the lower level, the controller with a more detailed traffic flow model for each subnetwork determines the optimal signal timing within the given region under the guidance of the upper-level controller through communication	Zhao Zhou, Bart De Schutter, Shu Lin, Yugeng Xi	— Network-wide control of large-scale urban traffic networks using a hierarchical framework can be more efficient and flexible than centralized strategies for reducing the traffic congestion in big cities, because it can adequately address some problems that occur in controlling such large systems, e.g., computational complexity, multiple control objectives, weak robustness to uncertainties, and so on

5.	Urban Traffic Cooperative Control based on Regional Division	the peak traffic network is divided into oversaturated region and its associated areas, and the grey relational analysis and spectral clustering method are used to divide the associated areas. Then, a traffic cooperative control model of urban oversaturation region and its associated area is proposed.	Shaohu Tang1 , Wei Zhu1 , Xiaoming Liu2 , Jianchun Zheng1 , Chunlin Shang2	Urban oversaturated traffic seriously affects the efficiency of road network traffic, causing traffic delays and congestion directly

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PROBLEM STATEMENT AND OBJECTIVE

PROBLEM STATEMENT:

- If the density gets heaver the operation may difficult to perform.
- The manual operation cannot be accurate.
- And the density detection using OpenCV may not be suitable for all cases.

OBJECTIVE:

- Our main objective of this project is to detect the density of the vehicles in the particular direction where the density is more and perform the manual operation to overcome the traffic problems and also to it is use full for the emergency vehicles to get exist at faster from the traffic. The applications like emergency vehicles , object detection and tracking can be performed with this proposed method.

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EXISTING MODEL

In India the siren sound of all emergency vehicles is pre-set and follows a similar pattern. The siren sound repeats in two tones. The tones are 960 Hz and 770 Hz, and these are repeated at every 1.3 sec period. The siren sound is affected by the Doppler Effect and varies its frequency due to the motion of the emergency vehicle. The proposed system works in two phases. First phase is about detection of emergency vehicle and second phase is all about taking the action at the intersection. The system uses the sound detection sensor, camera and microcontroller for processing the data. The proposed system uses the LoRa technology for communication. Data set of different emergency vehicle patterns will be stored at the smart object, which will be used to compare the current emergency vehicle with the existing dataset. Camera will be installed in the smart object and will be well positioned to capture only required portion of the road. In first phase the smart object detects the emergency vehicle on the road through: If the emergency vehicle is on the way towards the signal, then the smart object which is placed (200 m) away from the signal junction will detect the siren sound of emergency vehicle by using sound detection sensor. Next process in the smart object is about matching the moving object on the road with the stored dataset. The camera will be set to capture the pictures of vehicles on the road as soon as the Smart object detects the sound. If both the conditions satisfy, then smart object sends the message to the Decision Support System which is centralized in the Signal junction. Second phase is about taking the decision. Signal junction will be installed with the Decision Support System. This system receives the signals from the smart objects which are placed on the different roads which are going to intersect in the junction. All the smart objects and Decision Support System will be arranged in the star topology. The Decision Support System at the centre is responsible for taking the appropriate decision about clearing the traffic on the lane where the emergency vehicle is travelling. Decision Support System will be installed with Acoustic Sensors near the intersection which works on Receding Doppler Effect, to make sure that the emergency vehicle has crossed the junction so it can be reverted back to its normal functioning. Decision Support System is also responsible for receiving the data, processing the data, storing the data to the cloud, as well as transmitting the data to the next Decision Support System.

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PROPOSED METHOD

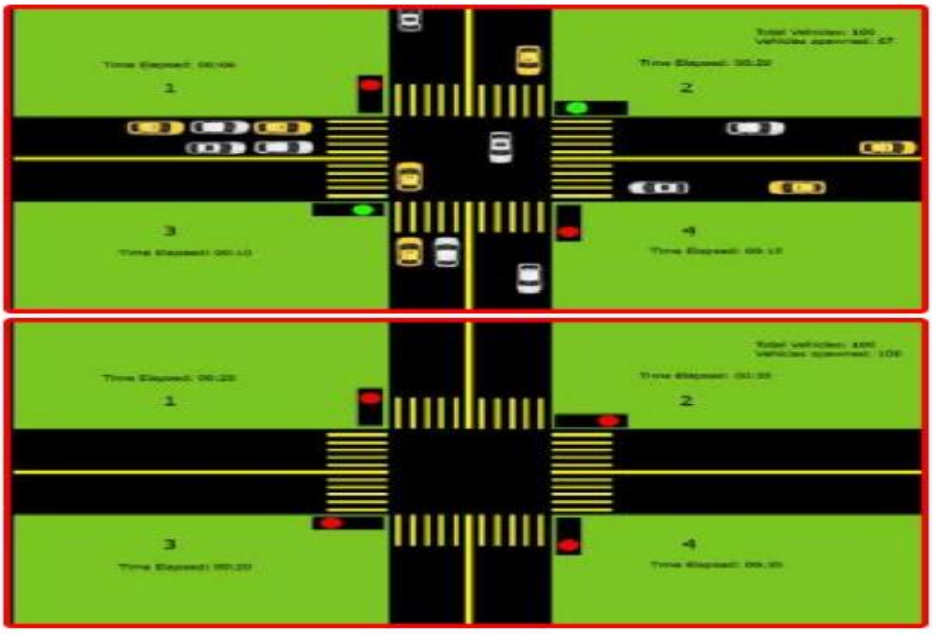
This proposed model of traffic control system using OpenCV monitoring based on camera and processing system which reduces the cycle time and possesses special provisions for emergency vehicles.

EQUIPMENT REQUIRED:

- Camera
- Python Software
- Python library OpenCV

WORKING:

The control algorithm is intended to control 4-way and 2- way approach intersection. The video feed is obtained via the automated operations supported by OpenCV using the Direct Display (D show) techniques. The classifier for the identification of objects, which in this case are vehicles, has been created using the Open CV development kit. The cascaded classifier, consisting of several stages of other simple classifiers, uses Haar-like features to detect objects. Based upon that the traffic signals are operated.



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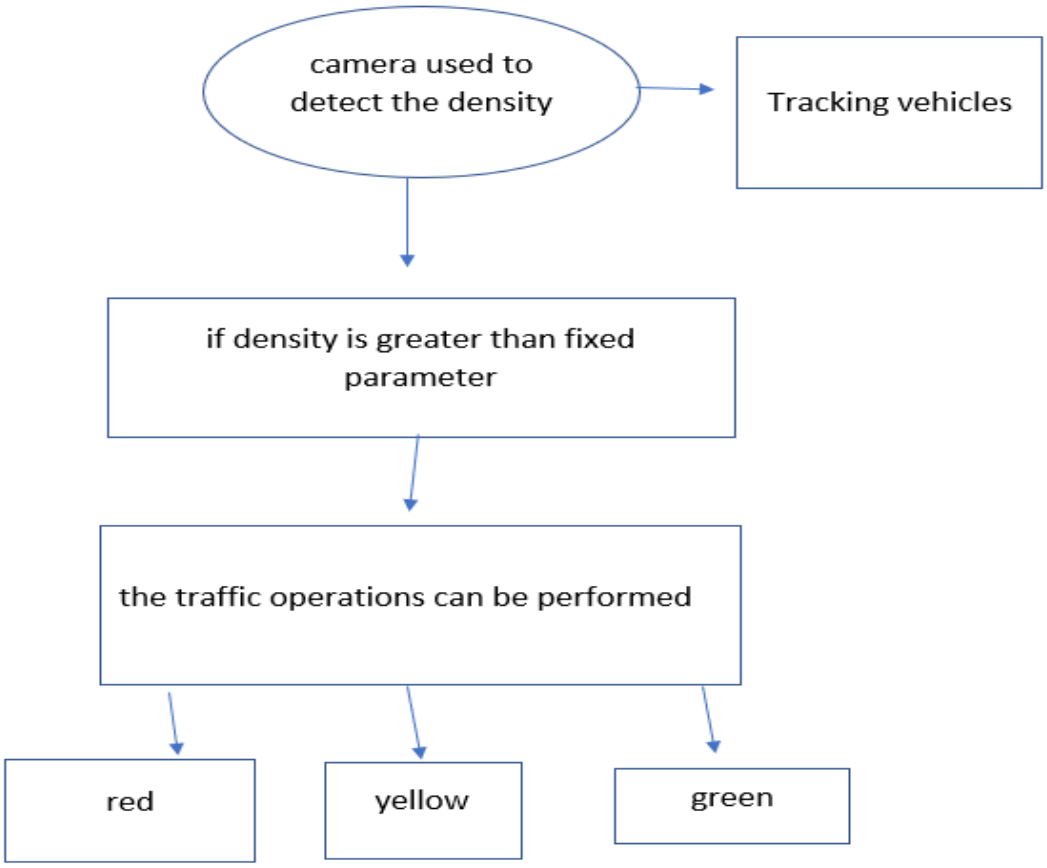
FLOW CHART



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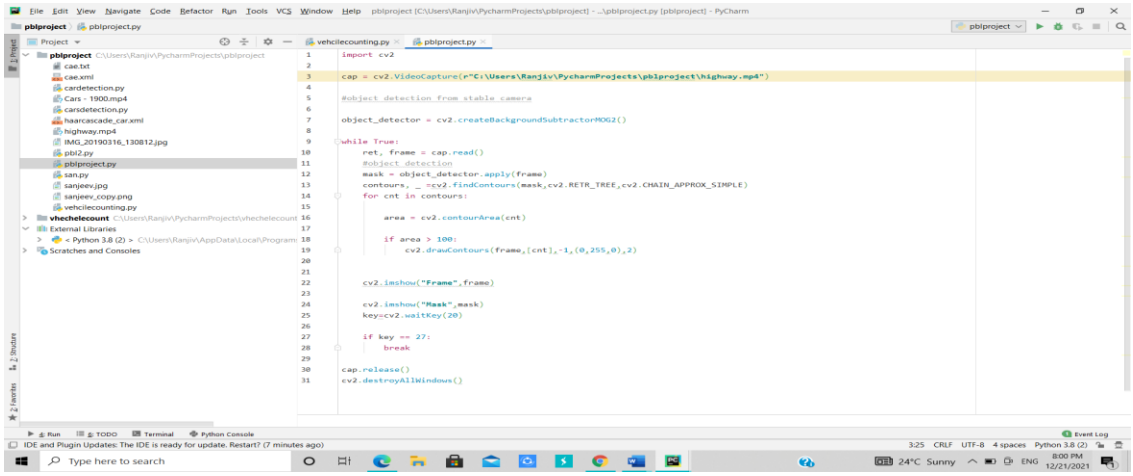
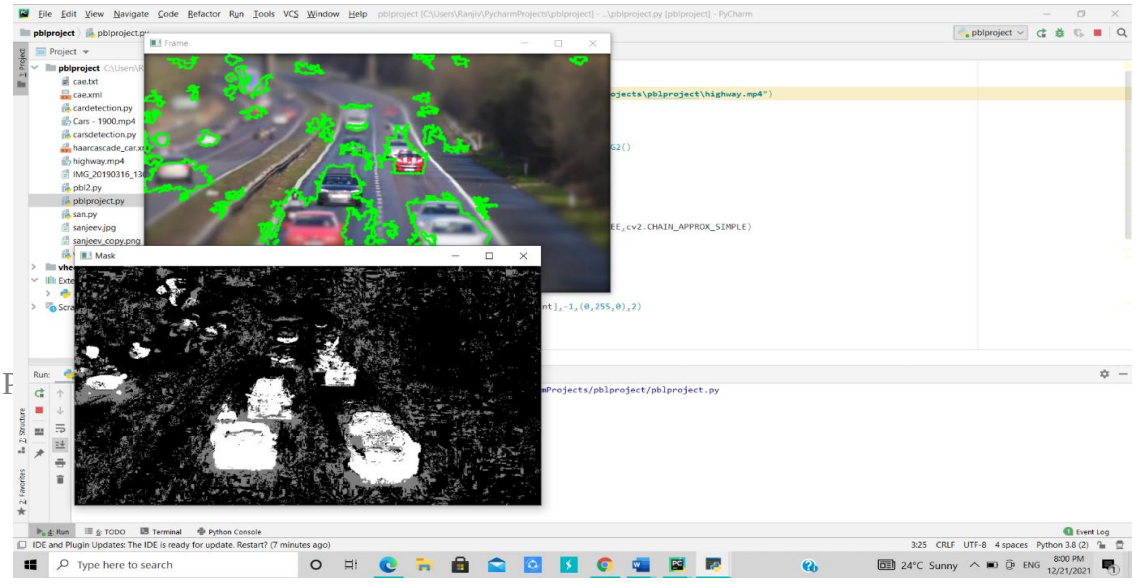
APPENDIX AND RESULT

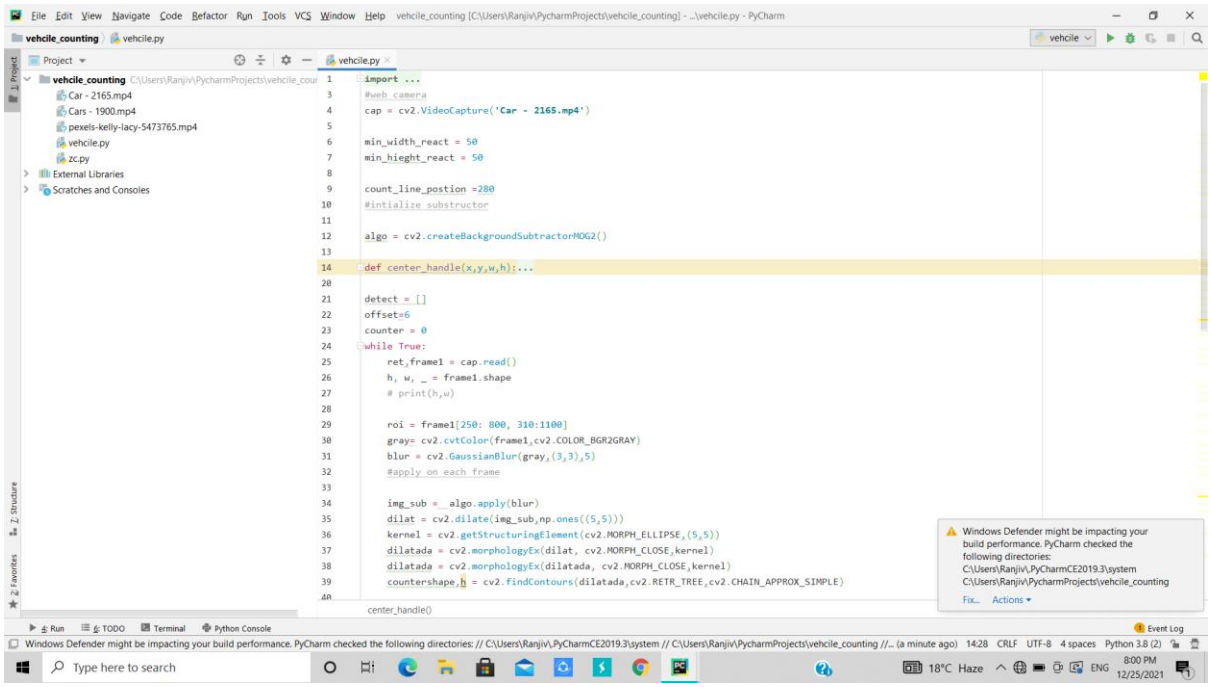
VEHICLE DETECTION:



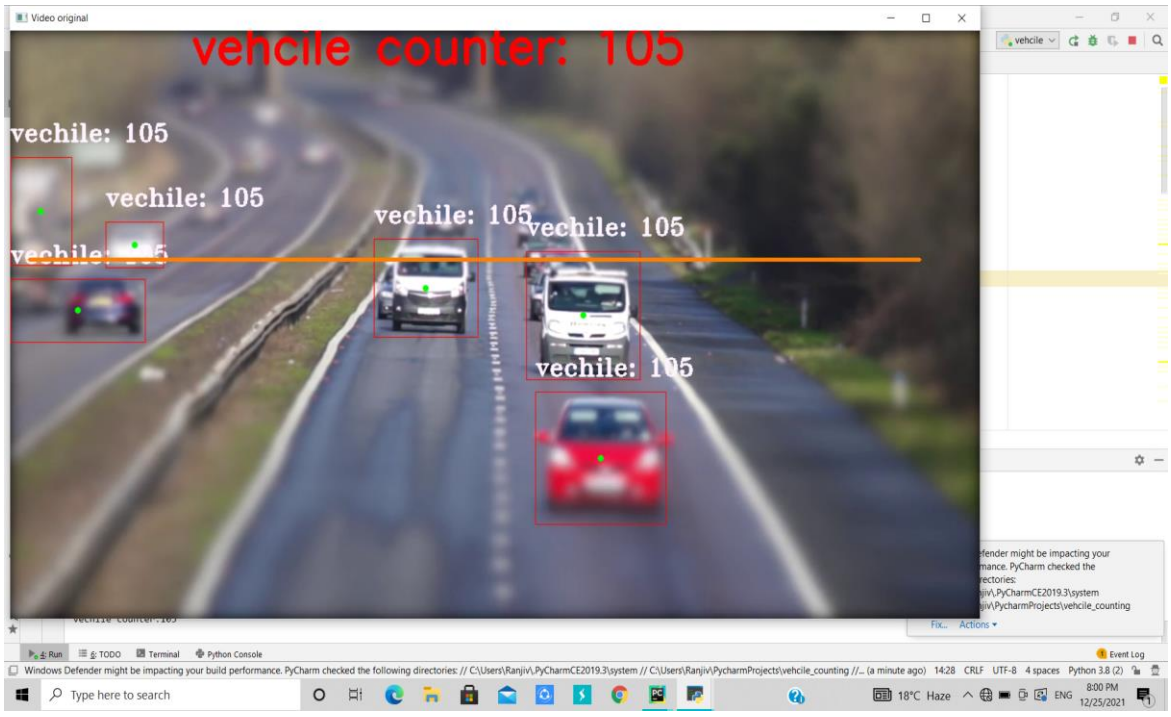
RESULT:



VEHICLE COUNTING:



RESULT:



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CONCLUSION AND FUTURE SCOPE

CONCLUSION:

- So, this proposed model of camera-based traffic monitoring and processing system which reduces the cycle time and possesses special provisions for vehicles and traffic control can be done easier and faster way.

FUTURE SCOPE:

- For increases in population this method can be easily adopted and the modifications can also be done future more.

- For emergency vehicles , tracking and counting and traffic signalling ,number plates detecting.

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