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# Identification of Contours, Detection &Tracking of Vehicles

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***Abstract:*** ***Detection, tracking, and counting of moving vehicles are very essential for continuous monitoring, tracking, and controlling of moving vehicles. The recorded video provides a better solution, when compared to other techniques, as it doesn't interrupt the traffic flow, and is installed easily. By analyzing the traffic video recorded from the camera, it provides an easy way for traffic monitoring and control. This paper comes up with results, implemented in python with Open CV, which indicates that the proposed method can detect, track, and count moving vehicles accurately. In this paper, three major strides are involved that is, background subtraction, foreground learning, and vehicle classification, and the count is given. Monitoring of vehicle movement continuously, detection, tracking, classification, and counting has high importance in military, civilian, and government and applications like high-way monitoring, traffic planning, toll collection and to manage the traffic flow. For better traffic governance, vehicle identification is a crucial step. Modern CV based techniques are more adaptable as they don't disturb traffic flow during installation and can be modified easily. The proposed system is inexpensive and provides an efficient way for vehicle detection and counting.***

***Keywords: OPENCV, background subtraction, foreground learning, vehicle classification, detection, computer vision-based system.***

## I. INTRODUCTION

Due to an increase in a large number of automobiles, Expressways, highways, and roads are becoming overcrowded. The Intelligent transportation systems (ITS), applied to gather, visualize and manage information about the way transportation from different sources, are turning up around the world to make transportation more better, easy, efficient, and safe. It is necessary to detect, track and count the moving vehicle as it is very important for controlling the flow of traffic. Detection of vehicles can be traditionally achieved through an inductive loop detectors which detect the vehicles approaching a particular point,radar detector, or video-based solution. Compared to other techniques, the solutions depending on the surveillance camera, are easily influenced by environments such as weather and lightning, etc. However, isnce these video-based systems provide various advantages over traditional methods as they can be installed easily and can be modified conveniently, etc, which are more advantageous, have drawn the attentiveness of the researchers in the recent times

In this paper, a traditional computer vision(OpenCV) method for moving object detection in a 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 are employed. Due to these reasons, an adaptive rather than fixed background is needed for real-time traffic monitoring situations. Since, OpenCV offers users to access over 2500 algorithms that can be utilized in various applications like object detection, face recognition, and more in both classic and state-of-the-art. However, the processing of images is time-consuming and automation is needed in order to save time for tracking and vehicle counting. In current times, where vehicle detection and counting consume more amount of time, python has an advantage of image processing. The paper describes a methodology for processing of images where the proposed methodologies can identify the contours, track, and count the vehicles efficiently.

## II. LITERATURE REVIEW

Under the literature review, the work contributed towards detection and tracking the count of vehicles is mentioned. A Variety of approaches have been developed that can detect, track , and count the vehicles and can be used for various transportation systems. A video-based real-time vehicle counting system using an optimized virtual loop method proposed by Tursun M and Amrulla where the camera that is deployed over roads is used to compute how many vehicles are passing. Adaptive background estimation and the Gaussian shadow elimination are the two main methods that were used proposed by Lei M, et al where surveillance cameras were used and mounted at a relatively high place to acquire the traffic video stream. The system's inability to classify the vehicle type is the main drawback. Mithun, N.C, et al presented detection and classification of automobiles by using different virtual detection lines and spatial images. The K nearest neighborhood (KNN) algorithm is implemented to classify the vehicles depending on their shape.

Experiments ensure that the proposed methodologies provide better accuracy and low error rate over existing methods since it also considers the various lightning and weather conditions. Detection of vehicles using a video-based system plays a major role as it greatly impacts the various algorithms like detection and tracking of the vehicles and hence an appropriate identification and segmentation of the foreground objects is necessary. Techniques like frame differentiation are used for detecting the foreground. Frame differentiation can be taken into consideration as the easiest segmentation and foreground detection method as it is acquiring the relationship between the sequential moving objects. Object detection is done by using Kalman filter for subtracting the background and in order to detect objects in the processed frame using OpenCV library is proposed by A. Suryatali and V.B. Dharmadhikari where Computer Vision-based vehicle detection that tracks and counts the vehicles. Nakorn et al proposed a vehicle detection and counting paradigm which uses different steps for background subtraction and object detection then uses CV techniques such as thresholding and adaptive morphological dilation to remove noise and enhance the foreground objects in a particular frame from the video. The proposed system ensures accuracy can be employed for real-time applications but can be improved further for traffic monitoring in various conditions such as weather and lightning conditions.

## III. EXISTING SYSTEM

Earlier implementations were carried using image/video processing and detecting the objects is used for monitoring and controlling traffic flow has gained attention for several years. Identification and tracking of vehicles are performed using one of these methods:

*A.* Matching
*B.* Thresholding
*C.* Edge detection
*D.* Frame detection

The traditional method uses forward and backward image differencing in order to get the images of the moving vehicles. The KNN algorithm is adopted to classify the vehicles based on the shape invariant and several other factors but found that the due to low error rate and better accuracy is obtained in the proposed system which assures more efficiency and performance.

## IV. PROPOSED SYSTEM

Different from the earlier works, the proposed method in this paper uses a combination of edge detection and frame differentiation methods to provide better quality and accuracy for vehicle detection. In this, the video is given as input that is taken from the surveillance camera and is further divided into frames. Then, the background subtraction is done by the morphological.ex() function that eliminates noise and unwanted objects like trees, human beings, etc. Later, the images with Greyscale conversion are obtained without any additional objects apart from vehicles which are referred to as foreground masking. Now, the contours are obtained by edge detection using draw contours() which obtains the features of the vehicles and outputs the count of moving vehicles thereby reducing the human effort.

The proposed model has several benefits such as,

*A.* Computer vision-based techniques are more appropriate such that they are more adaptable for systems as they do not disturb traffic flow and can be modified easily
*B.* The proposed system is inexpensive, portable, and efficient for detecting and tracking moving vehicles.
*C.* It reduces the human effort and thereby increases performance in tracking.

## V. APPROACH

In this paper, the following approach is followed in a step by step procedure in order to detect, track and count the vehicles,

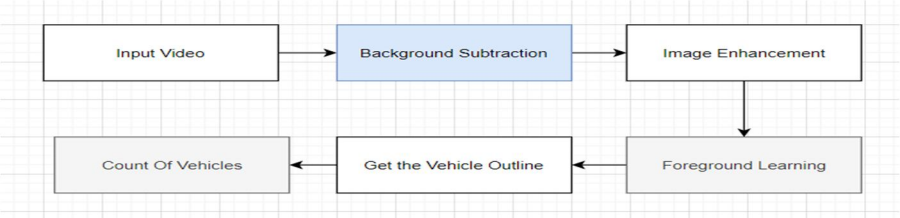


Fig. 1 Approach

### A. *Input Video*

A video of .avi format is given as input that is taken from the surveillance camera.

### B. *Background Subtraction*

As the name suggests, it differentiates the background from foreground . Furthermore, as the current system works on a video feed, frames are extracted in order to distinguish from the foreground objects from background. All the static objects are considered as background moving objects are considered as the foreground from the captured video. To implement the background subtraction using this methodology several image processing algorithms are used .

### C. *Image Enhancement*

This module consists of two major steps, image enhancement and foreground extraction/learning. Foreground objects are made visible by using the background subtraction technique. This is carried out by setting the steady pixels of steady objects to binary 0. Once after the background subtraction is done, in order to obtain the contours of foreground objects, image amplification techniques like noise filtering, morphological dilation, etc are used. The result obtained from this the foreground.

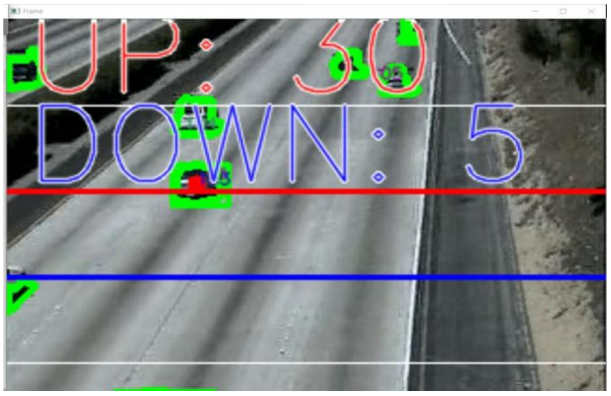


Fig. 2 Vehicle Contours

### D. *Classification*

The third stage in the proposed system is classification. Appropriate contours are obtained after applying the foreground extraction method. Attributes such as centroid, aspect ratio, area, size, and solidity are drawn out which and are used for classifying the vehicles.

### E. *Vehicle Count*

This stage gives the count of vehicles that are moving in both the directions I.e up and down and thereby reduces the human effort and increases efficiency.

## VI. RESULTS

Once all the pre-processing is done on the input video and the proper contours are obtained, then the count of vehicles along with the date and time is shown.

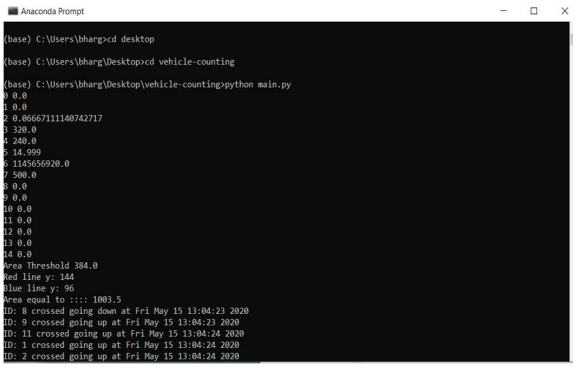


Fig. 3 Vehicle Count -1

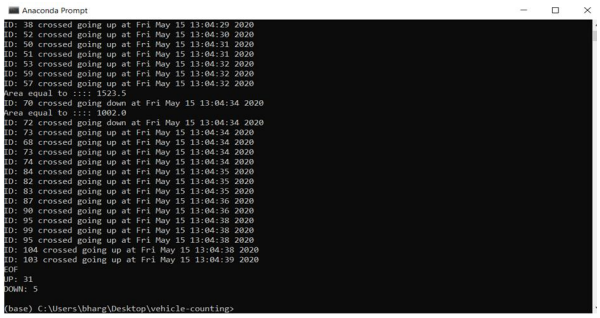


Fig. 4 Vehicle Count-2

The above screens represent the output of the proposed system that provides date and time in addition to the count of vehicles.

## VII. CONCLUSION

The solution acquired is applied to python, with the use of Open CV techniques. The traffic camera footage's from a diversified range of assets is in implementation. An interface is developed so that the user can select the region of interest that needs to be examined in order to calculate vehicle count. Using this method of computer vision will reduce the human effort involved as well as the cost that is incurred in maintaining a large workforce for traffic control. By this, we can easily know about the ongoing traffic from time to time in various regions which turn will provide a better solution for reducing traffic and maintaining ecological balance and take the edge off pollution in various regions.

### *A. Future Scope*

*1)* The extraction of contours and to obtain features for classification of vehicles can be done with the usage of SIFT characteristics, due to the system's inability to detect vehicles during night times.

*2)* Artificial intelligence operations and sophisticated image segmentation methods can be used to improve accuracy.

*3)* To provide an output based on the feed taken from a live camera for better results.

## VIII. ACKNOWLEDGMENT

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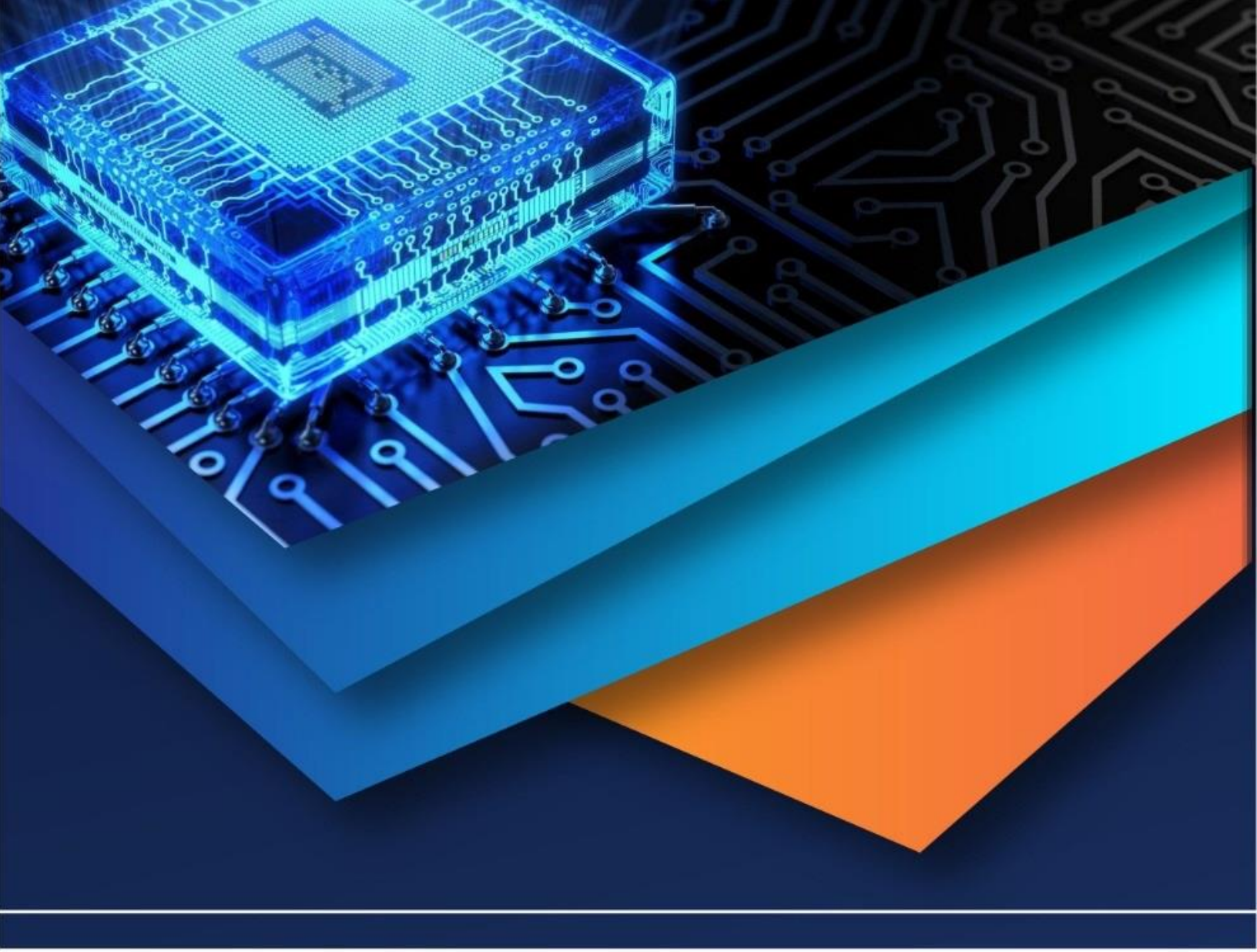

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