Novel Vision Based Traffic Violation Detection

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***Abstract*— One of the prime concern in all developing countries is traffic rule violation. The rapid increase of vehicle increase with the exponential increase in number of traffic rule violation. In spite it leads to the increase rate of accidents on road caused due to the rule violation such as breaking traffic, over speeding, driving on wrong sides etc. It is a tedious compromising task to manage and control such violation. Although all this system have been automated, in this paper. We implement a real-time vehicular traffic violation detection system. Indeed the proposed system comprises of a detection algorithm which identify various violation on road as well as on parking lots. The real-time analysis is achieved by implementing an image processing techniques. In this experiment both real and synthetic data is applied, also the experimental results demonstrate the performance of the proposed system with high efficiency in detection of violation on real -time with traffic monitoring stream.**

***Keywords*— —MATLAB, Image Processing, Traffic Rule Violation, Number Plate Detection.**

I. INTRODUCTION

In the 20th century, Automobiles is an evolution which indeed created a drastic transformation to every life in and around the globe. Initially, it started with the production of a few hundred automobiles per year but then it got extended over 50 million units which is consumed annually. In spite of this rapid increase of automobiles leads to increases in the rate of an accident with mortality and serious injuries. It has become a prime concern of priority to the government of India to enhance transport policy in order to achieve road safety. According to the survey, the accidents happening on the road is estimated around 3,00,000 every year. Also, these accidents create a huge cost of living and an impact on our economy. Based on the survey, it has been stated that over 80,000 people are killed on Indian roads while the economic loss owing to road accident estimated is over Rs 3,600 cores. Traffic-related problems have been exploded in global dimension creating a vital impact on the surroundings. The tremendous increase in the number of vehicles subject to traffic problems. Also monitoring, controlling and managing is not viable in practice yet it can be stabilized with a technology based intelligent system which can detect the vehicle on road, count, and since their presence in the restricted area. Eventually, it manages the traffic event and seeks the attention of the authorities in need. It is an essential need to detect and monitor traffic events to prevent traffic violation. Indeed, this can be achieved through a well-automated traffic detection system, which helps in maintenance of record as the main objective to record, build, train and test the traffic working with real-time videos. The automated traffic monitoring system comprises of various monitoring stages such as foreground estimation, object detection, object tracking and object recognition. In this, no system currently in practice include all the above-mentioned functionalities within one system nor functional. These systems are generally based on commercial and proprietary. Also, there are various literatures which indeed prove the above stated.

The remainder of this paper is organized as follows: Section II describes the literature review. Section III presents the proposed methodology in detail. Section IV introduces the experimental results. Section V concludes the paper.

II. LITERATURE REVIEW

Vehicle surveillance systems undergo various difficulties in urban such as road sections and intersection in which dense traffic, vehicle occlusion, pose and orientation variation and camera placement highly affect their performance. A vision-based vehicle detection and tracking systems for intersection monitoring Presented [1].In this, a real-time omnidirectional-vision based vehicle detection and tracking system, flexible to intersections geometries and easily reconfigurable, less delay at the

intersection due to more efficient. Also, it enhances ease of driving as the vehicle movement path is more clearly defined, Reduction in the number of traffic accidents as the movement of conflicting flows is more controlled. A technique based on multiple reference lines and variation of pixel values to effectively count vehicles, measure the speed of vehicles and identify the speed limit violating vehicles in the given traffic video is presented [2]. They use the concept of multiple reference lines for identifying vehicles. Using the total duration of frames the vehicle took to cross the reference lines they determine the speed and hence the possibility of a traffic violation. The system has an accuracy of 98.96% for vehicle count detection and an accuracy of 98.14% for speed violation detection. Image processing based intelligent traffic controlling and monitoring system using Arduino [3].These systems are capable of informing drivers about the traffic conditions and possible hazards of the roadway with the help of an intelligent transportation system. It is based on Internet concepts of Things- an approach that solve problems raised by traffic congestion this gives a solution to raising traffic-related pollution. This architecture is composed of two modules i.e., hardware module and software module. The system utilizes new technologies for real-time collection, organization and transmission which provide the information to estimate the accurate traffic density exploited by traffic-aware applications.

III. PROPOSED METHODOLOGY

In our traffic violation detection system an important steps are there. All the steps perform a peculiar process and it saves the way to the next process. Its block diagram is displayed in Fig.1.

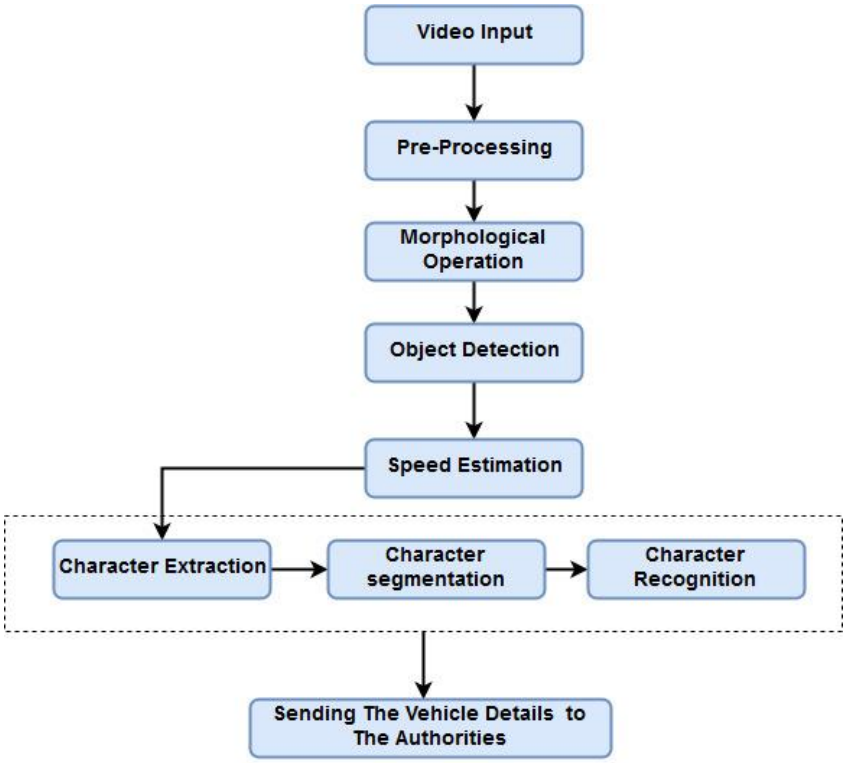

Fig 1.Architecture of the proposed model

A. Video Input and Pre-processing

Using web camera there is captured from traffic location. Moreover for speed detection it is captured from high ways also. Video data is first converted into frames. All frames are pre-processed individually. In our method pre-processing is used to remove bold shadow. Otherwise this shadow may reduce the accuracy of the system. First we pre-process using brightness and contrast adjustment. The following denotes it.

$$g(i,j) = \alpha f(i,j) + \beta$$

In this, F(i,j) denotes fixed intensity. α denotes default parameter and β denotes default bias parameter.

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B. Morphological Operation and Object Detection

In our proposed method morphological operation is used to restore parts lost during the shadow removal. There are two important steps in morphological operation [4][5]. First morphological erosion, this erosion is used to remove the unnecessary parts. Secondly, dilation, it used to restore the pixels wrongly erased. This is done by the process of opening and closing. In this

paper object detection is used to detect the object of the binary image. When an object is detected we generate a green color browsing box. This is an important aspect of our project.

C. Vehicle Count Detection and Speed Estimation

In our proposed method two lines are drawn in the image frame. We consider one as the starting point and other ending point. When a car is passing through the road color value and pixel value get changed. Based on this change a moving object is identified. From the time taken for this moving object to move from the starting point to the ending point the speed is predicted. First we identify the frame number where the vehicle was. Secondly, the time taken for the moving object to reach the second line is calculated. From the time taken by the object to reach the second line from the first line the speed is calculated. The speed denotes the speed of the vehicle. It is measured in Km/hour. We set a threshold value for the speed. It is 60km/hr. below 60 is taken as normal above 60 as over speed. When speed of a vehicle exceeds the threshold value the number plate of the vehicle is extracted. This number plate extraction is given in the next section in detail. Fig 2 show the image of speed estimation.

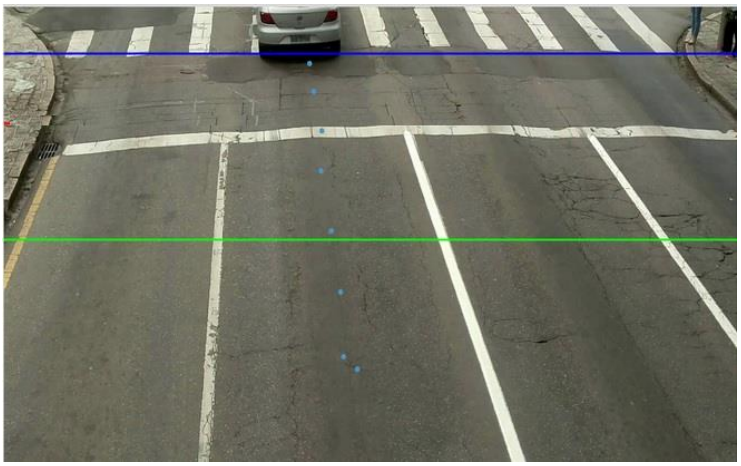

Fig 2 Speed estimation window

D. Number plate localization and segmentation

This is a very challenging part in our proposed work. Edge histogram [6][7] technique is used to localize the number plate. This edge histogram identifies the exact number plate location. First horizontal white region is considered as the number plate. In this case there are probabilities to consider several white regions. For vertical edge processing the same method is used. Next it localizes the number plate using the color features. In this project the proposed system is trained using different colour of number plates.

E. Character segmentation and recognition

In this process, the character is segmented from the extracted number plate. BW label is used to label the connected components as a binary image. Its function is ImCrop. It is used to separate regions of labelling components. Now we obtain the segmented character. Using image Resize function we change all the segmented images into the same size. Recognition part is used to create, load and read a segmented part. Using ImRead function A to Z character and 0 to 9 numbers are read. Comparing the read object with the already trained characters, this character is recognized. Thus the number plate of the car that violated traffic regulation is identified and regulated. Fig 3 shows the number plate character segmentation. The details of the vehicle identified in the traffic violation are sent to traffic regulation room using GSM modem.

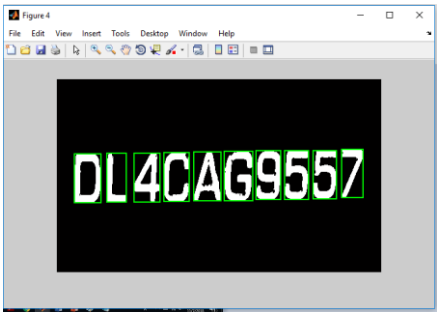

Fig 4 Segmentation.

IV. PERFORMANCE EVALUATION

To evaluate the performance of proposed traffice violation detection system, we used Window 10 (64-bit), i5 Processor, 370 M Processor, 2.40 GHz of speed with memory of 4 GB. Matlab is used for develop our proposed system. To evaluate the proposed image processing method several experiments are conducted. Overall, the results show that the proposed traffice violation detection system performed well. Table1 shows the accuracy of various methods. Fig4 shows the performance chart. It shows that proposed methods perform well than the existing methods.

Table 1 Performance comparison

Method	Accuracy	Sensitivity	Specificity
Proposed Method	91.7	92.1	91.7
[1]	83.4	84.2	85.1
[2]	85.6	83.1	84.5
[3]	87.8	85.3	85.1

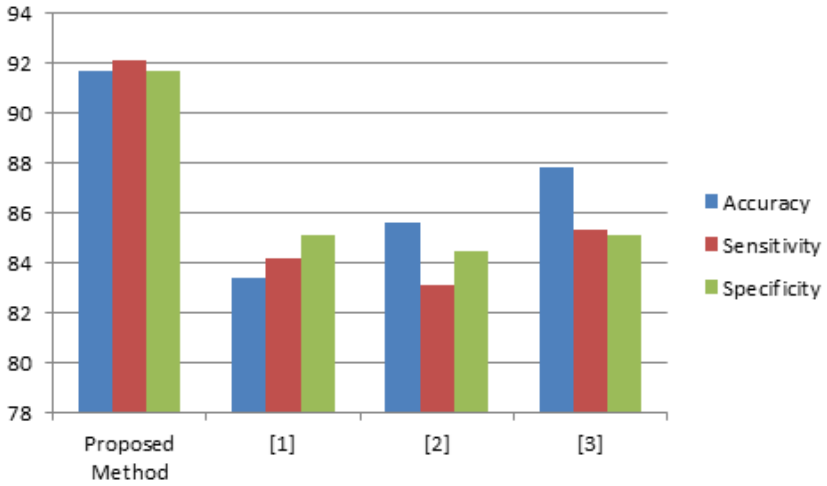

Fig 4 Performance comparison chart

V. CONCLUSIONS

As we have discussed about various problems faced by traffic police to maintain the all the vehicles traffic rules, easier solution for the same. Traffic violation detection is one of many important parts of Intelligent Traffic System (ITS) in our proposed work we have developed traffic violation detection and management frame work successfully by using image processing technique. It mainly monitors the over speed of the vehicle. The experiment results show the module what we have developed is able to justify 90% of the purpose.

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