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Automated Detection of Registration Number along with Classification and Tracking of Vehicles via Traffic Surveillance Videos using MATLAB

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Abstract — Vehicle Identification and classification plays a vital role in Electronic Toll Collection (ETC). The reason behind any method to incorporate into the system of ETC is to reduce the time at toll plazas and to improve the safety. In this paper we present a framework to estimate four major stages i.e., vehicle detection, tracking, classification and number plate identification. Detection and tracking of vehicles is done using optical flow and blob analysis method and classification of vehicles is by using the shape based features. Some morphological operations are used to remove the shadow noise and to detect the moving object correctly. After vehicle tracking, we consider two parameters such as aspect ratio and compactness are used to classify and count the vehicles. For detection of number plate we are incorporating Automatic Number Plate Recognition (ANPR). ANPR is an image processing technology which identifies the vehicle from its number plate automatically by digital pictures. Real time number plate recognition plays an important role in maintaining law enforcement and maintaining traffic rules. It has wide applications areas such as toll plaza, parking area, highly security areas, border areas.

Keywords— Vehicle Tracking, Vehicle Classification, Aspect Ratio, ETC, ANPR.

I. INTRODUCTION

Today Security is given very much importance and lot of electronic equipment is being used in security applications. Monitoring continuously the movements of persons or vehicles and reporting when predefined events take place is very common security applications. A human observation based system for implementing this has several disadvantages. In the olden days persons use to be employed for doing such observations. Decades before electronic cameras could solve the problem of man being physically present at such place. Instead man has to observe the camera's output on a TV and can detect when any expected events occur. The present day technology allows automatic detection based on predefined measures. In this foreground detection based moving object detection and vehicle tracking algorithm is implemented targeting a wide class of applications. Real time detection of the moving objects in image sequences is a fundamental step in many vision based systems including automated visual surveillance. We have proposed a framework in detecting some important but unknown knowledge like vehicle identification and vehicle flow count.

The rest of the paper is organized as follows: Section 2 gives a review of related works. Section 3 and Section 4 details the studied problem and overview of proposed method. Section 5 gives brief description about the methods used in this paper for vehicle detection and region based vehicle tracking. Section 6 deals with vehicle classification and counting. Section 7 gives brief description about number plate recognition. Section 8 discusses about experimental results and conclusions are presented in section 9.

II. RELATED WORK

There exists an extensive literature work in areas of vehicle detection and tracking, but only a few approaches have combined detection and tracking with classification and number plate recognition in a single framework. [1] has proposed tracking and classification of vehicles using shape based features. [2] has introduced hidden markov model (HMM) to vehicle identification during tracking. The use of temporal motion coherence of features enhanced the identification and tracking of vehicles. Based on background registration technique [3] has presented the paper to detect the moving objects. An approach that uses parameterized 3D model is proposed in [4]. In [5] they have presented a traffic-monitoring approach for vehicle tracking based on image processing and rule-based reasoning. Paper [6] presents an automatic traffic surveillance system to estimate important traffic parameters from video sequences using only one camera. Paper [7] present a novel tracking method for effectively tracking objects in structured environments. The tracking method that uses Gaussian mixture model and optical flow approach for object tracking has been implemented in [8]. Object tracking in video pictures based on pattern matching is proposed in [9]. Vehicle number plate recognition using sobel operator is proposed in [10].

III. PROBLEM DEFINITION

Existing method of traffic monitoring involves traffic count and classify the vehicle is done manually by employing

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number persons. Traffic monitoring is also done by installing cameras at various places. Several other vehicle detectors such as loop, infrared, ultrasonic, and microwave detectors are also existing but costly and require maintenances.

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- Traffic monitoring is also done by installing cameras at various places.
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IV. Overview of Proposed Method

In this paper, we propose a new traffic surveillance system for detecting, tracking, and classifying vehicles from different video sequences. Fig 4.1 shows the overview of this proposed system. In the proposed system, different vehicles are first extracted through frame difference method.. After vehicle detection, a region-based vehicle tracking method is used for building the correspondence between vehicles detected at different time instants. After vehicle tracking the two parameters, such as aspect ratio and compactness are used to classify and count the vehicles.

V. Vehicle Detection and Region Based Vehicle Tracking

The Flow chart for proposed vehicle detection and tracking is shown below:

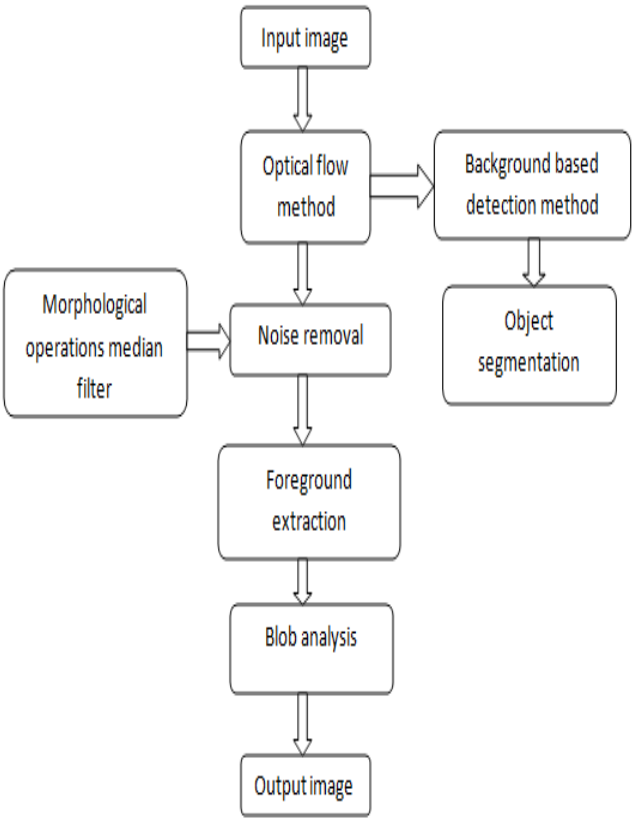

Figure 5.1 : block diagram for vehicle detection and tracking

Algorithm

Detection algorithm

Step1 - intialising the video.
Step 2 - reading of frames from the video sequence.
Step 3 - creating objects for drawing the bounding boxes and motion vectors
Step 4 - threshold the image and then filter it to remove speckle noise.
Step 5 – creating filter object for removing speckle noise introduced during segmentation.

Tracking algorithm

Step 1 - create a blob analysis system object to segment vehicle in the video.
Step 2 - create system objects to display the original video, motion vectored video, the threshold video and the final result.

VI. Vehicle Classification and Counting

After vehicle tracking, we consider aspect ratio for classifying and by the use of bounding box to count the vehicles. In the proposed system, the detected vehicle regions will be classified as car and truck or bus. The parameter aspect ratio is defined as follows:

Aspect ratio: The aspect ratio is defined as the ratio of rows and columns of the region with respect to the pixel value of image.

Currently we are classifying vehicles into two categories:

1. Car
2. Bus

Classification is done based on the threshold *T*. Because the pixel values of bus is larger than car, it will have larger aspect ratio. Accordingly, the detected vehicle with aspect ratio smaller than a threshold *T* is firstly labeled as car. The region with aspect ratio larger than a threshold *T* is classified as the bus. The classification rule of a detected vehicle is expressed as:

$$\text{Car if } AR < T$$
$$\text{Bus if } AR \geq T$$

VII. Number Plate Recognition

Algorithm

Step 1 - getting the input image from the frame sequence.
Step 2 - pre-processing is done by converting input image to gray scale and binarization.
Step 3 - extract the region containing the license plate.
Step 4 - Visualize the MSER regions overlaid on the original image.
Step 5 - convert the MSER pixel lists to binary mask.
Step 6 - find intersection between edges and MSER regions.
Step 7 - use canny edge detector to further segment the text
Step 8 - run the edge detector.
Step 9 - number plate extraction step final result is founded: license plate number recogn

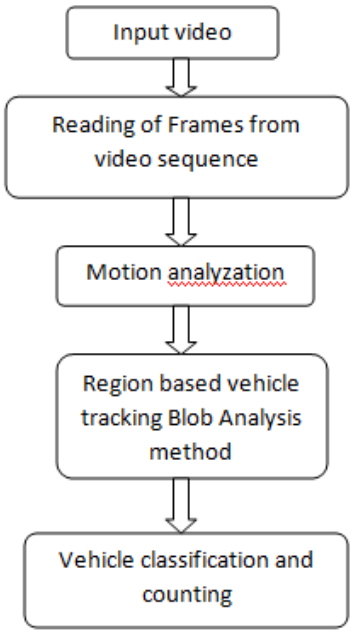

Figure 7.1: Block Diagram of number plate recognition

VIII. EXPERIMENTAL RESULTS

In this section, we show experimental results of the proposed vehicle tracking method with extracted number plate. The proposed algorithm is implemented in MATLAB 12.

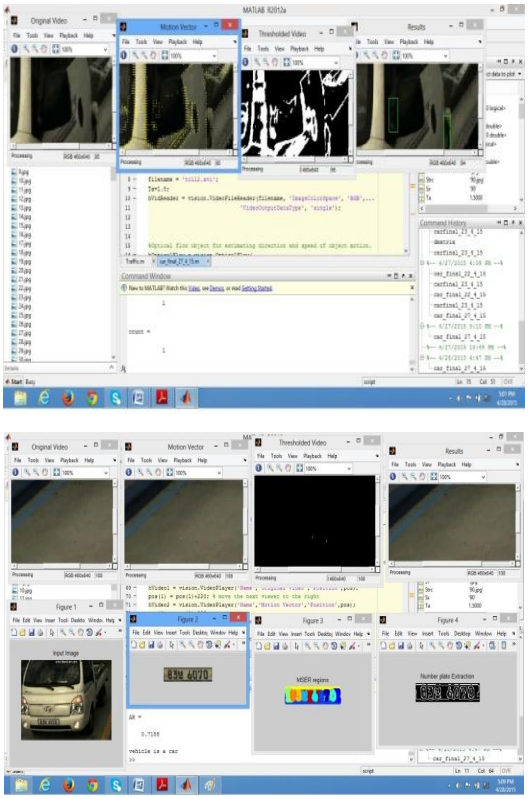

Figure 8.2: number plate extraction along with classification of vehicle is shown

The object video sequences come from standard camera, the size of the video sequences is 460×640 pixels. Figure 8.1 shows the tracking of vehicle with original video, motion vector,thresholded video ,final result and count of vehicle. Figure 8.2 shows the number plate extraction along with classification of vehicle.

IX. CONCLUSION

In this paper, we proposed the Optical Flow method successfully applied in a continuous video. We used the blob analysis approach for tracking, with morphological and median filtering to remove noise. On the other hand, classification of vehicles was done using aspect ratio and along with that number plate was extracted using edge detection. The best algorithms in the future still need more testing to be able to get the perfect result.

REFERENCES

[1] Ravi Kumar Kota and T.Chandra Sekhar Rao, "Analysis of classification and tracking in vehicles using shape based features", in international journal of innovative research and development ISSN:2278-0211, Vol 2 Issue 8, pp.279-286, (august 2013).

[2] Amirali Jazayeri, Hongyuan Cai, Jiang Yu Zheng and Mihran Tuceryan, "Vehicle detection and tracking in car video based on motion model" in IEEE Transactions on Intelligent Transportation Systems, Vol 12, No. 2, pp. 583-595, (June 2011).

[3] L.Vibha, M.Venkatesha, Prasanth G Rao, N.Suhas, P.Deepa Shenoy, K.R.Venugopal and L.M.Patnaik, "Moving Vehicle Identification using Background Registration Technique for Traffic Surveilllance" in Proceedings of the International Multiconference of Engineers and Computer Scientists IMECS, 19-21 march, Hong Kong,Vol 1,(march 2008).

[4] Surendra Gupte, Osama Masoud, Robert F. K. Martin, and Nikolaos P. Papanikolopoulos, "Detection and Classification of Vehicles" in IEEE Transactions on Intelligent Transportation Systems, Vol 3, No.1, pp.37-47, (March 2002).

[5] Rita Cucchiara, Massimo Piccardi, and Paola Mello, "Image Analysis and Rule based reasoning for a traffic monitoring system" in IEEE Transactions on Intelligent Transportation Systems, Vol 1, No.2, pp. 119-130, (June 2000).

[6] JunWei Hsieh, Shih-Hao Yu, Yung-Sheng Chen and Wen-Fong Hu, "An automatic traffic surveillance system for vehicle tracking and classification", in IEEE Transactions on Intelligent Transportation Systems, Vol. 7, No. 2, pp.175-187, (2006).

[7] Junda Zhu, Yuanwei Lao and Yuan F. Zheng, "Object Tracking in Structured Environments for Video Surveillance Applications" in IEEE Transactions on circuits and systems for video technology, Vol. 20, No. 2, pp.223-235, (February 2010).

[8] Abhishek Kumar Chauhan and Prashant Krishan, "Moving Object Tracking using Gaussian Mixture Model and Optical Flow", in International Journal of Advanced Research in Computer Science and Software Engineering, ISSN: 2277 128X, pp.243-246, Vol 3,Issue 4, (April 2013).