



COMPUTER VISION BASED VEHICLES DETECTION AND TRAFFIC CONTROL FOR FOUR WAY ROAD

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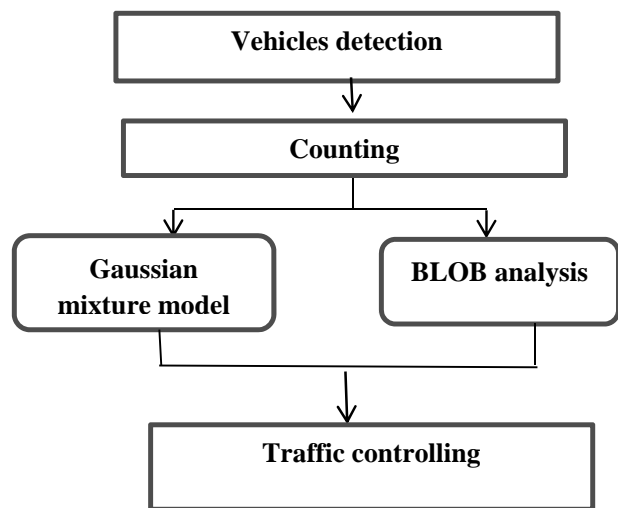
Abstract—Computer vision is a tool which automatically extracts, analyze the images from video data or from 3-D images. In this road traffic images are considered. First vehicles are detected using background subtraction method. Vehicles detection is nothing but separate the moving vehicles from road. After vehicles detection counting is important for the controlling the traffic. Counting of vehicles is done using GMM and BLOB analysis method. These two method counts the vehicles on one of the each road. After the counting of vehicles controlling is important. The road which having large numbers of traffic, more time is given to that road.

Keywords: Computer vision, background subtraction, Gaussian mixture model, BLOB analysis, Traffic controlling.

I. INTRODUCTION

Now a day there is the problem of traffic congestion. Vehicles are increased day by day. So traffic controlling is the big issue. To minimize the traffic congestion traffic controlling is the important part. For traffic controlling, the system is proposed which detect the vehicles, count the number of vehicles on each road and control the traffic. There is a four way traffic road is considered. Suppose the road A having more traffic than the road B,C,D the

time period of the traffic signal is more for road A as compared to the other roads. Number of counted vehicles is displayed using MATLAB. Traffic Process flow is shown below:



In this system first vehicles are detected using background subtraction method. Then counting of vehicles is done using Gaussian mixture model (GMM). The Gaussian mixture model is the type of segmentation. And BLOB analysis method produces the bounding boxes around he vehicles. After the counting of vehicles on each road controlling is done.

II. LITERATURE REVIEW

For detection of vehicles three methods is implemented .i.e. 1) Optical flow method 2) Frame differing method 3) Background

subtraction method. Out of all these methods background subtraction method is most widely used because it gives better output than the optical flow method and frame differencing method.

1) Optical flow method: It causes the motion of the vector characteristics which changes with time and detects the image in the video [3].It evaluated the good performance under the moving cameras, complexity is more, and more calculations are needed. It doesn't produce better output for the traffic control system.

2) Frame differencing method: It is nearly similar to the background subtraction method. In this pixel by pixel subtraction is done. Current frame pixel values are subtracted from previous frame pixel values. If the obtain pixel value is greater than given pixel value then it is considered as a foreground and rest of the part is background. This method is easy to implement.

Less calculation is needed. It is generally fails in detecting relevant pixel information from some types of moving objects [1]. For complex system it can't recognize the object properly.

3) Background subtraction method: This is a most relevant method used for subtracting moving object from static images. The basic of this method is it initiates the background first and subtracts the current frame from background frame.

III. PRAPOSED WORK

A. OBJECT DETECTION USING BACKGROUND SUBTRACTION METHOD

Background subtraction method is the type of the segmentation.it separate out he foreground images and background images. In this system foreground is vehicles and background is road.it produces the very correct output than other two methods. For background subtraction method algorithm is implemented.

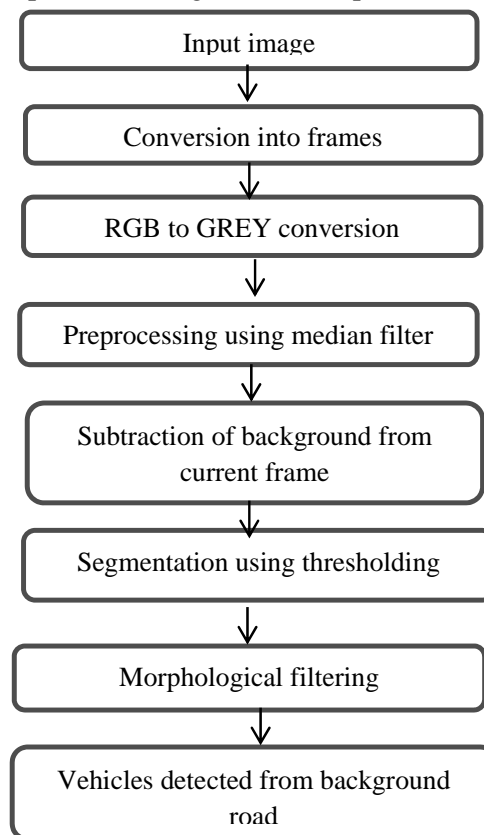


Fig2: Background subtraction algorithm

1) Conversion into frames: In this first image is taken as an input i.e. vehicles as a input. Vehicles are then converted into frames. Frames value is different for the different images.

2) RGB to GREY conversion: The input image is color image we have to convert it into grey scale image. After the conversion of video into frames, color image is converted into black and white scale.

3) Preprocessing using median filter: Preprocessing process used to reduce the noise in each frame. Preprocessing is done using various filters such as median, mean, and convolution filter. In this system median filter is used. The mask of the filter will multiply with frame and noise will get removed so it produces accurate result [1].

4) Background frame initialization: Background frame initialization is essential part in this algorithm. In this first frame or the average of the brightness of the frames is considered as a background frame and other frames are foreground.

5) Subtraction of background from current frame: once the background frame is initialized subtraction is done pixel by pixel i.e. current frame is subtracted from the background frame.

$$|f(x,y)-B(x,y)|>T_h \quad (1)$$

$f(x, y)$ is the foreground pixel frames. $B(x, y)$ is the background pixel frames. T_h is the threshold level value.

5) Segmentation using thresholding: In this thresholding value is practically set. If the value is greater than threshold value then it is considered as a background image and of it is less than threshold value it is considered as a foreground image. Processing is done pixel by pixel. In image processing black color is represented by binary 1 and white color is represented by binary 0. So segmentation using thresholding gives the moving vehicles in white

and static road black color. In this way detection is done.

6) Morphological filtering: It is used for reducing the noise in detected images. A morphological operation gives the better edges to the moving vehicles and produces the better output. In this various operations are performed like closing, erosion, dilation, opening etc. operations are done pixel by pixels.

7) Object is detected from background image: Using the entire steps objects is detected accurately and properly from the background image i.e. vehicles are detected accurately from the roads.

This algorithm is nothing but the background subtraction algorithm. Using this algorithm vehicles are detected each of the four way road.

B. COUNTING OF VEHICLES

Counting of vehicles is important for the traffic control system. Counting is done for each of the four way road. For counting of the vehicles Gaussian mixture model (GMM) and BLOB analysis are used.

1. Gaussian mixture model

Gaussian mixture model (GMM) is important part counting of vehicles. It is important for the segmentation purpose. It is applied on the original image. It provides the expectation stuffer presented an adaptive Gaussian mixture model by a mixture of K Gaussian distributions. Gaussian mixture model (GMM) evaluated the pixel values from reference pixel mean and variance. It is evaluated for each pixel and updated with each new frame value. At the every new frame some of the Gaussians approximately equal to the current value. For these frames mean and variance is updated. Single Gaussian causes the multimodal behavior of Gaussian mixture model. Some parameters of Gaussian mixture model are implemented such that number of Gaussians, number of training frames, learning rate, variance, subtraction ratio, minimum

variance, maximum variance etc. using these entire parameters Gaussian mixture model is applied to the original image. This Gaussian mixture model is applied on the four way traffic road. After the segmentation morphological filtering is used to reduce the noise. In morphological filtering closing operation is performed.

2. BLOB analysis

BLOB analysis is nothing but the collection of the connected pixels. BLOB analysis is used for the various applications such that counting of vehicles on traffic road, counting of people in crowded area, robot vision system etc. It produces the statistical characteristics of crowded area. It is most widely used to find out the statistical information such that size, area, location etc. BLOB analysis is very power full method which reduces the execution time and gives the better output and also improves the efficiency.

In the BLOB analysis some parameters are implemented such that bounding box, output area, and minimum blob area etc. it is also applied on the four way traffic road.it produces the bounding boxes to the vehicles and output is displayed in MATLAB.

C. CONTROLLING OF VEHICLES

Controlling of the vehicles is most important and main part in this project. In the controlling of vehicles four way traffic road is considered. Counting of vehicles gives a number of counts on each road according to that counting of vehicles controlling is done. In this one of the road having the maximum count of vehicles. The roads which have the maximum traffic, to that road provides the maximum time period. In this way traffic controlling is done.

IV. RESULTS



Fig3: Four way traffic roads





Fig 4: Moving vehicles detection using background subtraction method

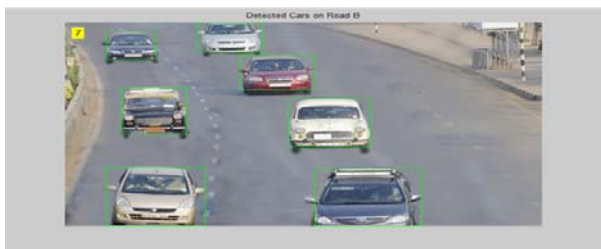
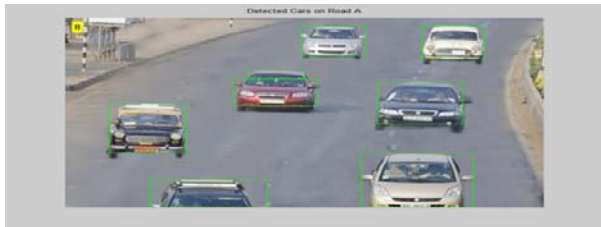


Fig5: Vehicles counting on each of the four way road



Fig6: Time period of each road according to counting

V. CONCLUSION

From all these results we conclude that, background subtraction method gives us better and accurate result for moving vehicles detection. It also evaluated the better segmentation for moving vehicles and produces good output within a microseconds. After the vehicles detection counting is accurately done using the Gaussian mixture model and BLOB analysis method. BLOB analysis produces the accurate bounding boxes to each of the vehicles on four way traffic road. After the counting of vehicles controlling of the traffic is also done. The road which having more traffic gives the first preference to that road. By maximizing or minimizing the time period of that particular road we control the traffic very accurately. This is the real time system.

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