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Motion Object Detection Using BGS Technique

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Abstract --- The detection of moving object is an important in many applications such as a vehicle identification in a traffic monitoring system,human detection in a crime branch.In this paper we identify a vehicle in a video sequence.This paper briefly explain the detection of moving vehicle in a video.We introduce a new algorithm BGS for idntifying vehicle in a video sequence. First, we differentiate the foreground from background in frames by learning the background. Then, the image is divided into many small nonoverlapped frames. The candidates of the vehicle part can be found from the frames if there is some change in gray level between the current image and the background. The extracted background subtraction method is used in subsequent analysis to detect a vehicle and classify moving vehicle.

Keywords : Background Subtraction,Optical Flow,Temporal Difference.

I. INTRODUCTION

Now a days the growth of vehicle in a road has necessary thing.Identification of moving vehicle in a video plays an important role in many applications such as traffic monitoring system,accident detection,reduce congestion and finding ambulance vehicle.The first step of finding the moving vehicle is to take a video sequence.For that purpose we fix a camera on a signal.It take a sequence of video.Videos are sequence of images.Each image is called a frame.An image is divided into two parts.First one is the background image and another is a foreground.We planned a method BGS to finding the foreground of an image.

The paper is organized as follows:Section II describes in brief motion detection architecture and its approaches.Section III covers the object detection methods.Section IV Describes comparative study of object recognition methods. Section V introduces a BGS Method.Section VI explain the proposed work.In Section VII Decribes experimental results. Finally, we conclude with a discussion in Section VIII.

II. OBJECT DETECTION

Object identification is performed to existence of items in video and to accurately locate that object. Most visual surveillance systems start with movement identification. Movement recognition aims at segmenting regions corresponding to moving objects from the rest of an image. Object detection is to establish a relationship between objects or object parts in successive frames and to extract sequential information about objects such as path, posture, speed and direction. The detection of moving object's area of adjust in the same image sequence which captured at different intervals in a video[5]. In reality, road traffic can be broadly classified into two categories, identical and varied. Detected objects frame by frame in video is a important and difficult task. It is a crucial part of monitoring systems since without object track, the system could not take out interrelated sequential information about objects and higher level performance analysis steps would not be possible. Moving object detection is the first step in video analysis. It can be used in many regions such as traffic monitoring and face tracking.

III. OBJECT DETECTION METHODS

Object Detection

- Temporal Differencing
- Frame Differencing
- Optical Flow
- Background Subtraction

Temporal Difference Method

Temporal Differencing is based on frame differentiation which attempts to detect moving regions by making use of the difference of continuous frames (two or three) in a video series. This method is highly adaptive to fixed background. So, the temporal difference is a simple method for detecting moving objects in a fixed background. But if the environment is not static, the temporal difference method will very sensitive to any movement and is difficult to differentiate the accurate and false movement. So the temporal difference method can only be used to detect the possible object moving area which is for the optical flow calculation to detect real object movement.[3] . It has high flexibility with active changes. Temporal differencing technique utilize the pixel-wise variation between two or three successive frames in a video imagery to take out moving regions from the background [2]. It has high flexibility with active scene changes although it cannot mine all related pixels of a foreground image mostly when the object moves slowly or has consistent surface [3, 4].When a foreground object is not moving, temporal differencing method cannot detect a change between successive frames and it lose the detection of item.

Frame Differencing

Frame differencing is a pixel-wise differencing between two or three consecutive frames in an image sequence to detect regions corresponding to moving object such as human and vehicles. The threshold function determines change and it depends on the speed of object motion. If the speed of the object changes much, then it's difficult to maintain the quality of movementation. The inter-frame differencing approach detect parts of moving objects by compare two consecutive frames. But, it can identify only differences in the background environment and, for that reason,it detects only parts of a vehicle covering the background in the previous frame. Despite some enhancing techniques this approach cannot acceptably deal with reasonable traffic conditions where vehicles might stay still for a long time.[1].

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Optical Flow

In this method ,the pattern of clear motion of objects, surface and boundaries in a video caused by the relative motion between an viewer and the scence.To detect moving regions in an image, optical flow [5] uses flow vectors of the moving objects over time. It is used for motion-based segmentation and tracking applications. It is a dense field of dislocation vectors which defines the change of each pixel area. Optical flow is best suited in occurrence of camera movement, but however most flow calculation methods are computationally very complex and responsive to noise.

IV. COMPARATIVE ANALYSIS OF OBJECT DETECTION METHODS

In this section we analyze the previously discussed different vehicle detection algorithms.Table I indicate the evaluation of these techniques on the basis of different advantages and disadvantages.By analyzing these algorithms we concluded that background subtraction method(BGS) is far better than others.BGS method is greater uses rate of detecting vehicles.

V. BGS METHOD

BGS Method

Background elemination is a technique for finding a foreground object from its background. It also known as Foreground Detection. Background elemination method describe the recent image is subtract from a reference background image, which is upgrad during a period of time. It works well only in static cameras. The elemination leaves only non-static or new objects, which include whole dark region of an object. This approach is simple and computationally affordable for real-time systems, but it is very sensitive to active vehicle changes from lightning and irrelevant event etc. Therefore it is highly reliable for good background maintenance model.[6] The problem with background subtraction [8], [9] is to automatically update the background from the input video frame and it should be able to overcome the following problems:

- Movement in the background: Dynamic background regions, such as lanes in a road,leaves and branches of trees, or flowing water, should be recognized as part of the environment.
- Illumination changes: The background model should be capable of slow changes in light over a phase of time.
- Memory: The background module should not use much resource, such as computing time and memory.
- Gloom:Gloom cast by moving object should be identified as part of the background and not foreground.
- Mask: Moving object should be detected even if pixel uniqueness are similar to those of the background.
- Bootstrapping: The background model must be maintained even in the lack of instruction foreground object.

VI. PROPOSED WORK

BGS method is a technique for identifying vehicles on a road.In this algorithm a pixel is marked as foreground

$$\text{If } [C_f(x,y) - B_f(x,y)] > T \qquad (1)$$

In this equation where C_f is the current frame,$B_f(x,y)$ is the background frame and T is the predefined threshold value. After the background frame $B_f(x,y)$ is obtained, subtract the background frame $B_f(x,y)$ from the current frame $C_f(x,y)$. If the pixel difference is greater than the set threshold value T, then determines that the pixels occur in the moving vehicle, otherwise, it is consider as the background pixels. The moving vehicle can be detected after applying threshold operation . Its expression is given below:

$D_f(x,y)=1$ if difference is grater than T,Otherwise 0

Where $D_f(x,y)$ is the binary frame of different results,T is dynamic which will be identified depends upon environment changes.Therefore,we add a dynamic threshold ΔT to the vehicle detection BGS method.It is expressed as

$$\Delta T = \lambda * \frac{1}{M * N} \sum_{i=1}^{N} \sum_{j=1}^{M} [C(i,j) - B(i,j)] \qquad (2)$$

In equation 2 ,where M x N is the size of each image, ΔT reflects the overall changes in the environment.

Then,

$D_f(x,y)=1$ if difference is grater than $(T+ \Delta T)$,Otherwise 0

It is effectively eliminate the impact of light changes.

BGS method follows four steps namely caputuring the input as .avi file, perform preprocessing(morphological operations),foreground identifying,vehicle detection. The sematic flow diagram of the proposed method is shown in figure I

Step 1:Caputuring the Input

Read the .avi file using VideorReader.The input video file converted into images to detect vehicle.These images are gathered into frames.Create the frame to each images.This process will be continued for all the frames.

Step 2:Morphalogical Preprocessing

The input image undergoes a series of morphological operations to detect the exact shape of the object.Morphological image processing is a collection of non-linear operations related to the shape or morphology of features in an image. Morphological operations can also be applied to greyscale images. It can be used in pre or post processing (filtering, thinning, and pruning) for getting a representation or description of the shape of objects/regions (boundaries, skeletons convex hulls).

A)Opening

Opening consists of an erosion followed by a dilation and can be used to eliminate all pixels in regions that are too small to contain the structuring element. In other words, foreground structures that are smaller than the structure element will disappear. In figure 3 shows opening image.

B)Reconstruction

Morphological reconstruction to extract marked objects, find bright regions surrounded by dark pixels, detect or remove objects touching the image border, detect or fill in object holes, filter out spurious high or low points, and perform many other operations.In figure 3 shows recontrcted image.

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Step 3:Background Elimination(Foreground Detection)
The background elimination method is used to finding of the motion vehicle in the traffic system.The demonstration has set up for the proposed system in the MATLAB software.Here the current frame is initialized in the code and elimination is done.After elimination the background image,current image and foreground image are show in figure 2.In that figure the background is represented as black where as foreground vehicle is white in color.

Step 4: Moving Vehicle Detected
Finally,moving vehicle is detected from background environment.

VII. EXPERIMENTAL RESULT

Experimental results for moving vehicle detection using the proposed method have been produced for many frames.Here,we implement three different frames that represent number of vehicles for traffic system.In figure 2 represented as a background image for all frames,In figure 3 shows the difference between frame 72 and its background elimination. In figure 4 shows the difference between frame 35 and its background elimination.

VIII. CONCLUSION

In this paper, a moving of vehicle is detected, based on BGS method. We propose consistent BGS method which uses thresholding to detect moving vehicle. This method is successful in real time, and it works well for all frames from our given .avi file.

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Table I Comparative Analysis Of Vehicle Detection Methods

Methods	Background Subtraction	Temporal Difference	Frame Difference	Optical Flow
Accuracy	Fair	Fair	High	Fair
Time	Fair to High	High	Low to Fair	High
Advantage	It need not much of memory	It perform for dynamic backdrop	It perform for static backdrop	It produce motion information
Disadvantage	It does not work multi environment	It can not detect changes into successive frames	It is difficult to maintain if the speed of object changes	It required more calculations
Uses Rate	40%	10%	30%	20%

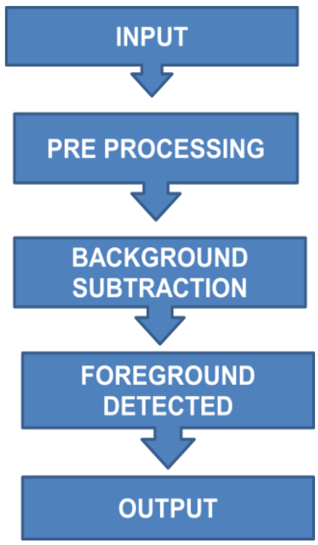

Figure 1 Sematic Flow Diagram of Vehicle Detection

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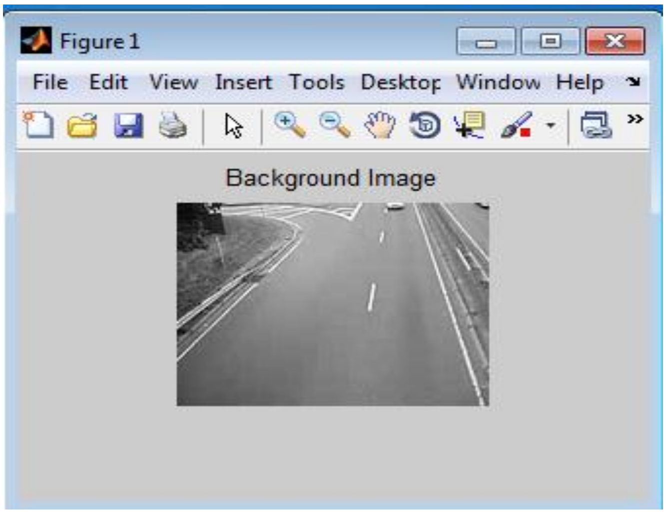

Figure 2 Background Image

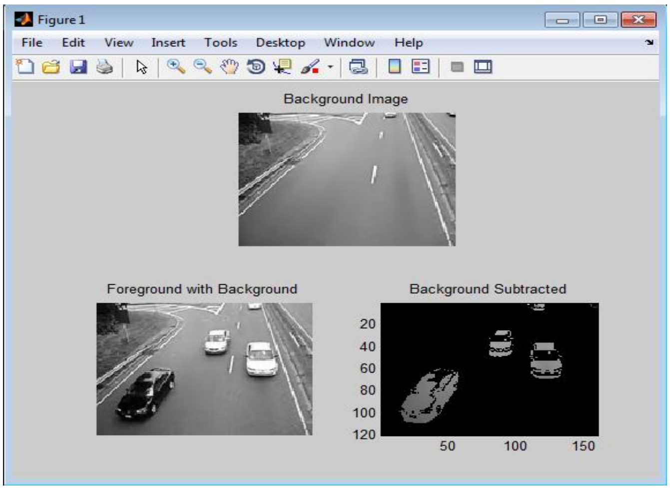

Figure 3:Difference between frame 72 and background subtracted(foreground)

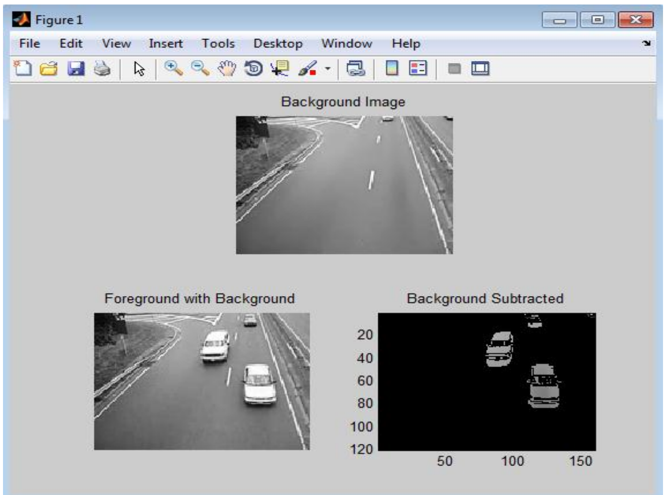

Figure 4:Difference between frame 35 and background subtracted(foreground)

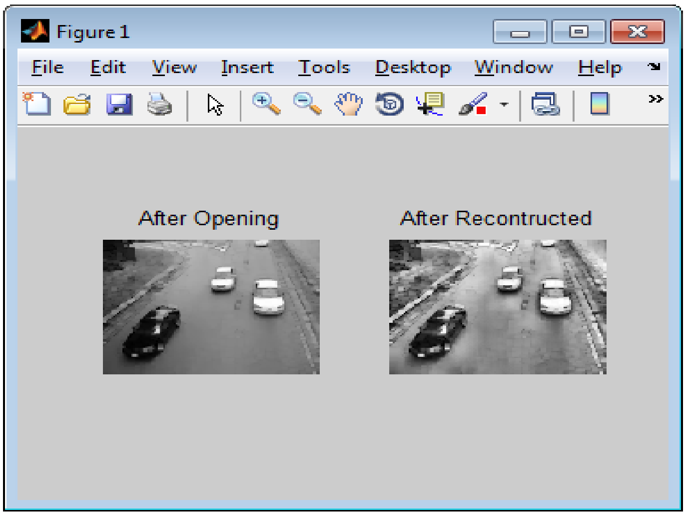

Figure 5 Morphological Preprocessing(Open,Reconstruct)