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Implementation of Moving Vehicle Detection in Video Surveillance for Automatic Traffic Control Monitoring

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Abstract-
Video monitoring has long been in use to monitor security sensitive areas such as banks, department stores, highways, crowded public places and borders. Project background subtraction based moving object detection and vehicle tracking algorithm is implemented targeting a wide class of applications. An AVI file is read and it is decomposed into R,G and B components. Various operations are carried out and the moving objects are detected. Thresholds at various phases are decide the possibility of identifying the moving object of certain sizes. Moving objects also tracked in this project.

***Keywords*—Background, Foreground, Histogram, Gray scale image, Shadow removal, Morphological operations.**

I. INTRODUCTION
Human quest for an automatic detection system of everyday occurrence lead to the necessity of inventing an intelligent surveillance system which will make lives easier as well as enable us to compete with tomorrows technology and on the other hand it pushes us to analyze the challenge of the automated video surveillance scenarios harder in view of the advanced artificial intelligence.

Nowadays, it is seen that surveillance cameras are already prevalent in commercial establishments, with camera output being recorded to tapes that are either rewritten periodically or stored in video archives. To extract the maximum benefit from this recorded digital data, detect any moving object from the scene is needed without engaging any human eye to monitor things all the time. Real-time segmentation of moving regions in image sequences is a fundamental step in many vision systems.

A typical method is background subtraction

Image background and foreground are needed to be separated, processed and analyzed. The data found from it is then used further to detect motion. In this project work robust routine for accurately detecting moving objects have been developed and analyzed. The traditional real time problems are taken under consideration including shadow while detecting motion.

II. Video Surveillance
In video surveillance, motion detection refers to the capability of the surveillance system to detect motion and capture the events. Motion detection is usually a software-based monitoring algorithm which will signal the surveillance camera to begin capturing the event when it detects motions. This is also called activity detection. An advanced motion detection surveillance system can analyze the type of motion to see if it warrants an alarm. In this project, a camera fixed to its base has been placed and is set as an observer at the outdoor for surveillance. Any small movement with a level of tolerance it picks is detected as motion.

Problems in real time environment:

Video motion detection is fundamental in many autonomous video surveillance strategies. However, in outdoor scenes where inconsistent lighting and unimportant, but distracting, background movement is present, it is a challenging problem. In real time environment where scene is not under control situation is much worse and noisy. Light may change anytime which cause system output less meaningful to deal with. Recent research has produced several background modeling techniques, based on image differencing, that exhibit real-time performance and high accuracy for certain classes of scene. where the weather introduces unpredictable variations in both lighting and background movement.

III. PROPOSED ALGORITHM
A. Background
Proper threshold values have to be chosen for background, standard deviation and area of the moving objects. The statistical parameter standard deviation is used in the processing of removing the shadow of the moving object. In this algorithm threshold value of background chosen as 250 pixels, standard deviation is 0.25 and area of the moving object is 8 pixels.8*8 pixel is taken as one block in this algorithm.

B. Foreground
The input video format is avi. Avi stands for audio video interleave. An AVI file actually stores audio and video data under the RIFF (Resource Interchange

File Format) container format. In AVI files, audio data and video data are stored next to each other to allow synchronous audio-with-video playback. Audio data is usually stored in AVI files in uncompressed PCM (Pulse-Code Modulation) format with various parameters. Video data is usually stored in AVI files in compressed format with various codecs and parameters. The aviread, aviinfo matlab functions which are are used to read the input video avi format. This Algorithm is tested with input video file having 120 frames.

C. Histogram

An image histogram is a graphical representation of the number of pixels in an image as a function of their intensity. Histograms are made up of bins, each bin representing a certain intensity value range. The histogram is computed by examining all pixels in the image and assigning each to a bin depending on the pixel intensity.. Image histograms are an important tool for inspecting images. They allow you to spot background and gray value range at a glance. Histogram is used to extract the background.

In a more general mathematical sense, a histogram is a function m_i that counts the number of observations that fall into each of the disjoint categories (known as *bins*), whereas the graph of a histogram is merely one way to represent a histogram. Thus, if we let n be the total number of observations and k be the total number of bins, the histogram m_i meets the following conditions:

$$n = \sum_{i=1}^{k} m_i .$$

D. Grayscale image

Grayscale images are images without color, or achromatic images. The levels of a gray scale range from 0 (black) to 1 (white).After calculating the histogram, images are converted in to gray scale images to reduce the complexity while applying the morphological operations.

E. Background Subtraction

This proposed algorithm dynamically extracting the background from incoming all video frames, it is subtracted from every subsequent frame and compared with the background threshold. If is greater than the background threshold, it assumed as foreground otherwise it is background. The background is updated in each and every frame.

F.Shadow removal

Performing the operation using a function on each frame by 8*8 block wise and result is compared with the variance threshold. If the result is less than the variance threshold,it assumes as shadow and it takes logic 0 otherwise it takes logic 1.

G. Morphological operations

Morphology is a broad set of image processing operations that process images based on shapes. Morphological operations apply a structuring element to an input image, creating an output image of the same size. The most basic morphological operations are dilation and erosion. Morphological operations are usually performed on binary images where the pixel values are either 0 or 1,and they play a key role in applications such as machine vision and automatic object detection.

1) Dilation

Dilation is an operation that "grows" or "thickens" objects in a binary image. The specific manner and extent of this thickening is controlled by a shape referred to as a structuring element. In otherwords,The dilation operation usually uses a structuring element for probing and expanding the shapes contained in the input image.

2) Erosion

Erosion "shrinks" or "thins" objects in a binary image. As in dilation, the manner and extent of shrinking is controlled by a structuring element. Erosion operation is quite opposite to the dilation operation.

H. Labeling the moving object

After performing the morphological operations, the area of the moving object is calculated and labeling the moving objects with red color rectangle in the output.

Fig 1.Reconstructed background

IV SIMULATION RESULTS

Fig 2 Moving object

Fig 3 Detected moving object with shadow

To distinct between background and moving objects (foreground here),histogram operation is performed and background frame is subtracted from foreground ,result frame is shown in figure 3

This algorithm removes the shadow of the moving object in order to calculate the area of the object effectively. During this process, after comparing with standard deviation threshold, result frame is shown in figure 4. If the result is less than standard deviation threshold, it is shadow.

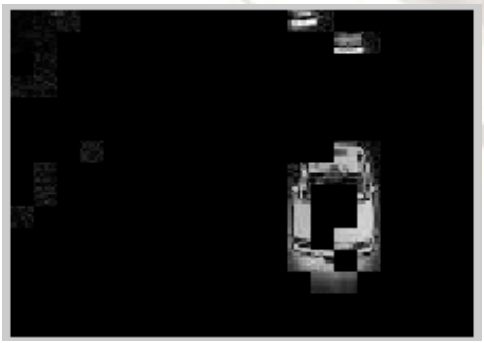

Fig 4 shadow removed object after comparing with standard deviation

Comparing with background threshold, if result is greater than the background threshold it is foreground otherwise it is foreground. The result frame is shown in figure5.

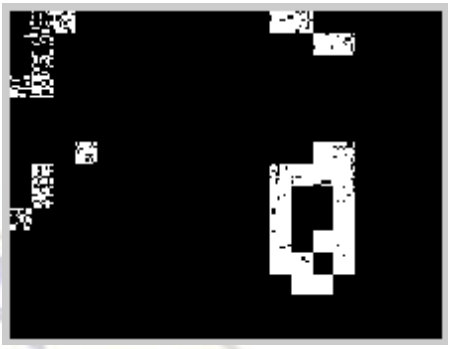

Fig 5 After comparing with background Threshold

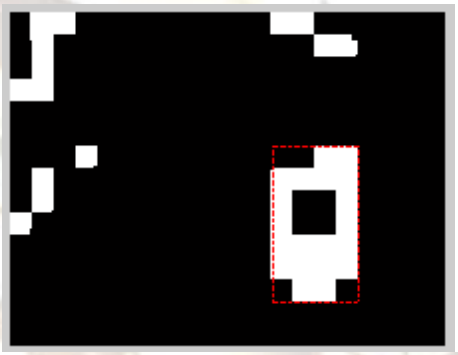

Fig 6 Labeling with moving object after Morphological processing

Morphological operations i.e dilation and erodes are performed and moving object is labeling with red colour rectangular box and counting is incremented.

MATLAB is used for implementation of the algorithm. The algorithm is tested with input AVI format video files consisting of 120 frames.

V.CONCLUSION

In this paper the proposed algorithm extracted the background from the all frames of video and detected the foreground effectively. .This algorithm dynamically updates the background and identify the shadow of the moving object and is removed to calculate the area of the object accurately. The moving region is detected accurately by selecting the proper threshold value of the objects. Finally this algorithm works for On-line (Real time) and Off-line (Quasi real time) video processing and its computational complexity is low.

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