Motion Detection Using Differential Images Method

Madhuri Sali
Vishawakarma institute of technology

Abstract- *This paper proposed a motion detection system using periodic background estimation subtraction method for outdoor illumination condition using OPENCV. The proposed method is robust to illumination change effect, change in background and noise. The method basically used background subtraction. The background image is estimated at every 0.8 second when the sum of absolute difference (SAD) is less than the motion threshold. The input image is luminance normalize before background subtraction. The results were converted into binary image by Auto threshold and enhanced the results with dilation and erosion. Blobs were created for each motion objects. Experiment results of using background image estimated by periodic background estimation demonstrate their robustness and effectiveness in background subtraction for real world scene.*

Keywords- motion detection; periodic background estimation; sum of absolute difference; motion threshold; luminance normalize.

I. INTRODUCTION

There are three commonly used methods to segment the motion area from sequence of images which are the background subtraction, frame differencing, and optical flow segmentation. The most useful, effective and simplest method for detecting moving objects in video images is using background subtraction by comparing the intensity of the background and observed images. However, its application is limited to the background scene that must remain motionless and unchanged [1]. In the real world especially the outdoors is impractical to implement the said methods due to the unpredictable intensity change as illumination fluctuates with the sunlight and weather, tree leaves waving and moving objects becoming static, for example like a moving car parking at a place and stop moving. Background subtraction method that robustly handles various changes in the background have been proposed by [2,3, 4, 5]. Frame differencing method were used by [6, 7,] to detect moving objects. Reference [8] used optical flow segmentation to detect human for safe control of robot. Reference [9] proposed a method to extract moving objects based on exclusive block matching but the tracking is limited because colours of blocks that are the same or similar cannot be avoid. Reference [1] used an approach by correlation measurement between two blocks of images against varying illuminations with Spatial Modulated Normalized Vector Distance (SMNVD) concept for a background subtraction method in a non-stationary scene. This method is able to detect the moving object but some of the moving regions remained undetected. Reference [3] proposed a method using background subtraction where the background estimated from global illumination change in the observed image by mapping table between the present image and the original background taken in advance. Each pixel from the background subtraction is calculated with mean and variance for each block to get better segmentation but there are errors in detection of background after a moving object passes through and shadow produced by moving object. Reference [4] used a method for detecting moving objects by using background subtraction that can be applied to cases in which the image has variations due to varying illumination based on two object detection methods which compares the background image and the observed image using invariant features of illumination. It estimates the illumination conditions of the observed image and normalizes the brightness before carrying out background subtraction. Reference [10] developed an algorithm based on constant characteristics of a common, 2-frame interlaced video signal. The proposed algorithm is robust to changes in the lighting conditions, environment and discontinuous motion parameters but large object out of the usual range of interest were segmented into several moving object and the identity of an object is lost when it stopped moving.

II. PERIODIC BACKGROUND ESTIMATION SUBTRACTION

Differential Images are the result of the subtraction of two images:

$$gdif(x,y)=g1(x,y)-g2(x,y)$$

So as you can see a differential image shows the difference between two images. With those images you can make movement visible.In our script we use a differential image calculated from three consecutive images $It-1$, It and $It+1$. The advantage of this is that the uninteresting background is removed from the result:

$$\Delta I1=It+1-It\Delta I2=It-It-1\Delta I=\Delta I1\wedge\Delta I2$$

OpenCV offers the possibility to subtract two images from each other using *absdiff()*. Also logical operations on two images is already implemented. We use the method bitwise_and() to achieve the final differential image.

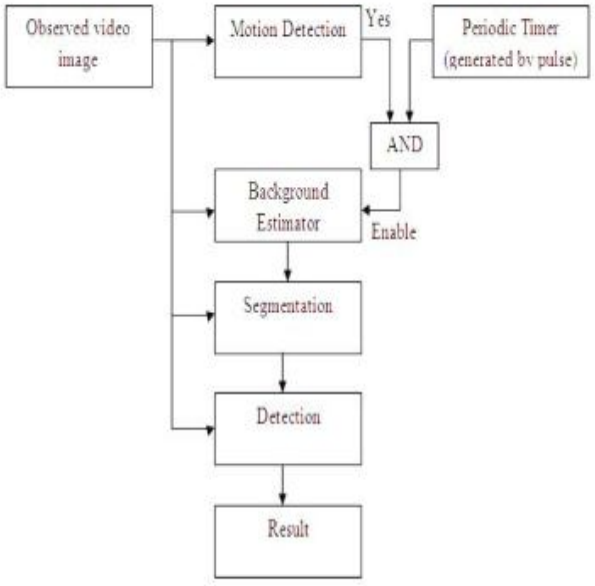
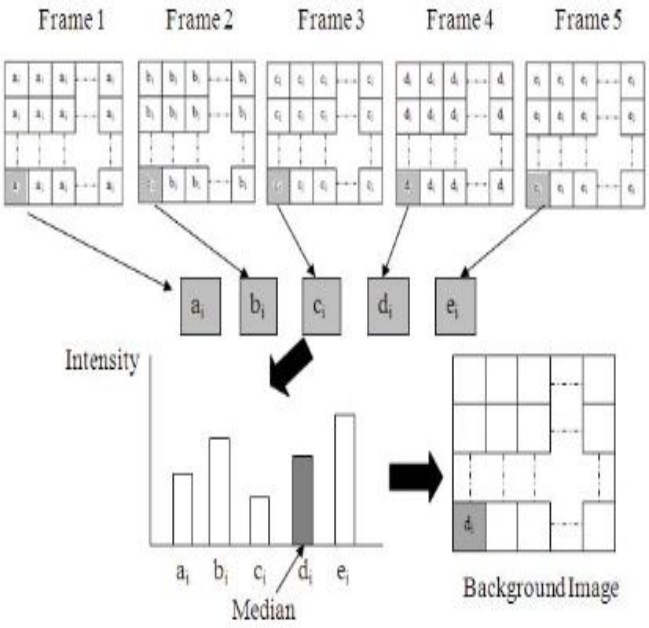


Figure 1. Motion Detection Using Periodic Background Estimation Subtraction Method.



III. RESULTS

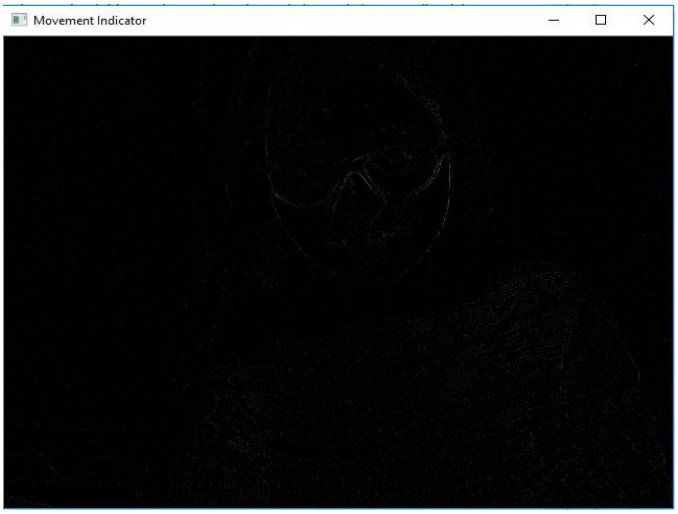


Figure 3.Result showing output of only moving part in the frame

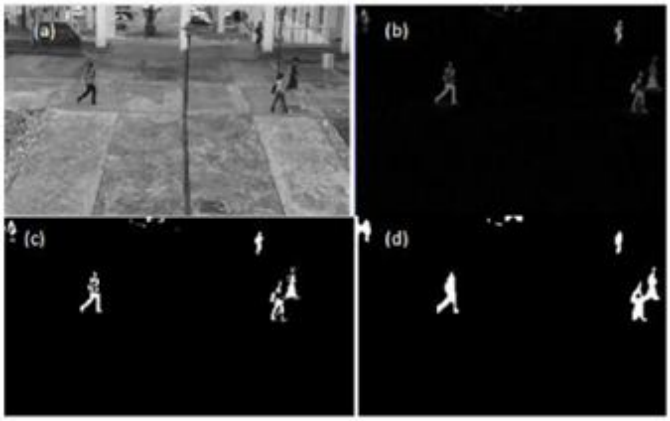


Figure 4. (a) Input video image (b) Background subtraction (c) Autothreshold (d) Dilation and Erosion.

IV. CONCLUSION

In this paper ofMotion Detection Using Differential Images Method. We can see from above results that we are getting results of motion detection and we can see that we are getting the output images only when a moment is detected otherwise the screen will remain black.

We achieved this by using RGB to GRAY converter and also we have used differential images that is image subtraction for this project

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BIOGRAPHY

Madhuri Sali is a student pursuing graduation in electronics engineering in Vishwakarma Institute Of Technology,
Pune, India. Her research interest are Computer Visions.