Object Motion Detection in Video Frames Using Background Frame Matching

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***Abstract*— In this project we present detection the motion in video frames using background frame Matching. These document video surveillance systems have become widely available to ensure safety and security in both the public and private sectors due to incidents of terrorist activity and other social problems. This paper proposes a novel motion detection method with a background model module and an object mask generation module with moving camera. We propose a self-adaptive background matching method to select the background pixel at each frame with regard to background model generation. The quality of the proposed method is analyzed. The experimental results show that our proposed method has high accuracy and performance compared to previous methods using static camera.**

***Keywords*— Object motion detection, Cauchy Distribution, MTD, MSDE, Optical Flow.**

I. INTRODUCTION

Nowadays, more and more moving cameras are used for different applications, such as unmanned aerial vehicle, driving assistant and wide-area video surveillance. Novel method to effectively detect moving objects from videos captured by a camera on a moving platform [1]. The proposed method could be generally applied to detect moving objects with irregular camera movement and in complex environment [1]. The surveillance system presented in this paper can detect and track moving objects in a video sequence,[2]. In moving object detection, many approaches have been studied; e.g. background subtraction method, inter frame difference method and the technique using the optical flow, which are well known as valid approaches in the image processing. Fast and accurate motion detection in the presence of camera jitter, known as a difficult problem. Because it is difficult to distinguish from the operating display jitter-induced errors in the statistical system [3]. Motion detection has been used for many computer vision applications, including image comparison, visualization of traffic flow, detection and classification of highway lanes, driver assistance, face detection. Motion detection methods can be categorized into three major classes, i.e., temporal difference, optical flow], and background subtraction[4].

Optical flow methods generally show the projected motion on the image plane with good approximation based on the characteristics of flow vectors[5]. thus detecting a sparse form of object regions.[6] These categories, background subtraction methods received the most attention due to the moderate time complexity and the accurate detection of moving entities.[7]

In general, the existing background subtraction methods can detect moving objects by estimating the absolute difference between each incoming video frame, Then calculate the binary values and detection motion from the each frame[8].

Disadvantages of Existing System:

- The computational complexity of optical flow methods is usually too high[9].
- Background subtraction is inaccurate, it may produce wrong objects[10].
- Poor performance.
- High cost.

II. MTD METHOD

Compared with the traditional temporal difference method, the Multi Temporal Difference (MTD) method holds several previous reference frames to reduce holes inside moving entities for motion detection[6]. As mentioned in, seven previous reference frames are used to calculate the difference frame.

III. Gaussian Mixture Model

Model the values of a particular pixel as a mixture of Gaussian distributions. Multiple adaptive Gaussians are necessary to cope with acquisition noise, lighting changes. This is a common method for real-time segmentation of moving regions in frame sequences. Model Gaussians are updated using K-means approximation method. Each pixel is then evaluated and classified as a moving region or as a background.

A. *MSDE Method*

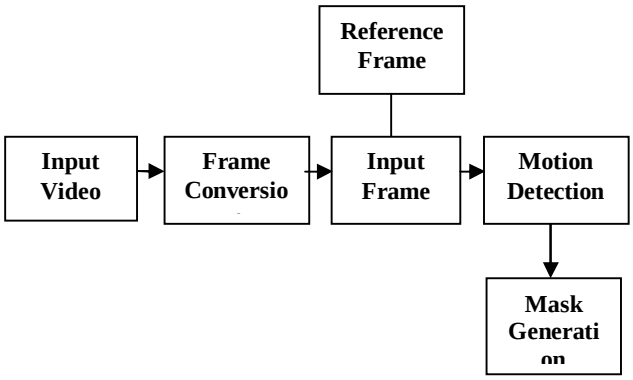
Based on a constant sign function, the Multi ∑-Difference Estimation (MSDE) method generates several reference frames to calculate a mixture background model [19].

B. . *Background Subtraction*

In this method, the moving regions are detected by subtracting the current image pixel-by-pixel from a reference background frames. The pixels where the difference is above a threshold are classified as foreground otherwise background. Some morphological post processing operations are performed to reduce noise and enhance the detected region.

IV. Proposed Method

A. ***Flow Diagram***



B. ***Object Detection:***

Detecting regions that corresponds to moving objects in video sequence plays a very important role in many computer vision applications.

In simplest form, Object detection from video sequence is the process of detecting the moving objects in frame sequence using digital image processing techniques. Moving object detection is the basis of moving object identification and tracking.

C. ***Cauchy Distribution Algorithm:***

Cauchy Distribution Algorithm Based On Frame Difference and Edge Detection:

The edge difference image is obtained by computing difference between two images. The smallest rectangle containing the moving object can be obtained. It is possible to get the exact position of the moving objects by calculating connected components in binary images, delete those components whose area are so small. The improved moving object detection algorithm based on frame difference and edge detection has much greater recognition rate and higher detection speed than several classical algorithms.

$$f(\Delta_t(x,y);p,q) = \frac{1}{\pi}\left[\frac{b}{(\Delta_t(x,y)-p)^2+q^2}\right]$$

$\Delta_t(x,y)$-Different frame

p , q – Location parameter

D. ***Moving object Detection Phase:***

In order to detect a movement within particular area, a moving security camera is positioned to monitor the area. The detection of a moving object within the monitored area is the first phase. The movement detection uses a simple but efficient method of comparing image pixel values in subsequent still frames captured every two seconds from the surveillance camera. Two images frames are required to detect any movement. The first frame is called reference frame, represents the reference frame values for comparison purpose, and the second frame, which is called the input frame, contains the moving object.

The two frames are compared and the differences in pixel values are determined. Pixel values are threshold and saved in a third frame, which is called output frame, with a black or white background. If the "difference" average pixel value is Smaller than a certain threshold value, then the output frame image will be white otherwise, the background will be black (pixel value is 0).

After tracking the moving object motion, the previous input frame will now be used as a reference frame, and a third frame is captured and is called now the input frame. This process is repeated with the frames being captured every second, where the same method is applied. If there is a difference between the reference and input images frames, then an output image is created. The obtained output image contains an object that will be extracted.

V. Experimental Result

Input image Frame (a)

Reference Image Frame(b)

Result (a)

Result (b)

VI. Conclusion

Object tracking means tracing the progress of objects as they move about in visual scene. Object tracking, thus, involves processing spatial as well as temporal changes. Certain features of those objects have to be selected for tracking. These features need to be matched over different frames. Significant progress has been made in object tracking. Taxonomy of moving object detection is been proposed. Performance of various object detection is also compared.

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