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Motion Detection Algorithm for Agent Interaction Surveillance Systems

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Abstract - Motion detection is the essential process in the extraction of information from moving objects in automatic video surveillance system. In this work, a novel and accurate approach is used to detect moving object from video. It contains two phase background matching techniques such as rapid matching and accurate matching for background modelling. The rapid matching technique is used to quickly find out difference between the current and previous incoming video frames. The accurate matching is used to compare the current incoming frame and current background candidates. The background module is used to produce optimum background pixels for the background model. Next, our proposed AT module eliminates the unnecessary examination of the entire background region allowing the subsequent OE module to only process block containing moving objects. Finally, the OE module forms the binary object detection mask in order to achieve highly complete detection of moving objects. The detection results produced by our proposed method were both qualitatively and quantitatively analyzed through visual inspection and for accuracy, along with comparisons to the results produced by other state of-the-art methods.

Index: Motion Detection, Video Surveillance System, Alarm trigger, Object Extraction Model.

I. INTRODUCTION

Video is the technology of electronically capturing, recording, processing, storing, transmitting, and reconstructing a sequence of still images representing scenes in motion. Video processing uses hardware, software, and combinations of the two for editing the images and sound recorded in video files. Extensive algorithms in the processing software and the peripheral equipment allow the user to perform editing functions using various filters. The desired effects can be produced by editing frame by frame or in larger batches. Most modern personal computers come with software that allows the user to compile images and videos, edit images, and create videos on a limited level. Storyboards allow the addition of audio files and the adjustment of visual images, transitions, and audio files, which, together, determine the overall length of the video. Videographers, electrical engineers, and computer science professionals use programs that are capable of a wider range of functions. Signal processing usually involves applying a combination of prefilters, intrafilters and post filters.

Video files are obtained from the recording device using a universal standard bus (USB) cable or fire wire attachment. The files are then loaded into a computer software program or peripheral device. Before applying the filters used in video processing, certain programs require information for the optimization framework. This information allows the program to calculate the horizontal and vertical image gradients, determine the desired filter gradients, and establish function parameters. Prefilters used in video processing might include contrast changes, deflicking, and noise elimination along with pixel size conversions. Contrast changes allow the processor to highlight particular areas of an image, change the lighting perspective, and darken or lighten images. Deflicking eliminates camera motion or uneven lighting effects that produce flickering on the video. Noise elimination removes artifacts, including lines or other textured effects that reduce image clarity. Using size conversions, users might change a video from 720 pixels to 1,080 pixels, crop the size of the video, or reposition the video on a background.

Processing videos using intrafilters allows users to deblock, or apply techniques that change the image quality. Deblocking removes blocking artifacts, sometimes acquired by compressed files that reduce image clarity. Using the calculated gradient aspects of images, filters might sharpen out of focus images, apply highlighting around specified areas of an image, or add graphics and text to a video. Filters can also change entire color schemes or vary the colors within an image. Deinterlacing is a post filter that is frequently used in video processing. When video recorders capture images, the images can overlap or interlace over each other. This creates artifacts that might include blurred images, a checkerboard effect, or lines that become visible during playback. Deinterlacing programs eliminate these problems by combining frames and allowing progressive scanning without these visual disturbances.

II. MOTION DETECTION

Motion detection is one of the greatest problem areas in video surveillance as it is not only responsible for the extraction of moving objects but also critical to many computer vision applications including object based video encoding, human motion analysis and human machine interactions. The moving human body detection is the most important part of the human body motion analysis. The purpose is to detect the moving human body from the background image in video sequences and for the follow-up treatment such as the target classification, the human body tracking and behavior understanding, its effective detection plays a very important role.

Currently, methods used in moving object detection are mainly the frame subtraction method, the background subtraction method and the optical flow method. Frame subtraction method is through the difference between two consecutive images to determine the presence of moving objects. Its calculation is simple and easy to implement. For a variety of dynamic environments, it has strong adaptability, but it is generally difficult to obtain a complete outline of moving object, liable to appear the empty phenomenon, as a result the detection of moving object is not accurate. Optical flow method is to calculate the image optical flow field, and do clustering processing according to the optical flow distribution characteristics of image.

This method can get the complete movement information and detect the moving object from the background better, however, a large quantity of calculation, sensitivity to noise, poor anti-noise performance, make it not suitable for real-time demanding occasions. The background subtraction method is to find the difference method of the current image and background image to detect moving objects, with simple algorithm, but very sensitive to the changes in the external environment and has poor anti interference ability. However, it can provide the most complete object information in the case of the background is known. In this method, a single static camera condition combined with dynamic background modeling and dynamic threshold selection. This is method based on the background subtraction and update background on the basis of accurate detection of object. This method is effective to enhance the effect of moving object detection.

Background Subtraction Method

The background subtraction method is the common method of motion detection. It is a technology that uses the difference of the current image and the background image to detect the motion region, and it is generally able to provide data included object information. The key of this method lies in the initialization and update of the background image. The effectiveness of both will affect the accuracy of test results. In this method uses an effective method to initialize the background, and update the background in real time.

The traditional automatic smart image surveillance system can usually be used in the environment with still background. That is, the background image must not contain the moving objects. If there is waving ocean, waving tree, floating cloud, or raining in the background image, the traditional methods do not work well. In order to improve this problem, a new motion detection method based on the theory of entropy and combined a multi-periods sigma-delta background subtraction algorithm is developed in this method. Based on the theory of moving average, a moving thresholding method is designed in this work to obtain a sequence of alarm announcements. Experiments are carried out for some samples with

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dynamic backgrounds to demonstrate the computational advantage of the proposed method.

III. SYSTEM ANALYSIS

In olden days, the video surveillance system will be a security person always watches the video output or they tape the video and manage backup file manually. If any problem occurs, then the security person watch backup video file and detect all object including tree. Now days there are some automatic motion detection system. In that system all static and dynamic objects are detected. Here, two motion detection methods are used, they are Optical flow and Temporal differencing method Optical flow method:Optical flow method shows the projected motion on the image plane with successful approximation of the complex background handling, it often requires levels of computational complexity that are very high and which subsequently create, Difficulties in its implementation.

Temporal differencing method:

The temporal differencing method is adapting to environmental changes, often results in incomplete detection of the shapes of moving objects. Due to the limitations in temporal differencing with a sensitive threshold for noisy and local consistency properties of the change mask.

IV. DETECT OBJECT USING BACKGROUND ESTIMATION ALGORITHMS

This module, detects unwanted object using background estimation algorithm, subtracting the background moving object (Tree, Cloud) from live video streaming in every time using threshold filter. Tracks each changed pixel in the current frame as indication to a moving object. It is a simple motion detection algorithm. There are some possible problems with the background estimation approach. It need to ignore the moving background, i.e. leafs falling, illumination changes, dirty pixels etc. Such a method will treat every small change as a moving object. Computationally heavy, too many moving objects can appear, it takes time to handle them. Important objects can never have a size of one pixel, it's quite obvious that moving objects are much larger. Background modeling is design a unique two phase background matching procedure using rapid matching followed by accurate matching in order to produce optimum background pixels for the entire background model

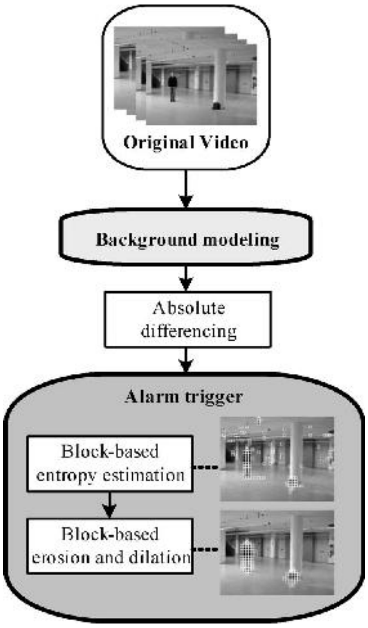

Fig. No. 1 Alarm Trigger

Threshold Filter

Threshold is a technique that helps us to "delete" unwanted pixels from an image and only concentrate on the ones we want. For each pixel in an image if the pixel value is above a certain threshold convert it to 255 (white) otherwise convert it to 0 (black). For example, a threshold of 120 transforms to:

Fig. No.2 Threshold value Transform

Background Initialization

The modified moving average is used to calculate the computational average of frames 1 through K for the initial background model.

$$B_t(x, y) = B_t{-}1(x, y) + 1/t\,(I_t(x, y) - B_t{-}1(x, y))$$

where,

$B_t{-}1(x, y)$ - previous background model,

$B_t(x, y)$ - background model,

$I_t(x, y)$ - current incoming video frame.

Rapid Matching

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The rapid matching is used to quickly find a great quantity of background candidates by determining respective pixel values for the current incoming video frame are equal to the corresponding pixel values of the previous video frame.

Accurate matching

The accurate matching technique each light gray pixel of the candidate is trained to the dark gray pixel by using the stable signal trainer. Stable signal trainer, all pixels form the set of candidates selected via rapid matching procedure.

Alert PC using Alarm

In order to significantly accelerate the following OE module, we propose that the AT module be comprised of a stepwise procedure involving novel block-based entropy evaluation followed by block-based morphological operations. Detection of each possible motion block candidate is accomplished by the proposed block-based entropy evaluation. Elimination of some of the detected background blocks and completed motion blocks is then performed via the block-based morphological erosion and dilation operations. Suppose that each $w \times w$ block (i, j) within the absolute difference (x, y) is composed of V discrete gray-levels and is denoted by $\{L0, L1, L2, L3, \ldots, LV-1\}$. The block-based probability density function $P(i,j)^h$ is defined as follows:

$$E(i,j) = -\sum_{h=0 \text{ to } L(V-1)} P_h^{(i,j)} \log 2(P_h^{(i,j)})$$

After each $w \times w$ entropy block $E(i, j)$ is calculated, the motion block A can be defined as follows:

$$A(i, j) = 1, \text{ if } E(i, j) > T \text{ and } 0, \text{ otherwise.}$$

When the calculated entropy block (i, j) exceeds T, the motion block $A(i, j)$ is labeled with “1,” denoting that it contains pixels of moving objects. Otherwise, nonactive one are labeled with “0.” The elimination of some of the detected background blocks and completed motion blocks can then be performed. This is accomplished through the use of block-based erosion and dilation, and can be defined by the formula as follows:

$$A^* = \delta b2\lambda (\varepsilon b\lambda (A))$$

where ε is the morphological erosion, δ is the morphological dilation, and $b\lambda$, the elemental structure, is a ball of radius λ which is experimentally set at 1 in this paper.

V. EXPERIMENTAL RESULTS

The objective of this section is to demonstrate the benefit of our proposed method. Experimental results have been produce for several natural video sequences by using our method an several other state-of-the-art methods, and are presented an compared in this section. The results were analyzed in two ways as follows:

1) Through comparison of generated background models and the detected qualitative binary objects masks.

2) Quantitative evaluation of all test sequences.

Test Sequence	IR	MR	SC	WS
Image Size	256*320	128*160	256*320	128*160
Elimination Pixel	60788	17331	54101	8755
Elimination Rate (%)	78.36	84.62	66.04	42.76

Table 1. Average elimination region achieved for each Dataset

Table 1 illustrates a representational suite of typical situation which can critically affect performance in video surveillance systems. The six sequences portrayed vary considerable in overall image size, noise level, background property, object size, and object number, with both indoor and outdoor environments presented. Generation of the background model without any moving objects is very desirable in advanced video surveillance systems. Some properties are indicative of a high-quality background model, including background model adaptation, maintenance, avoiding the probability of wrong associations owing to noise, and artificial “ghost” trails caused by cluttered motion.

VI. CONCLUSION

Video surveillance systems are increasingly being used in security systems. In that the motion detection is one of the greatest problems arises in video surveillance as it is not only responsible for the extraction of moving objects but also critical to many computer vision applications including object based video encoding, human motion analysis and human machine interactions. In this module we have used the background subtraction method which is the common method of motion detection. It is a technology that uses the difference of the current image and the background image to detect the motion region, and it is generally able to provide data included object information. In the background subtraction method we used; the rapid matching technique which is used to find out difference between the current and previous incoming video frames. In the accurate matching compare the current incoming frame and current background candidates. The background module is used to produce optimum background pixels for the background model. Here we have used the threshold value to identify the moving object.

References

[1] Shih-Chia Huang, "An Advanced Motion Detection Algorithm with Video Quality Analysis for Video Surveillance Systems" IEEE Trans. Image process, Vol. 21, No. 1, pp. 1-14, JAN. 2011.

[2] M.Besita Augustin, Mrs. Sujitha Juliet, Mr. S. Palanikumar "Motion and Feature Based Person Tracking In Surveillance Videos" in Proc. ICVGIP, Vol 5, pp. 605–609, FEB. 2011

[3] S. Saravanakumar, A.Vadivel, C.G Saneem Ahmed "Multiple Human Object Tracking using Background Subtraction and Shadow Removal Techniques" Intelligent Systems Design and Applications. Vol 22, pp.79 – 84, JAN. 2010.

[4] L. Maddalena and A. Petrosino, "A self-organizing approach to background subtraction for visual surveillance applications " IEEE Trans. Image Process., Vol. 17, No. 7, pp. 1168–1177, JUL. 2008.

[5] W. Hu, T. Tan, L. Wang, and S. Maybank, "A survey on visual surveillance of object motion and behaviors," IEEE Trans. Syst., Man, Cybern. C, Appl. Rev., Vol. 34, No. 3, pp. 334–352, AUG. 2004.

[6] C. Benedek and T. Sziranyi, "Bayesian foreground and shadow detection in uncertain frame rate surveillance videos" IEEE Trans. Image Process., Vol. 17, No. 4, pp. 608–621, APR. 2008.