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Object detection using block-based background method

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ABSTRACT

The goal of our system is to provide affordable and quality Surveillance system to every user. Most important feature of this System is to detect intrusion within the real time image frames and notify the user/administrator if intrusion found .In our System user use combination of various methods to detect objects in real-time video frames. In our surveillance system user have improved the performance and accuracy of detecting motion of the object as compared to existing system. IP camera provides features like remote view/remote access but it is not affordable to every user. User minimize the drawback of CCTV camera by providing remote access (real time streaming).Our system mainly focuses on minimizing the storage cost. The System is best suited for indoor security as user is monitoring a particular high security area like museum where precious and ancient arts are preserved. User/Administrator can view live streaming of the targeted area from anywhere. Our System works 24X7 and monitors the high priority targeted area and simultaneously it judges if the change is environment change or any other disturbance caused by human activity.images. Thus, object-tracking technology, which typically targets human subjects, will be implemented.In proposed system user have mentioned, Smart Surveillance technology which judges the situation and notifies the administrator immediately and responds accordingly. This System mainly focuses the area which requires higher security.The technology, which can judge the current situation in real-time by analyzing the behavioural patterns of the objects and its association with the surrounding environment, has also been studied actively.

Keywords— motion object detection, mean squared error,smart CCTV,frame difference method,adaptive background subtraction method,video signal processing,frame difference method.

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I. INTRODUCTION

Video Surveillance and its installation are increasingly being used in public facilities and organizations, as part of an effort to achieve security. The environments monitoring has been expanded to protect residents in places, such as elementary schools and other care facilities.The installation of the Video Surveillance helps in preventing crime and may aid in the solution of cases. Its role is also increasing in various forms. In addition, Video Surveillance has been used for purposes, such as crime prevention and detection. It also gives high security which is very important now days. The most important technique of this smart Surveillance is to track and analyze objects within the.The core technology of smart surveillance system analysis is used in detecting, analyzing, and tracking the object's motion. However, the object, which is the target to be traced, can vary, depending on the situation, such as image size, orientation, and location, within consecutive frames. In addition, when the light's color or direction changes, it is difficult to trace the object, as it is perceived as another object, even though it is the same object as in the previous frame.

MODULES OF THE PROJECT:

MODULE 1:

1. Capture Image:
Input: Camera ID
Output: Captured Image
In this module we provide camera ID and get an image as output.System will set or record the targeted area. This will store Captured image through Frame Difference Method. Number of captured images get converted into video and video recording is started.
2.Capture Video:
Input: Camera ID
Output: Captured Video
In this module we provide camera ID and get video as output. If any suspicious activity is detected in the targeted area or any intrusion is detedcted in the system then system can record the video of the activity using block Based Background Method. User can view any recoringat any time anywhere using user's authenticated android mobile phone.
3.Compare Image:
Input: Captured Image
Output: Difference in capture image and template image.
Here in this module we will get difference in captured images and template images.Selected target area is compared with the current image frame region and analysis is done on it. If mismatch is found, play an alarm and send notification to an authenticated Android Phone via SMS & plays alarm.

II.LITERATURE SURVEY

Moving object detection method shows high performance with regard to the MSE(Mean Squared Error) and the accuracy of detecting the moving object contours compared to other existing methods[2]. In general video surveillance system, video streams from cameras are sent to a control center and operators monitor the videos.But human operator monitoring of every moment is almost impossible, so smart surveillance system is required. This paper assumes the objects are correctly detected and located during video preprocessing[1][3]. A lot of research has been done in the area of camera selection in a camera-based wireless network. In case of camera sensors, the complexity of coverage issue increases as three dimensional coverage of space is required[4].

III.EXISTING SYSTEM

The long-term storage and archiving of cctv recordings is an issue of concern in the implementation of a cctv system. re-usable media such as tape may be cycled through the recording process at regular intervals. there are statutory limits on retention of data. Recordings are kept for several purposes. Firstly, the primary purpose for which they were created (e.g. to monitor a facility). Secondly, they need to be preserved for a reasonable amount of time to recover any evidence of other important activity they might document (e.g. a group of people passing a facility the night a crime was committed). Finally, the recordings may be evaluated for historical, research or other long-term information of value they may contain (e.g. samples kept to help understand trends for a business or community).Recordings are more commonly stored using hard disk drives in lieu of video cassette recorders. The quality of digital recordings is subject to compression ratios, images stored per second, image size and duration of image retention before being overwritten. Different vendors of digital video recorders use different compression standards and varying compression ratios.

IV.PROPOSED SYSTEM

The software can sense intrusion. The streamed video (5 sec delayed) can then be sent to administrator/owner for appropriate action to be taken. Administrator can send commands to control switch on/off of the device. The entire home surveillance can be made remote using this architecture.It can store mobile numbers for all the administrators/owners who need to be contacted in case of emergency. Software can manage numbers according to situation or priority. E.g. In case of intrusion, a SMS will be sent to the individual, user can then login to the surveillance web application to view the most recent videos.The system waits for a specified amount of time for response commands (SMS) from any of the owners, after which it takes necessary action itself. E.g. the device starts alarming.The system keeps track/log of all the activities. Hence detailed record of messages sent and received is maintained. Also a detailed track of all the activities (rise/fall in temperature, intrusion detection, etc.) is also maintained.

A.Architecture of the System:

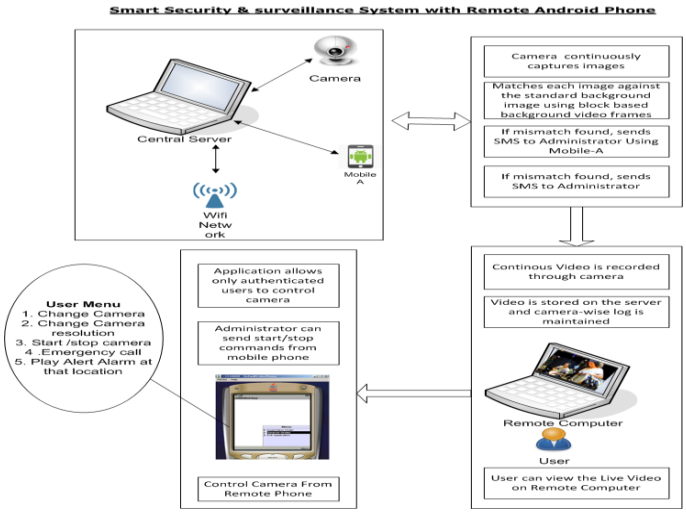

Fig.1: Architecture of the system

System can start and stop camera using OpenCV functions and it is also takes place video recording using OpenCV. Image Comparison and Intrusion detection comparison is campared using block based motion object detection method. It can store mobile numbers for all the administrators or owners who need to be contacted in case of emergency. Also User can change camera using his mobile phone.The system plays an alarm after detecting intrusion. user can also play it again and again using its mobile phone. The system keeps track or log of all the activities.Detailed record of messages received is maintained using this system and also a detailed track of all the activities (intrusion detection, etc.) is also maintained.The system only responds to owners mobile numbers and action received from any other mobiles will be rejected.

B.Algorithms:

1. Frame Difference Method (FDM)

FDM is a technique to find a moving object, using the difference between the frame image at the current point and the previous frame image from the information contained in each frame taken consecutively in any of the images. This technique is typically used in many frame change detection applications within the image such as in CCTV. In recent years it has been mainly used in satellite photos or high-resolution image applications that require a large amount of computation. FDM finds moving parts in the comparison of two sheets of a frame image or three sheets of frame one. Formula(1) and (2) show FDM, which uses two frames and three frames, respectively, and the image luminance value will be input for the operation.

$Dn(x, y) =$

$$1, |Fn(x, y) - Fn-1(x, y)| > tT$$
$$0, otherwise \quad (1)$$

$$Dn(x, y) = 1, (|Fn(x, y) - Fn-1(x, y)| > tT) \wedge (|Fn(x, y) - Fn-2(x, y)| > tT)$$
$$= 0, otherwise \quad (2)$$

In formula (1) and (2), *n* represents the current frame number,and *F* frame image. *x, y* indicates coordinates on the frame,and *tT* , threshold value of motion is to eliminate noise.*D* means the image that contains the information of the area in which motion is detected. In formula (1) and (2), the luminance value of the one-frame-earlier frame and the two-frame-earlier frame, respectively is subtracted from the luminance value present at *x, y* on the current frame, and the absolute value is taken. When the absolute value is greater than the predefined *tT* , it is recognized as a pixel with motion.However, when this is not the case, it is recognized as an area in which noise or motion is not present. If there is a moving target in the environment in which there was not supposed to be any motion, this technique is useful as a way to detect it.This method has a merit of short processing time due to its simple implementation. However, this has a disadvantage in that it does not detect all within the scope of moving objects but rather the area boundary of the moving objects. In addition,FDM does not clearly distinguish all the areas of a moving object. It is not sensitive to noise, and can make an error, as it may recognize even the minutest of movements, as a moving object.

2.Background Subtraction Method (BSM)

BSM is also used in CCTV and a technique to detect moving objects through subtraction from a background image for every frame currently being taken after placing the background image stored in advance against any of the images .Formula (3) shows how to obtain the subtraction image from the pre-stored background image using BSM.

$$Dn(x, y) = 1, |Fn(x, y) - B(x, y)| > tT$$
$$= 0, otherwise \quad (3)$$

As with formula (1) and (2), in formula (3), *n* represents the current frame number, *F* frame image. In addition, here, *x, y* indicates coordinates on the frame, and *tT* , the threshold value of motion area to eliminate noise. In formula (3), *B* indicates a background image stored in advance, and *D* an image that contains information on the area in which there is motion. In BSM, the luminance value of the background image location is subtracted from the luminance value located at *x, y* on the frame at the current point, and the absolute value is taken. If the absolute value exceeds *tT* , it is recognized as a pixel that has motion but, if this is not the case, it is recognized as noise or an area having motion. As this method has typically less changes in the surrounding environment over time, the area of moving objects can be exactly detected, if the pre-generated background image is sufficient to represent the current environment. However, if changes in the surrounding environment are severe or screen transition takes place rapidly,the moving object cannot be detected correctly. That is, BSM has also a disadvantage that the performance can be influenced by how well the background image prepared in advance represents the one in the current frame. It is an Adaptive Background Subtraction Method (ABSM) designed to solve such a problem. ABSM uses learning to create a background image.

3.Adaptive Background Subtraction Method (ABSM)

Adaptive Background Subtraction Method (ABSM) is a technique to detect a moving object by calculating the difference between the frame at the current point and the reference background image. At this time, the appropriate updating of the background image over time is used to reduce the noise caused by the surrounding environment. This method creates the initial background image by accumulating a series of multiple-frame images and creates the image that contains a moving object region through subtraction between the current frame and cumulative background screen over time.Formula (4) shows how to obtain the background image using an adaptive method. Formula (5) represents how to obtain an image by subtraction between the background image drawn from formula (4) and the current frame.

$$Bn+1(x, y) = \alpha Fn(x, y) + (1 - \alpha)Bn(x, y) \quad (4)$$

$$Dn(x, y) = 1, |Fn(x, y) - Bn(x, y)| > tT$$
$$= 0, otherwise \quad (5)$$

In formula (4) and (5), *n* represents the current frame number, alpha learning rate. As with formula (1), (2), and (3),*x, y* indicates coordinates on the frame, *tT* is the threshold value of the area in which motion is detected to eliminate noise. *B* denotes the average color of the background image, *F* the color of the current frame, and those colors have R, G, B components. In formula (4), when alpha is higher, the color values of the recent frames are reflected more; if alpha is lower, the adaptation of the background image generated is at a much slower rate. We can see better performance than BSM when we intend to detect the area of a moving object, as ABSM updates the background image adaptively to changes in surrounding environment over time and using the color image itself without converting to gray-scales. However, it is very time consuming to generate a background image, if there is a rapid transition on the screen, as it depends on the learning rate alpha, which indicates the extent of adaptation, and if it does not move for a long time, or if a moving object is slower at its speed, it is treated as an object that forms a background.We will

describe the new motion detection technique, which is designed to combine FDM with BSM, in the next Section, to solve problems shown in the existing representative motion detection methods, FDM, BSM, and ABSM.

V.CONCLUSION

a CCTVs are been widely used in various places like Museum ,Shopping Malls and many other areas due to the increased needs for security. CCTVs are also used in school zones to prevent social problems, such as the sexual abuse of woman and children. Existing CCTVs can record object with motion along with motionless object. A person has an authentication to take actions whenever any intrusion is detected. CCTV technology uses sensors to sense and judge the situation for itself and take immediate action if needed. This study examines the core technology that traces and analyzes a moving object. The proposed a motion detection method using background subtraction image that combines both FDM and BSM. The method proposed in this study did not have much calculation in terms of arithmetic and showed a slight inferiority compared to the other three methods in terms of processing time and memory usage to store change rate. The main advantage of Block-based background Method is it uses Frame Difference Method, Adaptive Background Subtraction Methods.

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