

Security and Smart Video Surveillance System Using Block-Based Subtraction Method

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Abstract:- Now a days, Security is a basic requirement in every field, security is becoming more and more of an issue for everyone. We are going to develop an software which will helps to identify the exact situation. For this we are using a CCTV technology which is very much secured for the security purposes. Closed-circuit television is the long form of CCTV. The use of CCTV systems has been increased and nowadays they are used to prevent sexual offenses, common place criminal acts, also to protect residents in places, such as elementary schools and other care facilities, and city parks etc. The installation of the CCTV helps to prevent crime and may aid in the solution of cases.

Index Terms:- CCTV, Security, Video Surveillance, Memory, Block-Based Background Subtraction Method.



INTRODUCTION

CCTV cameras has been a need for every human being in the day to day life, these devices provide security which protect the user from criminal acts. The core technology of smart CCTV 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. In proposed system we have mentioned, Smart CCTV technology, which judges the situation and notifies the administrator directly and immediately responds. The most important technique of this smart CCTV related technique is to track and analyze objects within the images. Thus, object-tracking technology, which typically targets human subjects, will be implemented. The technology, which can judge the current situation in real-time by analyzing the behavioral patterns of the objects and its association with the surrounding environment, has also been studied actively. The main aim of this project is to monitor particular object (e.g. Lockers) in room and if there is any suspicious activity happening around that object then send notification to admin. In this system, the system will identify time, activity and it will also checks the differences between the original image and the background image by using

block-based method. Along with that the system will also reduce the memory size.

SECURITY

Secure access of confidential data (user's details). Security means protecting data or system from unauthorized access, modification, use, disclosure, and destruction. It protects users from criminal acts.

SMART VIDEO SURVEILLANCE SYSTEM

Smart video surveillance system helps to enhance situational awareness across multiple scales of space and time. However, at the present time, the component technologies are evolving in isolation; for example, face recognition technology addresses the identity tracking challenge while constraining the subject to be in front of the camera, and intelligent video surveillance technologies provide activity detection capabilities on video streams while ignoring the identity tracking challenge. To provide comprehensive, uninterupt situation awareness, it is essential to address the challenge of multistage, temporospatial tracking. By using of real-time video analysis, multiple object models, active cameras, and long-term pattern analysis to provide comprehensive situation awareness we explore concepts of multistage temporospatial tracking. The idea is to set up a computer terminal, which can be used to transmit/receive video/photos and/or commands to and from the administrator/owner. No such smart video monitoring tool exists in market.

BLOCK-BASED BACKGROUND SUBTRACTION

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This project makes use of Open CV library to capture camera images and detect intrusion using comparison - Block-based background subtraction method.

A Motional Region Detection Structure:

It is similar to BSM (Background Subtraction Method).The method subtracts the current frame image from the background image. In this method we do not prepare background image in advance. However, method creates the background image in real-time while video shooting

Step 1:- The input image is according to the NTSC (National Television System Committee) standard. It uses the YIQ method. Input image is converted to grayscale using following formula.

$$G(x,y) = 0.299 * F_r(x,y) + 0.587 * F_g(x,y) + 0.114 * F_b(x,y)$$

Here in, F= frame image, R=Red, G=Green , B= Blue value to the pixel corresponding to the position of x and y.

Step2:-The grayscale image is segmented into the square block with the entire number of pixels, N. Subsequently the absolute difference image of the block is divided in the front using formula.

$$D_n(x,y) = \begin{cases} 1, & |W_n(x,y) - B_n(x,y)| > t_r \\ 0, & \text{otherwise} \end{cases} \quad \begin{matrix} x,y=0,1,2,3,4,\dots,N-1 \\ N=\text{window block size} \end{matrix}$$

Here in, n = number of blocks,W= the block for to the current image, B =the block for the background image, D=absolute difference between W and B.

B. Background Image Update:

Step 1:- One-dimensional array is used for storing images having difference.

R(n)=Rate of Luminance change ,initialized to 0.This step is performed only once during the first run.

Step 2:- int C= degree of change,initialized into 0. Here in, C represents the number of blocks with a change for the block difference image (Dn). Steps 3 and 4 are performed repeatedly.

Step 3: The number of pixels having value 1 put together within the block difference image (Dn). At 1.Sum of pixels >=t, change is occur. Value of R(n) increases by 1. Value of C increases by 1.

2. Sum of pixels <=t, no change. Value of R(n) reduces by 1. All the values of Dn are initialized to 0. The image with no change in the luminance value in the block is

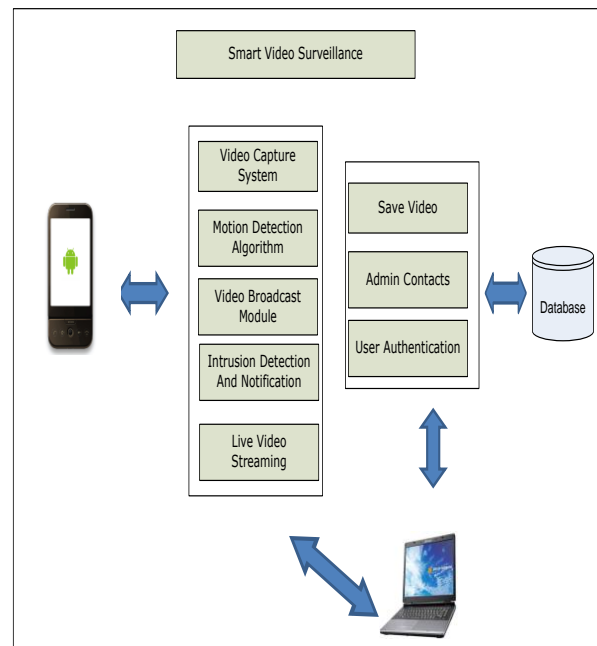
initialized into 0 to eliminate noise. Herein, t uses an arbitrary threshold value i.e. block size N.

$$R(n) = \begin{cases} R(n)+1, & C=C+1, & N^2 \sum_{K=0}^{N^2} D_n(k) > t \\ R(n)-1, & D_n=0 \end{cases}$$

Step 4: R(n) <-1,the background image of the block is updated. Otherwise, it is not updated and remains as the previous background image.

SYSTEM ARCHITECTURE

In this system we are using Open CV Framework application for recording videos and transferring them over the internet. Once the comparison is done and an intrusion is found, it sends the streamed video from server to remote administrator over android phone. On the basis of an appropriate action can be taken by admin and admin can alert local security. Smart video transfer and capture feature are the special features of our project. 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 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. Necessary action can be taken by system itself after waiting for specified amount of time for response commands (SMS) from any of the owners. Basically, this system can be used by any person at anywhere. It is very suitable for remote bank monitoring etc.



Remote access can be provided by almost any communications means possible. User can either log on to home server via internet connection and control/monitor using appropriate authentication. Alternatively user can control the system using SMS messages. A short application designed for mobile sends the messages from user mobile to home server. This will eliminate the need for the mobile user to remember the long keyword sequences to be sent in order to activate/deactivate a control etc. If this does not work, authenticated user can simply use email to send authenticated mails to home server account and control the system. User can also receive the feedback information via email. Before accessing the home server or before controlling/monitoring proper authentication using mobile number, email id, and passwords is done. Using a camera and motion detection algorithm user is also informed about any intrusion and the image/video is transmitted online. User can also send a series of command sequences scheduled for a later time. At the server, the commands will be executed automatically. It may include activation / deactivation of a relay, setting threshold, etc. We can also see live streaming of video over mobile phone.

CONCLUSION

Without using motion sensors, webcam will record live video whenever there is an intrusion in the room which

will results into the reduction of size of video. System also keeps track of information video data for future use. This application describes mobile based remote control and surveillance architectures.

FUTURE SCPOE

Gunshot Detection

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