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MOTION DETECTION &VIDEO SURVEILLANCE SYSTEM USING IP CAMERA

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Abstract— Video Surveillance has been used for purposes, such as crime prevention and detection and it is also used for high security. Existing systems include Frame Difference Method (FDM) and Background Subtraction Method (BSM) which are used to detect moving object and motionless object respectively. If there is no object motion for a long time then these methods are failed. 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 this System we use combination of various methods to detect objects in real-time video frames. In this surveillance system we have improved the performance and accuracy of detecting motion of the object as compared to existing system.

Keywords— Video Surveillance, Intrusion, On-demand, Motion detection, Video Frame, Block-based, Real-time, Streaming.

I. INTRODUCTION

Now-a-days security is most important issue arising due to the increase in criminal acts. Video surveillance is an important application that helps in monitoring different areas which require high security, thus video surveillance is a very important concept which plays a vital role in safety and security. Video surveillance system is used in detecting, analyzing, and tracking any unusual activity also it is used for public safety and other highly security needed areas like bank lockers, home surveillance etc [1][2][3].

Video Surveillance system can be achieved by CCTV(Closed Circuit Television) camera, IP-based cameras and many other surveillance technologies and surveillance devices. Cost of the system depends upon the requirements of the clients. It increases by performing number of operations like notifying the user about unusual activity. CCTV camera provides various features by adding external hardware, sensors and many other devices.
System captures video continuously& stores it simultaneously on the system because of this feature the user require more storage space. The system does not notify the administrator if any intrusion detected hence additional hardware & cost of that special system is increased. Also video streams from cameras are sent to a control center and operators monitor the videos. But human operator monitoring of the views every moment of every day is almost impossible thus we require the smart surveillance systems which have capability of automated scene analysis.

For comparing images Frame Difference Method which can detect moving objects and Background Subtraction method which can detect motion less or standalone objects. The technology judges the current situation in real-time and analyzes the behavioral patterns of the objects and its relation with the surrounding environment [4][5][6].

II. RELATED WORK

Streaming is the process of playing a file while it is downloading. This technology is also known as streaming media. Audio and Video begins playing soon after the stream begins. The user does not have to download the whole file in order to listen audio or watch video. There are several protocols used in streaming technology like RTP (Real Time Transport Protocol), RTSP (Real Time Streaming Protocol), RTCP (Real Time Control Protocol) etc[7].

There are various methods used to detect the suspicious activities/objects in the real time video Streaming: i) Frame Difference Method (FDM) ii) Background Subtraction Method (BSM) iii] Adaptive Background Subtraction Method (ABSM)

i)Frame Difference Method (FDM): This method compares the current frame and previous frame and detects the moving objects by using the difference between the images within the successive frames. This system is mainly used in high resolution image

application and satellite photos which require large competition.FDM has an advantage of being strong to environmental changes. Due to its simple implementation it has short processing time. It has disadvantage that it is inaccurate in detection zone because the background image is used as the previous frame from the current point, and it represents the background image of the current frame. It does not record noise properly and can cause error. Also if there are rapid changes in =the image frame then it cannot recognize the change in the previous and current frame [8].

ii) Background Subtraction Method (BSM): This method has advantage over the previously mentioned method that due to less change in surrounding environments it detects the area of moving object exactly. In this method an image is set as a background image and it is compared with the current frame image. In BSM the luminance value of current image frame is subtracted from background image frame for analysis.

If there is difference between the background image and current frame image then we say that the motion is detected. BSM is sensitive to changes in the surrounding environment but has the advantage of being tolerable in moving object detection. However, detecting moving objects is inaccurate when the surrounding environment changes rapidly.

iii) Adaptive Background Subtraction Method (ABSM):This method resolves all problems occurred in previous methods. It calculates the difference between current frame and previous frame but it updates the background image time to time. And it also minimizes surrounding environment noise.

III. PROPOSED SCHEME

The goal of our system is to provide affordable and quality Surveillance system to every user. IP camera provides features like remote view/remote access but it is not affordable to every user. We minimize the drawback of CCTV camera by providing remote access (real time streaming).This system mainly focuses on minimizing the storage cost. The System is best suited for indoor security as we are 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.

The System works 24X7 and monitors the high priority target area simultaneously it judges if the change is environment change or any other disturbance caused by human activity.

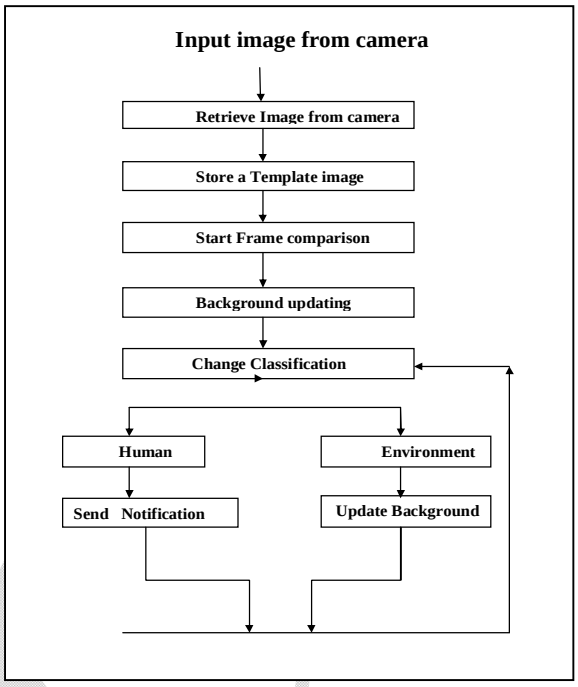

Fig 1: Flow of System

The comparison takes place by dividing the image frame into N number of blocks. Then each block's Centre and its adjacent pixels are compared with the corresponding template image (T_i)blocks. After comparing the image frames we count the number of pixels having different luminance value.

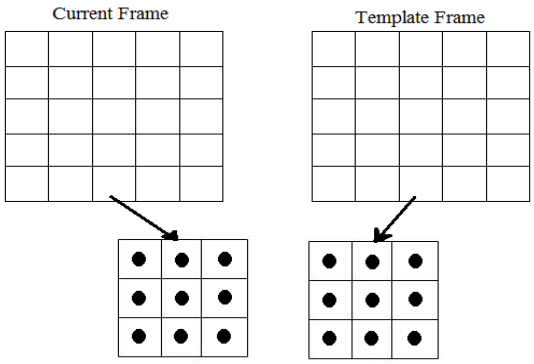

Fig 2: Block comparison pixel by pixel

Summation(C) of pixels having greater luminance value of each block is done and is compared with the threshold (Δt) value. If threshold value is less than the value of pixels that describe the change in the luminance of the image frame ($\Delta t < C$) then it shows that the intrusion is occurred or any unauthorized object is detected in the target area. Else if threshold value is greater than the value of pixels describing the change in the luminance of frame ($\Delta t > C$) then the background image is updated.

After detecting an intrusion or any disturbance in target area the system notifies the user/administrator via SMS and action is taken by them accordingly. The user can access the System remotely and view the area by real time streaming. Then user/Administrator can take required action by performing operations such as playing alarm etc.

Algoritham

Step 1: Get the camera input.

Step 2: Convert the input image into Gray scale using formula.

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

Step 3: The images after converting to gray scale are segmented into the square block with the entire number of pixels, **N**.
Step 4: Calculate the Absolute difference image of the block by using formula.

$$D_n(x,y) = \begin{cases} 1, & |W_n(x,y) - B_n(x,y)| > t_T \\ 0, & otherwise \end{cases}$$

$(x, y=0,1,2,\ldots\ldots,N\text{-}1 \qquad N$: window block size)

Step 5: One-dimensional array declared to store each difference image change rate by block **R(n)** and initialized to 0.

Step 6: Declared the integer variable **C**to calculate the degree of change and Initialized to 0.

Step 7: Repeat the steps 8 and 9 for the block difference image **(Dn).**

Step 8: For background change use the formula.

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

Step 9:If the value of **R(n)** is less than '-1', the background image of the block is updated.
Step 10: if the difference image is created at this time then it is initialized to **0**.

IV. CONCLUSION AND FUTURE WORK

In this paper, we minimize the drawback of CCTV camera by providing remote access (real time streaming).The System is best suited for indoor security as we are monitoring a particular high security. The System sends notification to administrator so that immediate required action is taken. In this system Block wise motion detection algorithm is used for detection the objects. This algorithm works faster than its previous algorithms which used before for detecting objects or activity. It also helps to identifying motion is environmental change or any other suspicious activity and prevent crime with less cost. Our future aim for this System is to make a system that can work with multiple cameras and implementing face detection in our system which can recognize trusted person.

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