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SUSPICIOUS MOVEMENT DETECTION AND NOTIFICATION USING GCM

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Abstract - *Camera surveillance includes movement detection and tracking. The proposed system uses movement detection to detect the intrusion. Cauchy distribution model identifies the moving object. The pixel of moving object in the detected incoming video frame can be detected by using Cauchy distribution model. Pixel value can be found out by setting up threshold value. Hence the accurate movement of the object is identified. GCM services are used for throwing the notifications over smart phone. GCM Notifications are sent only to the registered android application. GCM Notifications are sent in the form of images with the help of IP network. The image can be retrieved and viewed in a smartphone*

***Key Words*: Surveillance, Detection, Cauchy Distribution Model, Google Cloud Messaging.**

1.INTRODUCTION

Visual movement detection and tracking are important components of video analytics (VA) in multi-camera surveillance. Automatic object detection is usually the first task in a multi-camera surveillance system and background modeling is commonly used to extract predefined information such as object's shape, geometry and etc. Video Surveillance systems are used more often these days to keep everyone stay safe. Video Surveillance systems are used for security. While monitoring an area, cameras are set up at strategic locations and the video captured is viewed in one or more screens. This requires a person to constantly monitor the screen. This form of surveillance is highly inaccurate, inefficient and consumes excessive storage space. Advanced movement detection systems trigger a GCM notification over smart phone IP network. Android smart phone can be used for viewing and retrieving the images.

1.1 BENEFITS OF SURVEILLANCE

1.1.1 REDUCING LOSS, THEFT AND VANDALISM

Digital video cameras offer high definition clarity and wider viewing angles. This quality gives businesses the ability to clearly see what is taking place within or around their facility. These clearer images allow the business to pursue charges against individuals caught stealing or vandalizing property. As a result, a more effective deterrent than an analog system that merely catches an individual with poorly defined detail is obtained.

1.1.2 EASIER INSTALLATION, MORE EFFECTIVE IMPLEMENTATION

Digital systems can be installed more easily than analog systems, require less equipment and can help security team more effectively operate the surveillance system. Analog surveillance systems need complex wiring to cameras in order to view multiple video feeds. Today's advanced digital surveillance systems require less work to install and maintain.

1.1.3 REMOTE MONITORING

This might be the most overlooked advantage of a digital surveillance system. With a highly integrated digital video system, the activity can be monitored on surveillance feeds from anywhere in the world, as long as there is connection in the internet. Mobile devices, laptops and tablets are all fair game.

1.1.4 COST EFFECTIVE AND SCALABLE

Digital video surveillance is more cost effective than its analog counterpart. A digital system requires less physical infrastructure to operate than an analog system. Since digital cameras produce higher quality images with wider viewing angles. Digital feeds can be compressed and stored using less space than analog video. Then there is scalability. As the coverage area grows, a digital system can easily grow with your company one step at a time. Digital cameras can be added as needed and easily, and it can be more costly to place analog cameras in remote locations because of its wiring needs.

1.1.5 DISTRIBUTED INTELLIGENCE

With a new digital surveillance system keeping a sharp eye on the activities in your business, and countless hours of the captured video. Analog systems have gaps in security coverage that digital systems fill with distributed

intelligence. It is impossible to sit and view every minute of security footage captured by the digital surveillance system, but distributed intelligence can fill the gap. Available software programs can monitor video feeds to pick up events, activities and specified behavior through the recognition of movement patterns. Alerts are generated and sent to security team. Analog systems simply cannot match this capability.

2 VIDEO SURVEILLANCE

Monitoring the actions, activities of people for the purpose of influencing, supervising, directing, or protecting is called surveillance. Monitoring from a distance by means of electronic equipment (CCTV and cameras), or interception of electronically transmitted information (Internet traffic or it can also be phone calls) is referred to as surveillance. In government and law enforcement sectors surveillance is used so that activities such as social control, recognizing and monitor threats, and preventing/investigating criminal activity becomes easier. Government agencies and other corporations make use of the data collected for marketing purpose. It is applied in business intelligence, which enables the corporation to enhance their products and/or services to be desirable by their customers.

Automatic video surveillance tasks can be broken down into a series of sub problems

1.Movement detection and categorization which detects and classifies the interesting objects in the field of view of the cameras.

2. Multi-Target Tracking (MTT) is to estimate the trajectories of targets, keeping the identification of each target.

3. MTT across cameras with the goal of tracking the targets while observing the through multiple overlapping or non-overlapping cameras.

2.1 PURPOSE OF AUTOMATIC VIDEO SURVEILLANCE

The drawbacks of Traditional passive video surveillance are as follows

1. Available human resources to found out and the observation section is expensive.

2. Ineffective Manual systems make use of multiple cameras.

Automatic systems can accurately detect events and their cost is lower than maintaining a group of operatives. However, none of the state-of-the-art system is able to deal with all the problems a monitored scene typically presents, namely occlusions, illumination changes, shadows, and crowded situations. Detecting and tracking of objects is the hard task. A winning strategy consists in integrating different techniques and data sources in an adaptive framework in order to exploit their advantages minimizing drawbacks.

The computer systems for surveillance purposes are used of four modules

Object Detection

Tracking

Multi-Camera Data Fusion

Event Understanding

2.2 OBJECT DETECTION

Video surveillance separates the regions of the scene belonging to the background from the regions belonging to the foreground (i.e. the moving objects). The methods on image segmentation with dynamic background can be generally classified as follows:

1. Temporal differencing
2. Optical Flow
3. Background Subtraction

3 METHODOLOGY:

3.1 BACKGROUND SUBTRACTION

It is a segmentation technique able to achieve real-time performance, where data is processed through two major steps

1. Background modeling.
2. Foreground extraction.

The background modeling is carried out creating a model that represents the regions of the scene that remain constant in time. Different methods for background modeling and updating have been proposed in literature. Once computed the background model, foreground objects are detected calculating the difference between the incoming current frame and the background model. The output of this operation is a binary mask called foreground image containing the moving objects. The binary image is analyzed in order to find connected components

The moving object is identified using Background Subtraction**.** An image usually consists of foreground object and background object. Subtracting the background object of the image and adding the foreground object of the image at the later stages is known as background subtraction. This leads in effective processing of the image. This leads in accurate object detection and tracking. Unwanted pixels can be avoided using background subtraction technique.

3.2 FIXING THRESHOLD VALUE

When two frames are detected by the system, if the frame error is less than error threshold, then there is no movement or is there is and it is negligible. On the other hand if frame error is greater than error threshold, then there is movement that is to be detected. The pixel value of the moving object is identified by setting up the threshold value. Minimum and maximum value is given when setting

up the threshold value. Threshold detects all the movements of person in the scene with some errors and generates few number of sequenced motions. By setting up error threshold value the pixel of the moving object can be detected.

3.3 CAUCHY DISTRIBUTION MODEL

Image is detected using Cauchy distribution model. It is used for detecting movement in a particular area. It is used for detecting the pixel of the moving object in the incoming video frame. The pixel at each frame is detected. The Cauchy distribution, named after Augustine Cauchy, is a continuous probability distribution. Standard Cauchy distribution is the simplest. In statistics the Cauchy distribution is used as the canonical example of a "pathological" distribution. Both its mean and its variance are undefined. The accurate detection of the pixels at each frame is calculated by the Cauchy distribution model which uses the absolute frame differential estimation.

3.4 GCM NOTIFICATIONS

When movement is detected, the detected image will be saved. First the images are stored in a local server. The images can be uploaded to the Google server. Google cloud messaging services can be used for sending notifications. By using GCM service the images can be sent as notifications to the smart phone.

Google Cloud Messaging (GCM) allows the user to transfer data or images to an Android-powered device. A lightweight message in the form of Notifications telling the user that there are uploaded images or data that are to be fetched from the server (for instance, an image tracked or detected). Google-provided GCM Connection Servers which fetches the messages from a 3rd-part known,application server and transfer those messages to a GCM-enabled Android application that is running. The 3rd-Party Application Server is a component that can be implemented to work with chosen GCM connection server(s). Messages are transferred from APP servers to a GCM server that are connected; the messages are stored and enqueued by the connecting server, and the message is transferred to the connected device when the connected device is online. Connected device is a client APP which is usually an android application. This client App must be registered with GCM to receive GCM messages. If the app is registered with GCM a unique registration ID will be generated.

3.5 VIEWING THE IMAGES CAPTURED

Android applications receives GCM notifications. A unique GCM id will be created for every individual registration. The notifications are also based on the GCM id. This id will be different for each registration and each application. The application is authenticated to avoid unnecessary access. When the image is detected the image is usually compiled in the form of an URL and these images can be viewed and retrieved using this URL.

To monitor and detect movements within a particular area security cameras are used. The first phase is to detect the moving object in the monitored area. A simple but an efficient method is used for movement detection and for comparing the pixel values. The pixel values are captured from subsequent frames. To detect any movement two frames are required. Reference frame is the first frame and the reference frame values are represented for the comparison purpose. Input frame is the second frame and it contains the moving object. The difference in the value of the pixel is determined by comparing the two frames. The third frame consists of pixel value and threshold value. It can also be called as output frame with a black or white background.

The image in the output frame will be white and the background will be black when the difference in the average pixel value is smaller than the threshold value .The previous input frame will now be used as a reference frame after tracking the movement of the object. The process is repeated within the frames that are captured every second. When the difference between the reference and input frames occurs an output image is created. The output image contains an object o be extracted. Video cameras assist in movement detection by capturing the objects of interest in the form of sets of image pixels where qualitative measurements such as recall and precision are used for assessment. The video tracker estimates the location of the object over a time by modelling the relationship between the appearance of the target and the value of the pixel. Determination of the relationship between an object and its image projection is complex. Motion detection refers to the capability of the system to detect and capture the movement and events. Motion detection is also called as activity detection and it is a software-based monitoring algorithm. When the system detects any motions the event is captured. The major application areas of motion detection methods includes visualization of traffic flow, classifying the highway lanes, driving assistance, face detection, interaction of human-machine and remote image processing.

3.6 CAMERA SURVEILLANCE OVER IP NETWORK

Automated computer programs instead of humans are used by surveillance cameras for monitoring. Surveillance camera is used for observing an area. Surveillance cameras are connected to a recording device, IP network. GCM services uses IP network to throw the images to a smart phone. The images can be viewed and retrieved in a smart phone. The IP address of the smartphone should be entered in the login id as well as in the GCM intent service. It allows the GCM service to transfer the images over the smart phone.

4 FEATURES OF REAL TIME SURVEILLANCE SECURITY:

Enables real time assembly and sharing of video information are increasing in demand. Automatic alert when an object is jamming or crossing a railroad or rail track, or a motion recognition sensor which alerts authoritative personnel to the existence of trespassers on tracks, at station and level crossings of the infrastructure. For example, automatic alerts when an object is blocking or crossing a railroad or rail track, or a motion detection sensor which alerts authorized personnel to the existence of trespassers on tracks, at stations and level crossings of the infrastructure.

5 RESULTS AND DISCUSSION

TEST STEPS	EXPECTED RESULT	ACTUAL RESULT
Login Page	Get Access	Got Access
Image Conversion	Gray scale Image	Converted Image
Comparison of pixels	If abnormal pixel is detected , it is stored in server	Abnormal pixel is detected , and stored in server
GCM id generation	Generate GCM id for the registered user	GCM id is generated
Movement detection	GCM alerts are sent	GCM alerts are viewed

Table 1: Test cases

The system will able to accept any modification after its implementation. This system has been designed to favor all new changes. Doing this will not affect the system's performance or its accuracy. This is the final step in system life cycle. Here we implement the tested error-free system into real-life environment and make necessary changes, which runs in an online fashion.

6 CONCLUSION

The project introduced an approach for an effective video surveillance in the current system; this overcomes the traditional Surveying where human monitoring is needed and has to watch keenly for keeping track of the entire system. This project also has a unique feature in which it sends GCM notifications at once, when there is any sort of variation in the captured pixel.

7 FUTURE SCOPE

Though the project has added advantage, in future it will be upgraded into the next level , that is not only by just viewing the captured image, we can also view the entire clip of what happened and what has been captured. All this will be done just at the spontaneous moment, within seconds of the action been happened.

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