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Home Reconnaissance and Surveillance

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Abstract: ***The need for video surveillance and installation of CCTV cameras in public places is increasing due to the increase in crime and crime investigations. Nowadays, home appliances are controlled using mobile applications due to the rapid increase in the use of mobile devices. There have been so many equipments that make use of the GSM/GPRS facility of the handset. There were so many automated systems that inform the remote user about the intrusion of the intruder or attempt to intrude their house was developed. We are proposing a system for surveillance of home. This surveillance system processes by obtaining stream of video from a CCTV camera fixed at a particular location and informed the user about the intrusion via the android application installed in the user's mobile. This Android application installed in the user's mobile interprets the message a mobile device receives on possible intrusion from the server. The message is send to the android application via Firebase Cloud Messaging (FCM). The movement of the object is detected accurately. After the detection of motion and viewing of the image the user realize the intrusion and further actions and be made.***

Key words: Detection of motion, Firebase Cloud Messaging, Cauchy Distribution algorithm.

I. INTRODUCTION

Smart video surveillance is the activity of closely monitoring various situations using video technologies. Nowadays, Video Surveillance is implemented for the security of many locations such as hospitals, voting booth banks, shopping malls, jewelry shops and even homes. The In Smart Video Surveillance system the intrusion of any intruder in the particular monitoring environment is identified using motion detection technology. Here in this project motion detection is done using the Cauchy distribution model. The process behind Cauchy Distribution model is comparison of current frame obtained from the continuous stream of video sequence to the previous frame, which is taken as the reference frame. If the difference between the reference frame and the current frame exceeds a threshold limit, it is detected as motion and detected pixel is identified.

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This process is proceeded by sending an alert to the Android mobile of the user via Firebase Cloud Messaging (FCM). The detection of the motion is identified when the difference between the frames exceeds the threshold limit; the corresponding image is captured and stored while the user is notified with a FCM alert. This captured image can be saved and viewed by the permitted
user on the Android Smartphone. The performance of this method is found to be better than the other existing systems as it enables the user to take immediate action to stop the crime while it is in progress.

II. EXISTING SYSTEM

[1] The algorithm behind "Surveillance of Object Motion Detection and Alert Using Android" is subtraction algorithm. This algorithm calculates the difference between the background and foreground image to identify the motion in the particular surveying area. The exact image of the moving object can be detected. Once a motion is captured a GCM alert will be send to the user. The user is alerted via the android application installed in his/her mobile.

[2] The detection of a movement in "Modeling of Moving Object Detection using GCM alert" is done by comparing the pixel change in the streaming video. To detect the motion two frames are needed. For a particular area to be surveyed the camera should be placed within 5meters. The motion is detected by using a simple and efficient scanning method. The video obtained from the surveying camera is scanned line by line. The background and foreground frames are scanned line by line for pixel changes. The image thus obtained by the scanning is referred as first-generation image and video is represented in the form of matrices.

[3] "Modeling of moving object detection and GCM system" is the improved version of the previous method. Here the moving object is identified accurately by improving the scanning mechanism. In this method the clarity of the captured motion detected image is improved.

[4] "Multilayer background subtraction based on color and textures", the goal behind this method is to construct statistical representation and to maintain the scene that is to be modeled. This method utilizes both color and texture for detecting the pixel changes in the foreground and background frames obtained from the video stream.

[5] The concept behind "Real-time background foreground segmentation using codebook model" is the capability of extracting a image from the streaming video obtained from a surveillance camera fixed in a particular. A familiar method for differentiating moving objects from the video stream is background subtraction. The process of background subtraction is to subtract the current frame from a reference background frame.

This subtraction helps to discriminate the non stationary object in the video stream.

[6] "Statistical model based change detection" concentrates on the issue of detecting the moving object from a video sequence in the presence of noise. To rectify this issue different statistical observations are made. The null hypothesis on distributions of these statistics observations are made so that significance tests can be carried out. This method have three advantages: the accuracy in observing boundaries between changed and unchanged areas is improved, it regularizes the effect on these boundaries to smooth them, and it eliminates small regions if the original data permits this.

[7] A digitized image or video is represented by means of frames per minute. Each captured frame is then represented by various components like three colors or more, each component in turn represented by a set of pixel. The process is preceded by scanning the frame component line by line. This process is referred as first general representation. This process contains some issues like camera quality, scanning technologies and simplicity of this representation. The First-generation image and video in turn represented as one or more matrices.

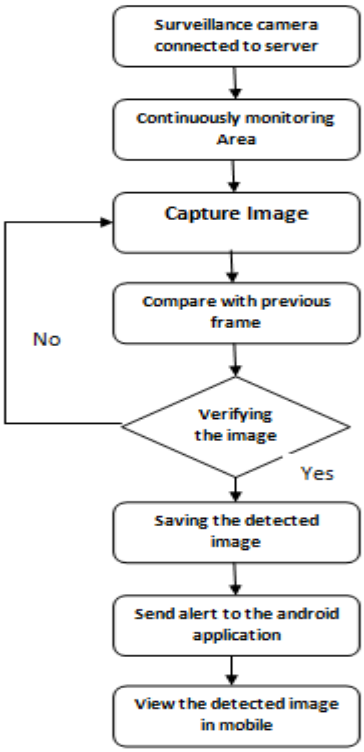
[8] The next step in application of automatic video analysis to surveillance systems is the multistage tracking technologies. Vehicle traffic monitoring, human specific activity surveillance for unusual behavior, people counting, pedestrian surveillance etc are the applications of visual surveillance. The three building blocks of surveillance application consists are: moving object detection, tracking of object, and high-level motion analysis.

III. PROPOSED SYSTEM

We are proposing a system in which the motion of the object is identified using the Cauchy distribution algorithm. The moving object is identified by comparing the previous frame and the current frame obtained from the streaming video sequence. The exact image of the moving object can be detected by means of pixel changes in the video sequence. Due to the increase in use of android mobile, controlling home appliances and home security became simpler and easier. When intrusion is detected the captured image will be saved in the server storage. Major advantage of this method is as soon as the detection of motion, the system will notify the user by sending a message to the user's mobile application via FCM. Users can retrieval the Images via android application to know whether the detected images are important and can be avoided accordingly. In response to the alert, the user can inform the intrusion of strangers to the nearby police station or can call the person by the mobile number registered in the emergency contact.

IV. FLOW DIAGRAM

Figure 1 represents the flow diagram of the system.



V. MODULE DESCRIPTION

5.1 Authentication the user

Authenticating the user is a necessary module for verifying the user and authenticating the application to access the system service. This module authenticates the user to view the detected image in the application. For authentication the user has to register with username, email address and mobile number. Using email address and mobile number user can login to the application.

5.2 Detection of motion

The process of motion detection is done using a Cauchy Distribution Model and Absolute Differential Estimation which works by comparing the background frame and incoming video frame. The pixel changes between the frames are calculated and thus the moving object is detected.

5.3 Sending FCM alert

When a motion is detected, the captured image is stored in the server system and then intrusion will be notified to the Google server, the Google server in turn send a FCM Alert to the user's mobile via the android application installed in that particular mobile. Firebase Cloud Messaging for Android is a service that allows you to send notification from your server to your user's Android mobile. This alert by FCM indicates that there is some data to be fetched from the server. This is how these components interact:

- Google-provided FCM Connection Servers, which take information from an application server and send this information to a FCM-enabled Android application of the user.

- The user Application Server is a component that is implementing in this work with the chosen FCM connection server(s). FCM connection server receives message from the app servers; the connection server stores the message, and then send it to the device which is online.
- The Client Application is a FCM-enabled Android application running on a device. To receive FCM messages, the application must register with Fire Base Messaging and get a registration ID.

5.4 Viewing the detected image

Android application will receive the notifications by FCM id which is recorded in Google account. Application id is distinctive for every application. After receiving the FCM alert from the server the image can be viewed in the application using the URL received from the FCM alert. A cctv camera is fixed to the particular environment that is to be monitored. The first phase is the detection of motion in the monitoring area. The detection of a motion uses a simple method for comparing the pixel values between frames captured from the surveillance camera every minute. For a motion to be detected the system needs two frames, the reference frame and the input frame. The reference frame is for comparison purpose. The input frame is obtained from the video stream which is compared with the reference frame. The difference in pixel values is determined by comparing the two frames. The frame with moving object is called the output frame. The input frame is now considered as a reference frame and the output frame is considered as the input frame. This process is repeated every two second and the same method is applied until the process completed. The resultant image contains an object that will be extracted..

5.5 Emergency Call Alert

There will be three options for making emergency alert. When receiving an emergency notification from Firebase Cloud Message, the user can share the image to three registered person. The first option is contacting the nearby police station. The second option is sharing the image to the parent. The third option is sharing the detected image with the friend. Mobile number of the emergency contact person should be registered in advance.

VI. RESULT

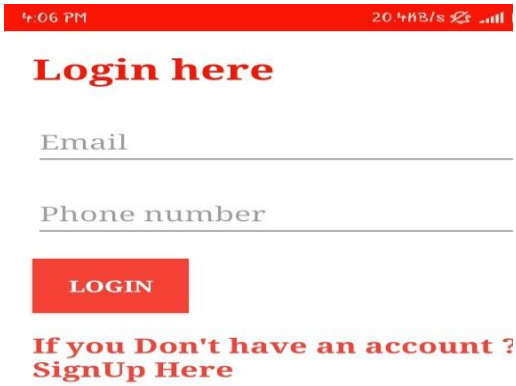


Fig 6.1 Login Page

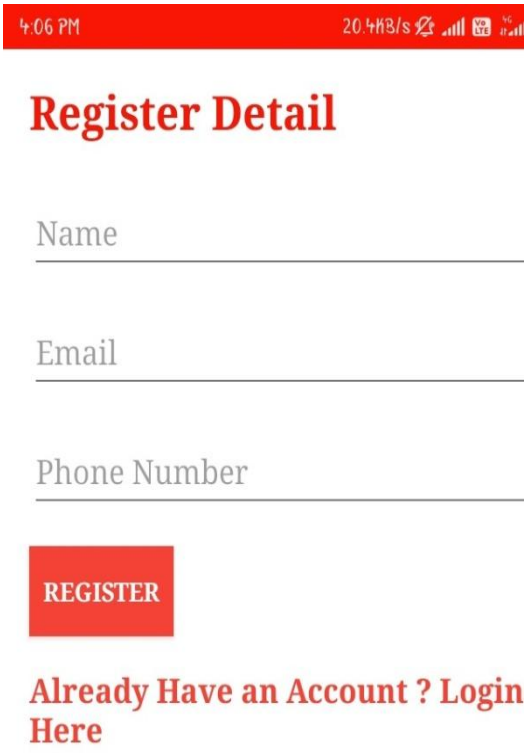


Fig 6.2 Registration Page

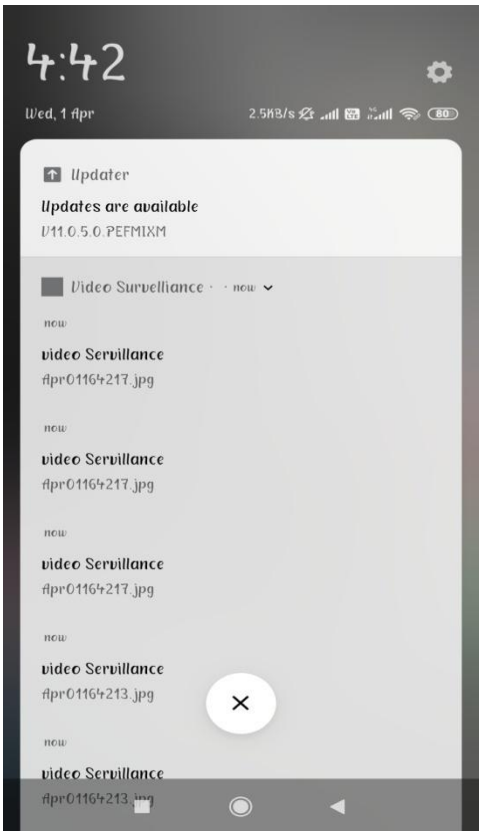


Fig 6.3 Receiving Notification

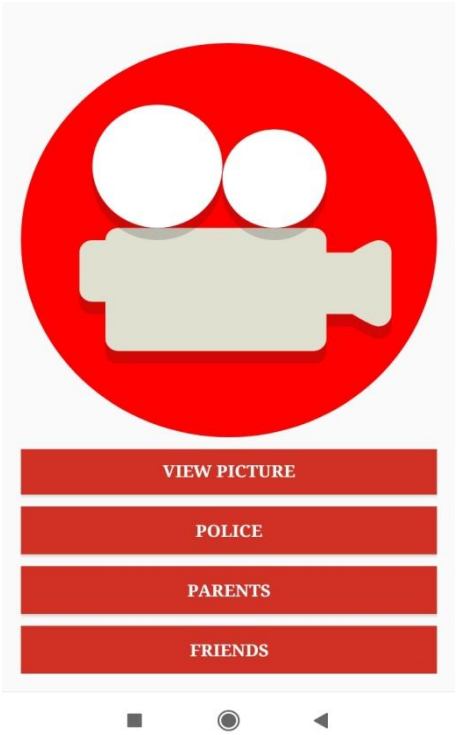


Fig 6.4 Emergency Contact

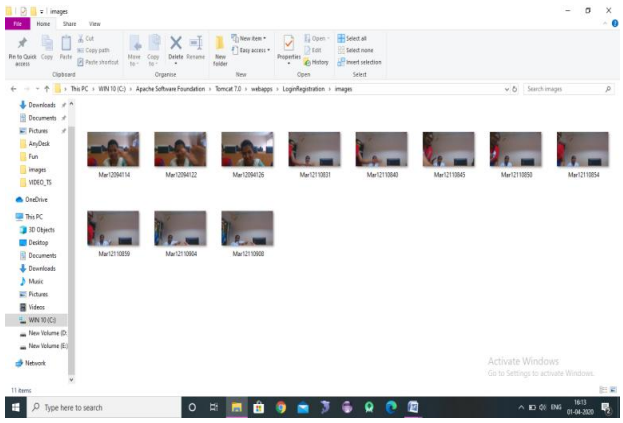


Fig 6.5 Storing in server

VII. CONCLUSION

This project introduced an approach for efficient video surveillance system that overcomes the traditional surveying method where human participation is necessary for surveillance. In this system, we have proposed a distinctive technique that overcomes the issues with the traditional system. Android enabled smart phones are essential for receiving the detected image from the server. This system has a special feature in which a FCM alert will be send to the android application installed in the user's mobile as soon as intrusion is detected.

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