Surveillance Camera with GCM Technology

M. Rajesh Khanna

Abstract: This paper makes use of the dual functionality in the surveillance camera 1: video capturing, 2: capturing photos based on motion. The main aim of this project is to find the intruder as quick as possible. Using the application, the surveillance video camera is converted into object detector based on motion. Each object that it captures are taken as frames. During frequent motion, these frames will change continuously. Using Cauchy distribution algorithm, the initial frame is compared with the current frame. If any change is found then this algorithm immediately informs the server along with the photograph of the captured intruder, sends push notification via Google Cloud Messaging(GCM) and gets stored in the storage for future backups. The alert message is sent using Android toolkit. Only the authorized person can view that intruders image. This paper can be used in many fields as it provides efficiency and also quick alert.

Index Terms: Cauchy Distribution Algorithm, GCM, Android toolkit

I. INTRODUCTION

Surveillance Camera technology has been deployed in many fields in recent years. Surveillance cameras are used in heavily crowded areas and in more private areas. In both the areas, the main aim is, to detect the crime that happens with the proof that the particular intruder is responsible for that. This paper mainly focuses on the Banking sectors. The intruders pay their attention to the areas that have more money. In order to capture those intruders and to save people's money, this project has been employed in banking sectors. Video Surveillance systems have increased their performance to allow different users (operators and administrators) to monitor the system, selecting different operators depending on the system status and to access live video and recorded video from a different angle. For example, using their mobile devices. In order to inform the presence of the intruder to the administrator, Android technology plays an important role. Android is a software which is implemented in mobile devices that includes several factors such as operating system, middleware, and applications which are suitable for the development of the end - user surveillance application. The burglary rate of India is 8.2 in the recent statistics. At the current scenario when an intruder attacks the banks, the respective bank comes to know that later and also the camera will save the recorded images in a server room. During the investigation police must go through the entire video to detect the intruder. To overcome such robberies new application has been implemented with the surveillance camera in the paper.

II. ARCHITECTURE DESCRIPTION

The application server contains a video server as a part in it. i.e. a central PC which is outfitted with a mobile phone of the authorized person. A standard image is preserved at the server side. A web-camera, which is a part of the video server, constantly catches the images. The system can start and stop camera using OpenCV(Open Source Computer Vision) functions and also video recording takes place using OpenCV. When the intruder enters the spot, these captured images are constantly compared with the standard image and sends a notification message to the authorized person. The system holds 2 modes which are DAY MODE and NIGHT MODE. During Day mode, normal video capturing takes place since there will be the presence of people everywhere. Whereas during Night mode, image capturing takes place and comparing with standard image takes place after detecting the presence of the intruder. If the intrusion is discovered, the server sends the notification to the authorized person via GCM(Google Cloud Messaging) technology. The authorized person is responsible for switching the modes from Day to Night and vice versa. The authorized person is detected based on the priority. The people who have registered at the last will be given the highest priority. This priority is based on Queueing Algorithm. Meanwhile, the system stores the captured images to the Storage unit.

III. DOMAIN INTRODUCTION

Surveillance cameras have been installed to capture the intruder red -handed. There are three types of algorithms that are being used in this project. They are 1: Cauchy Distribution Algorithm, 2: RGB Algorithm, 3: Gaussian Blur Algorithm. Every algorithm has its own specialty.

A. Cauchy Distribution Algorithm

This algorithm will compare the images frame by frame without overlapping. Initial frame is compared with the current frame(i.e: The frame that has been altered). This algorithm is responsible for detecting the frames that are been altered. And also it provides high-frequency images as output.
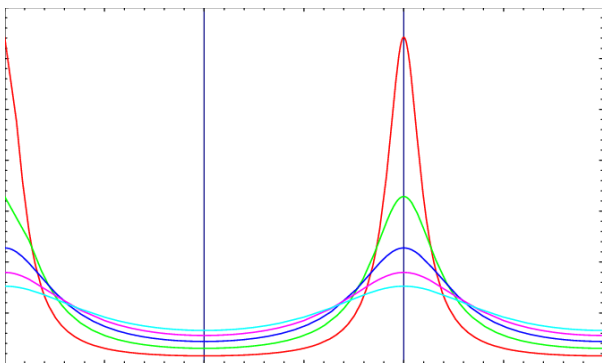

Fig. 3.1 Graph during different stages of comparison.

B. RGB Algorithm:

In this algorithm, RGB(Red, Green, Blue) colors are added up together to make different color formats. This algorithm is used in many image processing fields. This algorithm is responsible for detecting the captured images based on RGB(Red, Green, Blue) format. Moreover, it provides a sharp outer layer detection so that the images of the intruder is clearly visible.
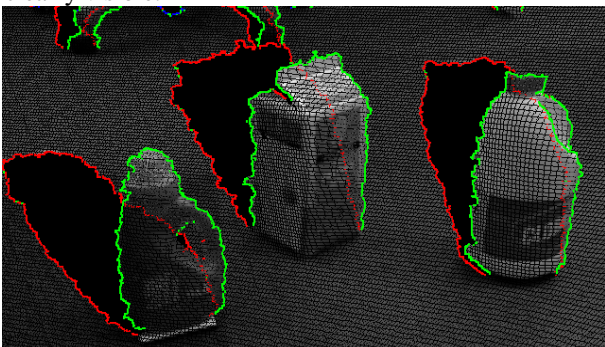

Fig.3.2 Providing sharpness to the captured image.

C. Gaussian Blur Algorithm

In image processing, a Gaussian blur algorithm is widely used. It is done to smooth the images that are with high sharpness. It is used graphics software, to reduce image noise. Excess sharpness is blurred using this algorithm and it provides smoothness to the captured image.
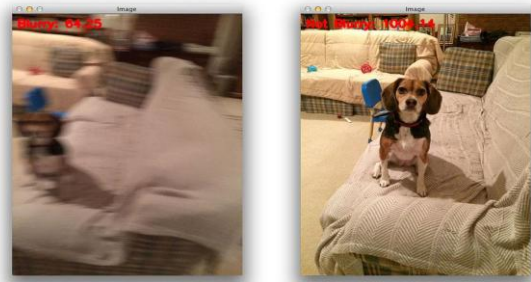

Fig. 3.3 Obtaining clear image using Gaussian algorithm.

Surveillance is defined as the managing of activities, behavior and other modifying information. It is mainly done to influence, to manage, to direct, or to protect. It is an uncertain practice, therefore creating positive effects, at other times as negative. It is sometimes done in a surreptitious manner. It usually refers to the supervision of individuals or groups by the government or the private organizations to manage the suspicious activities and to detect intruders.

IV. MATERIAL AND METHODS

Border Intruder Detection System Based On Computer Vision Published by Shivani & Dr. Lakhwinder Kaur on Second International Conference On Innovative Trends In Electronics Engineering (ICITEE2), 2017. This reference project is created using Matlab(Matrix Laboratory) and an algorithm called boundary-based feature extraction algorithm. This project mainly focuses on detecting intruders.

A boundary box is been used and any object that falls on that particular range is been detected. The main drawback of this project is, any object that falls under this boundary box is been detected. So, any object(human beings/ animals) will be detected. Other than intruders these objects are of no use but they are been detected. There are three different algorithms (RGB Algorithm, Cauchy Distribution Algorithm, Gaussian Algorithm) which have been used by replacing boundary-based feature extraction algorithm. They are responsible for capturing the images of the intruder. Only the images of the intruder will be captured since the images are detected based on pixel size using Cauchy Distribution Algorithm. Then, the captured images are sent to the authorized person using an Android application. The captured image may be blur/ not clear enough to view so, RGB and Gaussian algorithms are used to get a clear image of the intruder.

V. RESULTS

This paper is mainly used to capture the intruder as soon as possible. The three algorithms play a vital role in capturing the intruder's image. And also the Android application is useful in sending a notification message to the authorized person. When the intruder is being detected, the surveillance camera captures the image and sends it to the authorized person and also stores the image for future verifications.

Fig:5.1 Sign up with the surveillance system.

Fig: 5.2 Registered person receives notification message

Fig:5.3 The intruder who is caught red -handed.

VI. DISCUSSIONS

A security system with surveillance camera is becoming more important due to the increasing crime and theft around us. Surveillance cameras play a vital role in capturing intruders. And this project will be more specific to capture the intruders red -handed. This is the major reason why most of the people are protecting their homes and business centers with surveillance cameras. Surveillance cameras that are equipped with internet connection are a good way of monitoring your home as well as your business. With the help of the internet connection, the intruders can be viewed from anywhere. This allows owners or the authorized person to keep an eye on their property. Even the presence of the intruders can be detected with the help of e-mail systems. This will reduce crime levels to a considerable extent. For many years, the surveillance camera systems have become more and more affordable. This could be the reason why many people trust the surveillance camera systems.

VII. CONCLUSION

This paper is developed mainly to reduce the crime levels to a considerable extent. This is an advanced form of traditional surveillance camera systems where continuous monitoring is required. As soon as the intruders are caught on camera, the authorized person is sent an alert notification via GCM. An android connection is needed to achieve this. This project can be implemented in any areas if thief must be caught red -handed.

REFERENCES

1. Laptev, M. Marszalek, C. Schmid, and B. Rozenfeld, "Learning realistic human actions from movies," in *Proc. CVPR*, 2013.
2. J. Nielbes, H. Wang, and L. Fei-Fei, "Unsupervised learning of human action categories using spatial-temporal words," *IJCV*, vol. 79,pp. 299–318, 2015.
3. P. Matikainen, M. Hebert, and R. Sukthankar, "Representing pairwise spatial and temporal
4. relations for action recognition," in *Proc. ECCV*, 2017, vol. 6311, pp. 508–521
5. Shivani and Dr. Lakhwinder Kaur, "Border Intruder Detection System Based On Computer Vision," in Second International Conference On Innovative Trends In Electronics Engineering (ICITEE2), 2017.
6. Archana. C .S and S. G. Krishnan, " CDM for Motion of the Object Detection,"International Journal Of Engineering And Computer Science ISSN:2319-7242 Volume 3 Issue 3 March, 2017 Page No. 5138-5142 .

AUTHORS PROFILE

M.Rajesh Khanna, has received Ph.D degree on 2019.Currently working as Associate Professor in Veltech Multitech Engineering college.