

Smart Surveillance system for theft detection using image processing

Mandar Shriram Munagekar

Department of Computer Science, DYPIET Pimpri Pune, Maharashtra

Abstract - Surveillance video is used for watching known threats in real time. Video Surveillance is used to observe unusual activity going on to prevent crime. Today most shop owners have CCTV cameras to record, these uncertain activities but these systems do not detect theft. If a system to detect theft which is efficient and faster is not designed, then it would be difficult to detect theft. The existing systems currently present in the market are CCTV, Sensor and Trip Wires. This paper represents the detecting a crime taking place in an enclosed environment and catch the theft in an efficient manner. This paper uses Canny edge detection algorithm to prevent theft. As this technique provides total security by detecting and catching of unusual activity happening. Moreover, proposed system does not waste its memory by recording the activity unnecessarily. Hence saves lot of wastage of memory of hard disk.

Key Words: Intrusion detection, Security, Video surveillance, Edge detection, Grabbing

1. INTRODUCTION

Surveillance video has two key modes one is to watch for the threat happening and other is to search for that threat. Nowadays shop owner use CCTV which only records all the activity going on in the shop. Only recording the stuff takes large amount memory in hard disk that result in unnecessary usage of memory. And CCTV only records the data if any theft takes place, so one must go through all the video recordings and search for the video when theft happens. This method is time consuming and takes lot of efforts. Even most of the shop owners use trip wire Sensor, this is also a good technique to monitor crime, but it takes more financial aids for installations and these take lot of extra efforts at the time of deployment. In this technique false alarm can be generated if a wire is cut by any insect.

A system should be designed which can overcome all the downside of the existing systems in practice currently. This paper overcomes the shortcomings of above mention technique to find of crime taking place. The proposed system eradicates the additional installation cost needed and no upgrading of the system is required. So now the people in commercial business does not have to spend a lot of money in installation and upgrading. The thief is detected by intrusion detection as soon as there is intrusion the information of theft is passed on to owner and police station number which is stored in database.

Let's now see how the system exactly detects the theft, consider an example where a person is entering a diamond

factory to steal diamond and the factory has a camera installed which will monitor the activity that is it takes the video recording of it, and this camera captures the frames from the recording for very second, let's say it is set to 5 second. Then that frame is converted to image as the theft has entered the factory, so the frame previously taken do not match with the current one, so the intrusion is detected by using edge detection algorithm. And when intrusion is detected, alert is raised by calling to owner and police station and sending theft images.

The paper uses algorithm called Canny Edge Detection Algorithm is a multistage algorithm. This is used to preserve some properties of image for further image processing. This algorithm is used for image edge calculation and criteria is:

To locate no of edge in the image and to find all probable edges in the image.

Detection of all the possible real edge or at least near value to real edges.

The various stages of this algorithm are:

- 1] Smoothing: It is blurring of image to remove noise
- 2] Finding Gradient: Edge should be marked where gradient of image has large magnitudes.
- 3] Non-Maxima Suppression: only local maxima should be marked as edge.
- 4] Double Thresholding: potential edge is determined by thresholding
- 5] Edge detection using hysteresis: Final edges are determined by suppressing all edges that are not connected to a very certain edge.

2. RELATED WORK

Problem 1:

Traditional video surveillance systems use real time monitoring mechanism [1] which results into wastage of memory space and could become difficult to find out footage which shows theft occurred. This passive monitoring records surveillance [1] video 24x7 and thus leads to excessive cost. Conventional approaches based on browsing time/camera-based combinations are inadequate.

Methodology used:

As opposed to the traditional video surveillance systems, the authors are proposing real time theft detection mechanism which comprises of image processing techniques which results into faster theft detection without using time/camera-based combinations. Also, the anticipated system will start capturing video when possible theft detection is analyzed.

Outcomes:

The important resultant outcome is system will take minimum memory space and will store accurate theft detection footage. The active system will identify theft detection automatically and will store footage of theft happened.

Problem 2:

Conventional video surveillance systems are not completely automatic [2]. These systems do require human operator [2] who interprets the acquired information and controls the evolution of the events in a surveyed environment. These human operators [2] are responsible for noticing the unusual situations and discovering theft. The requirement of human operators induces to wastage of human efforts and subsequent rise in effective cost.

Methodology used:

In this paper we present a system in which image processing algorithm is used to identify theft detection automatically. Here Canny edge algorithm is used which will maintain status of edge pixels. The status of edge pixels of two captured images will recognize uncommon circumstances and alert to the owner.

Outcomes:

The anticipated system will be entirely automatic and will perform functions like determining theft, recording the footage, notifying the owner and police by itself.

Problem 3:

Orthodox video surveillance systems require human hours or specialized software [3] to discover the theft transpired and may require revisiting again [3] and again to identify appropriate footage for investigation. Some of the algorithms include Euclidean algorithm [5], linear filtering algorithm, and anisotropic diffusion and so on.

Methodology Used:

In this paper, the purpose was to ascertain the most suitable algorithm for analyzing video in real-time and probing large video databases swiftly. So, the authors came up with notion

of using Canny edge detection algorithm which have shown realistic faster approach for real-time video analysis.

Outcomes:

The experimental evaluation shows that the Canny edge detection algorithm is both fast and accurate. Our outcomes indicate that a substantial timesaving can be accomplished when searching video surveillance databases using the described technique.

Problem 4:

Traditional video surveillance system usually consists of some sensor device [4] and hardware such as trip wire, Intruder alarm sensor [2], Identification card, Microwave/Radio signal sensor etc. This leads to drastic increase in overall cost of the system which is directly proportional to scalability of the system.

Methodology used:

In this paper, the authors are propositioning a sensor less system which will not require any type of dedicated sensor. A surveillance device is enough along with computer to identify theft. This is achieved by using real-time video analysis.

Outcomes: The system will only require devoted surveillance equipment to capture and analyze the unusual situations. The proposed system will be cheaper and simpler to use.

3. PROPOSED METHODOLOGY

The proposed method can be explained by following 3 modules:

Module 1: Grabbing Frame.

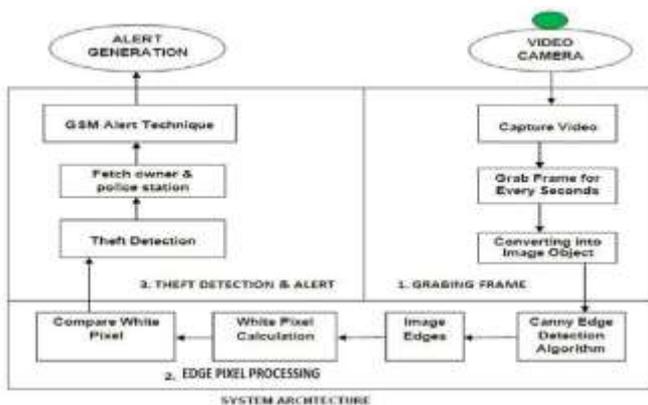
Firstly, camera will simply record the event. The recording is not stored in the secondary storage device, only the frames are Grabbed from the video recording for a second let us consider pixel span is set to 5 seconds. So, for every 5 second a new frame is taken from the event which is lively going on. The matching of frame takes place to detect intrusion. If intrusion is detected, then further process is carried out.

Module 2: Edge Pixel Processing

The frames are converted to image. Then by using Canny edge algorithm the image obtained is made blurred to remove noise. Then number of edges in the image is highlighted by whitening the outer edges, the other edges and object is blackened. This is used to detect intrusion as the previous image and when the image when intrusion happens will have some diverse edges.

Module 3: Theft Detection and Alert

White Pixel Calculation is done by counting pixels and compared by current pixel and previous one to observe any disturbance occurrence is there in the pixel number. If there is any variation in the count of pixel then intrusion happens. The pixel count of any small object will be not as much of human and the range of pixel count when intrusion happen by human will be already fetched in the system. Theft Detection takes place by raising an alarm by informing owner and nearby police station. And my mailing the theft images to owner by using JMF media file.



4. ENVIRONMENT OF THE PROJECT

This java-based project is developed using NetBeans as an Integrated Development Environment (IDE) and MySQL as backend technology. The developed system takes grabbed images from surveillance camera as input within time and uses Canny edge algorithm for processing these images. The sighting of theft and alarm generation activities is output of the system.

4. CONCLUSION

To put it briefly, real-time surveillance is essential to guarantee the effective theft detection. Conventional video surveillance systems require either human operators or sensor mechanisms. Here the use of Canny edge detection algorithm helps to detect the theft swiftly and automatically. Again, the system requires only surveillance equipment to detect theft. The proposed work is forthright and simple to use.

ACKNOWLEDGEMENT

It is a moment of pure gratification in presenting paper on “Smart surveillance for theft detection using image processing “. I take this opportunity to thank those who abetted me immeasurably during this project and whose efforts I will always appreciate and reminisce. I express our appreciation towards my project guide Ms. Jyoti Rao for her valuable suggestions, her indefatigable efforts to guide us onto right direction towards completion of project. I would

also like to extend my sincere appreciation to all staff members of Computer Department, without their assistance and co-operation the Project would not have been a triumph.

REFERENCES

[1]. A. Hauptmann, "Lessons for the Future from a Decade of Informedia Video Analysis Research", International Conference on Image and Video Retrieval, 2006.

[2]. M. Naphade, et al. "On the Detection of Semantic Concepts at TRECVID", ACM International Conference on Multimedia, 2004.

[3]. H Lee, A Smeaton, N O'Connor, N Murphy, User Interface for CCTV Search System, Imaging for Crime Detection and Prevention, 2005. ICDP 2005.

[4]. E. Stringa and C.S. Regazzoni, "Content-Based Retrieval and Real Time Detection from Video Sequences Acquired by Surveillance Systems", IEEE ICIP, 1998.

[5] Tasleem Mandrupkar, Manisha Kumari and Rupali Mane, "Smart Video Security Surveillance with Mobile Remote Control", 2013. IJARCSSE 2013.