Alert Based System for Real-time Suspicious Activity Detection

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Abstract- Alert based systems for real time suspicious activity detection is an active research area. In this work we have worked on abandoned object detection that is a type of suspicious activity. Real time video surveillance systems that are used in places such as airports, railway stations or different public places, can bring security to an upper level. Security is a major issue in this era. So, it has become crucial to set up proficient risk recognition frameworks that can identify and perceive possibly risky circumstances and alert the authorities to make a suitable move. The video surveillance systems that are used for security reasons require more intellectual and more robust technical directives. In this Proposed research work is to detect abandoned objects in real time. This work depicts a framework that perceives the event of somebody leaving baggage unattended in public areas either intentionally or mistakenly. Tracking of intentionally left object is a major problem as it imposes serious security risks. Also, proper tracking of mistakenly left object is another issue to resolve. Therefore, proposed system invokes an alert mail to the authorized person whenever it encounters a left object. This system can be used in railway stations, air ports where we want to detect real time abandoned objects. The video surveillance systems that are used for security reasons require more intellectual and more robust technical directives.

Keywords—Video surveillance; Object detection; Background subtraction; Background buffer; Moving object detection.

I. Introduction

Tracing and identifying objects using video surveillance is an important topic in computer vision and has diverse potential applications. There are several abnormal activities occurring in day to day life such as abandoned object, theft, abnormal health of patients and falling down of elders at home. Accidents or rule breaking activities such as illegal U-turns, illegal parking and reckless driving on road, violence such as slapping, punching, hitting, shooting at public places can be detected by surveillance cameras. Fire detection system also requires an intelligent surveillance system that can generate an alarm or alert automatically. In law enforcement, and military applications, there are immediate needs of automated surveillance systems. Now-a-days, explosive attacks are more dangerous activity for the community places performed by terrorists. Terrorists target to the more sensitive jam-packed public areas such as airports, bus stations, railway stations, government buildings and shopping malls. They come to these places and leave their luggage(bomb) for explosive attacks. It is difficult for the security guards to watch over the crowded public places and identify the suspicious objects. Mounting video cameras is cheap but finding available human revenues to observe the output is expensive.

We have worked on abandoned object detection. There are many methods for abandoned object detection. We are using background subtraction method. We are creating a background buffer and after every 4 second we are matching the background buffer and current background. If there is difference between current buffer and background buffer and also there must be difference in ending operations on frames. It will be said as abandoned object Proposed work can identify abandoned object at run time and is able to send alert by email.

II. Related work

Sacchi and Regazzoni (2000) presented a distributed video surveillance system to detect the presence of abandoned objects in unmanned railway stations. In this, an alarm issue is transmitted after recognizing an abandoned object to a remote-control machine that is located few miles far from the guarded stations. This system employed a direct sequence code division multiple-access technique to ensure noise-robust and secure wireless transmission links between the remote-control machine and guarded stations. Chuang et al. (2009) presented a novel method to detect the abandoned object. To detect suspicious human activity, kernel-based object tracking has been used to track the object. Forward-backward ratio histogram and a Finite State Machine have been used to recognize the transferring conditions and provided the100% accuracy for abandoned object detection. But, Ratio histogram method used 2^12 colour bins to identify the abandoned object which trades off between the efficiency and accuracy. Bhargava et al. (2009) presented a framework to detect the threat that

utilizes spatial-temporal and contextual cues to detect baggage abandonment. In this framework, if an un-attempted object is discovered in the video, the system tracks to the previous video frames to recognize owner of that object. The person who carries the object into the scene and sets it down at the location it is found, is considered the owner of the luggage. A background subtraction has been used to detect foreground object sand k-nearest neighbour classifier has been used to classify foreground blobs in the frames as luggage and non-luggage class. Thek-N classifier of this system failed to detect the baggage which was very close to a person sitting near it. This positional ambiguity can be removed by adopting fused information of multiple cameras. Nam (2016) used spatial-temporal features to detect abandoned and stolen objects in crowded scenes in real-time. Adaptive background modelling has been used for the removal of ghost image and stable tracking. Spatial-temporal relationship is determined between moving human and suspicious object to detect abandoned or stolen object. This method employed a vector matching algorithm to detect partial occluded object and also employed a tracking trajectory to reduce the false alarms. This system can be improved by calculating parameters and threshold automatically using incremental learning rate.

III. Existing System

In existing system there are webcams/CCTV cameras installed in mostly public places. The problem is to continuously monitor these Good Evening cameras. CCTV cameras can record activities but they are unable to process data. So, organisations need to hire a person who would continuously observe all the activities. It is not possible for a human to monitor a system 24 hour. There are so many reasons for a human to make mistake. In our proposed work, we can identify abandoned object at run time and also can alert authorised person by email with device id.

IV. Proposed system

In our proposed algorithm we are taking input from webcam then we are extracting frames. Initially, 200 frames are used for background modeling then they are stored in background buffer. Every incoming frame is subtracted and converted into binary image and noise is removed from these frames. Ending operation is performed on binary images. If static object is found in binary frames and also there is difference in background buffer, we will identify that object as abandoned object and send alert to authorized person.
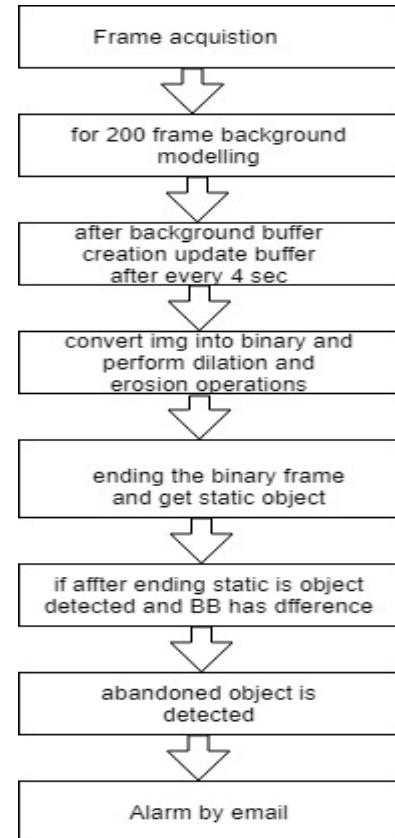

Figure 1 Flow Chart of Proposed Algorithm

V. Methodology

A.   *Background Subtraction*
Foreground detection or Background subtraction is a common and extensively used technique for generating a foreground mask. (a binary image containing the pixels fitting to moving objects in the scene) by using static cameras. Foreground detection calculates the foreground mask carrying out a background subtraction among the present frame and a background model, containing the still part of the scene or, more in general, everything that can be measured as background given the characteristics of the observed scene.

B. *ROI (Region of Interest)*
ROI defines the limits of an object under consideration. It is a part of an image that one would want to filter or perform some other operation on. ROI is defined by creating a binary mask, which is a two image that is the same size as the image to be processed through pixels that define the ROI set to 1 and all other pixels set to 0.

C. *Erosion and dilation*
In dilation and erosion are dual operations in that they have opposite effects. If a binary image is considered to be a gathering of connected regions of pixels set to 1 on a

background of pixels set to 0, then erosion is the appropriate of a structuring element to these regions and dilation is the fitting of a structuring
component into the background.

D. Thresholding

Image segmentation (Image thresholding) is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images. In this process, separate pixels in an image are visible as "object" pixels if their worth is better than some threshold value (assuming an object to be brighter than the background) and as "background" pixels then. An object pixel is given a value of "one" while a background pixel is given a value of "zero". Finally, a binary image is formed by coloring each pixel white or black, depending on a pixel's labels.

VI. Experimental Setup:

The whole experiment is carried out in Matlab2013a where the object detection is done by Background subtraction for the body detection. The image of the object is brought into more accuracy with the help of Morphological Closing. For many vision-based systems, it is important to detect a moving object automatically. Computer vision processing, analysis and machine vision represent an exciting and dynamic part of cognitive and computer science. Vision System included high resolution camera and hardware card (supported to camera) and camera is interfaced with pc.
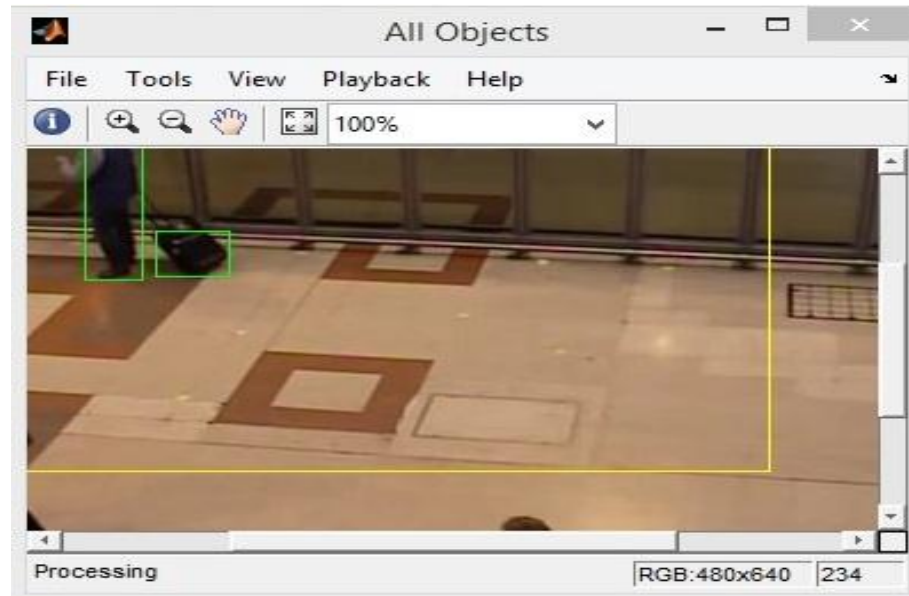
VII. Results

Figure 2 all object

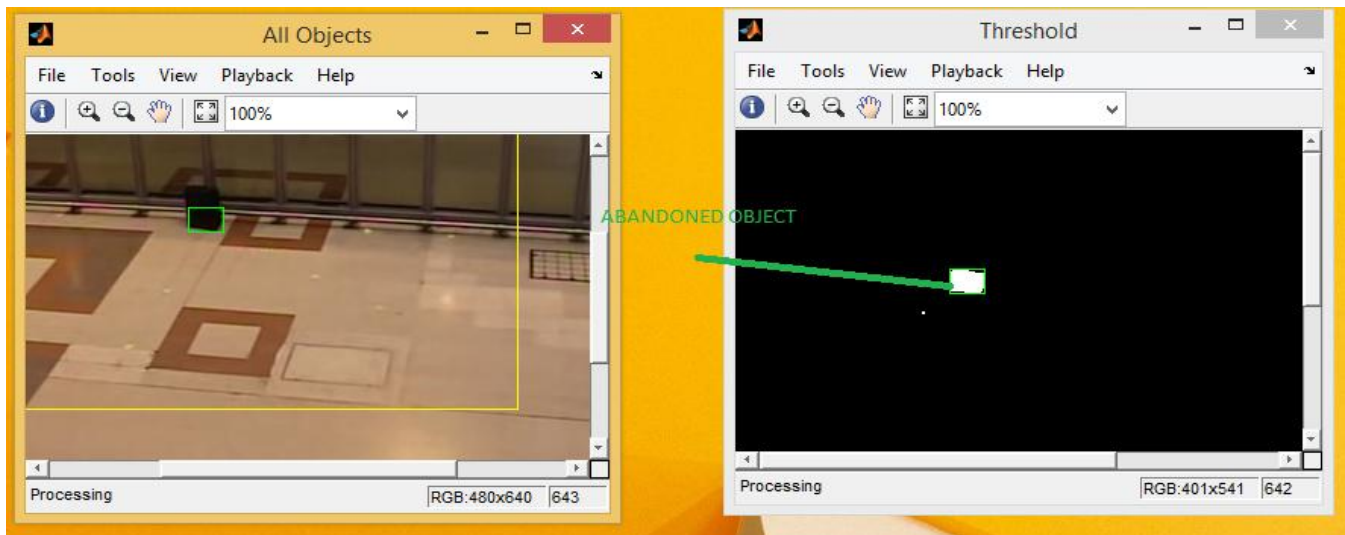*Figure 3 background subtraction*

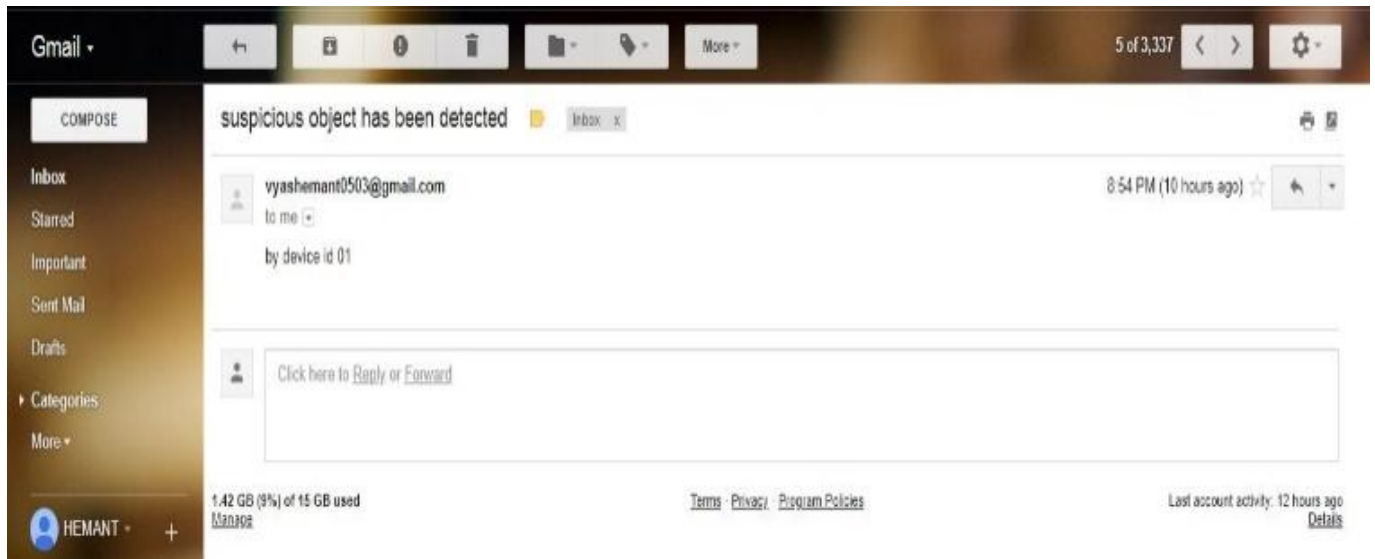
Figure 4 Abandoned Object detected

Figure 5 Mail Notification with device id to authorized person

VIII. Conclusion

The present work is an attempt to create a flexible and sectional module that can be used to detect abandoned objects in a video stream. Several methods have been implemented for each stage of detecting an abandoned object and we combined these steps into the system. An automatic detection system helps to complement the available manpower by serving as both a standalone monitoring system for critical areas and also integrated into manually monitored cameras so that it can detect the gaps that the human may have missed. Due to increase in terrorist activities in public places, security is now becoming a major issue in public places. In this project, we have developed an abandoned object detection over video surveillance installed (CCTV) in public places. Output is in real time. It helps to setup an environment in which we can solve security issues by less human efforts.

IX. Future work

In this work we have worked on abandoned object detection. This is currently an active research area and there are so many possibilities in this project. Our future target is to manage the data because we will generate a huge amount of data in real time (5min,1cam=approx. 3GB). So, if there are 20 cameras and we want to run this system 24 hours so the data will be approx. 1.7 TB. So, we will have to manage this data and another challenge is fast parallel input from multiple sources. It can make the system slow. So, we may need to use fast processing technologies.

References

[1] Mathur, Garima, and Mahesh Bundele. "Research on intelligent video surveillance techniques for suspicious activity detection critical review." Recent Advances and Innovations in Engineering (ICRAIE), 2016 International Conference on. IEEE, 2016.

[2] Panchal, Payal, et al. "A review on object detection and tracking methods." International Journal for Research in Emerging Science and Technology 2.1 (2015): 7-12.

[3] Dedeoglu, Yigithan. "Moving object detection, tracking and classification for smart video surveillance." Master's Thesis, Bilkent University, Ankara, pp2 (2004).

[4] Gupta, Aditya, et al. "Real-Time Abandoned Object Detection Using Video Surveillance." Proceedings of the International Conference on Recent Cognizance in Wireless Communication & Image Processing. Springer, New Delhi, 2016.

[5] Parihar, Vikramsingh R., and Anagha P. Dhote. "A Novel Approach to Real Time Face Detection and Recognition." International Journal of Computer Sciences and Engineering (IJCSE) 5.9 (2017): 62-67.

[6] Tavanai, Aryana, et al. "Carried object detection and tracking using geometric shape models and spatio-temporal consistency." International Conference on Computer Vision Systems. Springer, Berlin, Heidelberg, 2013.

[7] Ratnesh Kumar Shukla1, Ajay Agarwal." An Introduction of Face Recognition and Face Detection for Blurred and Noisy Images" International Journal of Scientific Research in Computer Sciences and Engineering (IJSRCSE), Vol.6, Issue.3, pp.22-26 , June (2018)

[8] Lee, Chan-Su, and Ahmed Elgammal. "Carrying object detection using pose preserving dynamic shape models." International Conference on Articulated Motion and Deformable Objects. Springer, Berlin, Heidelberg, 2006.

[9] Senst, Tobias, Rubén Heras Evangelio, and Thomas Sikora. "Detecting people carrying objects based on an optical flow motion model." Applications of Computer Vision (WACV), 2011 IEEE Workshop on. IEEE,2011.

[10] Senst, Tobias, et al. "Detecting people carrying objects utilizing

lagrangian dynamics." Advanced Video and Signal-Based Surveillance (AVSS), 2012 IEEE Ninth International Conference on. IEEE, 2012.

[11] Saindane, Amrut C., and Pravin S. Patil. "An Efficient Human Recognition Using Background Subtraction and Bounding Box Technique for Surveillance Systems." International Journal of Computer Sciences and Engineering (2016): 72.

[12] Punam Mahesh Ingale.,"The importance of digital image processing and its applications" International Journal of Scientific Research in Computer Sciences and Engineering (IJSRCSE), Vol.06 , Issue.01 , pp.31-32, Jan-2018.

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