Automated Video Surveillance for Abandoned Object

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Abstract— In this paper, we propose a new design and implementation method in supporting a smart surveillance system that can automatically detect abandoned objects in public places such as bus stations, train stations or airports, etc.. The developing system is implemented by using image processing techniques. In the circumstance such as when suspicious objects i.e. unattended objects have been detected, the system will alert to people responsible for the role such as security guards or security staff. In this paper, we also differentiate between the stationary objects and the objects that are in motion. The detection process consists of four major components: 1) Image extraction from live video feed 2) Image Processing 3) Object Detection and 4) Result Presentation. In this paper we put our attention into background subtraction algorithm for detection of object in low quality video i.e. improve accuracy.

Key words: Abandoned object, Background subtraction, Object detection, Stationary object, Surveillance system

I. INTRODUCTION

A surveillance system has become a part of every day's life without even noticed. In the recent years, video surveillance systems have become an extremely active research area due to a sharp increasing in the levels of terrorist attacks on crowded public places, like airports, railway stations, subways, buildings entrances, sporting events, and other public venues. Terrorist attacks have also a critical threat of public safety; especially, explosive attacks with abandoned or unattended objects/ packages are repeatedly concentrated on the public places. Hence, establishing a surveillance system with high-tech appliances to against terrorism is a critical issue nowadays. This has led to motivation for the development of a strong and precise automatic processing system, an essential tool for safety and security in both public and private sectors.

Video surveillance systems aim to provide automatic analysis tools that may help the supervisor personnel in order to focus his/ her attention when a dangerous or strange event takes place. In this context, the detection of stationary objects is receiving a special attention because it is a critical analysis stage in applications like the detection of abandoned objects or parked vehicles frequently used in the surveillance of public areas.

Additionally, the recognition of stationary objects in crowded unconstrained contexts is a challenging task.

Issues related to occlusions (by moving or stationary objects), appearance variations (e.g., color composition, shape) as people move relatively to the camera, lighting changes, speed and density structure of moving objects should be taken into account. Thus an essential component of a video surveillance system is the capability of correctly and accurately detecting suspicious objects and people involved in crowded areas. So that the system can be able to help the monitoring personals to immediately find a dangerous or strange event takes place in the monitored area.

Moreover, automatic analysis and interpretation tools are required to obtain the real time demands in a video surveillance system. For this purpose, immediate detection of suspicious packages or objects is vital to the safety of innocent citizens in the current age of terrorists who often use primitive home-made explosive devices. Thus, solving the problem of detecting stationary objects (also referred to as abandoned, static, left, or immobile objects) is currently one of the most promising research topics for public security and video surveillance systems. Furthermore the problem is increasing the worldwide attention in many contexts, especially for its application in crowded environments potentially at risk which therefore require particular controls to guarantee security. However, high-level video interpretation tasks related to surveillance are usually completely performed by human operators, who have to process large amounts of visual information presented to them through one or more monitors.

Various scenes are often guarded simultaneously by a single operator. It is widely known that, if the operator is exposed to this type of work for several hours his attention decreases, thus probability of missing dangerous situations increase. It is crucially important to support human conduct with semiautomatic surveillance systems in order to inform the supervisor in case of abandoned object and to focus his attention on the event. Abandoned/stationary object detection is the task of locating objects that are left behind in a scene. Often these objects are quite small (compared to the people at least) and are frequently occluded by other people or vehicles moving about the scene.

In the literature, several methods have been found describing on abandoned object detection and their applications to public safety and security problem. They can be categorized into two approaches: one is based on tracking methodology and the other is based on detection approach. The tracking-based methods encounter the problems of merging, splitting, entering, leaving, occlusion, and correspondence. These problems are not easy to solve in many cases since it is difficult to track all the objects precisely in crowded situations. On the contrary, the detection-based methods do not need to handle the complicated problems associated within the tracking-based methods, and only the abandoned objects that are not there initially should be of concern.

II. PROPOSED SYSTEM

A. System Architecture

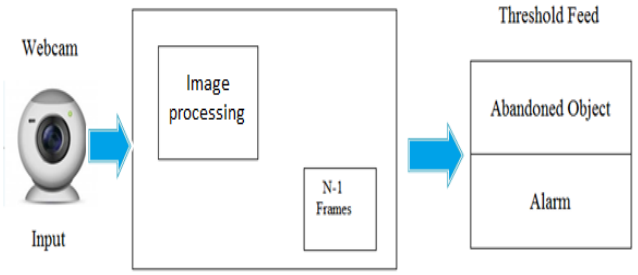

Fig. 1: Architecture of proposed system

First we will take input from live video feed that is captured by any camera. This live video feed is comprised of many frames. And we do the different image processing techniques on these frames. By applying various techniques like Gaussian blur, HSV thresholding and background subtraction technique, the desired unattended object is detected. When the object is detected as unattended the system will raise an alarm.

B. Modules and their functionalities

1) Module 1: Image extraction from input video.

- Video Stream – This method receives a streaming video from a file or a CCTV camera. Currently, the following video file formats are supported e.g. mpeg, mp4, avi, bmp and others.
- Sequence Frame – After the program reads the video file, it takes and processes each image by querying frames from the video file.
- Capture Image Displaying – Creating a window in which the captured images from camera will be shown on that window.

2) Module 2: Image processing

To detect unattended object we apply different algorithms as follows:

- Blur: it is an ideal form of white noise, which is caused by random fluctuations in the signal such as when we are watching the TV. Image Averaging, Average Filtering, and Adaptive Filtering are the techniques to clean noise. There are many options to reduce noise from the video. In this paper, a video is blurred by applying a filter to each frame. Grayscale: digital image is an image in which the value of each pixel is a single sample, that is, it carries only intensity information. Images of this sort, also known as black-and-white, are composed exclusively of shades of gray, varying from black at the weakest intensity to white at the strongest.
- RGB to HSV: Color vision can be processed using RGB color space or HSV color space. RGB color space describes colors in terms of the amount of red, green, and blue present. HSV color space describes colors in terms of the Hue, Saturation, and Value. In situations where color description plays an integral role, the HSV color model is often preferred over the RGB model. The HSV model describes colors similarly to how the human eye tends to perceive color. RGB defines color in terms of a combination of primary colors, whereas, HSV describes color using more familiar comparisons such as color, vibrancy and brightness. The basketball robot uses HSV color space to process color vision.
- Background subtraction: Performing a subtraction between the current frame and the background model.
- In detecting moving object in videos, the approach that mostly used is foreground segmentation or it is known in term of background subtraction. It is used for extracting current frame or interested object from background image. This is the first step to identify moving objects in a video stream.
- Threshold: It is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images.
- Blob detection: It refers to visual modules that are aimed at detecting points and/or regions in the image that are either brighter or darker than the surrounding.

3) Module 3: Object detection

By applying above algorithms we can detect the stationary objects that are abandoned for a particular period of time and hence conclude them as abandoned/unattended object.

4) Module 4: Raise alarm

When the object is declared as abandoned the alarm will be raised i.e. informing the security guard, sending email and messages, also maintaining the log.

III. UNATTENDED OBJECT ANALYZING PROCESS

In video surveillance one of the most important applications is to distinguish the unattended or removed object from still person. In order to do so, we subdivide extracted objects moving object was classified into one of four types, Temporary Static Object (TS), Moving Person (MP), Still Person (SP), Unattended Object (UO), and Unknown (U), using a simple rule-based classifier for the real-time process. It uses features such as the velocity of a blob, and exponent running average.

To classify, we used three critical assumptions:

- Unattended object does not move by itself,
- Unattended object has an owner and
- The size of the unattended object is probably smaller than a person.

If objects were detected, they were initially classified as Unknown. Then, using the velocity of the moving object, the

Unknown was classified as Person or UO. That is to say, if

Unknown moved at a velocity higher than that of the threshold value, Th_v for several consecutive frames, it was identified as a Moving Person. If Unknown's velocity was below the threshold velocity TL_v, it was classified as (TS). If Unknown is identified as TS, UO and Still Person were distinguished by using the Exponent Running Average (ERA). If ERA is greater than a predefined threshold value *The*, the TS is classified as still person and otherwise it will be unattended object.

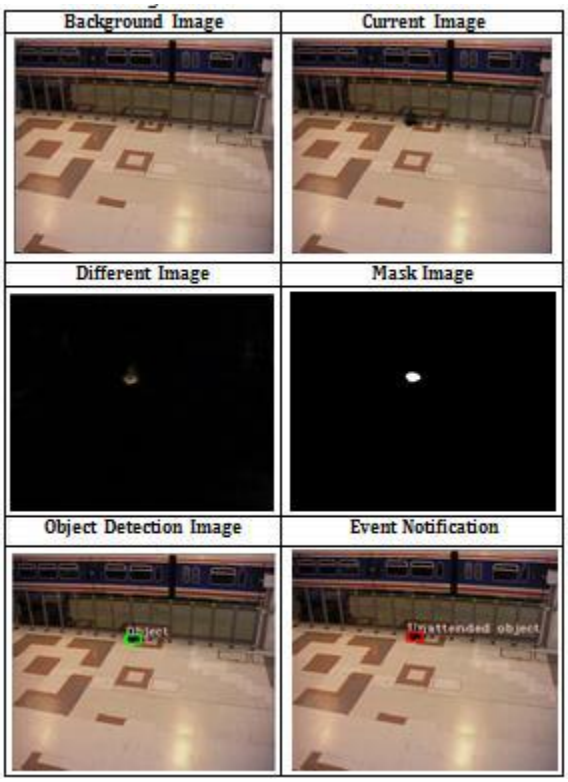

Fig. 2: Unattended object

IV. CONCLUSION AND FUTURE WORKS

In this paper, a method of the unattended object detection is presented. As started by a first step, image extraction through live video feed is used to import the video to process in the next step. The second step is by applying different image processing algorithms and distinguishes the moving object by using subtraction technique with background and current image. Next step, we separate between people or object, normally used for people detection, and discriminate between unattended events by analyzing the boundaries of static foreground regions. Finally, the result of detection will alert on the output screen. Although all process can detect and classify types of objects as people or unattended object, the system still needs efficient and correctness for more reliable detection.

This system can also be applied for detecting special events such as recording a burglary, robbery or monitoring school zone safety problems, for school children, thereby contributing to the safety of people in the home and schools.

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REFERENCES

[1] B. Atul, M. S. Nagmode, P. Dhaval. "REAL TIME ABANDONED BAG DETECTION USING OPENCV", International Journal of Scientific & Engineering Research, Vol. 4 Issue 11,:2229-5518,2013.

[2] P. Spagnolo et al. "An Abandoned/Removed Objects Detection Algorithm and Its Evaluation on PETS Datasets". Proc. of IEEE Conf. on Video and Signal BasedSurveillance, pp. 17-21, 2006.

[3] Thi Thi Zin, Pyke Tin, Hiromitsu Hama and Takashi Toriu. "Unattended Object Intelligent Analyzer for Consumer Video Surveillance", IEEE Transactions on Consumer Electronics, Vol. 57, No. 2, May 2011

[4] A. Singh, S. Sawan, M. Hanmandlu, V.K. Madasu, B.C. Lovell, "An abandoned object detection system based on dual background segmentation", Advanced Video and Signal Based Surveillance, 2009

[5] S. Kwak, G. Bae, H. Byun: "Abandoned luggage detection using a finite state automaton in surveillance video," Optical Engineering, vol. 49, no. 2, pp. 027007–027007-10, Feb. 2010.

