Review of Automatic Detection & Tracking of Abandoned Object

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Abstract —*This paper presents a framework for detection of abandoned objects from various surveillance videos by matching the reference frame with the next successive frames of the video sequence. The first frame of video is considered as reference frame & then by using background subtraction algorithm the foreground is separated from the background. Gaussian Mixture Model is used to detect static foreground regions. Features are extracted to classify the object as human or non-human objects. SVM classifier is used to classify the object as human, bag, mobile phone or any other object from extracted features. Proposed method can locate very small consistent items within the surveillance videos.*

Keywords- *object detection, background subtraction, surveillance videos, foreground analysis*

I. INTRODUCTION

Global security & terrorism are one of the major problems worlds facing today. In recent years, we have seen the terrorist attacks involving some suspicious objects which are left unattended at train stations, market places, public transports, airports etc. So the most challenging job in video surveillance system is to find such kind of suspicious objects. Hence there is a need for Video Surveillance system which can distinguish & identify highly hazardous situations and which gives alert to the experts in order to take proper action. With the rising concern about the security in public places, surveillance cameras are largely installed. Detection of abandoned & removed objects is presently one of the most promising research topics for public video surveillance systems. The first thing in the task of objects detection is to localize the object, and the second is to classify the detected items whether removed or abandoned.

In recent past years there are lot of research that has being done in field of abandoned object detection system for the video surveillance systems with proper human controlled or CCTV systems. To enhance the quality and the effectiveness of the system various kinds of algorithms and techniques are being suggested and implemented by researchers in various ways. Detecting static objects in video sequences has several applications in surveillance systems such as the detection of illegally parked vehicles in traffic monitoring or the detection of abandoned objects in public safety systems and has attracted the attention of a vast research in the field of video surveillance. These items can be grouped into two main classes, dynamic suspicious behaviors (e.g., a person attempting to attack others) and static dangerous objects (e.g., luggage or bomb abandoned in public places). The scope of this paper falls into the latter category.

II. LITERATURE SURVEY

According to literature survey after studying different IEEE paper, I have collected some related papers and documents some of the point discussed here:

1. J. Connell, A.W.Senior & others, "Detection & Tracking InThe IBM People Vision System" IEEE International conference on multimedia & Expo (ICME) 2004.
In this paper they have developed a system for detection & tracking of people in application of computer vision .They have developed a background subtraction system for detection of moving objects in various scenarios. The method is also implemented for detection of object moving in front of moving background. They have implemented tracking system to track the detected foreground regions which can initiate real time alarm & generates a smart surveillance index which includes information about tracks, their size, position, type & appearance etc.

2. M. Bhargava, C. C. Chen & others, " Detection Of Abandoned Objects In Crowded Environments"
In this paper the method is implemented for detection & recognition of the dangerous situation for anti-terrorism & global security concerns, which alerts the authority to take proper action. The method is implemented to recognize the event for which the bag or object is left unattended by someone. By analyzing the history of bag or object, its most likely owner is also detected. The owner is one who came with bag in the scene & left it unattended for a specific period of time. By tracking the subsequent frames, the owner of bag is identified. This framework can detect multiple abandoned objects in presence of occlusion, noise & other distortions. The results are tested on i-LIDS Datasets successfully.

3. Karel Zimmermann "Non-Rigid Object Detection with Local Interleaved Sequential Alignment (LISA)", IEEE Transactions on Pattern Analysis & Machine Intelligence, Vol.36, No.4, April 2014.

The successively evaluated functions utilized in a sliding window detection technique to decide about object presence/absence also contain know-how about item deformation. Exploit those detection capabilities to estimate the item deformation. Estimated deformation is then immediately implemented to no longer but evaluated capabilities to align them with the found photograph records. In this method, the alignment estimators are jointly learned with the detector. The joint manner lets in for the mastering of each detection stage from much less deformed education samples than in the preceding stage. For the alignment estimation we endorse repressors that approximate non-linear regression capabilities and compute the alignment parameters extremely rapid. Detection of items with look altered with the aid of pose variations (together with non-inflexible deformations and point of view modifications) is greater tough than the detection of items in a single pose. If the detection time is constrained, exhaustive search over the space of feasible poses with a single pose detector is intractable.

4.   Hui Kong, "Detecting Abandoned Objects With a Moving Camera", IEEE Transaction on Image Processing, Vol. 19, No. 8, August 2010

In this paper the method is implemented for detection of nonflat abandoned object. A moving camera is used to take a video where no suspicious object is present. This video is considered as a reference video. The other video is taken by the camera using the same route but it contains some extra objects. This video is referred as target video. For the detection of abandoned object, the reference & target videos are matched. The rough alignment of two videos done & the corresponding frame pairs are found by using the GPS information. The four main ideas used by the system are:
All possible suspicious areas are found by an inter- sequence geometric alignment, False alarms are removed by an intrasequence   geometric alignment, False alarms in flat areas are removed by a local appearance comparison between two aligned intrasequence frame, Conformation of suspicious object is done by temporal filtering.

5.   Claudio Sacchi and Carlo S. Regazzoni,, "A Distributed Surveillance System for Detection of Abandoned Objects in Unmanned Railway Environments" IEEE Transaction On Vehicular Technology, Vol. 49, No. 5, Sept 2000.

In this paper the method is implemented for detecting the unsafe conditions such as presence of abandoned object in the waiting rooms of unattended railway stations. For getting the image sequences a monochromatic camera is used in each guarded rooms. For the detection of the abandoned object, these image sequences are given to local PC based image processing system. When the object is detected, the alarm signal is sent to remote control center through communication system based on DS/ CDMA technique for secure communication. This method can be used for wide range of unattended environments such as car parking, airports, shopping malls etc.

III. CONCLUSION

In this proposed system the automatic detection of abandoned object from surveillance videos is done. I have introduced a general framework to recognize the event of object abandonment in the busy scene. The proposed system is characterized by his simplicity & superior detection accuracy of abandoned object on extensive real world surveillance videos. In future the proposed system will concentrate more on detection of occluded objects & reduction of false alarm rate in crowded scenes.

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