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A Review on: Abandon or Removed Object Detection

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Abstract: The automatic detection of objects that are abandoned or removed in a video scene is an interesting area of computer vision, with key applications in video surveillance. There are various methods to detect abandoned or removed objects. Tracking based approaches for detecting abandoned or removed object often become unreliable in complex surveillance videos due to occlusion, lighting changes and other factors. Therefore some authors present other methods like mixture of three Gaussian or using multiple cues like intensity, motion and shape to detect accurate static region. All of these methods are efficient to run in real time applications.

Keywords: Image Processing, abandoned or removed object detection, and visual surveillance.

I. INTRODUCTION

With the rising concern about the security in public places, surveillance cameras are broadly installed. Detection of abandoned objects is currently one of the most promising research topics for public video surveillance systems. The first thing in the task of abandoned objects detection is to localize abandoned object items, and the second is to classify the detected items.

The approaches of locating the left objects can be grouped into two categories one is based on the tracking approach and the other is based on the background-subtraction method. Most tracking-based approaches are designed for multiple camera systems, and they need to detect all moving objects accurately. They usually encounter the problem of merging, splitting, occlusion, and identity correspondence. And it is difficult to track all the objects precisely in crowded situations.

On the contrary, background-subtraction techniques can work well in these highly-cluttered scenarios. The existing methods can be divided into two categories according to their use of one or more background subtraction models. And for each category, it can also been subdivided into two classes: one based on frame-to-frame analysis and the other based on a sub-sampled analysis.

Nowadays, the demand for automatic video-surveillance systems is growing as a consequence of increasing global security concerns. Traditionally, the monitoring task is performed by human operators who have to simultaneously analyze information from different cameras. A reduction of efficiency is expected as operators have to process large amounts of visual information generated by these cameras. For this reason, real-time automatic video interpretation is emerging as a solution to aid operators in focusing their attention on specific security-related events. In this situation, the detection of abandoned and stolen objects has become one of the most promising research topics especially in crowded environments such as train stations and shopping malls. For example, a useful application of abandoned object detection could be to detect unattended packages in a subway station. For stolen object detection, an interesting application could be the monitoring of specific items in an office, showroom or museum. This detection aims to provide a continuous supervision of the information captured by the camera so that the appropriate actions can be taken.

II. LITERATURE REVIEW

The abandoned baggage problem has recently attracted considerable interests, and solutions have been attempted in many different ways, each inevitably with its own limitations. Several tracking models have been proposed based on variety of techniques.

Lv et al. combine a Kalman filter-based blob tracker with a shape-based human tracker to detect people and objects in motion [1]. Event detection is set up in a Bayesian inference framework. Stauffer and Grimson present an event detection module that classifies objects [2], including abandoned objects, using a neural network, but is limited to detecting only one abandoned object at a time. The probabilistic tracking model proposed by Kim et al. [3] is built of a mixed state dynamic Bayesian network and a trans-dimensional Markov chain Monte Carlo (MCMC) method. Agrawal et al. characterize the event of object abandonment by its constituent sub-events [4]. Their algorithm verifies the sequence of foreground observations by pre-defined event representation and temporal constraints. Adaptive background subtraction (ABS) has been a rather popular choice to detect unknown, changed or removed articles in the foreground. ABS methods, such as those described in, build and maintain a statistical model of the background, usually implemented in conjunction with an object tracker. Porikli demonstrates static object detection using long-term and short-term backgrounds [5] constructed using different adaptation

rates. However, in general, ABS-based systems run the risk of integrating stationary foreground objects into the background before they are actually deserted. Their performance also suffers considerably from foreground clutter.

Most of the proposed techniques used for detecting an abandoned object rely on tracking information[6],[7],[8],[9],[10],[11],[12],[13] to detect drop off events , which fusing information from multiple cameras.

The object video surveillance system [14] keeps track of background regions, which are stored right before they are covered by an abandoned object.

Jiman kim and Daijin kim proposed the region classification techniques [15] using multiple cues like intensity, motion and shape to characterize the true static regions and classifies their candidates into true/ false static regions using SVM classifier which avoids any dependency on pre-defined threshold values.

Much work has also been done on multi-view surveillance systems. Such systems offer the significant merits of inferring the 3D spatial position of all objects, their depth, size and motion. Although such systems have been largely successful, the deployment of multiple cameras per location is usually not practical in wide spread public areas such as the railways.

III.COMPARISION TABLE

TABLE1: SHOWS COMPARISION OF SOME LATEST METHODS OF ABANDONED OR REMOVED OBJECT DETECTION

PAPER	METHOD	RESULTS
1.Detecting Abandoned Objects With a Moving Camera **2010**	Novel framework for detecting non flat abandoned objects by matching a reference a2nd target video sequences. The reference video is taken by a moving camera when there is no suspicious object in the scene. The target video is taken by a camera following the same route and may contain extra objects. GPS information is used to roughly align the two videos and find the corresponding frame pairs.	This framework is robust to large illumination variation, and can deal with false alarms caused by shadows, rain, and saturated regions on road. It has been validated on fifteen test videos.
	The mixture of Gaussians BGS method is employed to detect both background and static foregrounds by using the same Gaussian mixture model. Then, the static foregrounds were classified into abandoned or removed objects by segmenting and comparing the surrounding areas of the background model and the foreground image.	This method can handle occlusions in crowd scenes. In order to reduce false alarms, tracking information is employed in a small temporal window to provide an additional cue to filter out the impact of spurious and noisy trajectories for abandoned object detection. The testing results have proved that this approach can be successfully applied in real-world surveillance applications.
3.Stopped Object Detection by Learning Foreground Model in Videos **2013**	A neural-based contribution is presented in digital image sequences taken from stationary cameras. A 3-D neural model for image sequences that automatically adapts to scene changes in a self-organizing manner is targeted for modeling the background and the foreground, finalized at the detection of stopped objects. Coupled with the proposed model-based framework for stopped object detection, it enables the segmentation of stopped foreground objects against moving foreground objects, robustly handling occlusion and restart problems.	Proposed 3-D neural model-based framework favorably compares to other tracking- and non tracking-based approaches to stop object detection. The proposed approach is shown to be an inexpensive by-product of background subtraction that provides an initial segmentation of scene objects, useful for any other subsequent video analysis tasks, such as abandoned and removed object classification, people counting, and human activity recognition.
4.Accurate Static Region Classification Using Multiple Cues for ARO Detection **2014**	Multiple cues (intensity, motion, and shape) are used to reduce false static regions efficiently. Also pre-trained SVM classifier is used instead of using many pre-defined threshold values.	This method has less false detection than any existing methods with a public database and higher TDA and lower FDR than the Object Video's method over all difficulty levels with a commercial database. Can be applied to various real situations because it removes the dependency of a number of pre-defined thresholds on ARO detection performance by using a single-stage SVM classifier with multiple cues in order to classify the static region candidates.

IV. CONCLUSION

We discussed various methods of Abandoned or Removed object detection. Proposed methods favorably compares to other tracking and non-tracking based approaches. All above methods can be applied to real-world surveillance applications. We can further have more research in this field. In future we can think about utilize the temporal transition model and back-tracking verification for visual surveillance.

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