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Engineering

ABANDONED OBJECT DETECTION BASED ON STATISTICS FOR LABELED REGIONS

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ABSTRACT Abandoned object detection is an essential requirement in many video surveillance contexts. with the rising concern about the security in public places abandoned object detection become very useful system to detect and recognize the suspicious activities that might endanger public safety, especially in crowded places like airports, railway stations, shopping malls, movie theatres and the like. The major steps in the proposed work involves background subtraction, abandoned object detection, and post processing to both thermal and optical image data sets to extract the abandoned object from the scene.

KEYWORDS : visual surveillance, background subtraction, abandoned object detection, post processing .

INTRODUCTION

Detection of abandoned objects is currently one of the most promising research topics for public video surveillance systems. Detection of moving object is necessary for surveillance application, for guidance of autonomous vehicles, for efficient video compression for smart tracking of moving object, remote sensing, image processing, robotics and medical imaging In general an abandoned object is an object which is left at a particular place under surveillance and unattended over a period of time. The object is said to be abandoned if it is a foreground object. Second, it should remain static in recent frames or for some time t. Detecting abandoned object is a very important in places like airports, railway stations, big shopping malls etc. where there is potentially high security threat. Abandoned object detection is one of highly challenging task in video surveillance systems, lot of research is carried out to enhance and automate the surveillance system. One of the major and important tasks in video surveillance system is to detect abandoned or removed objects. 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 moving object detection is the initial step in object recognition. The aim of moving object detection is at extracting moving objects that are of interest in video sequences with background which can be static or dynamic. This detection aims to provide a continuous supervision of the information captured by the camera so that the appropriate actions can be taken. Firstly, moving objects (foreground) are differentiated from the background of the scene in the foreground segmentation stage. Then, stationary regions are detected by analyzing foreground objects over time. Each detected region is then classified by type (person, group of people, luggage,).
The idea of background subtraction is to subtract or difference the current image from a reference background model. The detection of suspicious (dangerous) items is one of the most important applications. 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. Specifically, we investigate how to detect objects in a video as abandoned. We define an abandoned object to be a stationary object that has not been in the scene before. To detect abandoned objects, we focus on how to detect static regions that have recently changed in the scene. In general, the abandoned object detection is achieved by developing a system with the following analysis stages: background subtraction, abandoned object detection, post processing, abandoned object fusion. The last stage of this pipeline determines the system ability to living and nonliving discrimination of abandoned objects.

LITERATURE SURVEY

Magno et al (2) employs an unobtrusive embedded platform. This method uses a wireless video sensor to detect the abandoned object. The system employs multimodal sensor integration which saves power consumption. The objective is to develop a multimodal video sensor with low power and low cost to detect abandoned objects. This uses new algorithms for energy efficient image processing without giving up the flexibility of in-field configuration. In spite of using a video sensor, the number of false positives is 13% of the total detected objects.

Stationary objects in multiple object tracking [1], detects the foreground objects with several moving objects and is inspired by human's visual cognition processes. It relies on tracking information to detect drop-off events. This system produced larger errors under bright lighting conditions.

Singh et al(3) uses a dual-time background subtraction algorithm to dynamically update two sets of background. This method is dynamic, adaptive, non-probabilistic and intuitive in nature. It uses pixel color intensity information for background processing. The binary image is divided into a number of legitimate blobs. Once the blobs are generated, the system applies an algorithm for tracking of the abandoned objects. The system is robust to variations in lighting conditions and the number of people in the scene. The system does not classify stable objects as unattended and removed objects.

Stauffer and Grimson(4) present an event detection module that classifies objects, 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 Smith et al. is built of a mixed state dynamic Bayesian network and a trans-dimensional Markov chain Monte Carlo (MCMC) method.

Bhargava et al.(5) characterize the event of object abandonment by its constituent sub-events. 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.

F. Porikli(7) demonstrates static object detection using long-term and short-term backgrounds 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.

Y Tian et al(8), present Robust Detection of Abandoned and Removed Objects in Complex Surveillance Videos the method detects abandoned and removed objects using GMM algorithm. The type of static regions is determined by a method that exploits context information. A matching method is used to detect the abandoned and removed object and it outperforms the edge based techniques. A person-detection process is integrated to differentiate static objects from stationary people. The system is robust to quick-lightning changes and occlusions. The accuracy of the detection is influenced by the size of the object, light conditions, and contrast situations.

Kong et al [6], detects nonflat abandoned objects by comparing a reference and target video sequences. The system uses GPS information to align the videos to find the frame pairs. The camera is mounted on a moving platform to scan along a specified trajectory for non-flat abandoned objects. The difficulty of the system is to cope with moving objects, presence of shadows, lighting conditions.

SYSTEM DESIGN AND OVERVIEW

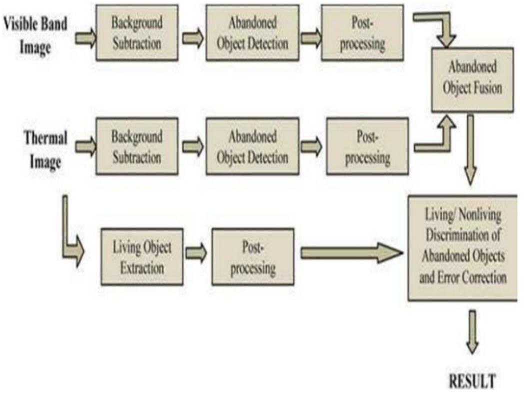

Figure 1: Block Diagram of Abandoned Object Detection

In this section, we provide a solution for detecting abandoned object in videos. Figure 1 shows the proposed Block Diagram diagram of Abandoned Object Detection. Here we use the information obtained from thermal and optical cameras observing the same area for this process. The images from each camera are processed separately to detect abandoned objects. We apply an additional step to the images from the thermal camera to discriminate animate from inanimate objects. Then, the abandoned object detection results are fused: if the abandoned object is not radiating heat (i.e., is classed as non-living), the alarm is raised. We apply background subtraction, abandoned object detection, and post-processing to both thermal and optical image data sets to extract the abandoned objects from the scene. We extract living objects by processing the thermal images. Since living subjects radiate heat, they are expected to look brighter in the thermal images in a typical white-hot setting than inanimate objects. To improve the discrimination of hot objects, we use local intensity operation (LIO), which brightens bright pixels and darkens dark pixels. Finally, we use the abandoned object results in combination with the living subject results to confirm the presence of stationary people in the scene, eliminating false alarms as a result

FLOWCHART

1. Initialize the required variables and System objects.
2. Create a MultimediaFileReader System object to read video from a file.
3. Create a Color Space Converter System object to convert the RGB image to Y'CbCr format.
4. Create an Auto threshold System object to convert an intensity image to a binary image.
5. Create a Morphological Close System object to fill in small gaps in the detected objects.
6. Create a Blob Analysis System object to find the area, centroid, and bounding box of the objects in the video.
7. Create a Shape Inserter System object to draw rectangles around the abandoned objects.
8. Create an Text Inserter System object to display the number of objects in the video.
9. Create a Video Player System object to display the video with the abandoned objects highlighted.
10. Create a Shape Inserter System object to draw rectangles around all the detected objects in the video.
11. Create a Shape Inserter System object to draw a rectangle around the region of interest.
12. Create a Video Player System object to display the video with all the identified objects highlighted.
13. Create a Shape Inserter System object to draw rectangles around all the identified objects in the segmented video.
14. Create a Video Player System object to display the segmented video.

CONCLUSION

Proposed method achieves superior detection accuracy of abandoned objects on extensive real-world surveillance videos. We introduce a general framework to recognize the event of object abandonment in a busy scene. The proposed algorithm is characterized by its simplicity and intuitiveness, and is demonstrated to be highly effective on benchmark datasets. It is capable of handling concurrent detection of multiple abandoned objects, in the presence of substantial occlusion, and perspective distortion.

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