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Abandoned Object Detection Based on Statistics for Labeled Regions

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***Abstract* - Many public or open areas are facilitated with cameras at multiple angles to monitor the security of that area for keeping citizens safe. This is known as the surveillance system. Terrorism & global security are one of the major issues worlds facing now days. Abandoned object detection is an essential requirement in many video surveillance contexts. terrorist attacks involving some suspicious bags, box, or any other thing which are left unattended at railway stations, shopping malls, airports or any other public venue, 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 dangerous to public safety. The most challenging task in video surveillance system is to detect such kind of suspicious bags. So, for that purpose it is necessary to have an efficient threat detection system which can detect & recognize strongly dangerous situations. Many methods were employed for detection of unattended objects but in this paper our focus is on the detection of abandoned objects in video surveillance system. The goal of this project is to design and implement a system which will be able to detect abandoned luggage using the captured videos from the camera as the input of the system. The system realizes image segmentation and image tracking, creates blobs of Objects, labels the blobs based on the shape and size of binary blobs and accordingly the status of baggage is defined in order to take appropriate action. The complexity of the problem arises from obstructions present in scene, lightening conditions & shadows. Our system is able to successfully overcome these difficulties to obtain impressive results.**

Index Terms— visual surveillance, abandoned object detection, image segmentation, image tracking, blobs of Objects.

INTRODUCTION

Terrorist attacks has took place all over the world because of that fear of terrorism has grown amongst people in the world. There were threats for more attacks and the world lived in fear. As a result, people feared to take public transportation with the attacks in their mind. When using public transportation, peoples are more scared about abandoned luggage and suspicious behaviour of travellers, To provide safe feeling to peoples when they travelling with public transportation, it is necessary to have better security systems at transportations area and their surroundings. Security cameras that can recognize suspicious circumstances automatically are convenient in this case. Even though security guards are watching the security videos, they are not always able to detect all the crime. With software that is able to automatically detect crime, the guard will be warned and he can watch at the videos and trigger an alarm if necessary. 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. An important aspect for video surveillance systems is the capability of reliably detecting events such as abandoned object. In this system image segmentation is carried out by using background substraction then blob analysis is perform and finally object is track by using statistics obtained from blob analysis.

RELATED WORKS

Hui Kong et al[1], presents a novel framework for detecting non-flat abandoned objects by matching a reference and a 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. The objective is to find these objects. GPS information is used to roughly align the two videos and find the corresponding frame pairs. Based upon the GPS alignment, four simple but effective ideas are proposed to achieve the objective: an inter-sequence geometric alignment based upon homographies, which is computed by a modified RANSAC, to find all possible suspicious areas, an intra-sequence geometric alignment to remove false alarms caused by high objects, a local appearance comparison between two aligned intra-sequence frames to remove false alarms in flat areas, and a temporal filtering step to confirm the existence of suspicious objects. Experiments on fifteen pairs of videos show the promise of the proposed method.

Y Tian et al[2], present a new framework to robustly and efficiently detect abandoned and removed objects based on background subtraction (BGS) and foreground analysis with complement of tracking to reduce false positives. In our system, the background is modeled by three Gaussian mixtures. In order to handle complex situations, several improvements are implemented for shadow removal, quick-lighting change adaptation, fragment reduction, and keeping a stable update rate for video streams with different frame rates. Then, the same Gaussian mixture models used for BGS are employed to detect static foreground regions without extra computation cost. Furthermore, the types of the static regions (abandoned or removed) are determined by using a method that exploits context information about the foreground masks a matching method is proposed to detect abandoned and removed objects. A person-detection process is also integrated to distinguish static objects from stationary people. The robustness and efficiency of the proposed method is tested on IBM Smart Surveillance Solutions.

Kevin Lin et al[3], presents an effective approach for detecting abandoned luggage in surveillance videos. We combine short- and long-term background models to extract foreground objects, where each pixel in an input image is classified as a 2-bit code. Subsequently, we introduce a framework to identify static foreground regions based on the temporal transition of code patterns, and to determine whether the candidate regions contain abandoned objects by analyzing the back-traced trajectories of luggage owners. The experimental results obtained based on video images from 2006 Performance Evaluation of Tracking and Surveillance and 2007 Advanced Video and Signal-based Surveillance databases show that the proposed approach is effective for detecting abandoned luggage, and that it out performs previous methods.

Karel Zimmermann, et al[4], shows that the successively evaluated features used in a sliding window detection process to decide about object presence/absence also contain knowledge about object deformation. We exploit these detection features to estimate the object deformation. Estimated deformation is then immediately applied to not yet evaluated features to align them with the observed image data. In our approach, the alignment estimators are jointly learned with the detector. The joint process allows for the learning of each detection stage from less deformed training samples than in the previous stage. For the alignment estimation we propose regressors that approximate non-linear regression functions and compute the alignment parameters extremely fast.

SYSTEM DEVELOPMENT

Flow diagram

Our approach is captures and obtains the flow of events which relates to the abandonment of an object. Figure 1.1 shows the flow graph of this method. The bag or object is said to be abandoned if and only if when owner brings the bag in video surveillance place and leaves that place without bag then that bag is said to be abandoned after some time. This algorithm is very simple and composed of two stages. The first stage is of object detection & second stage is object classification. These stages are discussed below briefly.

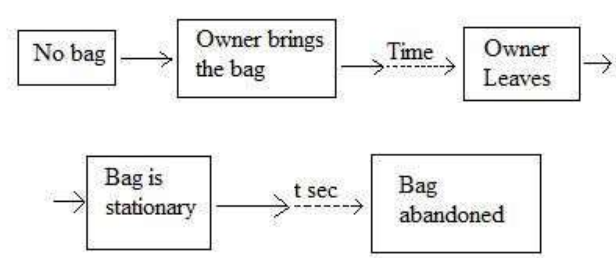

Figure 1.1. Flow Diagram of Method

Basic Image Processing

Our method involves the following steps:

- Get input video and select a region of interest (ROI)

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Vol 4, Issue 8, August 2017

- Perform video segmentation using background subtraction
- Calculate object statistics using blob analysis
- Detect stationary objects based on their area and centroid statistics;
- Show output video with boundary box around the detected objects.

For this system we are considering recorded video as input to the system and background image is stored, and then video is segmented into individual RGB frames. Once the frame is grabbed, it has go through chain of processing. The Blob Analysis block computes statistics of the objects present in the scene. It computes statistics for labelled regions, including area, centroid, bounding box of tracks, and feeds them to the core object detection function subsystem. The Abandoned Object Tracker subsystem uses the object statistics to determine which objects are stationary. This function gets the area, centroid, bounding box etc. from the Blob Analysis, checks whether the area and centroid of the blob has changed less than a ratio, and then determines which objects are stationary.

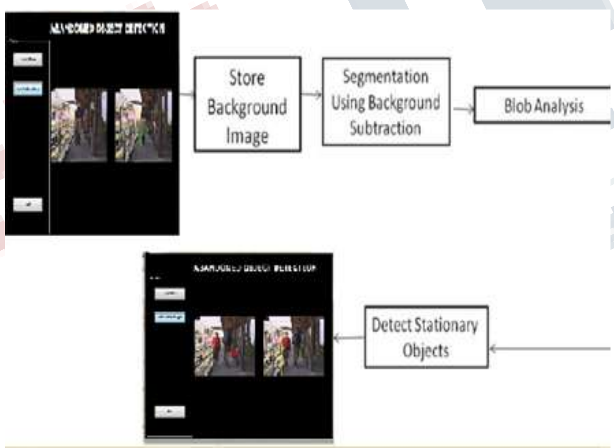
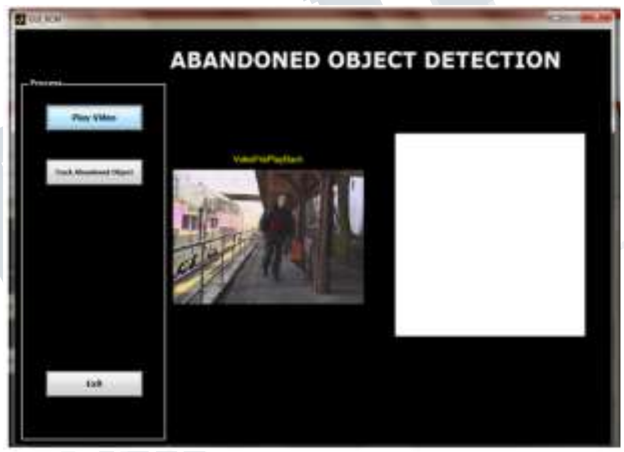


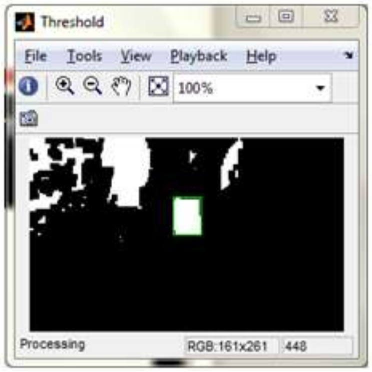
Figure 1.2. Block Diagram

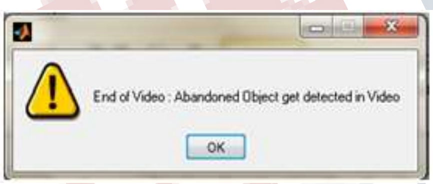
Algorithm

1. Initialize the required variables and System objects.
2. Create a Multimedia File Reader System.
3. Create a Color Space Converter System.
4. Create an Auto thresholder System.
5. Create a Morphological Close System.
6. Create a Blob Analysis System.
7. Create a Shape Inserter System.
8. Create an Text Inserter System.
9. Create a Shape Inserter System.
10. Create a Shape Inserter System.
11. Create a Video Player System.
12. Create a Shape Inserter System.
13. Create a Video Player System.

EXPERIMENTAL RESULTS







The Abandoned Objects window highlights the abandoned objects with a red box. The All Objects window marks the region of interest (ROI) with a yellow box and all detected objects with green boxes. The Threshold window shows the result of the background subtraction in the ROI.

CONCLUSION

This system introduces a general framework to detect the abandoned objects in public areas. The main features of this algorithm are simplicity & it is easily understood. 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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