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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. At the moment, the best solution to reach a safe environment requires a human operator tools to monitor the digital camera images. Even though human is arguably the most intelligent creatures in this world, there are still some shortcomings in the existing solution. Because of that humans keep inventing new discoveries to make the best of it. In order to support this surveillance system, a recognition and tracking system is built in this project to detect an abandoned luggage in the public places especially in crowded places like airports, railway stations, shopping malls, movie theatres. The goal of this project is to design and implement a system which will be able to detect abandoned luggage using the captured images or 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 and finally gives a warning when an abandoned luggage is detected.*

Key Words:— **visual surveillance, abandoned object detection, image segmentation, image tracking, blobs of Objects.**

1. INTRODUCTION

Over the years, terrorists have claimed hundreds of innocent lives for their selfish and immoral interests in the worst violent crime ever. In modern times, terror continues to region in our streets every day. However, terror upon tragedy best described from these terrorist attacks that struck streets, buildings, fields, towns, and any other place that had people living or doing business.

After the attacks of 11th September 2001 with the airplanes at the Twin Towers in New York, the fear of terrorism has grown amongst people in the world. There were threats for more attacks and the world lived in fear. Then on 11th March 2004 there were the attacks in the train in Madrid and on 7th July 2005 the subway stations in London. On 26 November 2008 series of attack took place in Mumbai. As a result, people feared to take public transportation with the attacks in their mind, When peoples using public transportation, they now tend to be more scared for abandoned luggage and suspicious behaviour of travellers. In Amsterdam, the whole railway system went down out of precaution when travellers spotted two suspicious men in a train and alarmed the police. To provide people a safe feeling when travelling with public transportation, it is necessary to have better security systems at transportations area and their surroundings. Security 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.

However, such an automated system will cause discussions in the society because applying such a system publicly can influence the daily life of people. Besides that, the infrastructures that are needed cannot be considered as cheap. This implies that designing such an automated system should be done carefully and that the societal analysis becomes an essential part in the design of the system.

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 't' 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 subtraction then blob analysis is perform and finally object is track by using statistics obtained from blob analysis.

2. LITERATURE SURVEY

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 Robust Detection of Abandoned and Removed Objects in Complex Surveillance Videos method, Tracking-based approaches for abandoned object detection often become unreliable in complex surveillance videos due to occlusions, lighting changes, and other factors. We 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, which significantly outperforms previous edge-based techniques. Based on the type of the static regions and user-defined parameters (e.g., object size and abandoned time), 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 for public safety applications in big cities and evaluated by several public databases, such as The Image library for intelligent detection systems (i-LIDS) and IEEE Performance Evaluation of Tracking and Surveillance Workshop (PETS) 2006 datasets. The test and evaluation demonstrate our method is efficient to run in real-time, while being robust to quick-lighting changes and occlusions in complex environments.

Kevin Lin et al(3) Abandoned Object Detection via Temporal Consistency Modeling and Back-Tracing Verification for Visual Surveillance system This method 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 outperforms previous methods.

Karel Zimmermann et al(4) Non-Rigid Object Detection with Local Interleaved Sequential Alignment This method 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.

3. ALGORITHM

1. Initialize the required variables and System objects.
2. Create a MultimediaFileReader System object to read video from a file.
3. Create a ColorSpaceConverter System object to convert the RGB image to Y'CbCr format.
4. Create an Autothresholder System object to convert an intensity image to a binary image.
5. Create a MorphologicalClose System object to fill in small gaps in the detected objects.
6. Create a BlobAnalysis System object to find the area, centroid, and bounding box of the objects in the video.
7. Create a ShapeInserter System object to draw rectangles around the abandoned objects.
8. Create an TextInserter System object to display the number of objects in the video.
9. Create a ShapeInserter System object to draw rectangles around all the detected objects in the video.
10. Create a ShapeInserter System object to draw a rectangle around the region of interest.
11. Create a VideoPlayer System object to display the video with all the identified objects highlighted.
12. Create a ShapeInserter System object to draw rectangles around all the identified objects in the segmented video.
13. Create a VideoPlayer System object to display the abandoned object.

14. Create a VideoPlayer System object to display the abandoned object.

4. CONCLUSIONS

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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