Abandoned Object Detection Based on Statistics for Labeled Regions

Miss.Snehal B. Dahivelkar[1], Prof. S. B. Borse[2]

[1] PG Student, Department of Electronics & Telecommunication Engineering ,

[2] Professor, Department of Electronics & Telecommunication Engineering,

[1,2] Late G. N. Sapkal College of Engineering, Nashik, Maharashtra, (India)

ABSTRACT

Terrorism & global security are one of the major issues worlds facing today. We have seen in recent terrorist attacks involving some suspicious bags which are left unattended at railway stations, shopping malls, airports etc. 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 and which gives alert to the authorities in order to take appropriate action.

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.

***Keywords* —Abandoned object detection, Blobs of Objects, Image segmentation, Image Tracking, Visual Surveillance**

I. 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 and the Pentagon in Washington, 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 As a result, people feared to take public transportation with the attacks in their mind. 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 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.

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.

1.1 AIM

To detect the abandoned object in public places like railway station, shopping malls, airport.

1.2 OBJECTIVES

1. To describe a video surveillance system for the detection of abandoned object.

2. Develop a user friendly system which is able to detect abandoned luggage in public transportation and surroundings.

1.3 PROBLEM DEFINITION

Develop a user-friendly system which is able to detect abandoned luggage in public transportation and surroundings using video captures as the input of the system. When a suspicious left behind luggage is detected, the system must trigger a warning signal to the user.

II.RELATED WORKS

[1] Hui Kong, Jean Ponce, "Detecting Abandoned Objects with a Moving Camera", IEEE Transactions on Image Processing, Vol 19,2010.

This paper presents a novel framework for detecting nonflat 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 intersequence geometric alignment based upon homographies, which is computed by a modified RANSAC, to find all possible suspicious areas, an intrasequence geometric alignment to remove false alarms caused by high objects, a local appearance comparison between two aligned intrasequence 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.

International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.03, April 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

[2] Y Tian, "Robust Detection of Abandoned and Removed Objects in Complex Surveillance Videos'', IEEE Transactions On Systems, Man, And Cybernetics Part C:Applications And Reviews, Vol. 41,2010.

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.

[3] Karel Zimmermann, "Non-Rigid Object Detection with Local Interleaved Sequential Alignment (LISA)", IEEE Transaction on pattern analysis and machine intelligent , vol.6, no.4, April 2014.

This paper 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 pixel.

[4] Kevin Lin, "Abandoned Object Detection via Temporal Consistency Modeling and Back-Tracing Verification for Visual Surveillance"IEEE Transactions On Information Forensics And Security, Vol. 10, No. 7, July 2015.

This paper 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.

III. SYSTEM DEVELOPMENT

3.1 PROPOSED APPROACH

Real time Video has been captured using Galaxy 7 mobile camera and it has been processed into frames. These frames have been used as input images for the system. The goal is to track an abandoned object in a crowded place. Here, we have used Background Subtraction algorithm to track the abandoned object where we are recording the initial frame as the background. We have also assigned a region of interest (ROI) where,the possibility of object abandonment is high. As the surveillance is for security purpose and accuracy is most necessary for these reason, we have used Morphology to enhance the accuracy for tracking the abandoned object.

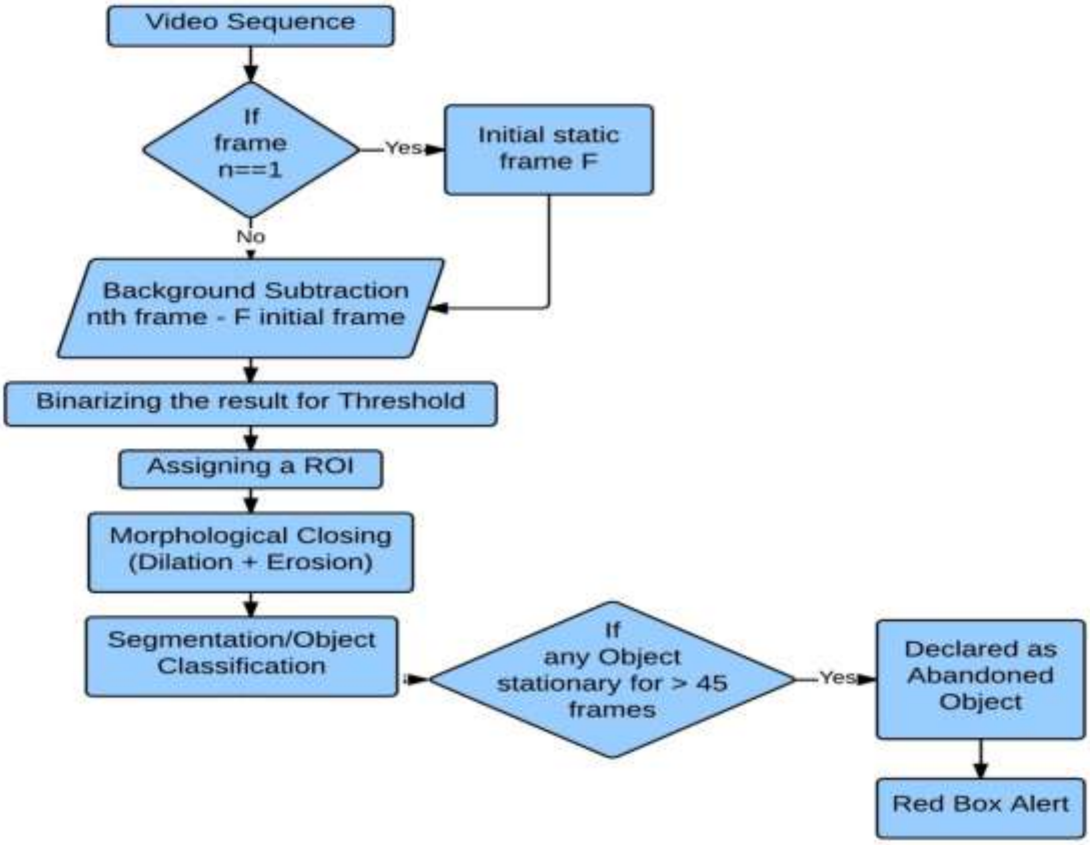


Fig 1. Flow chart of our Video Surveillance System

IJARSE
ISSN: 2319-8354

For this system we are considering the recorded video as an input to the proposed system. The video stream is initially segmented into individual RGB frames. The system is compatible with any video format and resolution, however, the video resolution is scaled down to around 320*480 to enhance the system performance. Generally the frame rate of the standard videos is 19fps or 22fps. The proposed work will be simulated using MATLAB and Tool Boxes and will be validated using standard videos available on internet. The input video is which is converted to frames are needed for further processing.

As the name suggests, Background subtraction is the process of separating out foreground objects from background in sequence of video frames. Background subtraction is widely used approach for detecting moving objects from static cameras, Fundamental logic for detecting moving object from the difference between the current frame and a reference frame, called background subtraction, and the method is known as frame difference method.

The first stage of image segmentation is image differencing. the current frame will be substracted from previous frame and pixel difference will be compared with a threshold. Candidate foreground pixels for abandoned object are defined as those below the abandoned threshold, i.e. the abandoned object pixels are assumed to be significantly darker than the background. The candidate foreground pixels for removed objects are defined as those above the removed threshold, i.e. the removed object pixels are assumed to be significantly brighter than the background.

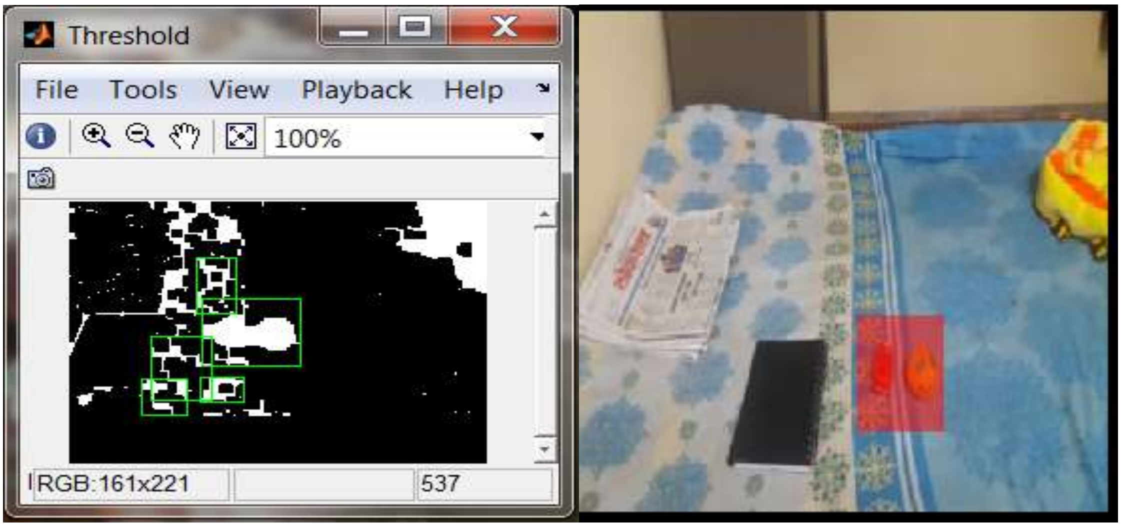
The result of foreground detection is represented as two binary images with the white portion representing foreground (blobs). In this module, we divide the binary image from the previous unit into a number of legitimate blobs. Each blob represents an object. In this step, morphological operations are performed on the binary images of the candidate foreground pixels. Morphological operations are affecting the form, structure or shape of an object, applied on binary images. They are used in post processing .

The two principal morphological operations done are dilation and erosion. Dilation allows objects to expand, thus potentially filling in small holes and connecting disjoint objects. Erosion shrinks objects by etching away (eroding) their boundaries. Candidate foreground object pixels, which are in the binary images (one for candidate abandoned object pixels and another for candidate removed object pixels) undergo the blob analysis. Blob analysis takes as an input a binary image, creates a region counter.

A blob (binary large object) is an area of touching pixels with the same logical state. All pixels in an image that belong to a blob are in a foreground state. All other pixels are in a background state. In a binary image, pixels in the background have values equal to zero while every nonzero pixel is part of a binary object. You can use blob analysis to detect blobs in an image and make selected measurements of those blobs. Blob analysis consists of a series of processing operations and analysis functions that produce information about any 2D shape in an image. Use blob analysis when you are interested in finding blobs whose spatial characteristics satisfy certain criteria. In many applications where computation is time-consuming, you can use blob analysis to eliminate blobs that are of no interest based on their spatial characteristics, and keep only the relevant blobs for further analysis. You can use blob analysis to find statistical information-such as the size of blobs or the number, location, and presence of blob regions.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.

IV.EXPERIMENTAL RESULTS

Experiments were carried out in public environment. The test video sequences used are taken by samsung galaxy g7 mobile camera, our system can detect the unattended object. Figure shows the experimental results where first frame of a video sequence is stored as a background frame and next frames are compared with the background frame, In order to test our project, The videos was made by us. The video is more than 300 frames as we need to check the abandonment of a back after each 45 frames.



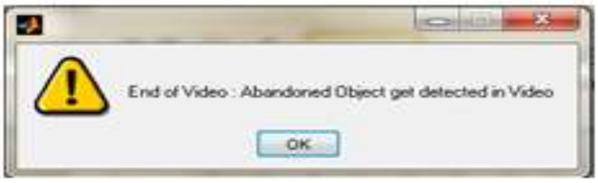


Fig 2.Two Objects are identified as abandoned by Red Box

V.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. It can detect abandoned objects easily in presence of occlusion, noise & distortion. This system can also be applied for detecting special events such as recording a theft, robbery or monitoring school zone safety problems, for school children, thereby contributing to the safety of people in the home and schools. Due to its simplicity the computational effort is kept low and no training steps are required. In this project a new approach for unattended object detection is presented. The considered video surveillance system aims at supporting a human operator in guarding indoor environments, such waiting rooms of railing stations or metro stations. There is tremendous scope for refinement & experimentation of current system. This system is a step towards the effective and efficient monitoring of objects in public areas. The fire detection algorithm can be added to this system which is based on an existing method but contains novel extensions.

REFERENCES

Journal Papers:

[1] Hui Kong, Jean Ponce, "Detecting Abandoned Objects with a Moving Camera", *IEEE Transactions on Image Processing,Vol 19,2010.*

[2] Y Tian, "Robust Detection of Abandoned and Removed Objects in Complex Surveillance Videos'', *IEEE Transactions On Systems, Man, And Cybernetics Part C:Applications And Reviews, Vol. 41,2010*

[3] Karel Zimmermann, "Non-Rigid Object Detection with Local Interleaved Sequential Alignment (LISA)", *IEEE Transaction on pattern analysis and machine intelligent , vol.6, no.4, April 2014.*

[4] Kevin Lin, "Abandoned Object Detection via Temporal Consistency Modeling and Back-Tracing Verification for Visual Surveillance"*IEEE Transactions On Information Forensics And Security, Vol. 10, No. 7, July 2015*

[5] Fahian Shahriar Mahin, "A Simple Approach for Abandoned Object Detection",*International Conference. IP, Comp. Vision, and Pattern Recognition | IPCV'2015.*

Books:

[6] Digital Image processing usinf MATLAB, By Gonsalves and woods.

[7] A handbook of image and video processing, edited by Al Bovik