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A Real Time Abandoned Object Detection and Addressing using IoT

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ABSTRACT
Most of the bomb blast were done with the help of abandoned objects. So, effective and efficient detection and Real time localization of abandoned objects is very important to prevent attacks. This paper gives an algorithm for detection with less complexity. For foreground detection two background short term and long term are constructed and updated continuously in real time. For change detection Mean-ratio and Log-ratio operators are used. To achieve higher accuracy fusion and fuzzy clustering can be applied on both outputs. Motion based criteria needs to be applied for static and moving object detection. SMV classifier is used to recognize the left-baggage. Proposed method in this paper can figure out very small abandoned objects with low quality video frames, and it is also vigorous the varying illuminations and dynamic background. It is most important to develop a system with careful control of false alarm.
Keywords: *Abandoned object detection, Object detection and tracking, SVM classifier, Visual surveillance.*

I. INTRODUCTION

Increasingly police and security staff rely on video surveillance system to facilitated their work. In video surveillance research referred as the problem of abandoned object or left luggage detection. As public security is concern it is critic task to determine sceptical stationary item. On the grounds that there is no object type of category that can be pretended as abandoned. wearisome methods such as training an object detector for particular category of object were unfit for doing above task. To overcome this problem foreground and background extraction techniques are relevant for knowing static foreground regions (i.e. object that remain static for long time). The existing methods are divided into two classes: one gives analysis based on frames while other on sub-samples.

In today's digital world demands for automatic video-surveillance system as a concern of security with fast analysis. In last decade, some traditional algorithms were developed but it needs manual interference for analyze a big data generated by cameras. These methods had less accuracy and time consuming. For this reason, automatic video interpretation is welling as a solution to operators in focusing their attention on security related events. The detection of abandoned object had become challenging research topic in crowed area such as hospital, railway-stations, and malls. A real-time application can be developed for abandoned object detection which is useful for monitoring a specific area and resulting an appropriate action. Which will avoid some hazardous accidents.

II. LITERATURE SURVEY

Many algorithms and methodologies has been developed for abandoned object detection. Singh has developed method on dual background segmentation. In which blob detection and tracking is used with the help of change in intensity and frame delay to find out object for video surveillance. Robust method has been proposed on double illumination for exact detection and reorganization of the abandoned object. In this method two Gaussian mixture models were constructed i.e. long term and short term. Which results two binary foreground masks.Lin.et.al has given catholic solution for managing abandoned object in real time scenario which not only detects but the system also helps to remove the object.

The detection of abandoned object is nothing but detecting idle/inactive object. In our system, we had developed a model for abandoned object with its location detection and addressing through IOT in real time with the help of video surveillance and image processing.

III. SYSTEM DESIGN

This system is for real time abandoned object detection and its addressing using IOT for enhancing our public security.

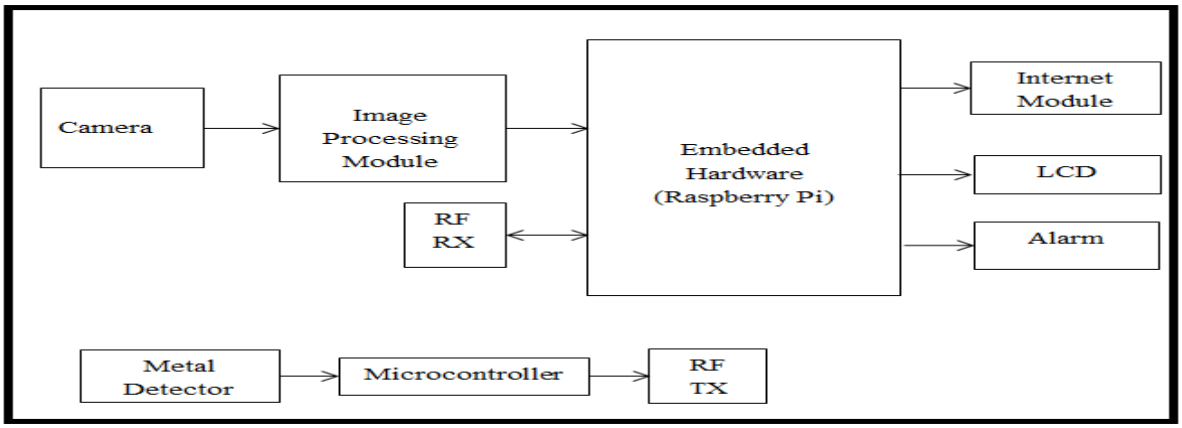

Figure 1. System Block Diagram

The above figure 3 shows the exact block diagram of system. It is divided into modules for better result. The heart of system is module of image processing which is developed with the help of MATLAB and another module for alert and addressing purpose which include embedded hardware, Internet-module, LCD and Alarm.
If abandoned object gets detected then image processing gives signal to Embedded module and RF Module through IOT. Respective action will be taken by controller for alert.

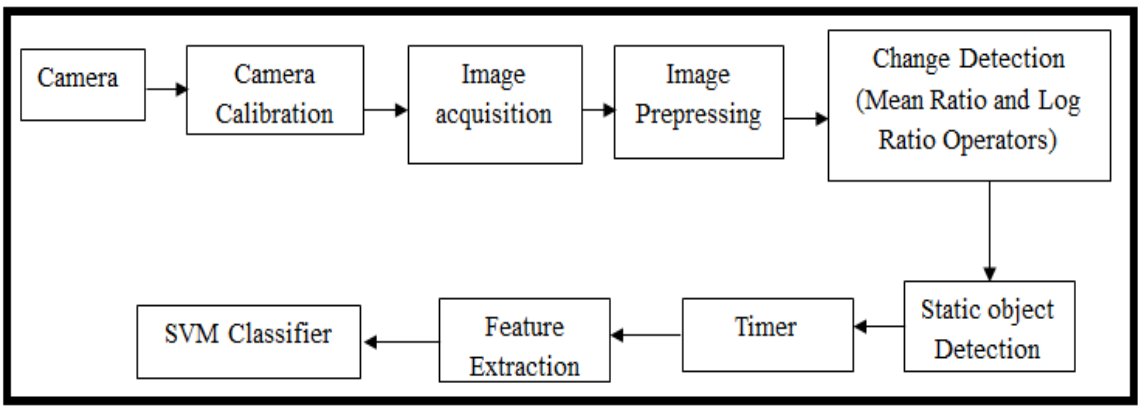

Figure 2. Image Processing Module

IV. OVERVIEW OF IMAGE PROCESSING MODULE

4.1. Capturing the Video and Calibration

For this system, we are considering the live video as an input to the proposed system. In this module, we are going to capture the video through the camera and it will be given as an input to the system.
A live video stream is initially segmented into frames. The resolution of the webcam is 640x480 and it can capture up to 30 frames per second. However, the video output resolution is scaled down to 320x240 to enhance the processing time of the system.
Primarily finding the internal quantities that affect the image for processing. For example, Brightness, Exposure. For the bright light exposure is set to low and for deem light it is set to high.

4.2. Data Extraction and Foreground Subtraction Unit

The captured video in first stage is breached into frames which is store as 2D array. Long term and short term background models are developed for finding reference image for comparison with current image. Foreground image is obtained here with the help of change detection module.

4.3. Change Detection and Object Tracking

We had used log operator and mean operator for detecting change. Change detection is nothing but process of recognizing difference between two images**.** The underlying idea of the optimal difference image is that unchanged pixels exhibit small values, whereas changed area exhibit larger values. It shows change region but it does not enhance it. Result is better than that of log ratio operator. The logarithmic operator is characterized by enhancing the low-intensity pixels while weakening the pixels in the areas of high intensity. Therefore, the

information of changed region that is obtained by the log ratio image may not be able to reflect the real change trains in the greatest extents areas of high-intensity pixels. Clustering involves the task of dividing data points into homogeneous classes or clusters so that items in the same classes are as similar as possible and items are in different classes are as dissimilar as possible.

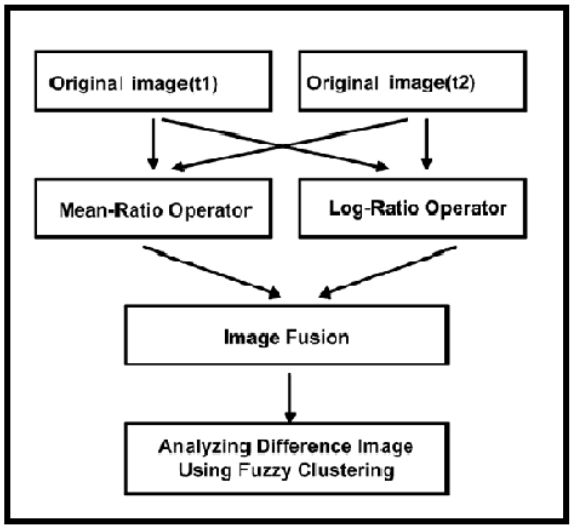

Figure 3. Operation on image using log and mean ratio

4.3.1. Temporary Static Object Detection

• Static or abandoned object or stolen object is traced out by applying Fuzzy Clustering to the current image.
• With the help of Motion Based Criteria we neglect the object which are moving.

4.4. Classification of Detected Objects

With the help of SVM classifier we classify different object based on their features because abandoned objects may have different arbitrary shape and color. It will classify whether the detected object is human, bag, mobile phone, dog like animal etc. depending on their features calculated by system and by comparing with database.
If the object is steady then it will check timer for classify the object is human or abandoned. For that it will check its features i.e. width to height ratio and eccentricity. Using eyes, mouth and face detection it will check the object is alive in nature or not.

4.5. Raising Alarm and Display Result

Whenever the abandoned object is detected by the system, then the alarm will be turn on Its location will have tracked by GPS Module and feed to embeded module for displaying on LCD and further communication through Internet of things(IOT).

V. MATHEMATICAL MODULE

5.2 Difference Image Detection

Conventional method -> Background subtraction

$$= | Ic-Ib |$$

Whereas, Ic = Current image
Ib = Background image

5.2 Improved Method

μA = mean (Ic) μB = mean (Ib)

$$I_{diff} - m = A - B$$

Whereas, $A = \frac{Ic}{\mu A}$ $B = \frac{Ib}{\mu B}$

5.3 Feature Extraction

5.3.1 Width to height ratio

$$S(i) = \sum_{j=1}^{C} I(i,j)$$

$$B(i) = \begin{cases} 1 & \text{if } s(i) >= 1 \\ 0 & \text{if } s(i) < 1 \end{cases}$$

Width = $\sum_{j=1}^{C} B(j)$ Height = $\sum_{i=1}^{R} I(i,j)$

5.3.2 Eccentricity= measure of roundness

$$E=\frac{\text{Minor Axis}}{\text{Major Axis}}$$

5.3.3 Support Vector Machine

$Y=W^{-1}x$ Where- Y = Output

W^{-1} = Hyper plane

X = Input Feature

VI. SIMULATED RESULTS

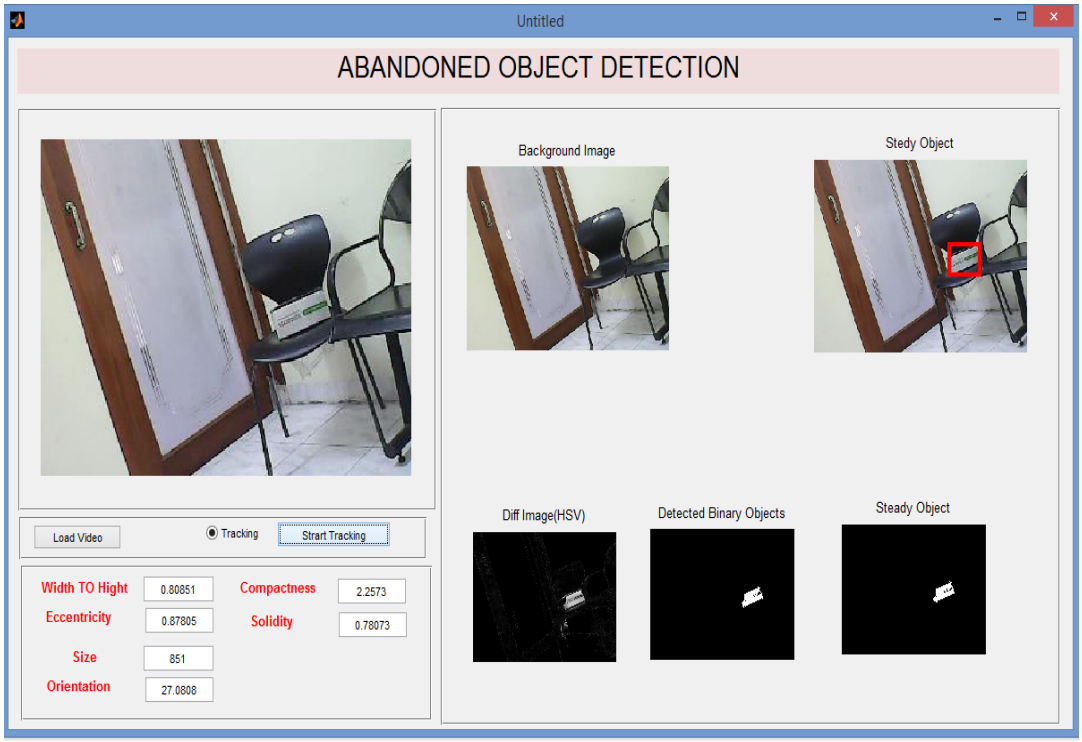

Figure 4. Out Put on Matlab Window

The detection of abandoned object is shown through red rectangular block.

VII. CONCLUSION AND FUTURE SCOPE

This paper gives the detailed implementation of abandoned object with improved architecture. As this system works in real time it will help our security system to avoid attacks. Object is detected using background subtraction technique. In future, instead of using pixel level will go for region based to improve processing speed and reduce data for storage.

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