Study of Unattended Object Detection

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Abstract— **Metropolitan cities are finding more problems to keeping the life secured from attacks even they having security systems like number plate recognition and automatic traffic management, CCTV cameras installed etc. on roads. Many such bad incidences can be avoided by detecting some unattended objects placed on roads. Video surveillance system should be a sufficiently fast enabling a real-time performance. Thus, a prime goal of automated visual surveillance is to obtain a live description of what is happening in a monitored area and trigger appropriate action. The computational effort and complexity involved in simply "following" someone through an extended video sequence is enormous, and a truly robust and reliable tracker is under research. Compounding the problem is that usually public areas under surveillance often have fluctuating and variable lighting conditions, people are frequently occluded by other people or structures, and people may temporarily leave a monitored area, etc. Variation in the light in scene area, size of the object, shadow in scene, distance of camera of system all these can add tremendous difficulty and delay. Here we were motivated to take these as a task for dissertation work. For example, in a system the unattended object which may be steady till last or the unattended objects which may be removed before getting trigger to system is to be detected.**

Index Terms— Background subtraction, brightness adjustment, classification of objects and humans, MATLAB, real-time video processing

I. INTRODUCTION

Terrorist attacks have become a critical threat of public safety; especially, explosive attacks with unattended packages are repeatedly concentrated on such public places. A key function in such a surveillance system is the understanding of human behavior in relation with objects left unattended. In this context, visual surveillance for human-behavior understanding has been investigated worldwide as an active research topic. Many algorithms with different software area available to make real time unattended object detection in video. As well as to take trigger action and highlighting the object in the crowded areas or handling changes in brightness causes the system fail and become very slow. Generally the bomb carrying bag or box being placed by unidentified person and not being attended by a person passed by. The result is destruction of human life and material loss. This is the work of bad elements in society and view is to not allowing them to succeed. In this operation of an automatic surveillance system searching such unattended object to give warning to a respective government department to avoid bad incidence is very much important task now.

To detect the unattended objects following steps need to study which will help us to complete desired task. Taking the video inputs (frames) or interfacing camera as a input device, background subtraction to detect static object in video, target extraction, removing shadow, finding the area, make trigger to system on unattended detection of object.

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II. LITURETURE REVIEW

In the past, many approaches based on background subtraction were proposed [12], [13] [15] & [17]-[20]. Such methods differ mainly in the type of background model and in the procedure used to update the model. Among them, a mixture of Gaussian distributions has been used for modeling the pixel intensities in [20], [19]. In [17] the authors proposed a simple background subtraction method based on logarithmic scaling of intensities of pixels. They claimed to have results that are superior than the traditional difference algorithms and which make the problem of threshold selection less critical which helps in differentiating pixels of two different objects.

In [15] a prediction-based online method for modeling dynamic scenes is proposed. The approach seems to work well, although it needs a supervised training procedure for the background modeling, and requires hundreds of images without moving objects. Adaptive Kernel density estimation is used in [12] for a motion-based back-ground subtraction algorithm, the detection of moving objects to handle complex background, but the computational costs is relatively high. Their method seems to work well in the presence

of both static and dynamic backgrounds. Although many researchers focus on the background subtraction, few papers can be found in the literature for foreground analysis [16], [14]. Reference [21] analyzed the foreground as moving object, shadow, and ghost by combining the motion information. The computation cost is relatively expensive for real-time video surveillance systems because of the computation of optical flow.

In [14] the authors described a background subtraction system to detect moving objects in a wide variety of conditions, and a second system to detect objects moving in front of moving back-grounds. In their work, a gradient-based method is applied to the static foreground regions to detect the type of the static regions as unattended or removed objects (ghosts). It does this by analyzing the change in the amount of edge energy associated with the boundaries of the static foreground region between the current frame and the background image.

The performance of this method could strongly depend on the technique used to update the background and, moreover, they could fail in presence of non-uniform objects. The existing methods can also be divided into two categories according to their use of one or more background subtraction models. And for each category, it can further be subdivided into two classes: one based on frame-to-frame analysis [7], [5] The core contribution of this approach is the integration of a powerful set of filter operators within a linear prediction model to-wards the detection of events using measures that are adaptive to the complexity of the scene. [5] And the other method based on a sub-sampled analysis [6].

For example, a statistical model of the background is used to detect foreground regions and to eliminate object shadows [10]. Two background models system is discussed in [8], [3] for detection of stationary objects. In many surveillance scenarios, the initial background contains objects that are later removed from the scene or left into the scene. Correctly classifying whether a foreground blob corresponds to unattended or removed objects or still person is an essential problem in background model, but most existing systems neglect it. From above literature review it can be concluded that it is a need of implementing system with following processing capability that will full fill requirements like below.

1. Give high speed performance to a system
2. Developing such a system which provide trigger.
3. Detecting object is possible for law light areas
4. Video frames with law resolution can be used for system as a input

So, this study will help implement future system to work for detecting unattended objects from a sequence of video frames inputs.

III. OVERVIEW OF SYSTEM

A.FLOW CHART OF SYSTEM OPERATION

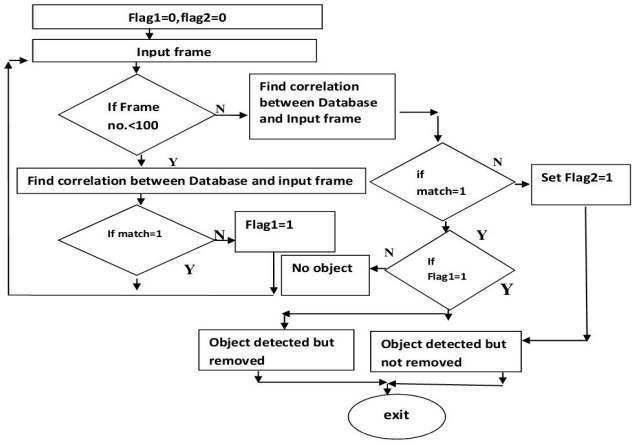

Fig.1. Flow chart diagram for basic system

B. BASIC ALGORITHM

From this study it is find that to make a system to detect unattended object following basic algorithm steps need to follow.

Step1:-Set flag1 and Flag2 is equal to zero

Step2:- Take input video frame and compare that video frame number with 100 count. If frame number is less than 100 then find correlation and if video frame number is 100 then go to step 4 given below.

Step3:- Find correlation of input frame and database frame. If database is matched with input frame then there is no unattended object present. If database is not matched with input frame then there is unattended object detected. So Flag1='1'.

Step4:- when input frame number is equal to 100 then, find correlation between database and 100th frame. If it is matched then check for Flag1. If Flag1 = '1' then it shows "unattended object detected but it is removed" before last frame.

Step5:- If correlation between database and 100th frame will not match then it shows "unattended object detected and it is not removed". If the correlation between Database and 100th frame will be matched then check for flag1. If Flag1 will be at "1" it shows "unattended object detected but it is removed" and if Flag1 "0" then it shows "No unattended object detected"

C. ANALYSING UNATTENDED OBJECT

It is explained in [1] paper that how system will analyze the unattended objects from the moving and still persons or human beings. In video surveillance one of the most important applications is to distinguish the

unattended or removed object from still person. In order to do so, we subdivide extracted objects moving object was classified into one of four types, Temporary Static Object (TS), Moving Person (MP), Still Person (SP), Unattended Object (UO), and Unknown (U), using a simple rule-based classifier for the real-time process. It uses features such as the velocity of a blob, and exponent running average.

To classify, we used three critical assumptions:

1. Unattended object does not move by itself,
2. Unattended object has an owner and
3. The size of the unattended object is probably smaller than a person.

If objects were detected, they were initially classified as Unknown. Then, using the velocity of the moving object, the Unknown was classified as Person or UO. That is to say, if Unknown moved at a velocity higher than that of the threshold value, Th_v (Threshold value) for several consecutive frames, it was identified as a Moving Person. If Unknown's velocity was below the threshold velocity TL_v, it was classified as (TS). If Unknown is identified as TS, UO and Still Person were distinguished by using the Exponent Running Average (ERA). If ERA is greater than a predefined threshold value then the TS is classified as still person and otherwise it will be unattended Object.

IV. CONCLUSION AND FUTURE WORK

This study paper going to help researcher works in the video surveillance, video processing field. Need of society is to develop a fast, highly precise and accurate system for unattended object detection. If the system with adjustment of light conditions, triggering of system at unattended object detection and database comparison of the objects to detect stationary human to differentiate object and humans is possible then this will add tremendous advantage over a current system. This future system will also be applied for detecting special events such as recording a burglary, robbery or monitoring school zone safety problems, for school children, thereby contributing to the safety of people in the home and schools.

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