Anomaly Detection Using Improved Background Subtraction

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Abstract-Both detection and tracking objects are challenging problems because of the type of the objects and even their presence in the scene. Generally, object detection is a prerequisite for target tracking, and tracking has no effect on object detection. In this paper, we propose an algorithm to detect and track moving objects automatically of a video sequence analysis, taken with a fixed camera. In the detection steps we perform a background subtraction algorithm, the obtained results are decomposed using discrete stationary wavelet transform 2D and the coefficients are thresholded. The tracking step is based on the classical filter algorithm. This later uses the filter as many as the number of the moving objects in the image frame. The tests evaluation proved the efficiency of our algorithm for motion detection using adaptive threshold. The comparison results show that the proposed algorithm gives a better performance of detection and tracking than the other methods.

Keywords-*moving object detection; background subtraction;*

I. INTRODUCTION

It is easy for a human being to recognize images or other objects around him, but it is a very complex problem for an automated system. Nevertheless, many systems need to have information on the presence or the absence of objects in their environment. In other terms, object detection and tracking in a video sequences have been one of many important problems in computer vision and have attracted more and more researchers working on it. Furthermore, moving object detection has been used for many computer vision applications, including recognition of traffic scenarios , supervision traffic flow , collision prediction of pedestrians , face detection , human–machine interaction , etc. While detecting and tracking, we need to analyze video sequences to detect and track target in each frame, to achieve monitoring and to master the dynamic variation of the moving objects in order to confirm their exact position. In general, there are lots of methods which can be classified into three categories: optical flow temporal difference and background subtraction. The algorithms of temporal difference quickly adapt to sudden changes in the environment, but the resulting shapes of target are frequently incomplete. In general, optical flow methods present the projected motion on the image plane to high approximation based on the feature of flow vectors.

Many algorithms have been proposed for the moving objects detection. In this we use an algorithm called ST-Patch for motion detection to cover dynamic changes in background. then, Bayesian algorithm corrects the shape of detected objects.various difficult cases are not perfectly solved and must be improved such as identification, occlusion, tracking of object, localization and removing shadows of objects. objects obtained by calculating the result of the difference between the background frame and the present frame image, and then thresholding. In starts. Therefore, we adopt the filter for more effective monitoring of targets.

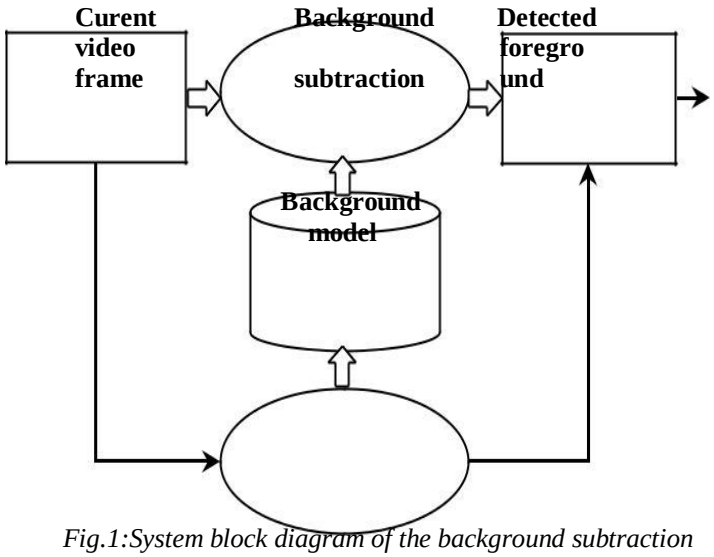

Fig.1:System block diagram of the background subtraction

II. RELATED WORK

An adaptive threshold technique based on SWT is applied on the obtained image using background subtraction, to detect moving objects of each frame in a video scene. For

better follow up the concept of proposed algorithm, the basic idea of detection using background subtraction is firstly described. Then, it will be combined with the stationary wavelet SWT. As a result, an integrated background subtraction-SWT algorithm is obtained for optimally detecting moving objects.

Motion detection methods are basically a process which detects the object in the surveillance area. The following diagram summarizes the proposed algorithm for motion detection with background subtraction based on an adaptive threshold. The following figure 2 involves a number of different steps, each of them are discussed below

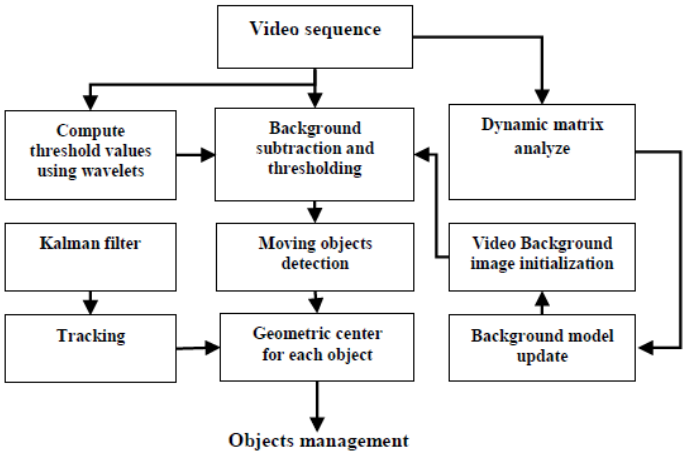

Fig.2:Block diagram of the proposed algorithm

Background subtraction is used in different applications to detect the moving objects in the scene like in video surveillance, optical motion capture and multimedia.

Background subtraction presents the following steps:

Background modeling, Background initialization, Background maintenance, Foreground detection

Background subtraction presents the following issues: Choice of the feature size, pixel, a block or a cluster,Choice of the feature type :color features, edge features, stereo features, motion features and texture features

Background subtraction is a computational vision process of extracting foreground objects in a particular scene.

A foreground object can be described as an object of attention which helps in reducing the amount of data to be processed as well as provide important information to the task under consideration. Often, the foreground object can be thought of as a coherently moving object in a scene.

We must emphasize the word coherent here because if a person is walking in front of moving leaves, the person forms the foreground object while leaves though having motion associated with them are considered background due to its repetitive behavior. In some cases, distance of the moving object also forms a basis for it to be considered a background, e.g if in a scene one person is close to the camera while there is a person far away in background, in this case the nearby person is considered as foreground while the person far away is ignored due to its small size and the lack of information that it provides. Identifying moving objects from a video sequence is a fundamental and critical task in many computer-vision applications. A common approach is to perform background subtraction, which identifies moving objects from the portion of video frame that differs from the background model.

III. IMPLEMENTATION

Background subtraction is a class of techniques for segmenting out objects of interest in a scene for applications such as surveillance. There are many challenges in developing a good background subtraction algorithm. First, it must be robust against changes in illumination. Second, it should avoid detecting non-stationary background objects and shadows cast by moving objects. A good background model should also react quickly to changes in background and adapt itself to accommodate changes occurring in the background such as moving of a stationary chair from one place to another. It should also have a good foreground detection rate and the processing time for background subtraction should be real-time.

Extraction of Foreground Object

After successfully developing the background subtraction model, a local thresholding based background subtraction is used to find the foreground objects. A constant value C is considered that helps in computing the local lower threshold (TL) and the local upper threshold (TU). These local thresholds help in successful detection of the objects suppressing shadows if any.

The steps of the algorithm are outlined in Algorithm.

Algorithm:-Background Subtraction for a frame f

Step 1: for i ← 1 to height of frame do
Step 2: for j ← 1 to width of frame do
Step 3: Threshold T (i, j) = [M (i, j) + N (i, j)] / C
Step 4: TL (i, j) = M (i, j) − T (i, j)
Step 5: TU (i, j) = N (i, j) + T (i, j)
Step 6: if TL (i, j) ≤ f (i, j) ≤ TU (i, j) then
Step 7: Sf (i, j) = 0 //Background pixels
Step 8: else
Step 9: Sf (i, j) = 1 //Foreground pixel
Step 10: end if
Step 11: end for
Step 12: end for

Much work has been done towards obtaining the best possible background model which works in real time.

Most primitive of these algorithms would be to use a static frame without any foreground object as a base background model and use a simple threshold based frame subtraction to obtain the foreground. This is not suited for real life situations where normally there is a lot of movement through cluttered areas, objects overlapping in the visual field, shadows, lighting changes, effects of moving elements in the scene (e.g. swaying trees), slow-moving objects, and objects being introduced or removed from the scene.

The performance depends largely on the ideal combination of the used information, background model, and classification and combination strategies. In the different existing methods, the features commonly used to handle critical situations are colour, edge, stereo, motion and texture . The combination of several measuring features can strengthen the pixels classification as foreground or background.

1V. SYSTEM ARCHITECTURE

The Architecture shows the working of the system.In this system web camera is fixed in the outlier areas.The web cam is recording video of the particular area ,the system stores the video like an input video,then it divides the video like a frames like an image sequence.After the segmentation of frames it divides them in to current image and background image .

System Architecture contains web camera, A place to keep secure, frame segmentation, GSM module .

After the dividing of images we apply the k-means clustering algorithm to compare the operation of the images.If any Anomaly is detected it sends the sms to admin .Here we use the GSM moderm for the sending sms to the admin with the help of serial port cable.

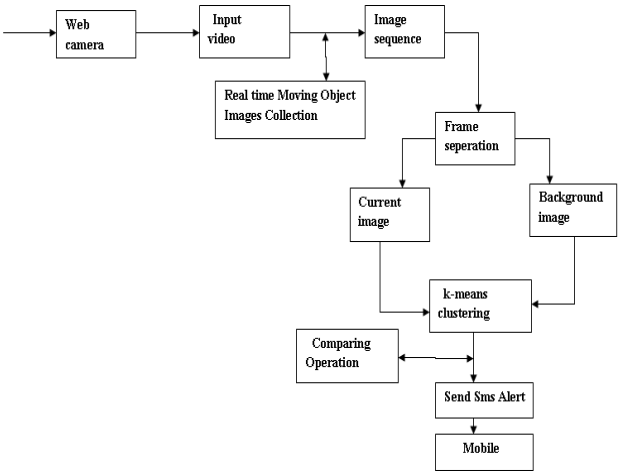

Fig.3:Architecture of the System

V. RESULTS

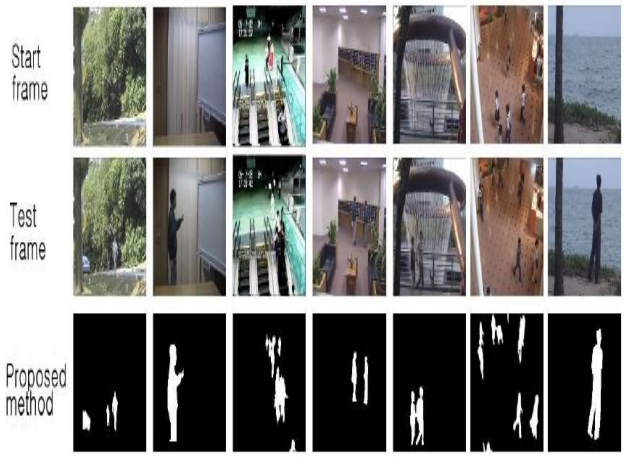

Fig.4:Block diagram of Background Subtraction

Background subtraction results obtained with the proposed scheme. The first frame of each video sequence is shown in the first row, the test frames are displayed in the second row, the resultant of the test frames are shown in the third row.

The purpose of our work is to obtain a real-time system which works well in indoor workspace kind of environment and is independent of camera placements, reflection, illumination, shadows, opening of doors and other similar scenarios which lead to errors in foreground extraction. The system should be robust to whatever it is presented with in its field of vision and should be able to cope with all the factors contributing to erroneous results.

Most primitive of these algorithms would be to use a static frame without any foreground object as a base background model and use a simple threshold based frame subtraction to obtain the foreground. This is not suited for real life situations where normally there is a lot of movement through cluttered areas, objects overlapping in the visual field, shadows, lighting changes, effects of moving elements in the scene (e.g. swaying trees), slow-moving objects, and objects being introduced or removed from the scene.

A large number of background subtraction methods that have been proposed, but the task remains challenging due to many factors, such as illumination variation, moving object's shadow, addition or removal of stationary objects and scene motion. Pixel-wise methods such as temporal difference and the median filtering, assume that the observation sequence of each pixel is independent to each other and background environment. The authors detected people by fusing colour and edge information, which is an illumination invariant feature.

V1. CONCLUSION

This paper used a background subtraction to detect the objects moving through an adaptive threshold technique based on SWT in order to improve our algorithm to detect and track the moving targets. The suggested algorithm does not only outperform the drawbacks of high complex calculation and slow speed for the background subtraction, but also preserves the approach can be implemented in different intelligent systems. Currently, DECOLOR works in a batch mode. Thus, it is not suitable for real-time object detection. In the future, we plan to develop the online version of DECOLOR that can incrementally, e.g., the low-rank model extracted from beginning frames may be updated online when new frames arrive. DECOLOR may misclassify unmoved objects or large texture less regions as background since they are prone to entering the low-rank model. To address these problems, incorporating additional models such as object appearance or shape prior to improve the power of DECOLOR can be further explored in future.the wavelet characteristics of the flexible multi-resolution image and the capacity for processing with noises and wrong motion such as moving leaves of trees. Compared to other algorithms, the experimental results prove that the proposed approach can detect and track the moving objects efficiently and with robustness. Moreover, the simplicity of the proposed method indicates that scene is static. A very popular technique in is to model each pixel in a video frame with a single work

VII. REFERENCES

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