Object Motion Detection And Tracking For Image

Ms. Renuka Raut[1], Mr. Hirendra Hazare[2]
[1]Dept of CSE
[2]Assit. Professor, Dept of CSE
[1, 2] Ballarpur Institute of Technology (BIT), Ballarpur.

Abstract- *Object detection and tracking is one of the critical areas of research due to routine change in motion of object and variation in scene size, occlusions, appearance variations, and ego-motion and illumination changes. Specifically, feature selection is the vital role in object tracking. It is related to many real time applications like vehicle perception, video surveillance and so on. In order to overcome the issue of detection, tracking related to object movement and appearance. Most of the algorithm focuses on the tracking algorithm to smoothen the video sequence. On the other hand, few methods use the prior available information about object shape, color, texture and so on. Tracking algorithm which combines above stated parameters of objects is discussed and analyzed in this research. The goal of this paper is to analyze and review the previous approach towards object tracking and detection using image sequences through different phases. Also, identify the gap and suggest a new approach to improve the tracking of object over image frame.*

Keywords- Object tracking, object recognition, statistical analysis, object detection, background subtraction, performance analysis, optical flow

I. INTRODUCTION

Identification and Tracking of object are an important factor in analysis of video in a surveillance system. It provides the extraction of the information from frames and video sequences which can be multiple processor vision applications for example, CCTV based surveillance, understanding an activity in focus, analysing flow of traffic, c1assifying and tracking an object. This exhibits that identifying and tracking an object is an important field of research in computer vision and its applications in various surveillance systems. CCTV based surveillance has become a demanding technology due to increase in terrorist threats, increase in public\private safety concerns, increase in crime rate, efficient management of public properties and various modes of transportation.

Past work in the field of 'Video Surveillance', have presented various different methods each having different pros and cons. In real word scenario alarm generation in a tracked/traced event is dependent upon accuracy of these proposed models on various research es. By far the most accurate methodology[l] developed has an accuracy rate of more than fifty percent, this method does a two phased [1] background detection using parametric method, for optimum results. Also, it employs background elimination method so as to reduce processing load. The main limitation is the rectification of ghost background. This methodology can be taken forward with a mix of earlier discussed method to achieve a better accuracy rate and hence making it reliable system. Most research work [2],[3],[4] till date seems to be focusing over one challenge and resulting solution causes another challenge, such as while segregating background from object such assumptions were made which cannot be feasible in real world scenario. Background segregation needs to be done with no ghost image area, which has not been achieved effectively, without compromising processing involved.

II. LITERATURE REVIEW

Today with the increasing advancement in technology, a growing concern for safety and security is arising everywhere. To address this concern, the numbers of surveillance cameras have increased in the recent past. Data collected is nevertheless difficult to store and monitor manually on a continual basis. There are several approaches to do this job without human intervention. The underlying principle of all these methods is detection, segmentation and tracking objects in the live video. The steps involved are

- Object Detection: To detect and identify suitable objects in the Video.
- Object Classification: Based on their size and shape objects are classified into birds, buildings, trees, vehicles etc
- Object Tracking: Tracking involves figuring out the path followed by the vehicle as it moves. This is a very challenging step as the noise, object occlusions and their complex structures are also taken into account.

OpenCV (Xianghua Fan), is an open source library for image processing and Computer vision applications, is having the predefined library of various Back ground subtraction methods (Piccardi.M, 2004). So, we choose OpenCV with Microsoft Visual Studio is as the development platform.

The various methods today being used for video processing are Frame differencing, Optical flow and Background subtraction. To detect the moving objects the Frame differencing method uses subtraction of successive frames. This approach is straightforward to implement and easily adaptable to dynamic environments, but it cannot always extract the complete edges of the object. Another popular technique is the optical flow method [2]. This method has two steps. First finding the image optical flow and then performing clustering process with the obtained optical flow characteristics. It performs accurately well in the detection process but the downside is the increased number of computations.

The third method is background subtraction. The principle used in background subtraction algorithm is to model a background and compare it with the current frame to detect objects i.e., zones where significant changes occur. Thus, the background subtraction algorithm separates the moving objects i.e., the foreground part from the static part of the frame i.e., the background.

There are two forms of background subtraction method, the recursive and non-recursive. The recursive method is more of a direct approach which does not depend upon temporary storage buffers but recursively models a background with the current frame. Few examples include adaptive background, approximate median and Gaussian mixtures. The non-recursive method uses a buffer to model the background taking the past frames using the variation of pixels inside the buffer. This method is highly adaptive. The extracted moving region from the video sequence is classified into different objects like trees, birds and humans etc. Classifiers for objects are based on Shape, Motion, Color and Texture [7].

III. PROPOSED SYSTEM

This topic presents a novel combination of an Adaptive background Modelling system and the cascade classifiers-based object detection system for application in video surveillance. The surveillance system presented in this topic can detect and track moving objects in a video sequence, and is resilient against temporal illumination changes. The system also adapts itself to long lasting changes in the background over time. Surveillance (ODS) System. A brief overview of the system is given in Fig. 1.

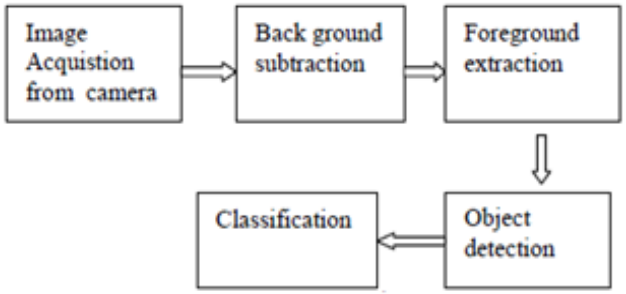

Fig 1: Surveillance System Overview

The foreground is extracted from the video scene by learning a statistical model of the background, and subtracting it from the original frame. The background model learns only the stationary parts of the scene and ignores the moving foreground. The system uses the Gaussian Mixture Model for modelling the background adaptively. Hence the motion regions are identified in the frame, which constitute the regions of interest (ROI) for our ODS system. The ROI might consist of a human figure, an animal or even a vehicle.

IV. METHODOLOGY

Motion Detection Methods

The video surveillance has long been in use for monitoring security sensitive areas for examples banks, department stores, traffic monitoring on highway, public places which are crowded. Due to the advanced technology the large capability of storage devices is available. The motion detection methods are classified according to the method of finding moving object. Different motion detection methods are described as follows:

The basic principle in the background subtraction technique is separating the estimated image from the observed image. The observed image is modelled as the background while the estimated image contains suitable objects known as foreground. This foreground process divides the image into two complementary sets of pixels, a foreground containing suitable objects and a background containing static area.

There are certain criteria which every detection algorithm must fulfil. Any background detection algorithm must adapt itself to sudden changes like illumination changes, motion changes, high frequency objects and their geometry especially while catering to outdoor surveillance scenes [8]. These include unfamiliar changes in light intensity, camera oscillations, objects like trees and parked vehicles. Most challenging applications require the algorithms to be implemented and incorporated in the camera itself to reduce the computational load later on. Let Image be represented as

F(x,y,t) and Background as K(x,y,t) at time t. Using Frame Differencing method, background frame is represented as

K(x,y,t) = F(x,y,t-1)
|F(x,y,t)–F(x,y,t-1)| >Thr (2)
Median filter uses the median of n previous frames as the background model
K(x,y,t) = median{F(x,y,t-i)}
|F(x,y,t) - median{F(x,y,t-i)}| >Thr (3) Where i = {0,1…n-1}

Background subtraction:it is particularly a commonly used technique for motion segmentation in static images. It will detect moving regions by subtracting the current image pixel-by-pixel from a reference background image that is created by averaging images over time in an initialization period. The basic idea of background subtraction method is to initialize a background firstly, and then by subtracting current frame in which the moving object present that current frame is subtracted with background frame to detect moving object. This method is simple and easy to realize, and accurately extracts the characteristics of target data, but it is sensitive to the change of external environment, so it is applicable to the condition that the background is known.

Background subtraction methods operate on pixels independently. One such method described in [9] advocates that neighbouring pixels of background models must remain constant or show similar variations over time. This theory holds good as long as the pixels neighbouring to each other belong to a single background object. For different background objects it poses a difficult task for pixels distributed in their borders. All the pixels are divided into groups first of N ×N blocks and every block is processed as a $N2$ component vector. Principal Component Analysis (PCA) model is computed for each block by collecting few samples over time [10]. Pixels are then classified based on the threshold difference between current image and backspace projection of its PCA coefficients as either background or foreground. Independent Component Analysis (ICA) is similar to the above approach and is described in [11]. This method uses a demixing vector and compares it with a new image to separate foreground from background image taken as reference.

Optical *flow:*The optical flow method uses the motion target of the vector characteristics which changed with time to detect motion area in image sequences. It gives better performance under the moving camera, but this algorithm is very complex and complicated computation and also it needs special hardware support, so it is difficult to meet the requirements of real-time video processing.

Cascade Classifier: Haar-like features have scalar values that represent differences in average intensities between two rectangular regions. They capture the intensity gradient at different locations, spatial frequencies and directions by changing the position, size, shape and arrangement of rectangular regions exhaustively according to the base resolution of the detector. The Haar basis functions are a set of rectangular 2D features derived from the Haar wavelet sets. Haar-feature said to be present if subtracting the average dark-region pixel value from average light-region pixel value is above a threshold (set during learning). Ada-Boost combines many weak classifiers to create one strong classifier. Object detection via Haar-like Features with Cascade of Boosted Classifiers.

V. RESULT & FUTURE SCOPE

In this topic, the background subtraction algorithm for the detection of the moving object in the surveillance area. The demonstration system has the set up for the implementation of proposed system in the opencv software. Here the reference image is initialized in the code and then the subtraction of the current frame is done. After the subtraction of the both frame the subtracted image is display on the screen.

VI. CONCLUSION

The application provides efficient “Object motion Detection”. For this to happen the algorithm involved includes background subtraction of the video and foreground detection of objects. The system finds its applications where real time surveillance is required such as bank,traffic monitoring, forest etc.

REFERENCES

[1] Shih-Chia Huang, "An advanced motion detection algorithm withvideo quality analysis for video surveillance systems", IEEE Trans.on Circuits Syst. Video Technol., vol. 21, no. I, pp. 1-14, Jan.201 I.
[2] T. DarreII, G. G. Gordon, M. Harville, and J. Woodfill, "Integratedperson tracking using stereo, color and pattern detection," Int. J.Comput. Vis., vol. 37, pp. 175-185, Jun. 2000.
[3] I. Haritaoglu, D. Harwood, and L. S. Davis, "W4: Real-timesurveillance of people and their activities," IEEE Trans. Patt. Anal.Mach. Intell., vol. 22, no. 8, pp. 809-830, Aug. 2000.
[4] W. Hu, T. Tan, L. Wang, and S. Maybank, "A survey on visualsurveillance of object motion and behaviors," IEEE

Trans. Syst.,Man, Cybern. C, Appl. Rev., vol. 34, no. 3, pp. 334-352, Aug.2004.

[5] Ruolin Zhang and Jian Ding.2012.Object Tracking and Detecting based on Adaptive Background Subtraction. International Workshop on Information and Electronics Engineering.

[6] Piccardi.M . 2004. Background Subtraction techniques: A review. IEEE International Conference on Systems, Man and Cybernetics.

[7] Nuria M. Oliver, Barbara Rosario, and Alex P. PentIand, "ABayesian Computer Vision System for Modeling HumanInteractions", IEEE Trans. on Pattern Analysis And MachineIntelligence, vol. 22, no. 8, pp.83 1-843, Aug. 2000.

[8] Si Wu, Hau-San Wong, and Zhiwen Yu, "A Bayesian Model forCrowd Escape Behavior Detection", IEEE Trans. on Circuits Syst.Video Technol., vol. 24, no. I, pp.85-98, Jan. 2014.

[9] Du-Ming Tsai and Shia-Chih Lai,"Learning Patterns of Activityusing real time Tracking", IEEE Trans. on Image Processing, vol.18, no. I, pp. 158-167, Jan. 2009.

[10] Weiqiang Wang, Jie Yang, and Wen Gao, "Modelling Backgroundand Segmenting Moving Objects from Compressed Video", IEEETrans. on Circuits Syst. Video Technol., vol. 18, no. 5, pp. 670-68 I, May 2008.