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# Various Methods for Object Tracking- A Review

Bindu Sharma[1], Navpreet Kaur[2]
*(Computer Science, Punjabi University Regional Centre for Information Technology and Management, Mohali, Punjab)*

***Abstract:*** *The object tracking is the technique which is used to track object from the image or from the video. The video consists of multiple frames and in each frame location of that object had been predicted. To predict location of the object technique of probability has been applied and this technique works on single object. In this paper, improvement has been proposed in probability based technique to track multiple objects from the video. The proposed technique had been implemented in MATLAB. The graphical results show that proposed technique works well in terms of detection rate.*

***Keywords:*** *object classification, object detection, object tracking, probabilistic*

## I. Introduction

Object tracking is the method of determining (estimating) the positions and other relevant information of moving objects in image sequences [4]. The trajectory of an object can be either of interest in its own right or can be used as the foundation for higher level analysis .The input to the object tracking method is a sequence of image frames taken after small intervals of time [5]. Detection of objects and classification of objects are preceding steps for tracking an object in sequence of images.

Object detection is performed to check existence of real-world objects such as cars, bicycles, buildings in the sequence of images and to precisely locate such objects. The detected object can be classified into various categories such as vehicles, humans, birds, swaying tree, floating clouds and other moving objects [8].

Object tracking is performed by monitoring spatial and temporal changes in sequence of images, including the presence of object, its position, size, shape, etc. Object tracking is used in numerous applications such as video surveillance, robot vision, traffic monitoring, Imprinting and Animation etc [2].Multiple object tracking in videos is one of the essential research topics in dynamic scene analysis such as video indexing, automated surveillance, traffic monitoring, human-computer interaction and vehicle navigation [3].

**1.1 Object detection:** is a computer technology related to computer vision and image processing. This is the process to identify objects in a video sequence and to cluster pixels of these objects.

**1.2 Object classification**: Classification includes a broad range of decision-theoretic approaches to the identification of images. It analyzes the numerical properties of various image features and organizes data into categories.

**1.3 Object tracking**: tracking is the problem of approximating the path of an object in the image plane as it moves around a scene. The purpose of an object tracking is to generate the route for an object by finding its position in every single frame of the video.

## II. Related Work

Author [1] presents a survey on object tracking on moving objects discussed the feature descriptors that are used in tracking to describe the appearance of objects which are being tracked as well as object detection techniques. They classified the tracking methods into three groups (contour-based, region-based, feature-point based models) and a providing a detailed description of representative methods in each group, and find out their positive and negative aspects.

Author [2] presents survey on different object detection , object classification and object tracking algorithms.The methods which are available for object tracking are discussed in this paper with their advantages and limitations. It reviews the various aspects of object detection and the challenges involved. It can be summarized background subtraction is a simplest method providing complete information about objectcompared to optical flow and frame difference for detecting objects.

Author [3] presents an algorithm to track an object, moving with an unknown trajectory, within the camera's field of view. To achieve this Kalman Filter (KF) was used for tracking and estimation because of its ease, optimality, tractability and robustness. The Single Filter method was implemented. The Single Filter was able to track high speed an error of a couple pixels.By using this series of measurements observed over time,

containing noise and other inaccuracies, and produces estimates of unknown variables that tend to be more precise than those based on a single measurement alone.

Author [4] presents a probabilistic object tracking model based on condensation algorithm. A novel object tracking algorithm based on particle filtering associate with population balances was proposed. The developed algorithm was used to track objects in synthetic frames and natural video frames. Firstly, the efficiency of the developed method has been checked against synthetic video frames. Thereafter, single and multi objects scenarios have been examined on natural video frames. The colour histogram was used as the main feature of the object, and a probabilistic particle filter method incorporating with a novel population balance approach in imaging was proposed to track an object. Population balance equations (PBEs) were used to define phenomena in particulate processes.

Author [5] presents a robust and real-time method for tracking objects. The proposedalgorithm included two stages: object tracking, object Segmentation. The concept of tracking object was built upon the object-segmentation method. Improving segmentation results as well as being able to extract additional information such as frame difference, Gaussian of mixture model, background subtraction allows for improved object detection and thus tracking. According to the segmented object shape, a predict method based on Kalman filter was proposed. Kalman filter model was used to tracking and predicting the trace of an object. Image enhancement is the process of adjusting tracked frame images so that the results are more suitable for display. Finally segmented frames were converted into video sequence. The proposed method has been tested on a number of video sequences.

Author [6] presents a method to detect object based on background subtraction method. A reliable background updating model was established. An optimization threshold method was used to obtainbehaviour of moving object and tracking. Motion of a moving object and tracking in a video stream was studied and detected. This method was beneficial for time efficient, and it works well for small numbers of moving objects.

Author [7] presents a novel algorithm for automatic video object tracking based on a process of subtraction of successive frames, where the prediction of the direction of movement of the object being tracked was carried out by analyzing the changing areas generated as result of the object's motion, specifically in regions of interest defined inside the object being tracked in both the current and the next frame. This moving region was displaced in the direction of the object's motion predicted on the process of subtraction of successive frames. Finally, the location of the moving region of interest in the next frame that minimizes the proposed function of dissimilarity corresponds to the predicted location of the object being tracked in the next frame.

## III. Tables

| Author Name | Year | Description | Outcomes |
|---|---|---|---|
| Barga Deori et al. [1] | 2014 | Presented survey on object tracking methods, categorized them and identify useful tracking methods. | Object tracking approaches were categories into three –contour based, region based and feature based approach. |
| A.Hema et al.[2] | 2015 | Presented survey on different object detection, object classification and object tracking algorithms. It reviews the various aspects of object detection and the challenges involved. | It summarized that background subtraction is a simplest detection method providing complete information about object compared to optical flow and frame difference. |
| Kiran .S. Khandare et al.[3] | 2014 | They proposed an algorithm to track an object moving with an unknown trajectory, within the camera's view. To achieve this Kalman Filter (KF) was used for tracking and estimation. | A new algorithm was created as neither processing method was able to increase the sampling frequency. The Single Filter method was implemented. The Single Filter was able to track high speed, an error of a couple pixels. |
| Muammer Catak [4] | 2014 | They proposed a probabilistic object tracking model based on condensation algorithm. An algorithm based on particle filtering associate with population balances was proposed. The developed algorithm was used to track objects in synthetic frames and natural video frames. | A novel object tracking method based on condensation, population balances, and variance reduction techniques was introduced The developed algorithm has adequacy to track objects in the video frames with high accuracy. |

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|---|---|---|---|
| P.Subhasini et al.[5] | 2014 | They proposed a robust and real-time method for tracking objects. The concept of tracking object was built upon the object-segmentation method. | It examined methods to improve the performance of object detection and tracking algorithms and block matching technique for object tracking applications. Improving segmentation results as well as being able to extract additional information such as frame difference, Gaussian of mixture model, background subtraction allows for improved object detection and thus tracking. |
| Vishwadeep Uttamrao Landge [6] | 2014 | They proposed a method to detect object based on background subtraction method. A reliable background updating model was established. An optimization threshold method was used to obtain behaviour of moving object and tracking. | Motion of a moving object and tracking in a video stream was studied and detected. This method was beneficial for time efficient, and it works well for small numbers of moving objects. |
| Andres Alarcon Ramirez et al.[7] | 2013 | They proposed a novel algorithm for automatic video object tracking based on a process of subtraction of successive frames, where the prediction of the direction of movement of the object being tracked was carried out by analyzing the changing areas generated as result of the object's motion, specifically | The location of the moving region of interest in the next frame that minimizes the proposed function of dissimilarity corresponds to the predicted location of the object being tracked in the next frame. |

## IV. Conclusion

In this paper, various techniques are used for tracking object in video and it has been concluded that existing technique will track objects from the videos on the basis of probability. In the probability based technique position of object will be predicted from the previous position of the object. This technique works well for the single object detection. To track multiple objects from the video, improvement will be proposed in the probability based technique.

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