Multiple Object Tracking in Videos: A Survey of Literature Work

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***Abstract* - Object tracking is a technique that is being used from past centuries. This technique includes an application called surveillance that helps to detect the threats on public places that may be the crowded public place or a mall or public transport with the help of CCTV cameras. In the surveillance system, several vision based methods are utilized for various objects. Some of the methods are used for tracking including background modeling, particle filter etc. The proposed method combines the background modeling and particle filter to track multiple objects. In the object tracking process the object is considered to be in motion if its location is changing with respect to its background. By using background subtraction method the change of frame is detected, in case there is no difference between two frames the object is considered to be static. Our work is to propose a system that detects the motion and to compare its results with the performance with former systems. Different colored particles are displayed on the object for tracking. After applying the proposed method on a video having several objects, successful results were obtained**

***Keywords* - Tracking, prediction, computer vision, background subtraction.**

I. INTRODUCTION

Multiple object tracking is an intensively studied area of research. A wide range of approaches relies on the recursive update of tracks with the most recent detections.Multiple object tracking is a significant computer vision task. It also has gained attention due to its academic and commercial potential. Many kind of approaches has been presented to handle this issue but still many problems remain unsolved, for example abrupt appearance changes, object occlusions etc. Multiple object tracking has several applications in visual navigation, sports video analysis, video surveillance and human behavior analysis. Multiple object trackers can hold all the objects concurrently and also provides better tracking performance than single object trackers.

An object in computer vision may be defines as a continuous closed area in an image that is different from its surroundings. In multiple object tracking, objects can be easily found with an identity. In computer vision detection may localizes objects in images but it does not involve temporal information. Detection is generally conducted by training an object detector from a training dataset. The main purpose of tracking is to localize an similar object in continuous frames. Tracking involves temporal information in a video or image sequence. In multiple object tracking, tracking may be considered as localizing multiple objects and maintaining their identities. The outputs of an object detector are given by detection responses. Trajectory is the output of a multiple object tracking system. a trajectory is unique as it gives One trajectory corresponds to one target. In an image sequence, one trajectory consists of multiple object responses of a similar target, each representing the location, size and some other information in one frame. An intermediate level of output between trajectories and detection responses are known as tracklet. Tracklet consist of various detection responses. It is generally acquired by connecting confident detection responses, hence it can be said that tracklet is shorter than trajectory regarding the time span. In some approaches, the final trajectories are obtained by progressively linking detection responses into longer and longer tracklets and eventually forming trajectories.

Multiple object tracking challenges are given as follows

1) Frequent occlusions
2) Initialization and termination of tracks
3) Small size of objects
4) Similar appearance among objects
5) Interaction among multiple objects.

Multiple object tracking can be divided into two different steps which indicate independent issues. The first step is time-independent detection. In this step, prediction scheme assumes locations of targets from the available signal independently at every time step. It generally includes either a discriminative machine learning-based algorithm or a generative model of the signal given the target presence. The step based on modeling detection errors and target motions to link detections into the most likely trajectories.

II. LITERATURE SURVEY

Nicolas Chenouard et al. [1] presented a method used for tracking the number of targets in biological image sequences. This proposed method includes a model of particle motion and its image feature. This framework provides high quality results in spite of poor imaging condition. Furthermore, the benefits of Bayesian tracking technique have been demonstrated in this paper.

Wongun Choi et al [2] in this work, model for tracking multiple objects has been proposed. In 3D coordinate system, camera ego-motion is framed in order to determine the trajectories robustly. In this proposed method, reversible jump Markov chain Monte Carlo particle filtering method is used. The results demonstrated that the proposed method can easily estimate camera's motion and track people who are independently moving.

SanjivaniShantaiya et al. [3] proposed multiple objects tracking from given video dataset.in this work; objects can be tracked using optical flow algorithm and Kalman filter. Tracking method has been presented for processing video data in order to perform tracking by a machinevision system. The proposed method can capable to control some problem like missing of an object, appearance of object etc. Moreover, optical flow algorithm has also been presented which gives better accuracy and less computation time.

Hitesh A Patel et al [4] proposed a visual surveillance system with moving object detection and tracking.in this paper kalman filter is used on standard surveillance dataset of CAVIAR and PETS. Object tracking of any single moving objects has implemented on these standard datasets. This implemented module can be applied to any computer vision application for moving object detection and tracking.

NisheethSrivastava et al. [5] in this paper, a computational model of multiple object tracking has been presented. This model is implemented in such a way that it leads to accurate prediction. Also, the proposed model can makes trial-level predictions about the allocation of visual attention and the resulting performance. This proposed approach makes accurate predictions of both the aggregate effect of target number and velocity and of the variations in difficulty across individual trials.

Berclaz, Jerome et al. [6] in this paper multiple object tracking has been proposed using k-shortest paths optimization.by detecting object in separate frames, multiple object tracking can be attained. Id object is not detected in frame; then accurate trajectory will not be produced. In this work, constrained flow optimization results in a convex problem have been indicated and this particular structureis used to solve it using the k-shortest paths algorithm, which is very fast.

Boris Kluge Christian Kohler Erwin Prassleret al. [7] in this paper presented tracking of multiple moving objects. This novel approach is implemented on robotic wheelchair. In this work, an object tracking system has been proposed which is based on the laser range finder data processing. The basic idea is to represent the motion of object shapes in successive scan images as flows in bipartite graphs.

III. CONCLUSION

We have exhibited a review of advancements in object tracking inside of a general handling structure for visual observation frameworks. The best in class existing approaches in every significant issue are represented with the focus on the tracking after detection, which are: location, tracking, comprehension and representation of methods, individual track ID for object tracking, also, predictive reconnaissance utilizing different cameras. With respect to the detection of moving objects, it includes natural representation, movement separation and object characterization. Three methods for movement separation are tended to: background subtraction, variation differencing, and optical flow. We have talked about four thoroughly observed methodologies to following: locale based, dynamic shape based, component based and furthermore, model based. We have looked into the best in class of behavior representation in terms of the path tracked. Out of these, one of the basic methods have been the background subtraction and path prediction. Further work in this area can be to analyze different methods for prediction and improving their efficiency.

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