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A CRITICAL REVIEW ON ALGORITHMS FOR TRACKING OF SELECTED TARGETS

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ABSTRACT

The target tracking has become the key technologies of the image processing technique for the IR imaging sensor. Object tracking is an important task within the field of computer vision. The proliferation of high-powered computers, the availability of high quality and video cameras, and the increasing need for automated video analysis has generated a great deal of interest in object tracking algorithms. The goal of this paper is to review the state-of-the-art tracking methods, classify them into different categories, and identify new trends.

Key words: ObjectTracking, tracking algorithm, Kalman Filter, image sequence tracking

INTRODUCTION

Literature survey has been conducted for object detection and tracking algorithm work carried out so far in video surveillance system. Tracking is the process to locating the interested object within a sequence of frames, from its first appearance to its last. The type of object and its description within the system depends on the application. During the time that it is present in the scene it may be occluded by other objects of interest or fixed obstacles within the scene. A tracking system should be able to predict the position of any occluded objects .In [1], the author gives the overview of object tracking. There are many algorithm are used in the tracking of object such as mean absolute difference algorithm [4],block matching algorithm [3], normalized cross correlation algorithm [5], multiple target tracking algorithm[7], genetic algorithm[8].In [15], the author suggests an algorithm to isolate the moving objects in video sequences and then presented a rule-based tracking algorithm. The preliminary experimental results demonstrate the effectiveness of the algorithm even in some complicated situations, such as new track, ceased track, track collision, etc. A tracking method without background extraction is discussed in [16]. In this methods using background subtraction like centriod tracking etc.while using improper thresholding, small blobs pretending to smaller blob may form a bigger blob which may cause tracking confusion and vice versa can also occur due to improper thresholding.

The author introduces a video tracking in computer vision, including design requirements and a review of techniques from simple window tracking to tracking complex, deformable objects by learning models of shape and dynamics in [19]. Collins et al. [17], created a half breed system that joins three-edge differencing with a versatile foundation subtraction model for their VSAM (Video Surveillance and Monitoring) undertaking. Desa & Salih et al [18], proposed a mixture of foundation subtraction and casing contrast that enhanced the past consequences of foundation subtraction and edge distinction.

The tracking of an object comprises of two primary steps namely representation and localization. The former depends on the modeling of the target object whereas the latter deals with method of searching the target in subsequent frames. Color histogram [20], feature point [21] and object contour [22] etc. are some of the models that are very popular for target representation.

1.1.1 Object Tracking using Kalman Filter

Automatic tracking of multiple objects is still an open problem in many application, including car surveillance [26], motion tracking [13], template matching[10], feature matching [9] sports [27] and smart rooms [28] among many others [29,30]. Object tracking decides the movement of the projection of one or more object in video frame plane. This movement is incited by the relative movement between the camera and the watched scene. Task of object tracking is to assess portion and trajectories of moving object over time. Object tracking finds application in various area like surveillance system, guidance system, etc. there may be various

challenges in object tracking in image sequence. Some of which are:

1) Non-uniformity in intensity variation across target.
2) Intensity variations across subsequent frames.
3) Changes due to moving camera.
4) Target size, orientation etc change.
5) Occlusion partial or full.

It is therefore essential to adopt principled Over the last few years, particle filters, also known as condensation or sequential have been used for tracking.

Methods for object tracking might be arranged into three classifications broadly as follow:

A Region-based methods: These strategies give a productive approach to decipher and investigate movement in a frame sequence of video. A region in frame might be characterized as a set of pixels having homogeneous attributes. It could be determined by image segmentation, which might be focused around different object characteristics like color, edges and so forth. Basically, a region would be the image range secured by the projection of the object of investment onto the frame plane. After segmenting the region a bounding box is created that identifies the target being track [1].

B Contour-based methods: in this object is represented utilizing contour shape information is used the tracking time to time, hence recovering both its position and shape [1].

C Then again, contour based tracking are typically more robust than region based object tracking algorithm, on the grounds that it could be adjusted to adapt to halfway impediments. Additionally the outline contour information is insensitive intensity variation.

D Template-based methods: Template-matching procedures are utilized by numerous researchers to perform object tracking. Template based tracking is nearly identified with region based tracking on the idea that a template is basically a model of the target area to be tracked. These routines include two steps for tracking. In the first step template might be instated by different off-line and online strategies. Throughout matching, it includes the procedure of seeking the interested object to focus the image region that looks like the template, taking into account a likeness or separation measure [10]

1.1.2 Template based method

The goal of a tracking system is to estimate the locations and sizes of the targets in a video sequence. In order to accomplish this task, it is impossible to know the appearance of the targets. A template, provides the information about the appearance of the targets, and thus plays an important role in the tracking system. Unfortunately, due to the fact that the targets may be non-rigid objects and the viewpoint of the camera may change in the video, the appearance of the targets may not remain the same during tracking.Therefore, in order to reliably track the targets throughout the video sequence, a template updating algorithm is required to adapt the template to the newly observed appearance of the targets. Many template updating algorithms have been developed recently. Most approach uses the previous observation as the template for the tracker to find the most probable location of the target in the next frame. Though simple, this approach has problems because the estimation of the target's location inevitably has errors so that the bounding box may include the background or other objects. If we take the previous observation as the template in the next frame, the errors will accumulate and finally lead to loss of targets in the future [23]. When the target is rigid, an alternative is to first use the previous observation as the template to obtain a rough estimation of the target's location. Then, we can conduct a local search utilizing the reliable first template, and start the search from the rough estimated location in order to correct the rough estimation [23]. However, this technique does not work when the targets are deformable such as hockey players. Toyama and Blake introduced the exemplar tracker [24]. Instead of constraining the appearance of the targets to be similar to some fixed number of templates, Black et al. [25] constrained the target to lie on a learned eigen-subspace. Their Eigen Tracking algorithm simultaneously estimates the location of the targets and the coordinates of the target's appearance in the subspace to minimize the distance between the target's appearance and the subspace.

FUTRE SCOPE

Significant progress has been made in object tracking during the last few years. Several robust trackers have been developed which can track objects in real time in simple scenarios. However, it is clear from the papers reviewed in this survey that the assumptions used to make the tracking problem tractable, for example, minimization of occlusion, illumination constancy, high contrast with respect to background, etc., are violated in many realistic scenarios and therefore limit a tracker's usefulness in applications like automated surveillance, human computer interaction, traffic monitoring, and vehicle

navigation. Thus, tracking and associated problems of feature selection, object representation, dynamic shape, and motion estimation are very active areas of research and new solutions are continuously being proposed. One challenge in tracking is to develop algorithms for tracking objects in unconstrained videos, for example, videos obtained.Another related video domain is of formal and informal meetings. These videos usually contain multiple people in a small field of view. Thus, there is severe occlusion, and people are only partially visible.

CONCLUSION

In this paper, we present an extensive survey of object tracking methods and also give a brief review of related topics. Moreover, we describe the context of use, degree of applicability of the tracking algorithms. We believe that, this article, the survey on **Robust Target Tracking Algorithm for Image Sequence** with rich contents, can give valuable insight into this important research topic and encourage new research.

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