

Object Tracking through Steiner tree and Sparse Model

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Abstract— Tracking of Object deals with moving objects that change over time. Object tracking having more importance in various monitoring systems like traffic monitoring system, in military applications etc. Many methods are developed for object tracking but still it is very challenging topic, because no method is efficient to track object in different image scenes or in videos. In this paper a new methodology for object tracking is introduced. In this paper a combination of Sparse Model and Steiner tree is used for tracking of object. Sparse Model extract features of object from image scenes or from video and Steiner tree is used to locate that object efficiently and speedily with the help of clustering method.

Keywords—*Sparse model, Steiner tree, clustering method.*

I. INTRODUCTION

Object tracking play important role in field of automatic surveillance system. Now in many sectors automatic surveillance needed and also efficiently used in many applications like military applications, traffic monitoring and other monitoring system. Object tracking particularly deals with moving target object. Tracking objects in videos is very popular application. Object tracking play vital role in many areas such as military application, visual surveillance systems, motion analysis systems, activity recognition system.

Any object tracking technique or methodology depends upon feature of an object. Object tracking in videos is difficult issue because many problems linked with tracking of an object. Many currently used algorithms are done object tracking in a controlled environment. However these methods are fail to handle difficult and dynamic situations. The main task of any object tracking method is to handle variability of appearance of target object. Many others issues are associated with tracking of object are motion of camera, occlusion and changing illumination, variation of pose and deformation of shape.

Appearance model is play key role in tracking of object because it representing a target objects and verifies state of an object in each frame of video. For an efficient appearance model several elements are needs to be considered. First, representation of target object is done by various features like color, intensity etc. Usually representation schemes can be based upon holistic templates and local representation. Second, for verifying state prediction generative or discriminative appearance model is needed. In the generative model tracking is done by searching for most similar region as the target object in the neighborhood.

II. RELATED WORK

In the following section all related works regarding object tracking are mentioned.

In [2], S. Wang, Huchuan Lu presented methodology for object tracking algorithm to handle large change in scale, shape deformation and motion. They used super pixel discriminative appearance model and with the help of mid level cues for distinguishing object from the background. Mid-level visual cues are very effective representations with sufficient information of image structure and great flexibility when compared with low-level features and high-level appearance models.

S.Avidan [3], presented method for tracking of object through binary classification problem, where weak classifiers are trained to distinguish between background and target object. In this model strong classifier is combining with weak classifier using technique called AdaBoost which is very efficient technique for object tracking. P.Perez, C.Hue proposed probabilistic tracking which based upon colors, where global color reference models are used by trackers. Such trackers are robust and versatile.

In [4], Xu Jia, Huchuan Lu presented tracking algorithm which is based upon adaptive template update strategy and structural local sparse appearance model. This model exploits partial information based on novel alignment pooling and spatial information. Accuracy of the tracking of object and to reduce influence of occlusion is done by Alignment pooling method.

In [5], Yuan Li, Haizhou Ai proposing technique for tracking object in low frame rate video. In this paper, they integrate conventional tracking and detection techniques to solve the problems occur in low frame rate video. Various problems associated with the low frame rate video such as processing speed, discontinuity in appearance etc. To overcome such problems authors find out solution in that two very useful techniques used first is conventional tracking and another is detection.

In [6], David Ross, Jongwoo Lim presents method for visual tracking which efficiently learn and update a low dimensional subspace representation of the target object. This method provides compact notion of the “thing” being tracked rather than treating the target object as set of independent pixels and it is facilitates recognition of object.

III. PROPOSED METHOD

In this paper we proposed method for object tracking, in which we assemble sparse model and Steiner tree concept to overcome drawbacks of existing systems. Our system works as follows:

- Step1. Choose a video and select object.
- Step2. Apply SDC and SGM on that object for getting features of that object.
- Step3. Apply Histogram clustering for comparing histogram of object with histogram of other frames.
- Step4. Implement Steiner tree on that histogram and locate that object.
- Step5. Tracking of an object.

IV. WORKING

In our system first step is to apply sparse model on an object i.e., applying Sparse Discriminative Classifier (SDC) and Sparse Generative Model (SGM). Through sparse model all features of an object is obtained. After getting features we apply Histogram clustering method to get histogram of an object and comparing that histogram with all frames histogram present in video. Only matching frames are considered for location of that object. And then Steiner tree concept is applied on that frames to track location of that object. Finally tracking is done.

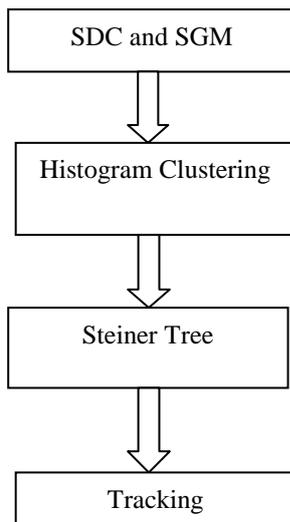


Fig. Working of System

V. CRITERIA FOR ANALYSIS

There are certain criteria on which measure our system's performance or advantages of our system. The following are certain analysis criteria on which our system depends:

1. Model of Appearance. An appearance model represents object appearance. It can be represented using various methods.
2. Accuracy. The accuracy play very important role in the tracking of object.

3. Object Features. Any tracking methodology depends upon features of tracking object.
- 4.

VI. RESULT

In our system we found out accuracy of our system by finding out the matching frames from total frames. Accuracy result table is shown as follows:-

No. of Frames	Matching Frames	Accuracy (%)
10	9	90
20	18	90
30	29	97
40	37	96
50	48	96
60	59	98.33

From the above table we can say that our system accuracy is above 90%. It shows that our system efficient method for tracking of object.

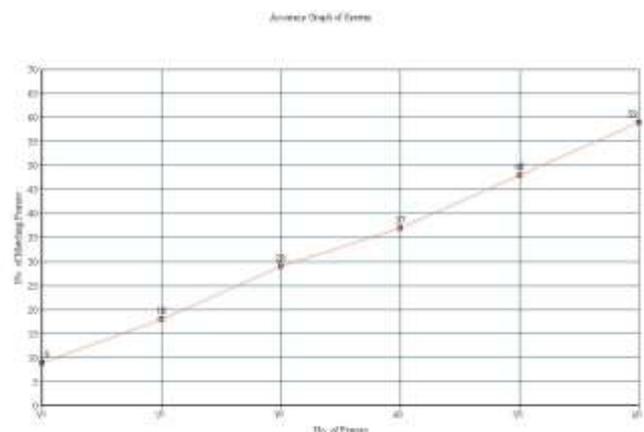


FIG. GRAPH OF SYSTEM

VII. SCOPE

The very important factor in object tracking is change of appearance. Because when target object and background does not change then tracker performances of that method is good but when objects and background appearance change over time then tracker must adapt that changes accordingly.

Handling of occlusion is another very big challenge in any object tracking method because object tracking depends upon the features of that object. It may be possible that features of two objects may same that create problem. And that degrade the performance of tracking method.

Pose variation, Shape deformation, handling of dynamic and complex scenes, illumination changes are other big challenges in tracking of object.

VIII. APPLICATIONS

There are many domains and area where object tracking play key role. Physical tracking an object is not feasible and not possible in many situations and in that situation we have to take help technology. Due to that it has tremendous demand in the many industries.

In military applications object tracking and detection play very important role. In military application target object direction and speed and shape, is not constant. So in that case efficient tracker is needed for tracking moving targets efficiently.

Activity recognition systems, driver assistance system, intelligent user interface systems, are the other useful application of the object tracking and detection.

IX. CONCLUSION

In this paper, we have presented a new method of object tracking in which sparse model, histogram clustering and Steiner tree is used on target object to get track. And through the result prove it that this system gives more accuracy than previous systems. We presented analysis criteria on which tracking method's evaluation is done.

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