Robust Object Tracking Via Sparse Collaborative Appearance Model Using Surf Technique

[1]Rumana Ahmed, [2]Saiyad Sharik Kaji
[1]Computer Science & Engineering, RTMNU University, W.C.E.M, Nagpur, Maharashtra, India
[1]rumanaahmed07@gmail.com . [2]sharik.kaji@gmail.com

ABSTRACT:

The main aspect of ours that we propose a robust object tracking algorithm based on a sparse collaborative model and SURF technique that achieved both holistic templates and local representations of a image to account for extreme appearance changes. Within the proposed collaborative appearance model, we develop a sparse discriminative classifier (SDC) and sparse generative model (SGM) for robust object tracking. The update scheme thereby enables the proposed algorithm to deal with appearance changes effectively and alleviate the tracking drift problem. The adaptive background method is also used. So as the proposed system work well on object tracking.

Keywords:* *object tracking, collaborative model, sparse representation, feature selection, occlusion handling.

I. INTRODUCTION

The main goal of object tracking is to appraisal the positional state of a target object in a sequence of images. It plays a crucial role in number of important vision applications such as motion analysis, activity recognition, visual surveillance, intelligent user interfaces and for invigilation purpose, While much progress has been made in recent years, it is still a challenging problem to develop a robust algorithm for complex and dynamic scenes due to large appearance changes caused by continuous changes in illumination, camera motion, occlusions, pose variation and shape deformation.

A motion picture is applied to predict the likely states of an object. In this paper, we mainly focus on the appearance model since it is usually the most crucial component of any tracking algorithm. Several major factors to be considered for an effective appearance model.

Firstly, an object can be represented by different features such as intensity, color, texture and super pixels. Meanwhile, the representation schemes can be based on holistic templates or local histogram. In this work, we use intensity values to represent objects due to its simplicity and efficiency. Furthermore, our approach exploits the strength of holistic templates to distinguish the target from the background, and the effectiveness of local background descriptor.

Second, a generative or discriminative appearance model is needed to effectively verify state predictions. For generative methods, tracking is formulated as searching for the most similar region to the target object within a neighborhood.

A. Related Work and Context

There is a rich literature in object tracking and here we discuss the most related work and put the proposed algorithm within proper context. Sparse representation has recently been applied to visual tracking. Mei and Ling present a visual tracking algorithm based on a generative sparse representation of templates. In spite of demonstrated success, there are still several issues to be addressed. First, this tracking method handles occlusion via *l*1 minimization of target and trivial templates with a particle filter at the expense of high computational cost. Second, the trivial templates can be used to model any image region from the target object or the background.

Therefore, the reconstruction errors of image regions from the occluded target object and the background may be both small. As the sample with minimal reconstruction error is regarded as the target location, ambiguities are likely to accumulate and cause tracking failure. Liu *et al*. Proposed a tracking method which selects a sparse and discriminative set of features to improve efficiency and robustness. As the number of discriminative features is fixed, this method is less effective for object tracking in dynamic and complex scenes. In an algorithm based on histograms of local sparse representation for object tracking is proposed where the target object is located via mode seeking (using the mean shift algorithm) of voting maps constructed by reconstruction errors. That is, this algorithm operates under the premise that the most likely target object location has minimal reconstruction error based on sparse representation. In contrast to the generative approaches based on sparse representation which do not differentiate foreground patches from the background ones, we propose a weighting method to ensure that occluded patches are not used to account for appearance changes of the target object, thereby resulting a more robust model. Furthermore, geometric information between local patches has not been well exploited whereas the proposed algorithm exploits both local histograms and a holistic template set to encode structural information.

Occlusion is one of the most challenging problems in object tracking. Adam *et al*. propose a fragments-based method to handle occlusions where the target object is located by a voting map formed by comparing histograms of the candidate patches and the corresponding templates. However, the template is not updated and thus this approach is sensitive to large appearance variations. We develop an effective method which estimates and rejects possible occluded patches to improve robustness of the proposed appearance model when occlusions occur. In addition, the proposed model is adaptively updated with consideration of the occlusion rate to better account for appearance changes.

II. PROBLEM STATEMENT

A. Sparse Local Descripting Features

We propose a collaborative model using the SDC and the SGM modules within the particle filter framework. In our tracking algorithm, both the confidence value based on the holistic templates and the similarity measure based on the local patches contribute to an effective and robust probabilistic appearance model.

B. Complex background:

The board sequence is challenging as the background is cluttered and the target object undergoes out-of-plane rotations. In frame most trackers fail as holistic representations inevitably include background pixels that may be considered as part of the foreground object by straightforward update schemes. Using fixed templates, the Frag method is able to track the target as long as there is no drastic appearance changes but fails when the target moves quickly or rotates .Our tracker performs well in this sequence as the target can be differentiated from the cluttered background by the SDC module.

C. Occlusion Problem:

Occlusion is one of the most general yet crucial issues in object tracking, and numerous tracking methods. In the SGM module, we estimate the possible occluded patches and develop a robust histogram which only compares the patches that are not occluded. Thus, this scheme effectively alleviates the effects of occlusions This can be attributed to our SGM module that reduces the effects of occlusions and only compares the foreground with the stored histograms. Our update scheme does not update the appearance model with occluding patches, thereby alleviating the tracking drift problem.

III. POSSIBLE CONTRIBUTION

A. SURF Technique:

In the proposed system, we will implement SURF technique for extracting features from image. it speed up the extraction of features of a image.

B. Local /global descriptor:

A global descriptor describes the whole image. They are generally not very robust as a change in part of the image may cause it to fail as it will affect the resulting descriptor. A local descriptor describes a patch within an image. Multiple local descriptors are used to match an image and this is more robust as not all the descriptors need to match for the comparison to be made. This makes them more robust to changes between the matched images. The target can be differentiated from the cluttered background by the SDC module. In addition, the update scheme uses the newly arrived negative templates that facilitate separation of the foreground object and the background.

C. Adaptive background method:

In our proposed system we will A standard method of adaptive back grounding is averaging the images over time, creating a background approximation which is similar to the current static scene except where motion occurs. While this is effective in situations where objects move continuously and the background is visible a significant portion of the time, it is not robust to scenes with many moving objects particularly if they move slowly. It also cannot handle bimodal backgrounds, recovers slowly when the background is uncovered, and has a single, predetermined threshold for the entire scene.

IV. SYSTEM ARCHITECTURE

The basic term in system architecture is, what background we are giving to our system, i.e. platform on which system going to be access or we can say that operating system for our application. Because this application is for desktop system which use real time video for testing and comparing of database to match the details of the particular captured image.

Operating System:-Windows 7 and above
Tools Used: MATLAB

The system architecture is define below with the help of block diagram which explain the overall technique for our system.

The System has the following Block Diagram:-

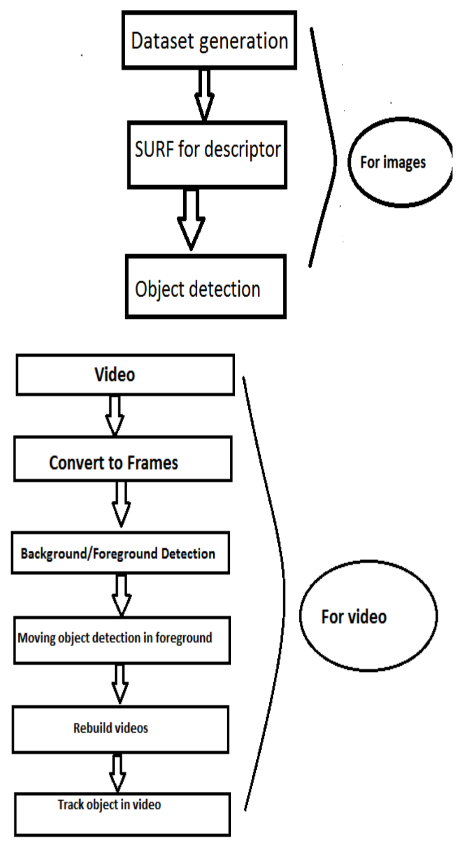

Fig1: - Flow Diagram of System Architecture

In this flow chart firstly the dataset of images has been created then the surf technique is applied for object detection.

In the video, it is converted into frames for background and foreground detection and moving object has been detected in foreground. Then the video is rebuild so that the object to be tracked in video.

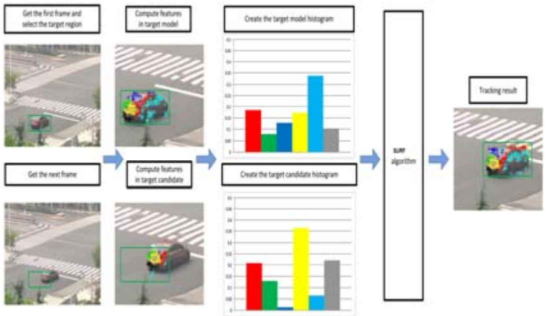

Fig 2: System Architecture

In this system architecture ,we are firstly selecting a image In this system architecture , firstly the frame is to be selected from the target region taken from the video and again the next frame has to be taken then the features of the target model and target candidate has to be computed. The histogram has to be prepared on the computed value and then SURF ALGORITHM has been applied to track the result.

V. CONCLUSION

Robust object tracking is widely used for numerous vision applications such as visuals surveillance. In this paper, we propose and demonstrate an effective and robust tracking method based on the collaboration of generative and discriminative modules.

In this we are using SURF technique for speed up the robust feature so that we can extract the features of image easily .Adaptive background method for averaging the images creating the background approximation

In the proposed tracking algorithm, holistic templates are incorporated to construct a discriminative classifier that can effectively deal with cluttered and complex background. Local representations are adopted to form a robust histogram that considers the spatial information among local patches with an occlusion handling module, which enables our tracker to better handle heavy occlusions and track object in a video.

REFERENCES

[1] D. Comaniciu, V. R. Member, and P. Meer, “Kernel-based object tracking,” *IEEE Trans. Pattern Anal. Mach. Intell.*, vol. 25, no. 5, pp. 564–575, May 2003.

[2] P. Pérez, C. Hue, J. Vermaak, and M. Gangnet, “Color-based probabilistic tracking,” in *Proc. Eur. Conf. Comput. Vis.*, 2002, pp. 661–675.

[3] Y. Li, H. Ai, T. Yamashita, S. Lao, and M. Kawade, “Tracking in low frame rate video: A cascade particle filter with discriminative observers of different life spans,” *IEEE Trans. Pattern Anal. Mach. Intell.*, vol. 30, no. 10, pp. 1728–1740, Oct. 2008.

[4] B. Babenko, M.-H. Yang, and S. Belongie, “Visual tracking with online multiple instance learning,” in *Proc. IEEE Conf. Comput. Vis. Pattern Recognit.*, Jan. 2009, pp. 983–990.

[5] Z. Kalal, K. Mikolajczyk, and J. Matas, “Tracking-learning-detection,” *IEEE Trans. Pattern Anal. Mach. Intell.*, vol. 34, no. 7, pp. 1409–1422, Jul. 2012.

[6] S. Baker and I. Matthews, “Lucas-Kanade 20 years on: A unifying framework,” *Int. J. Comput. Vis.*, vol. 56, no. 3, pp. 221–255, Feb. 2004.

[7] A. Adam, E. Rivlin, and I. Shimshoni, “Robust fragments-based tracking using the integral histogram,” in *Proc. IEEE Conf. Comput. Vis. Pattern Recognit.*, Jun. 2006, pp. 798–805.

[8] X. Jia, H. Lu, and M.-H. Yang, “Visual tracking via adaptive structural local sparse appearance model,” in *Proc. IEEE Conf. Comput. Vis.Pattern Recognit.*, Jun. 2012, pp. 1822–1829.

[9] X. Mei and H. Ling, “Robust visual tracking using _1 minimization,”in *Proc. IEEE 12th Int. Conf. Comput. Vis.*, Oct. 2009, pp. 1436–1443.

[10] B. Liu, L. Yang, J. Huang, P. Meer, L. Gong, and C. Kulikowski, “Robust and fast collaborative tracking with two stage sparse optimization,” in linear coding for image classification,” in *Proc. IEEE Conf. CVPR*, Jun. 2010, pp. 3360–3367.

[11] M. Everingham, L. Van Gool, C. K. I. Williams, J. Winn, and A. Zisserman, “The pascal visual object classes (VOC) challenge,” *Int. J. Comput. Vis.*, vol. 88, no. 2, pp. 303–338, Jun. 2010

[12] IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 21, NO. 10, OCTOBER 2012, “Object Tracking via Partial Least Squares Analysis Qing Wang, *Student Member, IEEE*, Feng Chen, *Member, IEEE*,Wenli Xu, and Ming-Hsuan Yang, *Senior Member, IEEE*,” .