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REAL TIME OBJECT TRACKING USING MEAN SHIFT ALGORITHM - A REVIEW

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Abstract— In the field of computer vision object tracking is one of the crucial research area. In order to evaluate the final tracking position of a target, target representation and locations are important. Mean shift algorithm is one of the accurate and fast objects tracking algorithm the modified mean shift algorithm which has been proposed here aims at continuous tracking in complex situations, such as the shape and the change in illumination of an object. The mean shift algorithm emphasizes on determining the object target region, and then a judgment on the tracking effect is made. In case of tracking failure, the object area is matched with the target model and a new track position is determined. Another option is to update target model periodically according to the state change of the moving object. Our emphasis will be there on experimentally showing that the proposed method can effectively track an object under the condition of varying illumination and shape deformation.

Keywords- Object Tracking, Mean Shift, Joint Color Histogram, LBP.

[1] INTRODUCTION

In the field of computer vision the most complex task is to track the movable object. For analysis of visual information, the basic requirement is object tracking. It aims at state estimation of an object under severe varying visual conditions in a video sequence. The process of object tracking in a video takes place in three steps.

- Detection of target object
- Next step is to track the object's movement.
- Final step is to observe the object's behaviour

Many tracking algorithm [1] have been proposed to overcome the difficulties arising from noise, occlusion, clutter and changes in foreground object or in the background environment. Among the various algorithms available, the algorithm which has gained popularity is Mean Shift because of its simplicity and efficiency.

II. MEAN SHIFT

In video tracking, movable object is an interesting subject. It's a challenging task to track the moving object in a video and this task can be achieved using mean shift algorithm. Mean shift algorithm was proposed by Fukusanga and Hostler in 1975. It is a non parametric density estimator. The procedure for this algorithm is iterative type and steps for the mean shift algorithm are given below:

- Choose the search window size and the initial location of search window.
- The mean location in the search window is computed.
- Centre the search window at mean location which is computed in second step.
- Repeat second and third steps until convergence.

The mean-shift method is widely used to locate a target object quickly in sequential image. It takes advantage of a colour distribution with a uniform quantization. Conventional mean shift algorithm will be enhanced and its modification will be used for tracking objects in running Videos for error free target detection. So, our emphasis will be on improving the conventional mean shift, actually when the target moves fast then the area of target in the neighbouring frames does not overlap and as a result wrong object is tracked. In our modified mean shift algorithm we will be utilizing colour features and texture features for object tracking. In order to extract the texture features from object we will apply LBP (Local Binary Pattern) technique.

2.1 Texture Feature Extraction

It is a very effective technique to describe the texture feature. It has got beneficial qualities such as fast computation and rotation invariance. LBP is a grey scale invariant. It is fast to compute. All these features of LBP make it a powerful means of texture analysis.

2.2 *Colour Feature Extraction*

Now coming to the next feature i.e. Colour feature, we will employ colour histogram for its extraction. Basically, histograms are the collected counts of data which are organized into a set of predefined bins. Colour histogram is an estimating mode of point sample distribution and it actually represents the object appearance in well defined manner. Here colour feature is extracted in form of RGB Colour space which is divided into equal k-intervals. This interval is known as a bin. Number of bins feature is given by Mc=k^3.Simple

Colour histogram ignores the close relationship of colour statistics. The uniform distribution also results in many empty bins. Sometimes the target lose its information in spatial domain. Simple color histogram also fails to distinguish between target and background when both resemble almost similar appearance. For the above said reason it is convenient to use joint color histogram rather than simple color histogram. The joint color histogram and LBP will be applied together to enhance the tracking capability of conventional mean shift algorithm. Here the texture value is assigned to each pixel which is then combined with pixels color value to represent target feature. So a joint color histogram method is proposed for the more distinctive and effective target representation

III. DESIGN METHODOLOGY

In order to start with object tracking, a video file is read using .avi format. After this the video is bifurcated into frames. The first frame is considered and the target window is selected. The features of the frames are extracted. Figure2 shows extraction of frame from video file. Figure 2 shows the selection of target window. Once, the target window is selected then the features of the frame are extracted. Figure 4 shows the target extraction of frame.

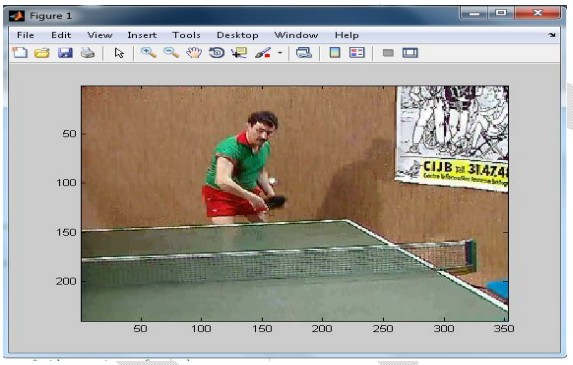

Fig 1. Extraction Of Frame

Fig 2. Selection of Target window

Table 1: Extraction of Frame

PARAMETER	VALUE	MIN VALUE	MAX VALUE
FRAMES	<1*58cell>		
M	<1*58struct>		
blue bins	8	8	8
center	[47,150]	47	150
cmax	165	165	165
cmin	134	134	134
dontneed	1	1	1
endFrm	58	58	58
frame00	<240*352*3units8>	0	255
greenBins	8	8	8
height	240	240	240
K	0	0	0
lower left	[133.9194,27.5175]	27.5175	133.9194
number of frames	58	58	58
point1	[133.9194,27.5175]	27.5175	133.9194
point2	[164.7396,65.4123]	65.4123	164.7396
q_u	<1*512 double>	0	0.1449
rect region	[238,297,38,53]	38	297
red bins	8	8	8
rmax	65	65	65
rmin	28	28	28
Start Frm	1	1	1
Upper right	[164.7396,65.4123]	65.4123	164.7396
W_half size	[19,16]	16	19
width	352	352	352

Our next step will be implementation of target appearance model and candidate appearance model. We have shown the flow chart for the target appearance model and the candidate appearance model. Fig 3 shows the target appearance model and Fig 4 shows the candidate appearance model.

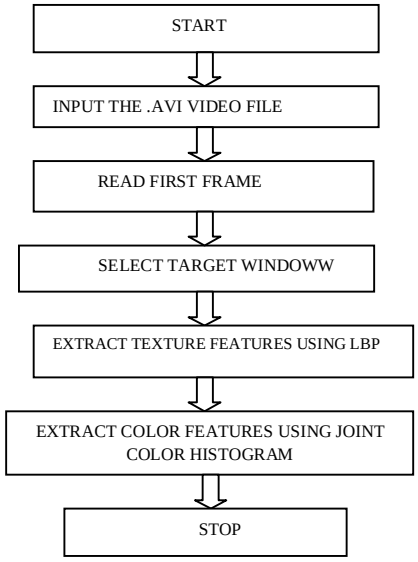

Fig 3: Appearance Model for Target Representation

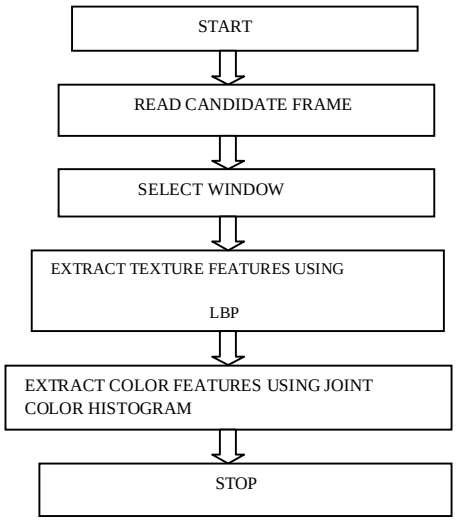

Fig 4 : Appearance Model for Candidate Representation

IV. LITERATURE REVIEW

According to Wei Zhong, Huchuan Lu, Ming- Hsuan Yang, to serve the purpose of robust object tracking MAP based algorithm has been proposed. It is based on a sparse collaborative model. This model can exploit both holistic template and local representations to check for drastic appearance changes. It consists of Sparse Discriminative Classifier (SDC) and Sparse Generative model (SGM) for object tracking. It requires online update scheme to update the templates.[2]

According to Xiaowei An, Jaedo Kim, Youngjoon Han, Mean shift utilizes color distribution with uniform quantization. But, the quantization method ignores the close relationship of color statistics. The color histogram consists of many empty bins because of uniform distribution. In order to reduce the number of empty bins an optimal color based means shift algorithm was proposed. In this the histogram agglomeration technique was applied to extract the optimal colors.[3][4]

According to Liang Wei1 Xie, Xudong2 Wang, Jianhua, Zhang Yi4 Hu,jian ming ,In order to determine the candidate target region, mean shift algorithm was utilized and then a judgment on the tracking effect was made according to the Bhattacharyya coefficient. In case of tracking failure, the candidate area was matched with the target model by SIFT feature. In the next and final step a new track position was determined.[5][6].

V CONCLUSION AND FUTURE WORK

In proposed work we are working on mean shift algorithm. Our emphasis will be on improvising the conventional mean shift algorithm with the application of LBP technique for feature extraction and joint colour histogram for colour feature extraction.

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