Object Tracking Based on Joint Color Texture Histogram Using Local Binary Pattern (LSB) Technique

Santosh Kumar Mishra
Associate Professor
Department of Computer Science & Engineering,
JB Institute of Technology, Dehradun, India
santoshmishra.2006@rediffmail.com

Asheesh Kumar
Assistant Professor
Department of Computer Science & Engineering,
JB Institute of Technology, Dehradun, India
asheesh2005@gmail.com

Abstract— Object tracking discovers its appliance in various computer vision appliances, such as video compression, surveillance, robotics etc .like human life is very precious hence under some restricted areas we can apply computer vision technique to avoid death of human being. In region based object tracking, color and texture characteristics are considered. These features can quickly and approximately locate objects. In boundary situated object tracking, edge and frame difference characteristics are included. The main intention of object tracking is separating a ROI(region of interest) from a video clip and carryout track of its movement, location and occlusion. The object discovery and object categorization are previous footprint for tracking an object in series of images. Object detection is carried out to check presence of objects in video and to exactly locate that object. In static surrounding segmentation of object is easy. In dynamic surrounding due to changing in the environmental conditions like as intensity changes, shadows and sudden changes in sequence of images. Adopting the Texture operator local binary patterns (LBP) in this paper with the help of MATLAB.

Index Terms: Computer Vision, MS Tracker, Local Binary Pattern (LBP), Object Tracking, Histogram, Intensity, Edge, Color, Uniform Pattern (Up)

I. INTRODUCTION

Video surveillance systems have been used to monitor security sensitive areas. These videos yields required information can be extracted for knowledge of discovery and forecast of an object. Every tracking methodology needs an object discovery process either in each frame or first appears of object in the video. A common technique for object detection is to use information in a single frame and also some object detection techniques can use of the sequential (temporal) information computed from a series of frames to decrease the figure of incorrect detections. The frame differencing will gives normally the sequential (temporal) information, which mainly concentrates on changing regions in successive frames. Tracking not excluding registering the motion of the segmented object from initial frame to the last frame in a video.

Real-time object tracking (RTOT) is not a easy task in computer vision applications. Several tracking algorithms have been invented to get back from the difficulties emerge from noise, alignment, clutter and variations in the background of the scene in video clip. Among the many tracking algorithms, mean shift tracking algorithms have recently become prominent due to their simplicity and effectiveness [1].

The mean shift algorithm (MSA) was actually proposed by Fukunaga and Hostetler for data clustering. Later it is introduced by Comaniciu and Meer to mean shift algorithm (MSA) to image partitioning and object tracking (OT). Mean Shift (MS) is an iterative kernel-based (KB) real time procedure which converges to a local maximum of the measurement function with some assumptions on the kernel behaviors. Mean Shift (MS) is a less complex algorithm, which gives a general and appropriate solution to object tracking(OT) and is not dependent of the target representation[10].the figure.1 shows that the changing in object position in a video.
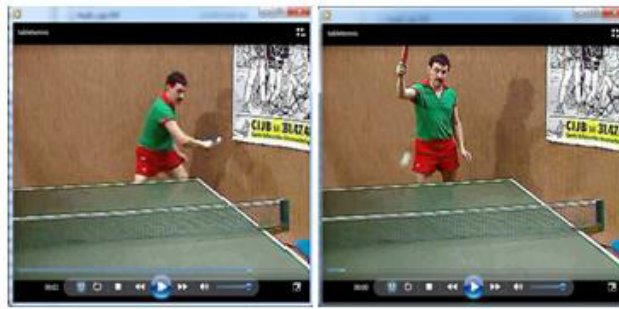
Fig. 1: Change of Object Position in Video

LBP is well suited for applications that need fast feature extraction and texture classification. this technique have exclude power and simple computation, the LBP texture operator has become a well known approach in many applications, including visual examination, image regain, remote sensing, analysis of biomedical image, movement analysis, military to identification of enemy and in many appliances analysis. During the past decades, local binary patterns have more interest in image processing and computer vision. The LBP gives local structures of images efficiently by comparing each pixel with its surrounding pixels. The most important characteristics of LBP are its resistive power to monotonic illumination changes and its simplicity of computation. LBP was actually proposed for texture analysis it's powerful approach to describe local structures effectively and efficiently [11].

In this paper, the demonstration of track of object in video sequence based on joint color texture histogram by MS Tracking using MATLAB. At last the comparisons of the outputs of different tracking methods.

II. LOCAL BINARY PATTERN (LBP)

Local Binary Pattern was first introduced by Oglala et al in 1996, it is an effective technique used for feature extraction and texture categorization .The LBP operator was introduced as a alternative method to measure the local image contrast, and it was enhanced as a grayscale invariant pattern measure adding alternative information to the "amount" of texture in two dimensional entity (image).

Local Binary Pattern (LBP) technique is possible to describe the texture and shape of a digital (gray scale) image.

LBP is a binary code for an image-pixel which tells something about the local neighborhood of that pixel is explained by LBP in the form of image pixel the local binary pattern (LBP) was initially designed for texture characteristics. It is not varying to monotonic grey- level transformations have weightier for texture analysis. Also due to the computational simplicity processing of image in real time is possible. By this technique possible to describe the texture and shape of a digital image.

$$T = t(g_c, g_0, \ldots, g_{p-1}) \qquad (1)$$

Where T is the threshold value of the centre of image, $t(g_c, g_0, \ldots, g_{p-1})$ is the intensities of surrounding pixel to the centre of region of interest of original image and the intensities are calculated by using horizontal as well as vertical positions by make use of following equations[11]:

$$X_p = x_c + R\cos(2\pi p/P) \qquad (2)$$

$$Y_p = y_c + R\sin(2\pi p/P) \qquad (3)$$

$$LBP_{P,R}(x_c, y_c) = \sum_{p=0}^{P-1} s(g_p - g_c)2^p \qquad (4)$$

This is carried out by dividing an image into number of regions from which the features are extracted (figure 2). These features consist of binary patterns that explain the surroundings of pixels in the regions. The each pixel is represented by separate histogram .it reduces the computation, just by comparing the similarity in the intensity level of the pixels. The equations describe the position.
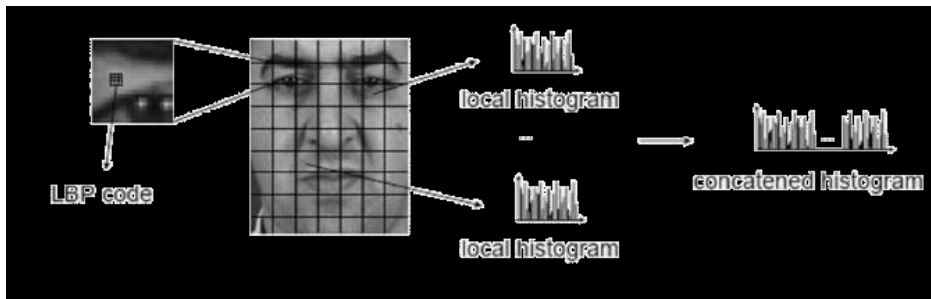
Fig. 2: Histogram Representation of Image by LBP

III. MEAN SHIFT TRACKING (MS) TECHNIQUE

Recently, a lot of tracking algorithms are projected such as Mean-shift algorithm, Kalman filter algorithm, particle filter algorithm and etc with different approaches. where the MS algorithm has noteworthy concern as an well-organized and robust(fast) method for visual tracking. As the traditional color histogram MS algorithm caused object tracking not exactly or lost easily when the object color was probably similar to the background color or the target moves speed. To overcome these problems, many researchers proposed different improved techniques in recent decades, such as, to modeling features of the object effectively, Yuan et al use the color and texture as the target feature, and then use the noticed object contour to track the target, Li et al proposed an object tracking algorithm with the right to block average drift based on color texture histogram, but MS could not adapt to it where the object moves fast.

In addition to that, the main problem is that the feature of MS is, easily lead to track failure in the light intensity or the object color is identical to the background color and when the speed objects movement or the sudden changes in speed, the MS could not predict exactly the object location in the upcoming frame.

$$\begin{cases} \hat{q} = \{\hat{q}_u\}_{u=1\cdots m} \\ \hat{q}_u = C \sum_{i=1}^{n} k(\|x_i^*\|^2)\delta[b(x_i^*) - u] \end{cases} \qquad (5)$$

Non-rigid object tracking is an significant topic in animation, supervision, human–computer communication and medical analysis. The complexity of tracking is addressed on the more dimensional ambiguity and complexity implanted in the image sequences. In recent times, approaches based on deformable templates have been established to resolve this tracking trouble. Throughout the tracking process, the shape of the tracked object is represented by an ellipse.

All the colors are constituted by the basic colors such as red, green and blue .this shows that if the need of representing any image, it is necessary that represent all the three basic colors as given in the following figure .figure shows the red, green and blue colors have separate representation in the histogram. the following figure shows that the representation of each colors such as green ,red as well as blue colors as the histogram ,for easy way of representation , easy to communicate and track of an any entity in given data.

The equation (5) shows that representation of object model using those terms, where k represents the kernel template, c is constant.

IV. OBJECT TRACKING BASED ON JOINT COLOR HISTOGRAM TECHNIQUE

To demonstrate and give evidence the proposed joint color-texture technique based mean shift(MS) tracking algorithm . The videos of dissimilar scenes, including the one that has comparable target/background colors, are used in evaluating the performance of different algorithms. Our algorithms are implemented in a MATLAB.

The process of the object tracking based on local binary pattern (LBP) technique is as follows:
- Start the process by login to the MATLAB.
- Read the video input file for the process.
- Extract the frames from the video by appropriate commands in MATLAB.
- Extract the features from each frame such as color, edge and corner for MS tracking algorithm for identification.

- Select and thresholding one value for pixel values in the image.
- Represent the each pixel color values as histograms.
- Select a normal window to track an object by choosing appropriate columns and rows in an image.
- Execution of program by giving an run command.
- Displayed the tracked image sequence of the video.
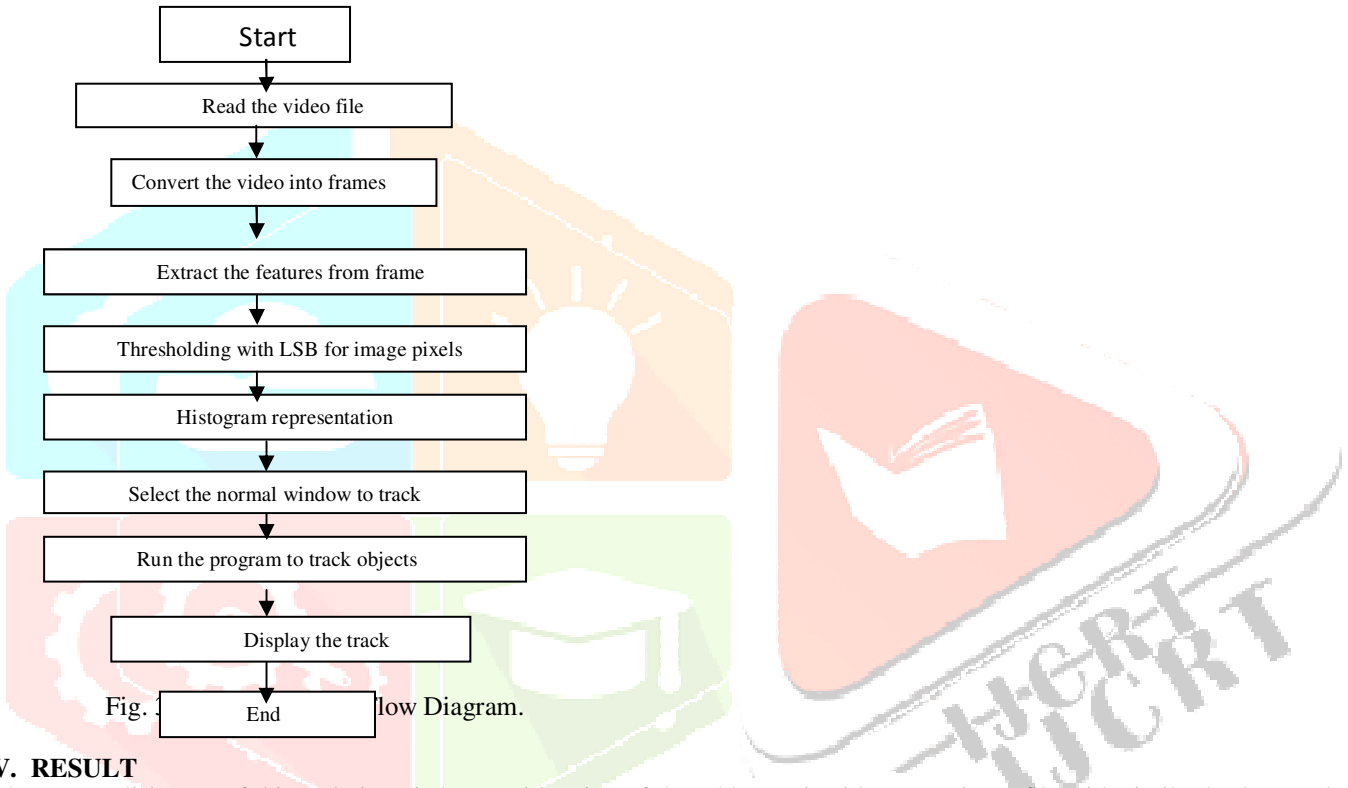- Analyze the image for location of object in the video sequence.

Fig. _____ low Diagram.

V. RESULT

The accomplishment of this technique is by consideration of the table tennis video as an input file with similar background compare with the object .The region of interest in the sense interested part in the image. the process is carried out with the resolution of 352×240. The object tracking is carried out make use of MATLAB2014 a series with windows 7 operating system. The enhancement is that consideration of rectangular shape of kernel template representation with making use of uniform patterns (UP).
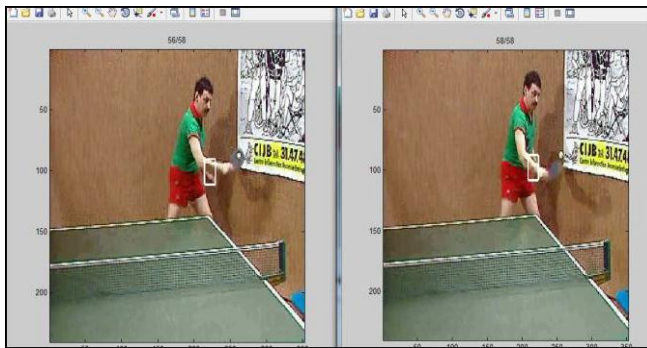
Fig. 3: Output of Tracked Images

The figure 3 shows that the outcome of the tracking of an object in sequence ,we can track any region in an image for example if our interest to track the head choosing the location by considering the rows and columns in the image. which is very useful in the military ,restricted areas for the overview of the location under camera coverage to save the human life and also improve the interaction between the human as well as computer to accurate and real time response.

VI. ANALOGY OF MANY TECHNIQUES

The given table.1describes that the mean shift tracker better compare to other three ,why because in computer vision applications real time response must be needed. Here the data shows that mean shift tracker needs very less time to respond hence it is the better one from this factor. By considering the location error it is intermediate value but it has less value than the FRAG tracker. Finally the number of successfully tracked frames it will be not much but real time response is the main criteria. so for better performance should be achieved by considering mean shift tracker[1].

	Successfully Tracked Frames	Average location error(location)	Average execution time(ms)
MS	120	15.75	12
FRAG	34	20.5	1230
TLD	156	8.5	182
CT	156	12.8	21

Table 1: Comparison of Different Trackers

VII. CONCLUSION

The object tracking is a hot topic in the surveillance areas; Local binary pattern technique (LBP) is effectively track an object under intensity changes in the video and also under ideal background by MS tracking technique by considering the edge, corner and color characteristics for tracking. And also texture reorganization
 is more effective in computer vision(CV) using uniform patterns(UP) for matching template of kernel [10].but it fails only when the changing of background simultaneously .it has fast computation and more accurate results compare to other technique.

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