_____

Single Object Tracking System By Using Labview

Divya M
Department of Electronics & Communication Engineering
S. J. B Institute of Technology
Bengaluru, India
divya16.deeksha@gmail.com

Dr. Ravi kumar A V
Department of Electronics & Communication Engineering
S. J. B Institute of Technology
Bengaluru, India
ravi_sjb@redifmail.com

Abstract— Moving object detection is an interesting area in the field of video tracking. When the object is moving then tracking that is challenging task in vision area. This paper is about detecting, tracking of moving objects from the source. Many image processing methods to detect and track the moving object from the source was proposed, but those methods require more time to implement and is complex. This paper gives information about the moving object detection based on the tracking mean shift algorithm. LABVIEW vision module introduces a recent algorithm for object detection and tracking, in this algorithm current location is searched based on the histogram of the object in the previous image frame and result of mean shift is used to find the peak of probability density function near the object old position. Initial location of the target object need to be determined for this to work correctly. Mean shift is an effective algorithm that has so many application especially in the field of computer vision like clustering, object contour detection etc.

Keywords— *LabVIEW, object tracking, mean shift*

_____*****_____

I.   INTRODUCTION

Object detection and tracking is important research in the felid of computer vision . Tracking is an important approach in various fields like, in military uses such as anti-aircraft, artificial intelligence, monitoring and security. Some other application of object detection are vehicle navigation, biometrics, robotics, video games , and industrial automation applications.

In this paper an object can be defined as anything that is stimulating for inspection for example .people walking on the road , movement of cars on the road, face in a motion etc.

If we take an object as a vehicle then the vehicle detection and tracking is widely used in the vehicle information system, in intelligent transport and traffic systems. Most of the research works are on this field from last decade by using image procesisng technolgy and computational capacity. Now a days vehicle detection and tracking is key factor for the road traffic controller. Some of the appliction of vehicle detection and tracking system are traffic signal controller, automatic vehicle accident detection and traffic density estimation.[4].

Video object tracking can be stated as detection of an object when it is moved around the scene.This research work is very intresting in the field of both civilian and military applicattion.

A well-configured object tracking method track the object apart from blur, noise, or particle occusion of object . any gradual changes in the tracked object including geomatric transformation such as shifting, rotation by NI vision is tolerent for object tracking.

Object tracking in LABIEW NI vision can be used in gray scale(U8, U16) as well as color(RGB32).

II.   MEAN SHIFT ALGORITHM

Mean shift algorithm for moving object tracking was initially proposed byfukunaga et al, comaniciu [10] in the estimation of probability density function et al,[8].if we have a distribution points . Then according to the mean shift algorithm modes or peaks in density function is determined. This method is called non-parametric method [9].this method of tracking tracks the object for long time and more robust compare to other tracking algorithm.

To find the new location of the object that we are going to track, we need to find a vector which can suggest the direction of the moving object. This vector is called mean shift vector [10].First we need to draw the ROI around the object and get the data points, approximate location of the mean of this data. Then estimate the exact location of the mean of the data by determining the mean shift vector from the initial mean.

- In the first frame, tracking object is selected and object model has probability distribution of color histogram. If y_0 is the center of an object, then the position of pixels are $\{x_i^*\}$i=1…N, where N is the number of pixels in the image. statical histogram distribution model of target area given by
  $q_h = C\sum_{l=1}^{n} k(||x_i^*||2) \, \delta[b(x_i^*) - h]$.

- At the current frame   the statistical histogram distribution given by
  $$\widehat{p_h}(y_0) = C_h \sum_{i=1}^{nh} k\left(|| \frac{y_0 - x_i}{W} \right) \delta[b(x_i) - h] \qquad (1)$$

- Computing the measurement between the object and candidate template by Bhattacharyya coefficient.
  $$P\left(\widehat{p_h}(y_0), \widehat{q_h}\right) = \sum_{h=0}^{H-1} \sqrt{p_h\widehat{(y_0)}\widehat{q_h}} \qquad (2)$$

_____

- Weight of the window of pixels in tracking window

$$w_i = \sum_{h=0}^{H-1} \delta[b(x_i) - h] \sqrt{\frac{\widehat{q_h}}{\widehat{p_h}(y_0)}}$$

- New object position search by mean shift value given by

$$y_i = \frac{\sum_{i=0}^{nh} x_i \, w_i \, g\left(\left\|\frac{y_o - x_1}{W}\right\|2\right)}{\sum_{i=0}^{nh} w_i \, g\left(\left\|\frac{y_o - x_1}{W}\right\|2\right)} \qquad (3)$$

Then computing the Bhattacharya coefficient given by

$$P(P_h\widehat{(y_1)}, \hat{q}) = \sum_{h=0}^{H-1} \sqrt{\widehat{p_h}}(y_1)\widehat{q_h}$$

- Comparing coefficients and update the candidate window.
- If $\|y_1 - y_0\| < \varepsilon$ iteration stops, and going to step 2.

III. OBJECT TRACKING IN VIDEO SEQUENCE

Object tracking in a video sequence can be defined as process of locating the position of a moving object over the time using a camera. Application of video tracking is security and surveillance, traffic controller, medical imaging etc.main aim of the object tracking is tracking the target object in a video frames. First step in this work we have to read the AVI video file. AVI file can be read ion LabVIEW. The basic parameter to initialize, create an AVI file can be set by IMAQ AVI2 create function. It includes path name, including drive, file name, directory etc. file extension must be AVI. AVI frame rate should be equal to rate at which images are acquired. IMAQ AVI get info is used to obtain the information about the AVI file with AVI reference. To read the frame from the video IMAQ AVI read frame is used, with the frame number is specified. It will read an image from the AVI file which is specified by AVI refnum. Which is reference to the AVI file output put from IMAQ AVI2 create or open VI. Technique of tracking an object in a video sequence of frame is directly depending on the object representation being used. Figure 1. Shows how the AI file can be read using LabVIEW.
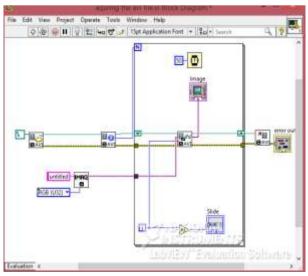

Figure 1 block diagram of acquiring AVI file

A.IMAQ AVI2 open VI

This VI used to opens the existing file. It contain AVI file path, which is complete pathname, including drive, directory, file name, for the AVI file. Extension of the file name must be .avi.

B.IMAQ AVI2 get info VI

This VI acquire the information about the AVI file. Such as width of the image, height of the image , frame number per second, number of frames contained in the AVI file etc.

C.IMAQ create

this VI creates the temporary memory location for an image. using the IMAQ create in conjunction with IMAQ dispose VI we can create or dispose the images in LabVIEW.

D.IMAQ read frame

This VI used read the image from the AI file specified by AVI refnum. Image is reference to the image that we want to contain the AI image after we call this VI. Frame number identifies the which frame of AVI file to read. Image out reference to the output image or destination image

IV. PROPOSED METHODOLAGY

Once the avi video file read we have select the algorithm for object tracking. Algorithm used in this paper is traditional mean shift algorithm. It will track the user defined object by iteratively updating the location of the object.

Next step is to wait for the user to draw the region of interest (ROI), if the user fails to draw the ROI loop repeated until user draw. IMAQ add tracking object is used to add the object information from the ROI stored in the object tracing section. Once get the information about the object next step is to check frame by frame.
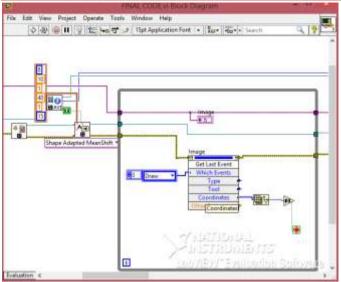
Figure 2. Code for draws the ROI on an image

Once the user draws the ROI it will exit from the loop. IMAQ add tracing object adds an object from the list of instance stored in the object tracking session .IMAQ track object VI gives the information about the tracked object. And tracks the user defined object from frame to frame. Once the object I found draw the bounding box. Then the object will be tracked using IMAQ track object VI, by using the IMAQ overlay multiple lines 2 VI we can see the tracking of an object. We can change color of the bounding box. This process will be repeated number of frames times. This method effectively checks the every frame to track the moving object. Figure illustrate how the object being tracked using LabVIEW.
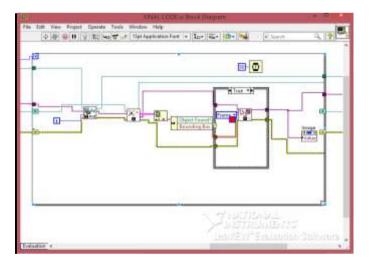

Figure 3. Code for tracking object

E.IMAQ create object tracking session VI

Create the new object session we use this VI. Object tracking session in this VI reference to the new object tracking session.
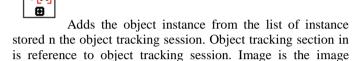
F.IMAQ object tracking options VI

This VI specifies the option to which algorithm we are going to track the object. There are two type of option mean shit option and shape adaptive option.

IMAQ mean shift option specifies the algorithm for mean shift tracking. IMAQ shape adaptive option specifies the algorithm for shape adaptive object tracking.

G.IMAQ add tracking object

Adds the object instance from the list of instance stored n the object tracking session. Object tracking section in is reference to object tracking session. Image is the image contains an object to track.

H.IMAQ track object VI

This VI use to track the user defined objects from image to image. Image is reference to the image that contains the object to be track. Objects in this VI refer to the object found in the image.

V. EXPERIMENTAL REULTS & PERFORMANCE ANALYSIS

The project implementation has three front panel components. The first component is file path, which gives the location of the source file. The second component display indicator which is used to display the output .third component is Stop button which is used to terminate the program.

 Experiment 1: The result of moving vehicle tracking in a video sequence
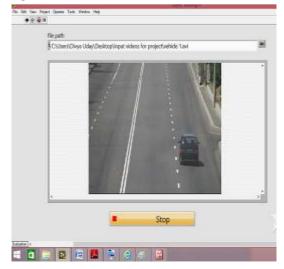

Figure 4. Before tracking the object

54

_____

Figure 5.after tracking the object.

(a) 45th frame

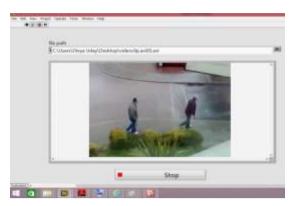Experiment 2: test results of tracking human in a video sequence

Figure 6: before tracking the object.

(b) 61st frame

Figure 7: After tracking the object.

©104th frame

(d) 31st frame

(e) 39th frame

(f) 42nd frame

Experiment 8: tracking of moving ball.

_____

Figure 9: after tracking the object

(g)15th frame

(h)27th frame

(i)88th frame

VI.   CONCLUSION

LabVIEW method is cost effective. It is also low on maintenance so labVIEW program is easy to use. The drag and drop feature reduces the time to implement program.

Many algorithm of moving objects detection achieves by image processing, but in this algorithm which is easy to be affected by light change of surround. So this paper provides algorithm of moving object detection and based on tracking mean shift algorithm. Mean shift is an application, independent tool suitable for real data analysis. The experiment is performed on the moving vehicle, moving human, moving ball. The results at figure 4-5,6-7,8-9 shows the movable object tracking successful. Experiment on actual AVI (Audio video interleaved) files shows that the algorithm is effective with high accuracy.

REFERENCES

[1] Ravi kumar A.V, Dr. nataraj .R , Dr. rekhka K, R."morphologica real time video edge detection in labVIEW"IJCSIT, Val. 3(2),2012,3808-3811

[2] Ravi kumar A. "real time face selection and tracking based camera motion control system"IJECE, val 7, no 2(2014), pp.89-97

[3] Ravi kumar A.V , sunil tiwari N, "multiple moving object detection and tracking using Harr features with smart video surveillence system"IJERT, vol 3-issue 6(june 2014),2278-011

[4] Morris, B.T; Cuong tran; scora, G; Trivedi, M.M;Barth, M.J.,"Real-time video-based traffic measurement, "Intelligent Transportation system, IEEE Transactions on, vol.13, no.4, pp.1667,.1678,Dec.2012J.

[5] Wei zhan, xiaolong ji, b   "algorithm research on moving vehicles detection"

[6] Khatoonabadi, S.H bajic, I.V, "video object tracking in the compressed domain using spatiotemporal markov random fields,"IEEE International on image processing 2013

[7] Amer, A, "voting-based simultaneous tracing of multipe video objects,"IEEE transaction on circuits and system for video technoogy.2005

[8] Mahesh kumar chouhan, rahul mishra, Dr.dhiiraj nitnawwre"movabe object trcking by using mean shift method with adjusted background histogram" volume 2, issue 7, july 2012.

[9] Xiaojing zhang,"object tracing approach based on mean shift algorithm" journal of multimedia, vol.8, No 3, june 2013

[10] D.comaniciu, .ramesh and p. meer, "real –time tracking of non-rigid object using mean-shift", IEEE proc.comput. vis. Pattern recog.,pp. 673-678,2000.

[11] Jaideep jayakar R.enkatesh babu and K.R ramakrishnaan, "roubst object tracking with backround weighted local kernels", comput. Vis. Image understanding, ol.112,pp.296-309,2008.

[12] Fukunaga, keinosuke, andlarry hostetler. "the estimation of the gradient of a dencity funtion , with application in pattern recognition". Information theory, IEEE transaction on 21.1(!975):32-40.