International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 6 Issue 5, July-August 2022 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Tracing of an Object in Video through Mean Shift Protocol

Sahila Fareed[1], Kirti Bhatia[2], Shalini Bhadola[2]

[1]Student, Sat Kabir Institute of Technology and Management, Haryana, India
[2]Assistant Professor, Sat Kabir Institute of Technology and Management, Haryana, India

ABSTRACT

Image processing techniques have been heavily used to extract specific relevant information from a figure. By applying specific processes to the image, it is converted into a digital figure. Finding and tracking an object in a video is an interesting task that helps with video analysis and automobile detection. In busy situations like tracking a game participant, traffic control, and public safety, video detection is mostly required. This paper provides an overview of the various methods, tasks, and physiologies for object detection and tracking in a mobility (video) configuration.

KEYWORDS: *Object Tracking, Video Processing, Mean Shift and Cam Shift*

How to cite this paper: Sahila Fareed | Kirti Bhatia | Shalini Bhadola "Tracing of an Object in Video through Mean Shift Protocol" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-6 | Issue-5, August 2022, pp.661-665, URL: www.ijtsrd.com/papers/ijtsrd50525.pdf

IJTSRD50525

INTRODUCTION

Humans can grasp their environment via seeing and being sighted. There are countless different types of items and impersonations in the environment that surrounds us. One approach to developing empathy for the environment is through vision. Even if phytology has been looking at the occurrences for ages, precisely how the pictorial configuration functions is still a secret that needs to be addressed. When discussing vision, we have the all-encompassing and intangible look of computer vision by replacing the living person with computing equipment. It might be brief since the process of processors looking at digital images or videotapes is acquiring a high level of empathy [1].

RELATED WORK

Object tracking in the video is a part of a image processing method like the identification of humans through a webcam [2-3], image quality enhancement [4], and recognition of face [5]. Computer vision has several practical applications, including machine direction finding and object tracing [6]. It is a thoroughly researched problem that might be tricky to address in many situations. The task of figuring out where an object is in each frame is referred to as object chasing in video [7]. Many factors, including as details about the desired object and the type of restrictions traced, have an impact on an object's ability to be tracked in an audiovisual [8]. With the initiation of low-priced extreme quickness processors in the times of 1990s, numerous academics employed on movement-based methods to resolve computer vision issues. The aim of a mobility-centered method is to explain the sight related to graphic cubes. E.g., to achieve the finest vision jobs, like movement identification [9] and audiovisual recovery [10], numerous academicians have begun to use 3D information.

THE PROBLEM OF TARGET TRACKING

Small SNR ratio, low contrast, contextual chaos, and partial target obstruction make the exposure and tracking of mobile targets an exciting problem in image layouts. Tracing moving targets with image data entails managing images from a target of awareness and calculating the target's current location and speed vectors at each period step. Doubts in the target mobility and in the intended values, which are frequently displayed as additive arbitrary sound, are what lead to the target situation's complying improbabilities. Similar uncertainty exists with regard to the expected data's source, which may or may not be arbitrary clutter and may or may not include dimensions from the goals. It could result in the data relationship problem. In this context, information on detection and the likelihood of a false alarm must be included in the tracing procedures. Object Tracing is the process of:

1. Getting a fresh batch of item recognitions
2. Creating a unique ID for each initial recognition
3. Following the assigned unique IDs while tracking each object's movement as it moved between frames in a film. We can also use a distinct ID for each tracked object thanks to object tracing.

MEAN SHIFT TRACKING

Mean shift is a non-parametric mode-seeking approach used for feature analysis. It is a method for determining a density function's maxima from discrete data taken from the function. In a way, it is estimating the density gradient non-parametrically. It is helpful for figuring out this density's modes [11]. Indeed, the mean shift procedure is a more general statistical idea connected to clustering. The mean shift algorithm makes an effort to locate areas of the data set with a significant concentration of data points, or clusters, like other clustering algorithms. Each data point is given a kernel by the method, which creates a Kernel Density Estimation by adding all of the kernels together (KDE). The KDE will have high and low data point densities, respectively, which correspond to peaks and valleys. In a single step, the algorithm creates a copy of the data points and pushes them slightly toward the nearest KDE peak. The programme will keep changing the points over iterations until they no longer travel significantly. This can render the data more comprehensible and the clusters more obvious. A preliminary tracking box must be built prior to applying the mean shift algorithm. The tracking box will travel until it completely encircles the object of interest as the mean shift algorithm iteratively moves points. Regrettably, the tracking box cannot account for changes in the object's size or orientation. This problem is addressed by the cam shift (Consistently Adaptive Mean Shift) method. The cam shift method simply modifies it such that the tracking box may fluctuate in size or even spin to better correspond with the movements of the tracked object. It functions very identically to the mean shift technique. Fig 1 shows the Mean Shift Clustering Process.

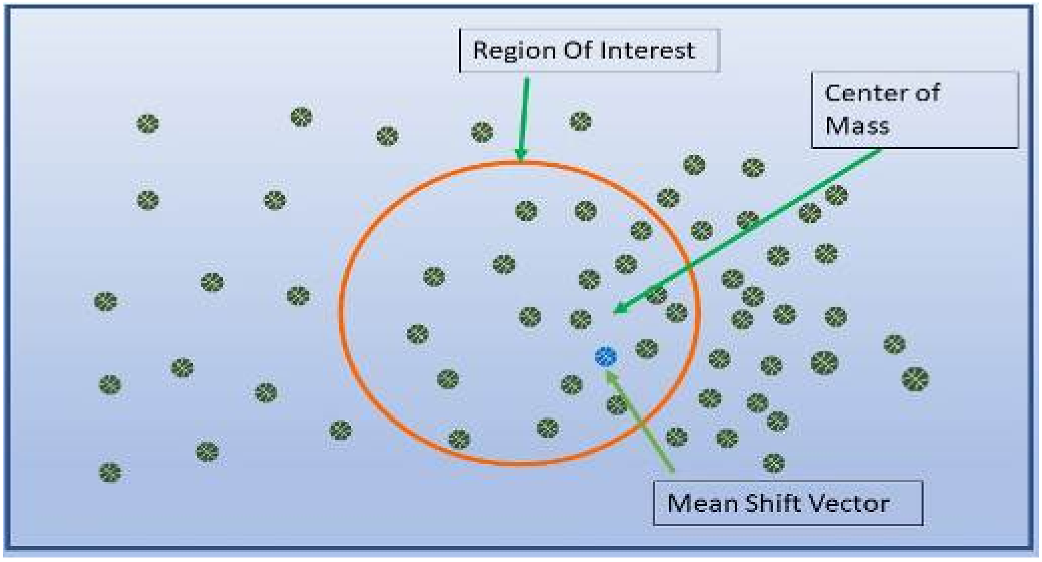

Fig 1: Mean Shift Clustering Process

Step 1: Utilizing colour probability density to model an object

Step 2: By comparing the colour probability of the target with the object model, we identified the target candidate in a video.

Step 3: To determine colour probability and target position, use mean shift.

Step 4: In CAMSHIFT, search window W location is determined as follows

- Determinene the zeroth moment (mean) within W.

$$M_{00} = \sum_{(x,y)\in W} I(x,y)$$

- Determine first moment for x and y

$$M_{10} = \sum_{(x,y)\in W} xI(x,y), \quad M_{01} = \sum_{(x,y)\in W} yI(x,y)$$

- Search window position is set at

$$x_c = \frac{M_{10}}{M_{00}}, \quad y_c = \frac{M_{01}}{M_{00}}.$$

- Initialize location of target in current frame as y
- Compute

$$\{p_u(\mathbf{y})\},\ u = 1, \ldots, m, \text{ and } \rho(p(\mathbf{y}), q)$$

- Compute weights wi,
- Apply mean shift: Compute new location z as

$$\mathbf{z} = \frac{\sum_{i=1}^{n_h} w_i\, g\left(\left\|\frac{\mathbf{y}-\mathbf{y}_i}{h}\right\|^2\right)\mathbf{y}_i}{\sum_{i=1}^{n_h} w_i\, g\left(\left\|\frac{\mathbf{y}-\mathbf{y}_i}{h}\right\|^2\right)}$$

- Compute

$$\{p_u(\mathbf{z})\},\ u = 1, \ldots, m, \text{ and } \rho(p(\mathbf{z}), q)$$

PROPOSED SOLUTION

Stage 1: We have applied the Mean Shift procedure to identify the progress of an object.
Stage 2: We have determined the value of the Parzen window and its gradient with regard to the x- and y-axis.

The several sorts of kernel are:
{Uniform, Triangular, Epanechnikov, Gaussian}

Stage 3: We have designed Import_mov to examine the progress of an object in a video.

'Path' imports an AVI video file. The output of this AVI file is its length, size (height, width), and the video sequence as processed by MATLAB as illustrated in Fig 1.

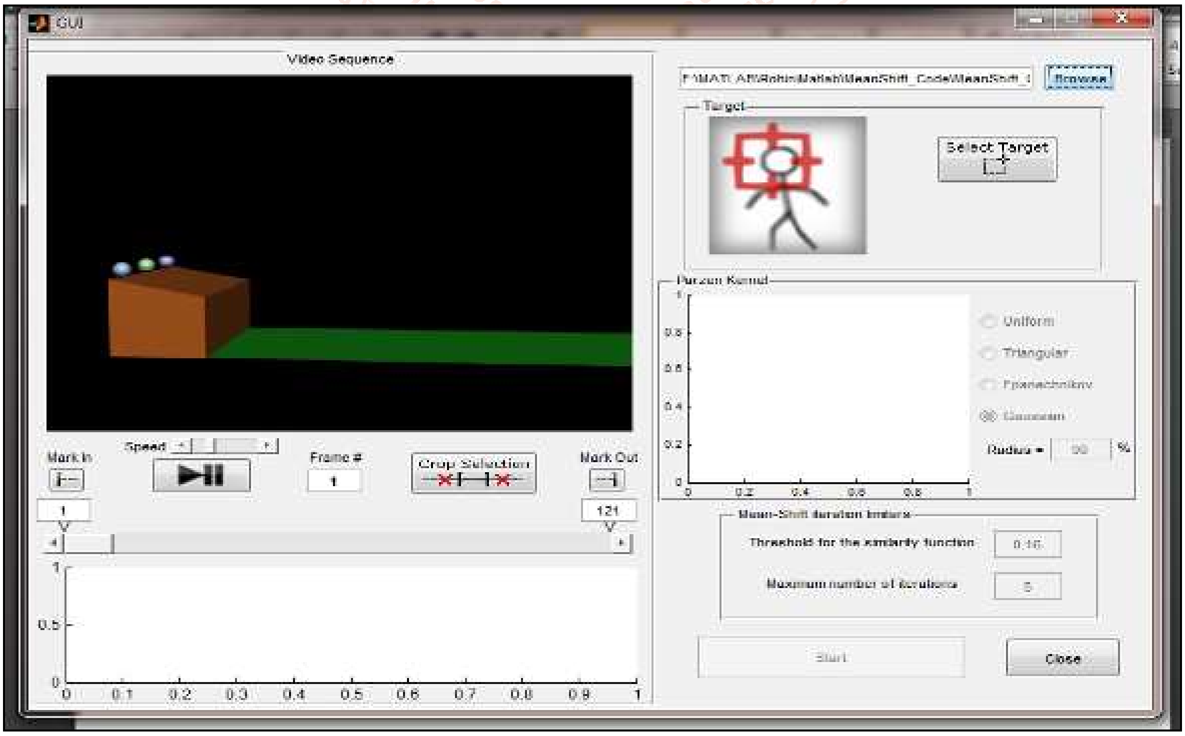

Fig 1: Objects for Tracing

According to figure 2, a rectangle with the dimensions and viscosity is represented in pixels.

Fig 2: Tracing of Balls

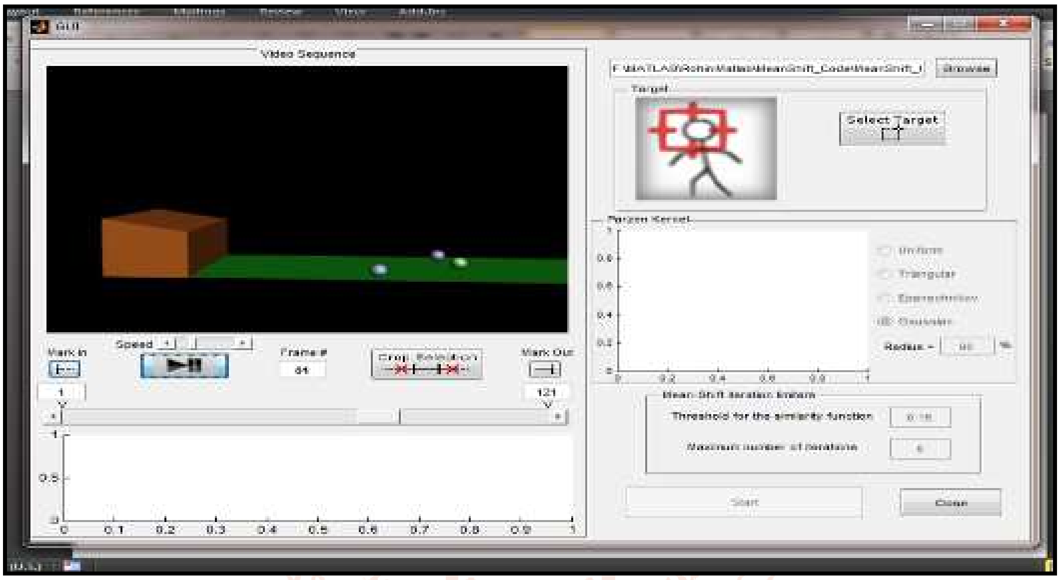

Fig 3: Tracing Patch

Figure 4 shows selection of an object using the Gaussian model.

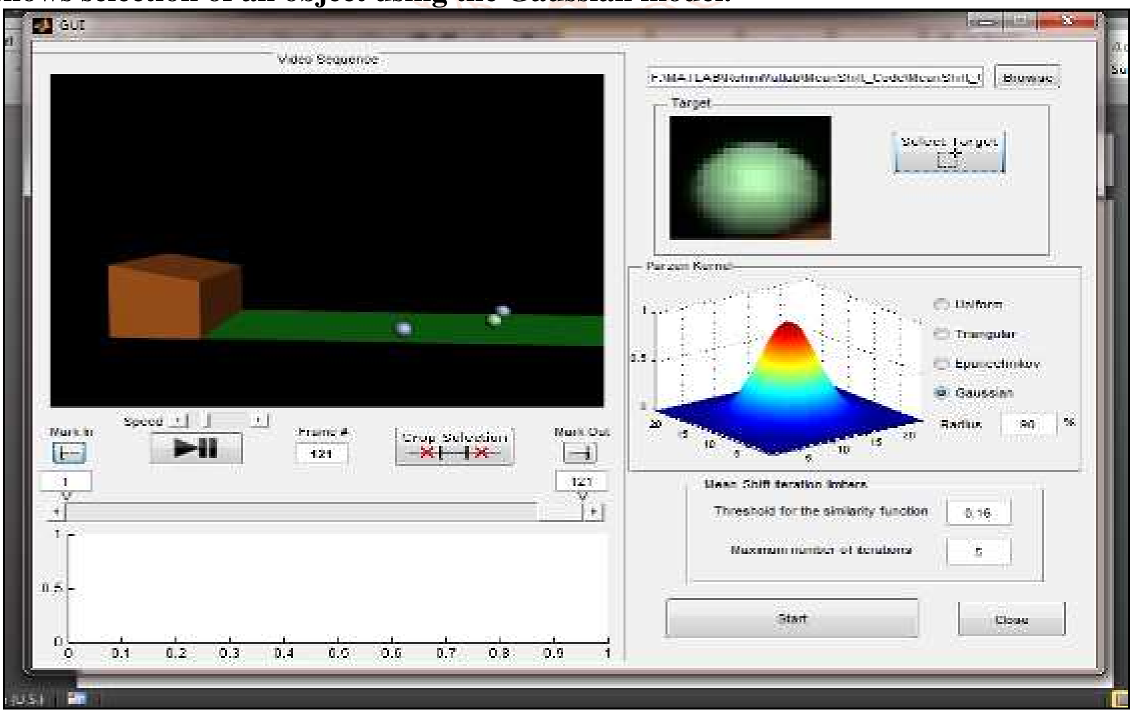

Fig 4: Gaussian Kernel Effect

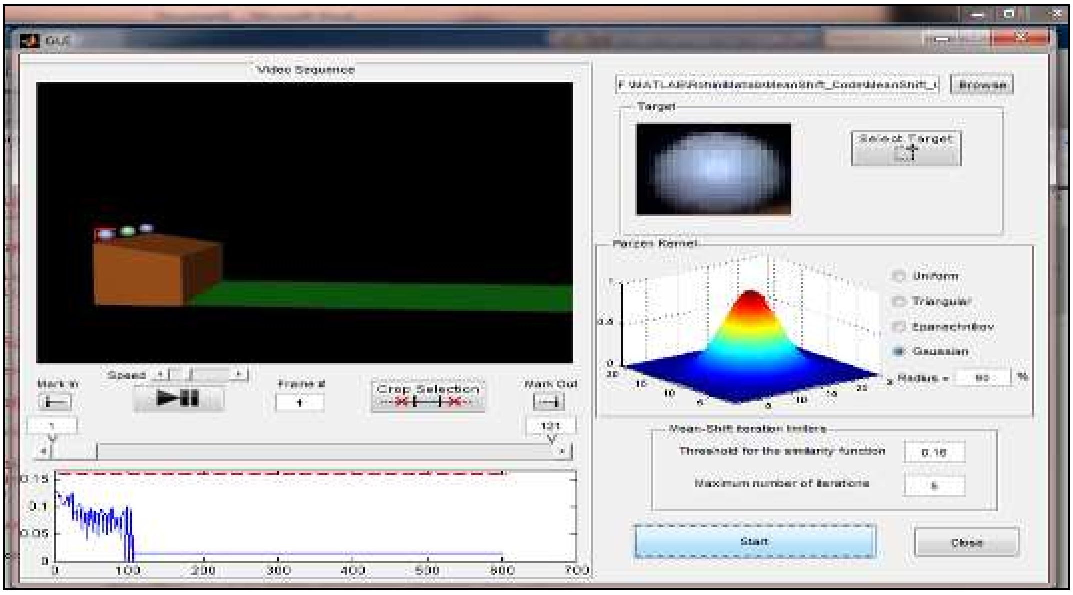

Fig 5: tracing Results of Gaussian Model

CONCLUSION

The projected technique is employed for object recognition and tracing. This approach is based on background and centroid subtraction methods. It has been thoroughly tested to function in composite, physical world, complex, and a variety of settings. The way to follow a mixture of items in a cluttered environment with shifting shapes, colours, and sizes has been examined in this work. The approach is applied in a quick and active manner. Additionally, it has the ability to trace objects in different lighting conditions. As a result, the intended technique of object recognition and tracking in anonymous and identifiable atmosphere is highly helpful in the field of computer vision for new real-world usages as well as creating existing ways to be used in the real scenario.

REFERENCES

[1] Vernon, D. (1991). Machine vision. Pearson Education Limited, 1991.

[2] Nakul Nalwa, Shalini Bhadola, Kirti Bhatia, Rohini Sharma, Development of Vision Based People Counting Framework using Webcam, International Journal Of Multidisciplinary Research In Science, Engineering and Technology (IJMRSET), Volume 5, Issue 7, July 2022, pp. 1665-1671.

[3] Nakul Nalwa, Shalini Bhadola, Kirti Bhatia, Rohini Sharma, A Detailed Study on People Tracking Methodologies in Different Scenarios, International Journal of Innovative Research in Computer and Communication Engineering, Volume 10, Issue 6, June 2022, pp. 5907-5913.

[4] Mahesh Kumar Attri, Kirti Bhatia, Shalini Bhadola, Rohini Sharma, DEVELOPMENT OF A FOURIER TRANSFORMATION BASED MODEL FOR IMAGE SMOOTHING, International Research Journal of Modernization in Engineering Technology and Science, Volume:04/Issue:06/June-2022, pp. 4204-4210.

[5] Sanju, Kirti Bhatia, Rohini Sharma, An analytical survey on face recognition systems, International Journal of Industrial Electronics and Electrical Engineering, Volume-6, Issue-3, Mar.-2018, pp. 61-68.

[6] Li, H. and Wang, Y. (2015). Object of interest tracking based on visual saliency and feature points matching, In Proc. 6th International Conference on Wireless, Mobile and Multi-Media (ICWMMN 2015), 2015, pp. 201–205.

[7] Patel, S.K. and Mishra, A. (2013). Moving object tracking techniques: A critical review. Indian Journal of Computer Science and Engineering, 4(2), 95–102.

[8] Jemilda, G. et al., (2017). Tracking moving objects in video. Journal of Computers, 12(3), 221–229.

[9] Yilmaz, A. Rao, C. and Shah, M. (2002). View invariant representation and recognition of actions. Int. Journal of Computer Vision, 50(2), 203-226.

[10] Rasheed, Z. and Shah, M. (2003). Scene detection in Hollywood movies and tv shows, In Proc. IEEE Conf. on Computer Vision and Pattern Recognition.

[11] Y. Cheng., Mean shift, mode seeking, and clustering., IEEE Trans. on Pattern Analysis and Machine Intelligence, 17(8):790–799, 1998.