International Journal of Scientific Engineering and Technology (ISSN : 2277-1581)
Volume No.2, Issue No.7, pp : 691-693 1 July 2013

A New Algorithm for Tracking of Multiple Moving Objects

S. J. Rajput, S.D.Oza

Assistant Professor, MIT, Pune, Maharashtra, India
seema.rajput@mitpune.edu.in, shraddha.oza@mitpune.edu.in

Abstract—***Monitoring of human activity requires people to be tracked as they move through the scene. Every tracking method requires object detection. We proposed a new method for detection and tracking of multiple moving objects under static background, based on motion detection, background subtraction using canny edge detection with edge difference between consecutives frames.***

Keywords—**motion detection; background subtraction; canny edge; tracking**

I. Introduction

Automated video surveillance and monitoring has rich history [iii]. Monitoring of human activity requires people to be tracked as they move through the scene. Object tracking is an important task within the field of computer vision. Tracking can be defined as the problem of estimating the trajectory of an object in the image plane as it moves around the scene [i]. Every tracking method requires an object detection mechanism either in every frame or when object first appears in the video [i]. The existing object detection methods roughly classified into four categories: Point Detectors, Background Subtraction, Segmentation, Supervised Learning. Point Detectors: Point detectors are used to find interest point in the images which have an expressive texture in their respective localities. Background Subtraction: Object detection can be achieved by building a background model then finding the deviation from the model for each incoming frames. Any significant changes in an image region from the background model signifies a moving object [vii] Segmentation: The aim of image segmentation algorithms is to partition every image into perceptually similar regions [vi]. Supervised Learning: object detection can be performed by learning different object views automatically from a set of examples by means of supervised learning mechanism. Learning examples are composed of pairs of object features and an associated object class where both of these quantities are manually defined.

The aim of object tracker is to generate the trajectory of an object over the time by locating its position in every frame of video [i] Typically, tracking over time consists of matching moving objects in successive frames [ii]. Tracking categories are Point Tracking, Kernal Tracking, Silhouette Tracking, Shapes Matching. Point Tracking: Object detected in consecutive frames are represented by points and the association of the points based on the previous object state which include object position and motion. This approach requires an external mechanism to detect the object in every frame [v]. Kernal Tracking: Kernal refers to object shape and appearance. Objects are tracked by computing the motion of the kernal in the consecutive frames [iv]. Silhouette Tracking: Tracking is performed by estimating the object region in every frame. Silhouette tracking make the use of information encoded inside the object region. Shape Matching: In shape matching object silhouette and its associated model is searched in the current frame. The search is performed by computing the similarity of the object with the model generated from the hypothesized object silhouette based on previous frame [ix].

II. Methodology

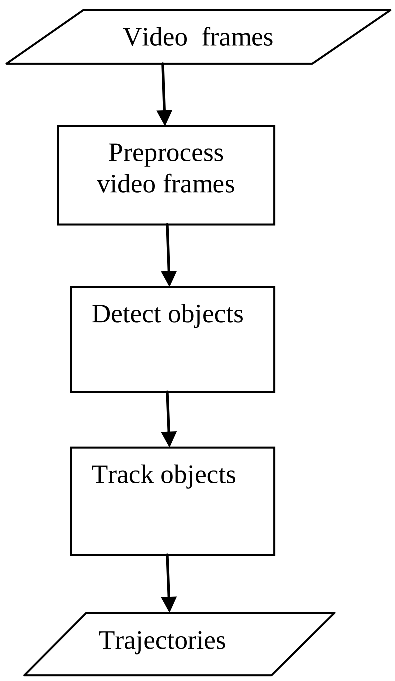

Figure 1. Proposed algorithm overview

The proposed algorithm which depicted in figure 1 consists of three stages: preprocess video frames , detect moving objects, and track detected objects. In first stage, video frames are preprocess, and in second stage moving objects are detected from the background scene based on background subtraction method. In tracking stage our aim is to simultaneously track all moving objects from frame to frame. To do this, the tracker determines when an object enters visual field of view, computes the correspondence matching between objects in previous frame and objects currently being tracked and estimate the position of each object to trace its trajectory during sequence.

International Journal of Scientific Engineering and Technology (ISSN : 2277-1581)
Volume No.2, Issue No.7, pp : 691-693 1 July 2013

1.Preprocess Video Frames
Pre-processing of video frames consists of following steps:
A. Scaling: Read the size of every input frames.
If frame height<200 && frame width <300 then
do frame height and frame width double of its original size.

If frame height > 400 && frame width > 500 then
do frame height and frame width one third of its original size.
B. Frame Difference: Take difference of every consecutive frames.
C. Sharpening: For sharpening filters the resize frames.
D. Edge Detection: Canny edge detection method is used to find out the edges in every input frames. Compute the edge difference between every consecutive frames [viii].

2. Object Detection
For object detection we used pre-processed frames as input frames.
1. Move 10 pixels overlapping blocks of 180 *60 in every frames.
2. Compute sum of every blocks.
3. If sum is greater than 1200 then blocks are optimized blocks (shown by yellow color in result).
4. Find out block which has maximum sum. This block shows that moving object is detected(shown by red color in result).
5.For multiple object detection compute difference between optimized blocks and block which has maximum sum.
6. If difference is less than 100, single object is detected but if difference is greater than 100 multiple objects are detected.

3. Object Tracking
For object tracking, we repeat object detection method for every input frames. Once moving object is detected our aim is to track that object. For object tracking we used motion prediction technique. We read last 60 frames of video to predict motion of detected object.
While detection we saved left and top parameter of detected object block. While tracking whatever parameters being saved those will be compared with parameters of detected object block in current frame. If difference is greater than 100 then new object is enter in current frame and also track that object by reading last 60 frames.

III. Results

We did several experiments to prove the feasibility of proposed detection and tracking method. We used Computer Vision Laboratory1_files videos. All test sequence are stored in Microsoft AVI format. Frame rate of video depend on that particular video. Figure 2 shows detection and tracking of single moving object in frame number t and figure 3 shows detection and tracking of single moving object in frame number t+1.
Figure 4 shows detection and tracking of multiple moving objects in frame number t. Figure 5 shows trajectory of detected objects where x axis represents left parameter of block in which object is detected and y axis represent top parameter of same block.

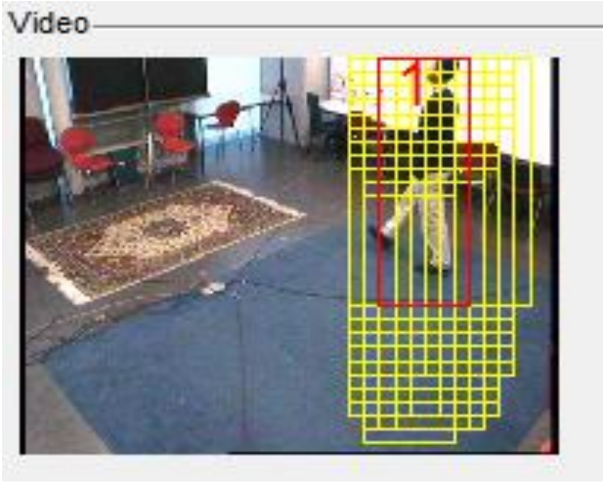

Figure 2. Detection and tracking of single moving object in frame t.

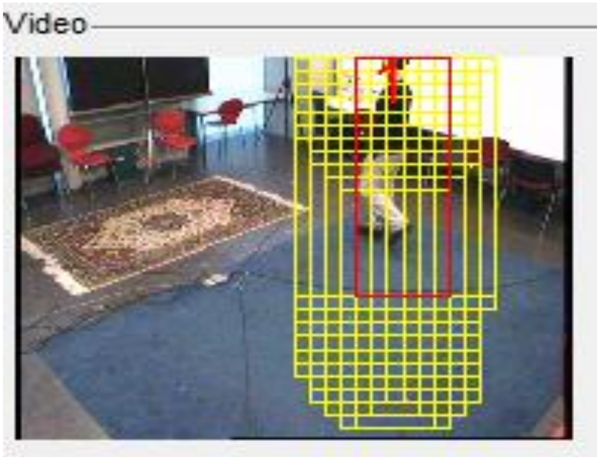

Figure 3. Detection and tracking of single moving object in frame t+1.

Figure 4. Detection and tracking of multiple moving objects in frame t.

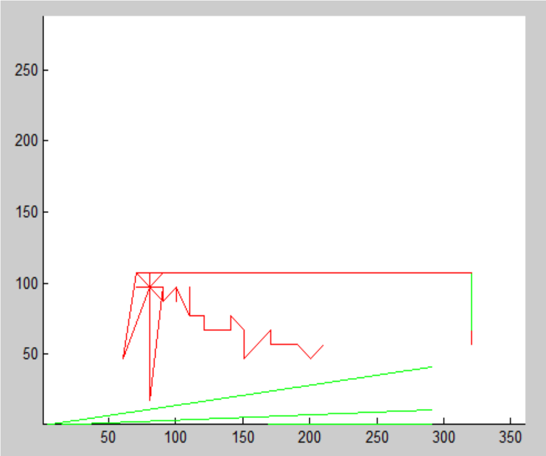

Figure 5. Trajectory of multiple moving objects.

IV. Conclusion

A new method for detection and tracking of multiple moving objects is proposed. A moving objects are identified by using background subtraction with canny edge detection method. Tracking is done using motion prediction technique. Future work is analysis and testing of proposed algorithm for dynamic background.

Acknowledgement

The proposed method has been tested and validated by a significant number of experiments. Experimental results proved the feasibility and usefulness of the proposed method for tracking of peoples under static background.

References

[i] Alper Yilmaz, Omar Javed, and Mubarak Shah, "Object tracking: A survey", ACM Computing Surveys, Vol. 38, No. 4, Article 13,Dec-2006

[ii] Falah E. Alsaqre, Yuan Baozong, "Multiple moving objects tracking for video surveillance systems", ICSP'04 Proceedings.

[iii] Kaiqi Huanga, LiangshengWanga, Tieniu Tana and Steve Maybankb, "A real-time object detecting and tracking system for outdoor night surveillance," Pattern Recognition, 2008, pp. 432 – 444.

[iv] Comaniciu, D., Ramesh, V., Andmeer," Kernel-based object tracking" ,IEEE Trans. Patt. Analy. Mach. Intell. 25, 564–575,2003

[v] Shafique K, Shah M, " A non iterative greedy algorithm for multi frame point correspondence", IEEE International conference on Computer Vision (ICCV), 2003

[vi] Ali A., Aggarwal." Segmentation and recognition of continuous human activity", IEEE workshop on detection and recognition of events in videos, 2001

[vii] Monnet, A., Mittal, A., Paragios, N. and Ramesh," Background modelling and subtraction of dynamic scenes." IEEE International Conference on Computer Vision (ICCV). 1305–1312, 2003

[viii]. John Canny. A computational approach to edge detection. Pattern Analysis and Machine Intelligence, IEEE Transactions on, PAMI-8(6):679–698, Nov. 1986

[ix] QI Xiaoping, Zhnag Qiheng, Ouyang Yimin, MA Jiaguang, " A method for object tracking using shape matching", Institute of optics and electronics , Chinese Academy of sciences, Chengdu 610209, China.

[x] R.C. Gonzalez and R.E. Woods, Digital Image Processing, Addison Wesley, Reading, MA, 1992.