

Efficient Segmentation and Detection of Object in Complex and Crowded Scene

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Abstract - This paper intends to develop a technique to extract the moving object by using temporal differencing. Initially the stereo images are captured from vicon camera and the images are cropped as per the requirement. Next interested ROI is selected to extract the object is a particular scene. The noise that are present in the cropped images are removed with the help of filters. The objects are detected by considering height and occupancy of the object in a given scene. After obtaining the objects, morphological operations are applied and finally the objects are detected. It is applicable in verities of applications in real time.

Keywords: Stereo vision, ROI, Noise artifacts, morphological operation, height map, occupancy map, object detection.

I. INTRODUCTION

Extraction of dynamic body is a significant process in the video surveillance system, traffic monitoring, pedestrian tracking and also many other applications. In general, the vicon camera system provides pan, zooming functions and tilting function by revolving s 360 degrees corresponding to its axis. Since most of the scenes that is captured by these vicon camera is different from each frame, estimation of camera movement is necessary. While using a stationary camera, the input images can always be aligned to so call reference image. Three common techniques of segmentation towards motion are temporal differencing (TD), background subtraction (BS) and optical flow (OF). Out of all these techniques, the background subtraction is one of the standard method, particularly for situation where a static background is considered.

It senses moving pixels by means of taking difference in the pixel intensity among existing input image and also with the background image. It is one of the effective technique when the so called background image is aligned 100% to the existing current image [1]. The theory about temporal differencing is likely to be similar to that of background subtraction, where is takes the difference of the intensity among the two images i.e., reference [2]. In the temporal differencing, it make use of 2 or 3 successive frames in the video to extract dynamic objects. Compare to BS, it has very less efficiency when object tries to move slowly because it uses the preceding frame as the reference image. There might be some holes in objects that has been detected. Currently, there are few enhanced methods of the temporal differencing [3]. The methods based on optical flow uses the feature of a flow vectors about the dynamic objects in a

video sequence over a time in order to detect these dynamic regions in the image sequence. In Optical flow approaches, it can be directly used to find and detect individualistically moving dynamic objects even in presence of the camera movement [4]. When using the vicon camera, the background subtraction technique seems to be not powerful method as it is needed to capture background frames in huge amount. It takes more time. Therefore, in this work temporal differencing approach is used since only single or multiple frames are taken as a reference. But it likewise senses dynamic object of the preceding image also. The main goal of this research is to basically extract the dynamic objects in a crowded scene. It also aims in overcoming the shadow problem as well as noise appearance and also in removal of artifacts in a detected image is explained further in proposed worked. The outline and contribution towards this work is explained in the upcoming sections.

II. RELATED WORKS

Various methods that exist in the literature for a dynamic object extraction. P. Spagnolo [5], used the method of temporal differencing since there exists a difficulty using the BS approach. They proposed the consistent foreground segmentation approach which combines the analysis of temporal image with the background image taken as reference. This method was adopted to background illumination changes. Murali and R. Girisha [6], developed a segmentation technique for a color video sequences in a real time along with background which was monostatic. A. Yamashita [7] developed an algorithm for the regions consisting of adherent noise and artifacts in reference image by investigative the distance and shapes of the particular regions that are existing in so called subtracted image. After this step they have merged these two images in order to remove the noise. S. Elena [8], proposed an approach to identify the shadows by using the concept and model of invariant color in a digitized image. The usage of these invariant features permits a very low complexity in the stage of classification of features. In [9, 10] the author has given a detailed information about the stereo matching algorithms. In [11] the author has explained the correlation based stereo matching algorithms and their performance. In [12] the author has explained about the effect of depth discontinuity in the disparity. In [13], an efficient framework for object stereo matching is studied. By making use of all of the above survey a new algorithm is developed to detect the

objects. A statistical review on various object detection methods were explained in detail in [14].

III. PROPOSED APPROACH

The proposed approach for an efficient object segmentation and tracking is explained in detail in the below diagram. The proposed approach for segmenting and detecting an object from the video is shown in Figure.1. Initially the stereo images taken from Vicon camera are considered. The images are then cropped with a resolution of 380 x 460 images size. Once the images are cropped in a video sequence, it is then required to find the ROI or a VOI in an

image. In almost all the images there will be a presence of unwanted noise in an images which is to be removed. These noises are removed using a morphological operations. Once the images are free from noise the corresponding connecting bandwidth is found in the given image. Here while detecting an object one should also take consider the height and occupancy of the object in a given sequence of image. Taking objects of the size which is greater than the 4050 pixel is considered in order to find the largest objects. After finding the object, the holes are filled and mask are generated. Finally these mask are connected based on the connected component concept and objects are detected.

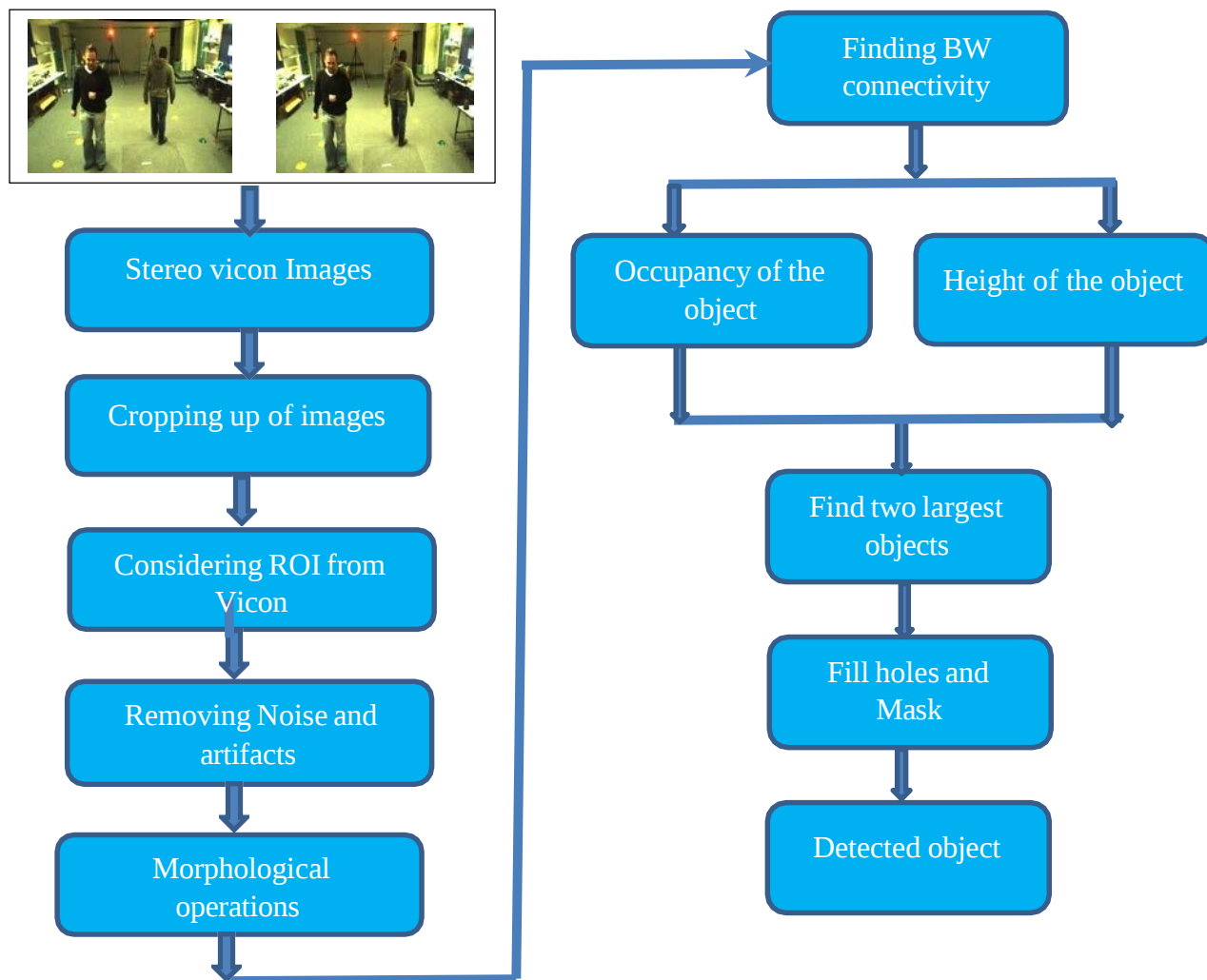


Fig.1Proposed approach for object detection

IV. RESULTS AND DISCUSSION

In order to estimate the accuracy and efficiency of the developed and proposed approach, it is evaluated using

MATLAB with a 4GB RAM, Pentium processor. The images are taken from Vicon system which will be shown below. Figure 2 shows the detection results.



Fig.2 First row indicates the original image, Second row shows the segmented object and Third row shows the detected object.

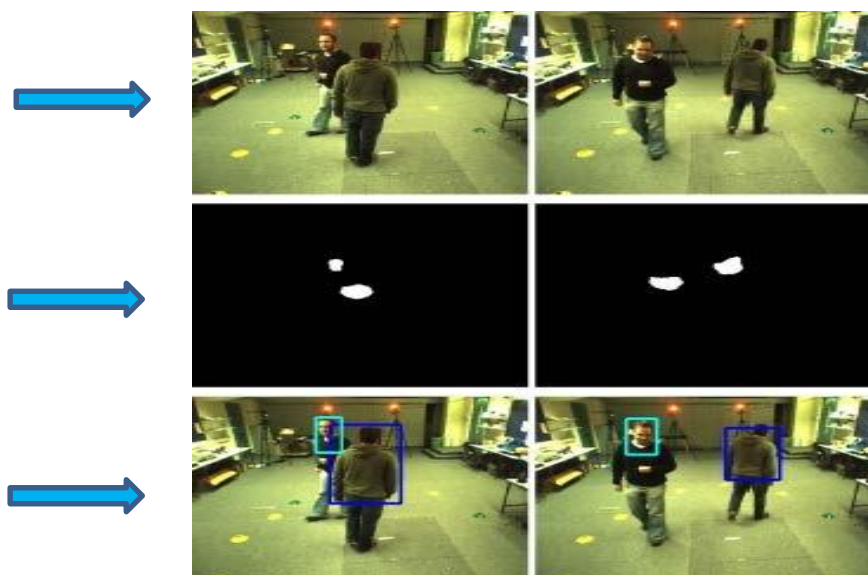


Fig.3 First row indicates the original image, Second row shows the segmented object and Third row shows the detected object.

As in the Figure.2, the First row indicates the data set that is taken from the vicon system. The second row indicates the segmented images and finally third row indicates the detected objects from the proposed approach. One can say from the above results that the objects are clearly identified and it is detected efficiently. Figure.3. gives the detail about the segmented and detected object using the proposed approach. First row indicates the data set that is taken from the vicon system. The second row indicates the segmented images and finally third row indicates the detected objects

from the proposed approach. One can say from the above results that the objects are clearly identified and it is detected efficiently.

V. CONCLUSION

This paper has proposed a technique to extract moving object. Temporal differencing is used to extract. Initially the stereo images are taken from vicon system. The proposed technique begins with discovery and finding the appropriate

difference between the current and previous images. The proposed work in this paper outperforms well in complex environment. The proposed algorithm is good in handling occlusion, illumination compensation, pose and orientation. The objects are clearly identified and it is detected efficiently from the developed approach or the technique.

REFERENCES

- [1] McKenna, Stephen J., et al. "Tracking groups of people." *Computer Vision and Image Understanding* 80.1 (2000): 42-56.
- [2] S. Vahora, C. Narenda and P. Nilesch, "A Robust Method for Moving Object Detection Using Modified Statistical Mean Method," *International Journal of Advanced Information Technology (IJAIT)*, vol. 2, no. 1, p. 65, 2012.
- [3] D. P. Bertsekas, A. Nedich and V. S. Borkar, "Improved Temporal Difference Methods with Linear Function Approximation," in *Learning and Approximate Dynamic Programming*, Wiley IEEE Press, 2004, pp. 231-235.
- [4] J. Barron, D. J. Fleet and S. S. Beauchemin, "Performance of Optical Flow Techniques," in *IEEE Computer Society Conference on Computer Vision and Pattern Recognition, ICPR*, 1994.
- [5] P. Spagnolo, T. D. Orazio, M. Leo and A. Distanti, "Moving Object Segmentation by background subtraction and temporal analysis," *Image and Vision Computing*, vol. 24, no. 5, pp. 411-423, May 2006.
- [6] S. Murali and R. Girisha, "Segmentation of Motion Objects from Surveillance Video Sequences using Temporal Differencing Combined with Multiple Correlation", *Sixth IEEE International Conference on Advanced Video and Signal Based Surveillance, AVSS 09*, 2009, pp. 473-477
- [7] A. Yamashita, T. Harada, T. Kaneko and K. T. Miura, "Removal of adherent noises from images of dynamic scenes by using a pan-tilt camera," in *Proceedings of International Conference on Intelligent Robots and System, IROS 2004*, vol. 1, pp 437-442.
- [8] S. Elena, C. Andrea, E. Touradj, "Shadow Identification and Classification Using Invariant Color Models," in *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2001*, May 7-11, 2001, Salt Lake City, UT, vol. 3, pp. 1545-1548.
- [9] Bindu N.S and H.S.Sheshadri "A comparative Study and Evaluation of Stereo Matching Costs for Radiometric Differences" in the proceedings of "International Conference on recent trends in Signal Processing, Image Processing and VLSI", at Don Bosco Institute of Technology, Bangalore, Karnataka, India from 21st and 22nd February 2014. DOI: 03.AETS.2014.5.117
- [10] Bindu N.S and H.S.Sheshadri "An Evaluation Of Correlation Based Stereo Matching Algorithms By Considering Various Parameters" in the proceedings of "International Conference on recent trends in Signal Processing, Image Processing and VLSI", at Don Bosco Institute of Technology, Bangalore, Karnataka, India from 20st and 22nd February 2014. DOI: 03.AETS.2014.5.323
- [11] Bindu N.S and H.S.Sheshadri "A Comparative Study of Correlation Based Stereo Matching Algorithms: Illumination and Exposure" in the International conference on intelligent computing, communication and devices (ICCD-2014) at Institute of Technical Education and research (ITER) .Bhubaneswar, Odisha, India on 18th and 19th of April 2014. DOI 10.1007/978-81-322-2009-1_22.
- [12] Bindu N.S and H.S. Sheshadri, "An Evaluation of Uniform Region and Depth Discontinuity Region Error in Stereo Algorithms" in the International journal of Engineering Research & Technology (IJERT). Vol 3, issues 3, March 2014, pp 1709-1711. ISSN: 2278-0181.
- [13] Bindu N.S and H.S. Sheshadri, "Computationally efficient two stage sequential framework for stereo matching" in International journal in foundations of computer science and technology .Vol 6, issue 5, September 2016, pp 1-10. DOI:10.5121/ijfcs.2016.6501.
- [14] Bindu N.S and H.S. Sheshadri, "Statistical review of various object detection algorithm" in International journal of science and engineering applications, Vol 5, issue 6, September 2016, pp 321-326. ISSN-2319-7560