Volume 6, Issue 5, May 2016 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

An Object Detection and Technique for Velocity Estimation along With Classification on the Basis of Speed

Ishankumar Shahu
M.Tech Student, CSE Department,
Shri Ramdeobaba College of Engineering and Management,
Nagpur, Maharashtra, India

Dr. R. Hablani
Associate Professor, CSE Department,
Shri Ramdeobaba College of Engineering and Management,
Nagpur, Maharashtra, India

Abstract: ***Velocity calculation of moving object is very difficult using camera. It is very difficult to calculate velocity of particular object on which we are interested. For calculation of velocity we have to detect object in the video so it's very important to recognize the object in video. Object detection is task for detection of moving pixel in the video frames for that in the domain of image processing number of researchers trying to get the perfect method for the detection of object. Number of methods and algorithm like background subtractions, frame differencing, temporal differencing, optical flow etc. are proposed by researchers. In this paper the clustering base algorithm that is k-mean is used for the object detection after that we remove the noise from the detected false object. After that we perform operation on detect object for the calculation of the velocity. In this paper we try to get the object efficiently. We avoid the false detection of object only interested object are classified as a object else remaining are concluded as a noise or background image. As the object detection is efficient the velocity computation is only for detected object so time of computation required is less.***

Keywords: ***Object detection, K-means, Velocity estimation, Background Image subtractions, Threshold.***

I. INTRODUCTION

Velocity estimation is the very important for the application which are used for the traffic analysis, limits the speed of vehicles, avoiding the collision of vehicles etc. Velocity estimation by using the captured video or by live video is very complex process. As velocity estimation is very important component for traffic control and collision avoidance. In this paper velocity estimation is done using digital video. Video is the basically the time wise collection of image frame with audio data. Frame is the unit of the video. Video processing is the image by image processing.

Based on international and domestic Vision Ranging technology and digital image processing theory research, this paper proposes a new method of measuring the velocity of object based on the digital image processing theory, and obtains the velocity on which object move in the surveillance.

In this paper, in section III we are giving the method for the object detection, tracing that object, finding the distance travel by the object and on which speed the object travels and then classifies that object on the basis of their speed or velocity.

We are providing computation for multiple objects using single camera where location of camera is steady where objects are moving.

As per the moving detection and tracking concern its deals with frames that is one by one processed image. Identifying the moving object is the basic operation in video. As object is detected we can operate that object by using there characteristic & parameter. In any video, for the processing we have to follow the step,

1. Identification of the Moving Object.
2. Tracking the object in the all frame of video where that object presents.
3. Perform analysis on that object and take action as per the requirement like estimation of velocity, classification on its behaviour, study of characteristic etc.

II. LITRATURE SURVEY

In IEEE 2009, paper titled Moving Object and Shadow Detection Based on RGB Color Space and Edge Ratio[1]gives the overview on Separation of object, shadow and background using RGB color space model considering chromaticity and brightness ratio model combined with edge ratio model for treatment of misclassified object and shadow having positive aspect as Moving object and shadow are determined separately and Fast enough for utilization in real time analysisbut having negative aspect as Darker shadow areas or moving target having similar color information to that of background area will lead to failure

In ELSEVIER 2011, paper titled Robust moving object detection against fast illumination change [2]gives the overview on Identification of moving target under fast illumination variations using Gaussian mixture model for object detection and chromaticity and brightness ration model for elimination of false foreground pixels.having positive aspect Does not require training sequence and Automatic adjustment of the parameters but having negative aspect as Results degrades in complex environment that has piled snow, puddles or in specular regions.

In IEEE 2012, paper titled Spatio-Temporal Traffic Scene Modelling for Object Motion Detection [3] gives the overview on Approach for traffic surveillance using Bayesian fusion method where in kernel density estimation is used for background modelling and Gaussian formulation is carried out for foreground model. Having positive aspect Requires less computational time and Works well with rapidly and slowly changing background but having negative aspect as Object's feature identical to that of background are abolished.

In IEEE 2013, paper titled An Improved Moving Objects Detection Algorithm [4] gives the overview on Enhanced three frame differential method combined with canny edge detection to gain complete information related to moving target having positive aspect Ghosting effect is eliminated and Algorithm beats the empty phenomenon and edge deletion problems of standard three-frame differential method but having negative aspect as The result is not ideal in the environment with strong light and obvious shadow also Results degrade for dynamic background.

In IEEE 2013, paper titled A Moving Target Detection Algorithm Based on Dynamic Scenes [5] gives the overview on Five frame differential approach combined with background subtraction method for detection of target in motion having positive aspect Moving target can be extracted more accurately and completely from dynamic scenes but having negative aspect as It cannot eliminate leaves flutter noise and Cannot identify multiple moving targets.

In ELSEVIER 2014 ,paper titled The 3dSOBS+ algorithm for moving object detection [6] gives the overview on Moving target is detected by Neural background model which is automatically created by self-organizing method having positive aspect Works well with dynamic backgrounds and not only Accurately adjust with gradual illumination variations, and shadows cast by moving objects but also Robust against false detections but having negative aspect as Accuracy cannot be obtained in case of sudden illumination variations and reflection.

In IEEE 2014, paper titled Image Processing Based Vehicle Detection and Tracking Method [7] gives the overview on Vehicle recognition and tracking using Gaussian mixture model and blob detection having positive aspect Vehicle counting is done automatically Also a Robust for low and medium traffic but having negative aspect as In case of overcrowding and high traffic flow situation performance breaks down and not efficient to obtain best performance significant amount of parameter tuning is required.

In IEEE 2014, paper titled Moving Object Detection Based on Temporal Information [8] gives the overview on Makes use of temporal information for generation of motion saliency which is then followed by maximum entropy and fuzzy growing method to identify moving target having positive aspect No prior knowledge of the background model is required and Robust to mild background motions and camera jitters, No user interaction for parameter tuning is required and very Efficiently deals with the perturbations of the background but having negative aspect as Shadow is determined along with moving object which may be misclassified as object itself.

In HINDAWI 2014, paper titled Moving Object Detection and Shadow Removing under Changing Illumination Condition [9] gives the overview on Local intensity ratio model used for elimination of shadow followed by Gaussian mixture model for moving object detection having positive aspect as Successful moving target identification without shadow and changing illumination condition but having negative aspect as Performance drops significantly in case where background is same as foreground and foreground is similar to shadow and cannot accommodate with back to back illumination changes like light on/off..

III. WORKING

A. Object Detection

Object detection is very important operation in the video processing. The number of technique are discovered for the effective object detection like Background Subtraction Method , Frame difference method, optical flow, Temporal differencing method etc.

We are applying the clustering technique for detections of the object in the video. K-Means algorithm is used for the object detection. For the object detection we are detecting the moving pixel of image which is different from the background image. Background image, an image which is the first image taking by the camera where only static object are there. The first image of the video is taken as the background image or reference image also says as static image. After getting the first image we are computing the difference of every image with respect to first image. Consider that computed image for the further detection of the object.

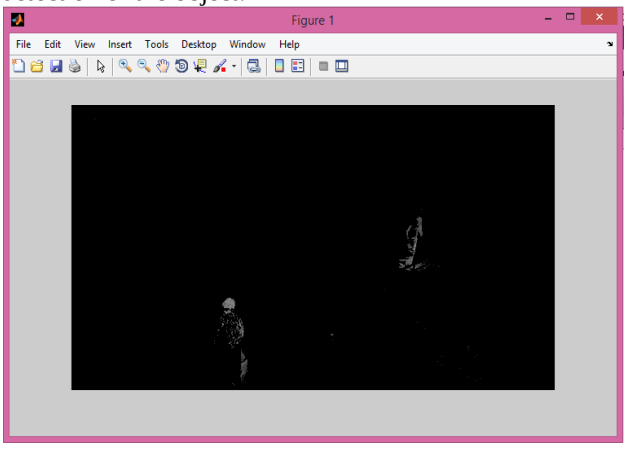

Figure 01: Difference of first image and current image.

Then we apply k-mean on that image where k-means create three cluster of the pixels in which we have foreground pixel, background pixel and noisy pixel. We select the culture of foreground pixel and apply logical morphological operation over that and getting the corresponding pixel which are connected through each other by this we get the moving object efficiently in the sequence of image frames. As shown in figure.

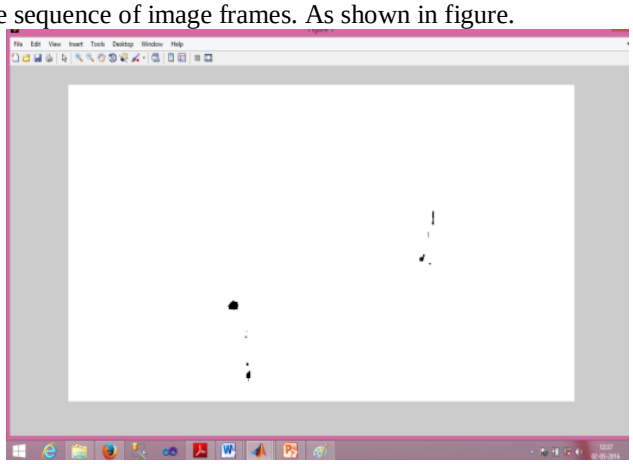

Figure 02: Connected pixels of moving object.

B. Velocity Estimation

Velocity is calculated on the basis of the object we are detecting by k-means algorithm followed by the logical morphological operation. For the velocity estimation we need two parameter one is distance and another is time. We are using Euclidean distance for the calculation of distance travel by the object. Euclidean is applied on the two consecutive frames where the same object is found. On the basis of the two frames of the in video in which same object found we apply the Euclidean distance formula to compute the distance travel by the object. For that we take the distance between the minimum value of the pixel of object found before and minimum value of the pixel of object found after. As we get the distance the unit of distance is in pixels i.e. how much pixel that object moves in consecutive frames. Time is calculated as a no of frame takes by the object for moving from one location to another. Number of frame we take as 2 for minimizing the computation time we take the distance of two conjugating frames. So now we having both parameter which is used for the calculation of velocity that is distance in pixels and time as no of frames that's why we having the velocity as pixel per frames.

C. Classification

As the object detection and velocity estimation is carried out by above method. From section III B. We get the speed of the object in pixel per frame. What we did? We set the threshold value according to speed limit. As per the threshold value if object having speed above limits the get classified as fast moving object.

IV. RESULT

A. Object detection

On the basis of test on different dataset from pets 2014, live recorded video and sample video of Matlab itself we compute that the system is able to detect the object which are moving in the frame are caught by the system accurately. The efficiency of system of moving object detection is 95%.

B. Velocity calculation

Velocity is calculated after the object is detected. Test on velocity calculation is done on the basis of the manually created video by the capturing the clip from road with knows velocity objects.In the output the fast object shows the high value and low speed object shows relatively low value. Value of velocity is calculated in the form of pixel / frame

V. CONCLUSION

The method proposed in this paper is very efficient in object detection and velocity estimation. Which is tested and proved by the above test cases? The complexity of the computation is less and result getting from the system is good enough for making the application for full fill the requirement for the velocity estimation of object and classification. We use various technique like k means,background subtraction, thresholding values for minimize the computation and best algorithm for the classification. So the all over complexity of system is less with the high efficiency. In future we can also classify the object on the basis of different parameter like event detection anomaly detection or outlier detection etc. The classification of the object on the basis of their speed is carried out efficiently.

REFRENCE

[1] Xia Dong, Kedian Wang and GuohuaJia, *Moving Object and Shadow Detection Based on RGB Color Space and Edge Ratio*, IEEE 2nd International Conference, on Image and Signal Processing, pp. 1-5, Oct. 2009

[2] JinMin Choi, Hyung Jin Chang, Yung Jun Yoo and Jin Young Choi, *Robust moving object detection against fast illumination change*,"Computer Vision and Image Understanding, pp. 179-193, 2012.

[3] JiuYueHao, Chao Li, Zuwhan Kim, and Zhang Xiong. *Spatio-Temporal Traffic Scene Modeling for Object Motion Detection*, IEEE, Intelligent Transportation Systems, 2012.

[4] Liu Gangl, NingShangkun, You Yugan, Wen Guanglei and ZhengSiguo, *An Improved Moving Objects Detection Algorithm*, in Proceedings of the 2013 IEEE International Conference on Wavelet Analysis and Pattern Recognition, pp. 96-102, 14-17 July, 2013.

[5] Huijuan Zhang and Hanmei Zhang, *A Moving Target Detection Algorithm Based on Dynamic Scenes*, IEEE Conference on Computer Science & Education, pp. 995-998, April 2013.

[6] Lucia Maddalena and Alfredo Petrosino, *The 3dSOBS+ algorithm for moving object detection*,"Computer Vision and Image Understanding, pp. 65–73, 2014.

[7] Prem Kumar Bhaskar and Suet-Peng Yong, *Image Processing Based Vehicle Detection and Tracking Method*, IEEE, 2014.

[8] Zhihu Wang, Kai Liao, JiulongXiong, and Qi Zhang, *Moving Object Detection Based on Temporal Information*, IEEE Signal Processing Letters, vol. 21, no. 11, pp. 1404-1407, November 2014.

[9] Jinhai Xiang, Heng Fan, HonghongLiao, JunXu, Weiping Sun and Shengsheng Yu, *Moving Object Detection and Shadow Removing under Changing Illumination Condition*, Hindawi Publishing Corporation, Mathematical Problems in Engineering, pp. 1-10, February 2014.

