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Motion Human Detection & Tracking Based On Background Subtraction

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Abstract: *The moving human body detection is the most important part of the human body motion analysis. The purpose is to detect the moving human body from the background image in video sequence and for the human body tracking. This paper proposes a new method to detect moving object based on background subtraction. A reliable background updating model is established. A dynamic optimization threshold method is used to obtain a more complete moving object. Morphological filtering is introduced to eliminate the noise. At last, contour projection analysis is combined with the shape analysis to remove the effect of shadow; the moving human bodies are accurately and reliably detected. Motion of a moving object in a video stream is studied and its velocity is detected. The centroid of object is computed to use in the analyses of the position of the moving human body. The experimental results show that the proposed method runs quickly, accurately and fits for the real-time detection.*

Keywords: *Background subtraction, tracking, object detection, image initialization*

I. INTRODUCTION

Human body motion analysis is an important technology which combines modern bio-mechanics with computer vision. It is widely used in intelligent control, human computer interaction, motion analysis and other fields. Currently, methods used in moving object detection are mainly the frame subtraction method, the background subtraction method and the optical flow method. Frame subtraction method is through the difference between two consecutive images to determine the presence of moving objects. Its calculation is simple and easy to implement. The Frame Subtraction is generally difficult to obtain a complete outline of moving object, liable to appear the empty phenomenon; as a result the detection of moving object is not accurate.

The background subtraction method is the common method of motion detection. It is a technology that uses the difference of the current image and the background image to detect the motion region, and it is generally able to provide data included object information. This method is very sensitive to the changes in the external environment and has poor anti-interference ability.

In optical flow method the optical flow generated in the sequential images taken by a moving camera is used for detecting the object motion in the images. The detection is executed with analysis of the flow distortion, so that the moving object is distinguished from the static objects. In this method, a large quantity of calculation, sensitivity to noise, poor anti-noise performance, makes it not suitable for real-time demanding occasions.

The extraction of moving objects, followed by object tracking and recognition, can often be defined in very general terms. The final component is largely depended upon the application context, such as pedestrian counting or traffic monitoring.

II. MOTION HUMAN DETECTION

Human body detection is to identify the corresponding part of human from the moving region.In this paper, the background subtraction method for detecting the object is implemented. The key of this method lies in the initialization and update of the background image.

A) Initialize the background: The median method is selected to initialize the background. Here median is taken from continuous multi-frame.

B) Updating background: The background needs to be updated in real time, so as to accurately extract the moving object. In detection of the moving object, the pixels judged as belonging to the moving object maintain the original background gray values, not be updated. For the pixels which are judged to be the background, the background is updated.

C) Moving Object Extraction: The background image is subtracted from the current frame. If the pixel difference is greater than the set threshold T , then it determines that the pixels appear in the moving object, otherwise, as the background pixels. If dynamic threshold method is used then we can dynamically change the threshold value according to the lighting changes of the two images obtained. This method can effectively suppress the impact of light changes.

D) Reprocessing: The difference image obtained contains the motion region, in addition, also a large number of noise. Noise is removed by using median filter. Morphological methods are used for further processing. Corrosion operation is taken to effectively filter out non-human activity areas. Expansion operation is used to filter out most of the non-body motion regions while preserving the shape of human motion.

E) Extraction of Moving Human Body: When moving object appears, shadow will appear in some regions of the scene. The presence of shadow will affect the accurate extraction of the moving object. Vertical combined with horizontal projection is used to detect the height of the motion region. This eliminates the impact of the shadow to a certain degree. Then we analyze the vertical projection value and set the threshold value (determined by experience) to remove the pseudo-local maximum value and the pseudo-local minimum value of the vertical projection to determine the number and width of the body in the motion region, we will get the moving human body with precise edge. The extracted moving region may correspond to different moving objects, such as pedestrians, vehicles and other such birds, floating clouds, the swaying tree and other moving objects. Hence the shape features of motion regions are used to further determine whether the moving object is a human being. Judging criteria are as follows: (1) The object area is larger than the set threshold (2) The aspect ratio of the object region should conform to the set ratio. If these two conditions are met then moving object is the moving human body. After detection we are going to track the moving object by finding the area and centroid.

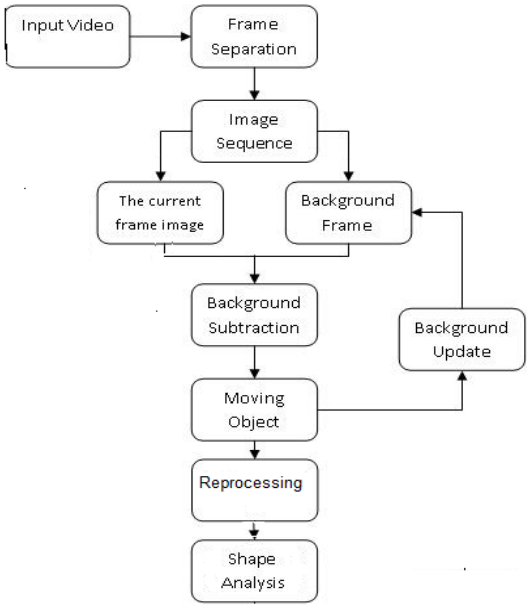


Figure 1: The flow chart of moving human body extraction

III. TRACKING

In this phase, motion of a moving object in a video stream, is studied and its velocity is detected and its future position is predicted. The centroid of object is computed to use in the analysis of the position of the moving object image. The centroid is a good parameter for specifying the location of an object. The centroid of the object has been used for target detection. The x-y curve of the object has been obtained using this centroid.

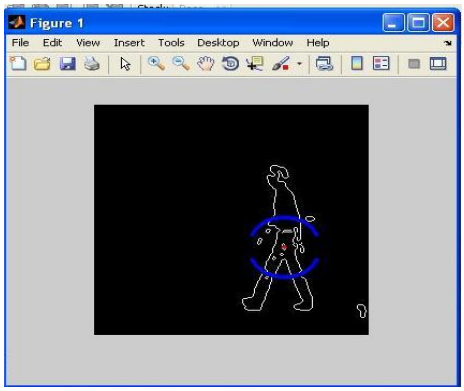
A) THE DETECTION OF OBJECT MOVEMENTS AND TARGET: The video image occurs by many sequential images changing very rapidly in a frame. The area and centroid of the object is computed in each frame. The area of object is an important component in the computation of the object. If the object is in the image work area, the area value will not change. In this situation, the centroid is real centroid of object and can be used in computations. If the area of object is changing time by time, the whole object is not in the work area. The digitalization of the image area is very easy because it is fixed. So, the centroid of the object can be digitalized on x and y-axis easily. Using these obtained values, the movement analyze of the object is done.

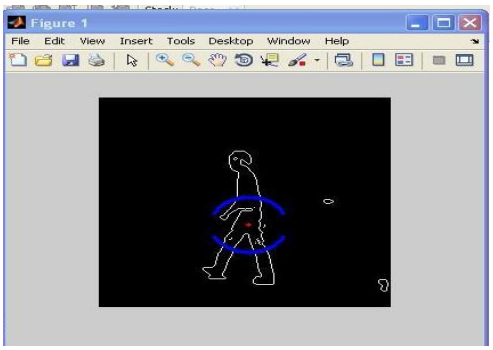
B) THE COMPUTATION OF THE OBJECT SPEED: In the computation of the speed, t_1 and t_2 image frames are used in the followed image sequences. The system clock of computer is used to decide the time. The position change of object is calculated using x-y curve. By the assumption of linear motion for objects movement, the average speed can be calculated by using formula:

$$v = \frac{\Delta x}{\Delta t} = \frac{\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}}{t_2 - t_1}$$

C) THE DECISION OF THE TARGET: The location of the object at any time in the future can be computed by the supposition of that object is steady moving due to the computed speed. The coordinate of centroid at any time can be computed by using equation x=y, t. The coordinate can be found using this computed x value.

IV. RESULT





V. Result comparison between neural Map method & background subtraction method

Input Video	Video Size in (pixel)	Tot No of Frames	Processing time for Neural map	Foreground Detection in *'s for NM	Foreground Detection in *'s for BS	Processing time for Background Subtraction
video_1	324 x 244	31	5.0312 ms	4 *	5*	0.0652 ms
Video_2	324 x 244	60	5.7036 ms	3*	4*	0.2158 ms
Video_3	132 x 132	15	5.8152 ms	3*	4*	0.1365 ms

VI. CONCLUSION

In this paper, a real-time and Pre-defined video of moving object detection is proposed, based on background subtraction. In cognizance of the shortcomings and deficiencies in the traditional method of object detection, we establish reliable background model, use threshold method to detect moving object and update the background in real time. At last the moving object is tracked by finding the area and centroid. A benefit of this method is that it is time efficient, and it works well for small numbers of moving objects.

Target detection and process is realized on the video image. Video image data of the human body is processed, and its geometrical centroid is obtained in different time intervals. These computed centroid values are used to draw the x-y graphic. Then, the speed has been computed. On this way, the future position can be computed by the assumption of that the motion is steady movement.

REFERENCES

[1] M.Dimitrijevic, "Human body pose detection using Bayesian spatiotemporal templates," 2007 International Conference on Intelligent and Advanced Systems, 2008, pp.764-9.

[2] Tao Jianguo, Yu Changhong, "Real-Time Detection and Tracking of Moving Object," Intelligent Information Technology Application, 2008.UTA '08. Second International Symposium on Volume 2, 20-22 Dec.2008 Page(s):860 - 863

[3] Niu Lianqiang and Nan Jiang, "A moving objects detection algorithm based on improved background subtraction," Intelligent Systems Design and Applications, 2008. ISDA '08. Eighth International Conference on Volume 3, 26-28 Nov. 2008 Page(s):604 – 607

[4] C. Bregler: Learning and recognizing human dynamics in video sequences. In Proc. *IEEE Int. Conf. CVPR'97*, pages 568-574, 1997.

[5] A. Cavallaro, F. Ziliani, R. Castagno, and T. Ebrahimi: Vehicle extraction based on focus of attention, multi feature segmentation and tracking. *In Proc.* European signal processing conference EUSIPCO-2000, Tampere, Finland, pages 2161-2164, 2000.