Er. Puneet Sandhu, Dr.Charanjit Singh, Er. Navneet Kaur, / International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com
Vol. 3, Issue 3, May-Jun 2013, pp.298-300

Motion Detection and Target Tracking using Neural Network Correlation Co-efficient Technique

Er. Puneet Sandhu*, Astt.Prof, Dr.Charanjit Singh Astt.Prof, Er. Navneet Kaur, Astt.Prof

*Department of Electronics and Communication Engineering,Chandigarh group of colleges,Landran,Mohali,Punjab,India
**Department of Electronics and Communication Engineering, UCOE,Punjabi University ,Patiala,Punjab, India
***Department of Electronics and Communication Engineering,Chandigarh group of colleges,Landran,Mohali,Punjab,India

ABSTRACT

For an effective human computer intelligent interaction, the computer needs to recognize the motion and track the moving objects. Moving object detection is a crucial aspect of computer vision and video processing areas. Its basic operation involves the selection of significant segments of a video signal. Such operation is also called Target Tracking (the process of locating a moving object throughout a sequence of consecutive frames). The detection of moving objects in complex environments with various types of motion is a challenging problem because the camera motion and the object motion both are mixed. The process of moving object detection based on the background extraction is divided into two steps, background extraction and moving object detection. The basic idea is to capture a series of video pictures of the scene at regular intervals, the selected picture is divided into m*m blocks whose expectation and variance are calculated respectively to describe the vector information of the region. This paper proposes correlation co-efficient methodology to accomplish the process of motion detection and target tracking.

KEYWORDS: Correlation Network, Motion Detection, Background Extraction, Target Tracking, Neural Network

I.INTRODUCTION

Now-a-days image processing and video analysis are the fast growing developments of computer and electronics engineering. Moving object detection of the video images is an important research topic of the electronics vision technologies. Moving object detection means segmenting and extracting the moving object from the continuous video images, that is, the separation of the foreground and background [1]. Moving object detection is an important part of digital image processing techniques, and it is the base of the many following sophisticated processing tasks, such as target recognition and tracking, target classification, behavior understanding and analysis. This technology has a wide application prospect such as gesture recognition, human-computer interaction, virtual reality, and so on. To make system more efficient and economic, the video is compressed by using motion JPEG (MJPEG). Then the movie is converted into a sequence of frames. As per basic block diagram shown in Fig. 1, the sequence of compressed image frames [3] from the given input video is given to cross correlation network and neural network to detect rough motion of the target. Then for the purpose of minimizing error and getting accurate output a Feed-Forward Neural Network [1], [5] is formed. As nature of output is known, supervised learning is done and formed network is trained using Radial Basis Function, to detect the level of the motion.

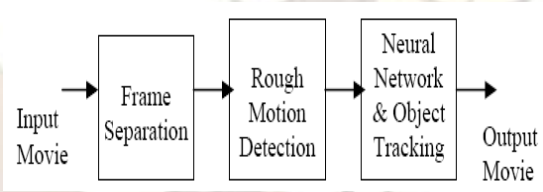


Fig.1Basic Block Diagram of target detection

II.BACKGROUND EXTRACTION

Background extraction means that the background (stagnant scene) is extracted from the video image as the camera is fixed; each pixel of the image has an analogous background value which is basically fixed over a period of time. The purpose of background extraction is to find the background value of each point of the image [2]. Background will change when we analyze it at different time periods. For example, the change of the light can lead to the change of the brightness and color of the background, when the moving object stops. It becomes the part of background and the movement of the part of the background lets it to be the moving foreground. Therefore, the background should be updated invariably. Firstly, we study the method of background initialization or extracting background image without any information of moving foreground. The input is video image including

moving objects and static scene, and the output is background image containing scene only. The background extraction is consummated by using two following methods:

A) Background Extraction from color image

In this technique each pixel of the image is sampled according to time and the time is taken in terms of background pixel and foreground pixel. Moving foreground has shorter living time when background is static due to this the color and brightness of the background and foreground are different. In addition, there are very obvious differences in color for moving objects and still images. Nearly all methods are based on this idea. Generally, the background extraction of color image has three methods including color background extraction based on average value, color background extraction according to median filter and color background extraction based on common region.

B) Background extraction of gray image

Moving object detection and tracking technique cannot directly uses the original color image but it uses the gray image. Therefore, the color video image is converted to gray image, and then the background is extracted from the gray image.

1) Transform color image to gray image

Each pixel of color image in the RGB space is a three dimensional vector, and each component represents the gray value of the red, green and blue colors. The simplest method of converting color image to gray image is by taking the average of these three components [4]. However, this method does not match the visual perception of human eyes since the weights of the three colors are not identical for the human's perception.

The image compression format of JPEG adopts the YUV space which is a linear transformation of RGB space. R, G and B indicate the gray values of red, green and blue respectively. Y component expresses the brightness of the image, which matches perception of color, then, we let Y component as a gray value of image pixel. The formula of converting the color pixels to grayscale pixels is as follows:

GRAY=0.229R+0.587G+0.114B

2) Background extraction of gray image

Background extraction algorithms of color image can also be used for the background extraction of gray images, as long as we use the absolute value of scalar difference to replace Euclidean distance of vector while computing the distance. The background acquired by mean method has uneven state of distribution of brightness and darkness, and it is easily affected by the number of moving targets. The implementation of median method needs larger calculations and this ultimately consumes larger computer memory, furthermore, in median method it is easy to mistake the target as background when there are continuous objects.

The steps for background extraction are as follows:
a) Read M continuous pictures;
b) Divide each picture into m*m blocks and calculate the expectation and variance of each block stored in the vector pair (*Eai*, *Ebi*) to describe the region vector;
c) Calculate the average vector of the region with M vector pairs
d) Set a threshold T;
e) Calculate *Di* for all vector pairs
f) Set a timer and sample a series of images at regular intervals.
g) Repeat the above steps to amend the background, and then achieve background extraction.

III.MOVING OBJECT DETECTION

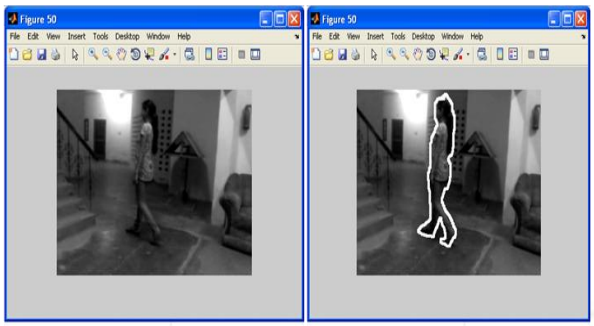
Target monitoring based on background extraction means that monitoring the moving object according to the acquired background image. Following is the method used for the detection of an object:

Threshold segmentation method

Extraction of target using Threshold segmentation method means that we can obtain the goal by using background subtraction method after retrieving the background image from above said technique [6]. The image difference obtained by direct subtraction may have some pixel points with negative values; we can use the absolute value to solve the problem. The idea of threshold segmentation method is very simple. A threshold value is set for an image, the pixels with gray values greater than the threshold are set to 255(white), and all the pixels with gray values less than the threshold are set to 0 (black). The accurate selection of threshold value is a great challenge in this technique. The prospect images and background images may constantly change, then, we cannot use a fixed threshold to segment each frame image, different image may be selected a different and appropriate threshold. There are many methods to select a threshold, the most commonly used one is iterative method which is based on the approximation theory [7]. Generally, the gray value is set to 256, that is, the gray value changes from 0 to 255.

IV.RESULT & CONCLUSIONS:

The input to the MATLAB program is given as continuous images .These images are taken using moving camera.



Figue2: Image Extraction

The images are further converted into frames so as to find the correlation coefficient between consecutive images for detection of moving target. The figure 2 shows the extraction of moving target when the input is given to MATLAB program.

In this paper, we adopt background extraction algorithm based on the common region which is further improvement on the traditional extraction method. The new method can determine the background image real time and has better robustness. To extract the object from the moving image, the best method is to use a neural network based on correlation network.

V.REAL TIME IMPLEMENTATIONS

The moving object detection has voluminous number of implementations in daily life:

- Military applications (Tracking an airplane from the video)
- Room Security Applications (Tracking a person in the room)
- Automatic visual surveillance and tracking system.
- Biomedical Applications(Detecting growth of tissues)

REFERENCES

[1] Moving object detection under free moving Camera by Jiman Kim, Guensu Ye, and Daijin Kim in Proceedings of 2010 IEEE 17th International Conference on Image Processing September 26-29, 2010, Hong Kong.

[2] Moving Object Detection Based on Background Extraction by Chen Peijiang of Engineering College Linyi Normal University Linyi, Shandong, 276000, China in ©2009 IEEE.

[3] "Detection of Moving Images Using Neural Network" by P. Latha, L. Ganesan, N. Ramaraj, and P. V. Hari Venkatesh in World Academy of Science, Engineering and Technology 46 2008.

[4] "Performance evaluation of object detection algorithms for video surveillance" by Nascimento J C and Marques J S, IEEE Trans.On Multimedia, vol. 8, pp. 761-774, April, 2006.

[5] "Tracking Humans using Multi-modal Fusion"by Xiaotao Zou, Bir Bhanu Center for Research in Intelligent Systems University of California, Riverside, CA 92521

[6] "Incident detection Algorithm Evaluation" by Dr. Peter T. Martin, Associate Professor Joseph Perrin, Ph.D., PE, PTOE Blake Hansen, M.S.in March 2001