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Tracking of Multiple Humans in Video

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Abstract: Human tracking is an important research area in computer vision with potential applications in many other fields like augment reality, human–machine interaction, and advanced driver assistance systems. Despite a lot of progress in the field, visual tracking remains a difficult problem due to many challenges. In this paper we describe a method of automatic motion tracking of a person in a sequence of video frames. The method is suitable for tracking a person walking or running in a surveillance video captured from a single still camera. The method initially removes the noise from the captured image then segments the image using frame difference and binary converting techniques and finally tracks the person using a bounding box.

Keywords: Human Tracking, Bounding Box, Computer Vision, Camera, Visual Tracking.

I. INTRODUCTION

The performance of human tracking systems has steadily increased during the past few years. Two factors mainly contributed to the improvement: the advance of robust detectors and various extensions of the data association technique. The proposed work focuses on the importance of the appearance model, which is orthogonal to the approaches of previous works on multi-target tracking, but is a key problem in single object tracking applications. Human tracking algorithms aim to find the most similar region of an image as compared with the target, by detection, predicting the position of an object and simultaneously adapting its parameters to different appearances of object.

Challenges will be seen during occlusions. Challenges are also faced when features for the human beings are difficult to discriminate against that extracted from other objects in the scene. Another challenge is the variant appearance of the human beings, e.g., dress color and texture. All these factors are important in the uniformity of human tracking. They are commonly affected by pose variation, illumination change, camera motion and different viewpoints. Approaches maintaining a template for each human being typically face how to update an existing human being such that it remains a representative model. If the human being position is fixed, it can't be an effective model for different situations.

Sometimes human beings often are occluded by other object(s) or they leave the field of view of the camera. To deal with these circumstances, the detection of the human being independently of his previous position in the image is required; in addition, the required execution time is another difficulty. Our goal is to automatically determine the bounding box of human being, which is not necessary in every frame that follows. The video stream is to be processed at a frame rate and the process should execute indefinitely long. This task is called as long-term tracking. In the proposed work, a novel approach combining the strategies of tracking, detection and recognizing the human beings.

II. OBJECTIVES OF PROPOSED WORK

- To design a simple and stable algorithm that can detect multiple human beings.
- To be capable of predicting & tracking the motion of the human beings in the frame under processing.
- To yield better results for crowds.
- To deliver steady performance even in case of sudden movements.
- To recognize the actions performed by the human beings in the frames under consideration.

III.METHOD USED FOR DETECTION OF MOVING HUMAN

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. The key of this method lies in the initialization and update of the background image. The effectiveness of both will affect the accuracy of test results. Therefore, we use an effective method to initialize the background, and update the background in real time. Input video is given as input which converted in to

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frame . From these frames images are separated. From these images initial background image is constructed. This image divided in to two images current frame image and background frame image. After separation background subtraction method applied to detect moving object for next frame background updated.

A. BACKGROUND IMAGE INITIALIZATION

There are many methods to get initial background image .Time average method cannot deal with image shadow problems. While the method of taking the median from continuous multiframe can resolve this problem simply and effectively. So the median method is selected for background initialization.

B. REPROCESSING

As the complexity of the background, the difference image obtained contains the motion region, additionally it also contains large number of noise. Therefore, noise needs to be removed. To remove this noise we use median filter with the 3 X 3 window and filters out some noise. After the median filter, in addition the motion region, includes not only body parts, but also may include moving cars, flying birds, flowing clouds and swaying trees and other nobody parts. Morphological methods are used for further processing. Firstly, corrosion operation is taken too effectively to filter out non-human activity areas. Secondly, using the expansion operation to filter out most of the non-body motion regions while preserving the shape of human motion without injury. After expansion and corrosion operations, some isolated spots of the image and some interference of small pieces are eliminated ,and we get more accurate human motion region.

C. EXTRACTION OF MOVING HUMAN BODY

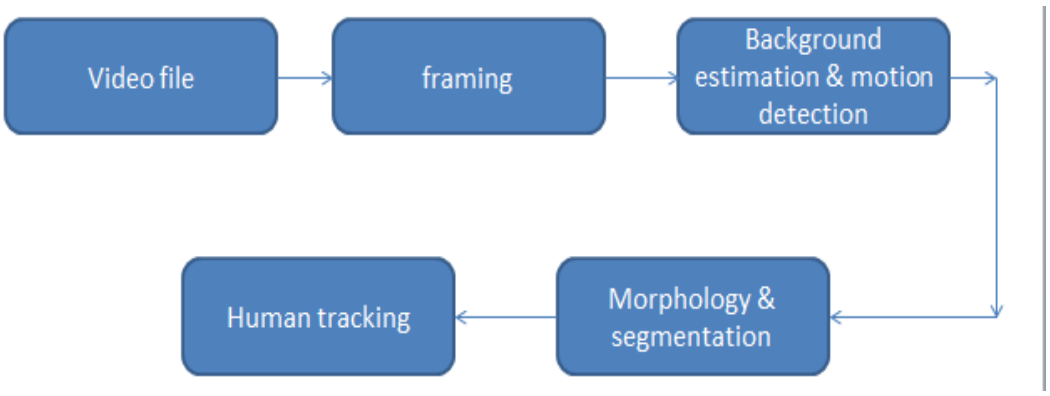
After median filtering and morphological operations, some accurate edge regions will be got, but the region belongs to the moving human body could not be determined. Also it is seen that while moving object appears shadow will also appear in some region of scene. It will affect to accuracy of moving object detection. By using vertical and horizontal projection to detect the height of motion region. This will help to eliminate the impact of the shadow up to certain degree. Human body detection is to identify the corresponding part of human from the moving region. But 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 we use the shape features of motion regions 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, the moving object is the moving human body, or is not a human body.

IV. METHODOLOGY



This system follows following stages to track moving object

Input video

Actually input video is taken pre-recorded video from the file which is captured from the still camera.

Frame Separation

In this project we need to convert input video to frame's by using MATLAB. Combination of frame's is called as video. Each and every video have number of frames, by using that value we can take the number of frame's.

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Background estimation

After converting video to frames first frame (image) is called background image, and other then first image are current image and these images are not similar at the time of moving object detection video. And also these current images are similar at the time of non- moving object detection.

Background Subtraction

Background subtraction means we just subtract the current image and background image, and the current image is updated in each and every time, background image is constant. by using these technique we can easily find the moving object. For ex. background image pixel – current image pixel If the output is 0 means no moving object detected. If the output is 1 means moving object detected.

Morphology

By using this technique we can identify the shape of the moving object (if there is any variation in background image and current image).otherwise no moving object is detected (if there is no variation in background image and current image).

Here we are using HOG (histogram of gradient) for analyses the human structure like size, color, shape ,height etc..

Segmentation

It is the process of dividing an image into multiple regions. Segmentation separates the objects and background in an image. Segmentation first converts the filtered video to gray scale, if it is in other color space. Then it calculates the absolute difference between two consecutive images at every pixel position. Finally gray level difference images are converted into bi level binary images.

Human tracking

Last phase is human tracking. Human tracking visualizes the moving human in a sequence of frames surrounded by a rectangle bounding box. The dimension of rectangle depends on the size of tracked human.

Working flow of project

1) First we are taking one video file as input then we are going to convert video to "n number of frames" by using MATLAB. And save the frames in any format with proper name. Here we do 30 frames of taken video.
2) In frame separation we use image resizing.
3) In that video first frame is consider as Background image (say as previous image), other than first image we consider as current image. (and background image is constant but current image is different based on iteration and video). By subtracting background image from current image we get difference image. Before background subtraction we have to convert every current image from RGB to Grey scale.
4) For this difference image we apply thresholding as follows Difference image >35=1 otherwise 0
For dynamic thresholding, Difference image >100=1.Otherwise 0.
5) After background subtraction we are going to update the current image.
6) Then we are applying the median filter for noise suppression.
7) Using Morphological functions we track object. If the background image and current image is similar means no moving object detected or moving object detected. For more than one object we use different outbox of different colors to track them.

V. IMPLEMENTATION

Technical Requirement
Software Requirements Platform: Windows 7
Programming Language: MATLAB Version 7.9.0.529 (R2009b)
Hardware Requirements: Main processor: Intel Core i3 processor 2.30GHz.
RAM: 4 GB Hard Disk: 160 GB

VI. RESULT

The video under consideration is a very good quality video of duration 14 seconds and memory size 21.7MB. The camera remains stationary and hence the area covered by the camera remains constant. The video consists of 5 persons with moderate walking speed. The tracking result and histogram representation of a frame of video is as shown in figure 2.

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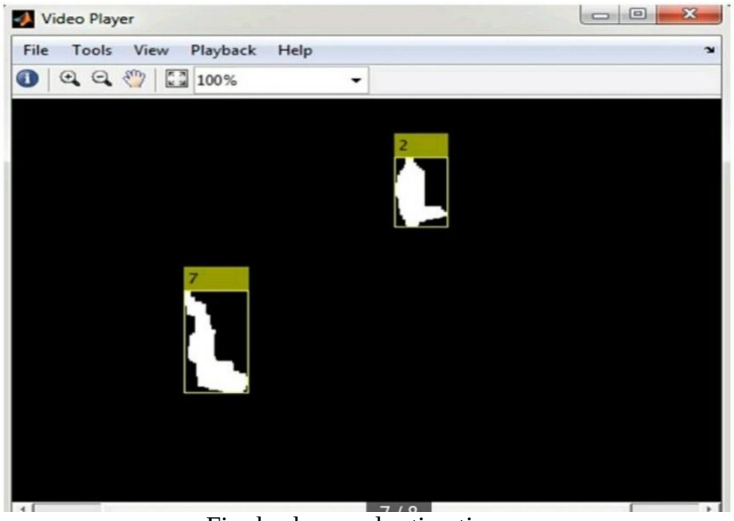

Fig: background estimation.

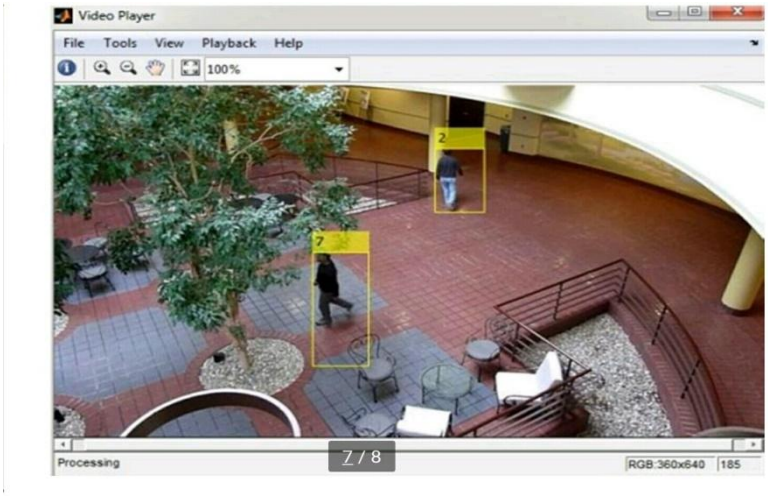

Fig2: tracking of human.

VII. CONCLUSION AND FUTURE SCOPE

The proposed work gives a simple and stable solution for Multiple Human Tracking. Although there are numerous works done on the subject, the proposed work stands unique with its ability of providing excellent results for various kinds of videos considered. The combination of blob extraction with Kalman filtering gives effective results with less number of false detections. The advantages of the proposed work are simple algorithm, easy to implement, less complicated, can detect human beings in crowd and track them, sudden movements of humans do not affect system performance, only human movements are tracked ignoring the movements of any other objects in the video. Even though the proposed work gives good results with many advantages, many improvements can be done. Future works can aim to identify false tracks of shadows and reflections and ignore them and thus reduce the rate of false detections. There is scope to work on developing an algorithm which can provide successful tracking of humans in moving camera videos.

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