

Detection and Tracking of Moving Object using Python

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Abstract: These days video analysis find many application in security and tracking system. This paper shows method to track moving object in live streaming video and displays the motion is detected or not on command window. Frame differencing and contour tracking are the methods used for implementing this system. Moving object is detected by calculating continuous frame difference. To track the moving object contours are formed then notification will be send.

Keywords: Motion, tracking, Python, Video analysis

1. Introduction

Now a day's video content analysis plays important role in video security system. It takes lots of time to analyze each and every video regularly. For proper video security system, customer used multiple camera. So every camera captures the video regularly. And many people require analyzing and monitoring the video. It is not intelligent system. Because humans eye is capable to capture only 15% information.

This system demonstrates the effective and powerful way of detecting motion. In this system first moving object is detected then track that detected object and finally notification is send to the concerned person. Notification may be in any form like email, message, siren alarm etc.

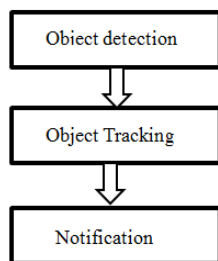


Fig. 1. Flow of the system

1. Object Detection: Moving object detection is first step in this system. This task is done by various methods like frame difference, background subtraction and optical flow method etc.
2. Object tracking: This step is all about tracking the moving object. Sometimes object is track by its features like shape, color, size etc. But in this project we are going to track all moving object irrespective of their features. So we are going to use Contour tracking algorithm.

3. Notification: When moving object is detected the notification will be send to the respected person. Sometimes video will be store where movement happened so that later it will be helpful.

2. Literature Survey

Nishu single [1] demonstrate the system in which motion is detected for making security system more sensible. Frame differencing is used to detect motion in live video, then difference is calculated and finally filter is applied to remove noise.

Improvised background subtraction [2] is very useful for detection motion from unstable background. Color difference histogram (CDH) makes possible to detect moving object from movable backgrounds like varying illumination, frames with camouflage, on-stationary background etc. This will be more accurate by using fuzzy c-mean clustering.

Four different detectors are compared and final result will be generated by using improved algorithm in Ching Yee Yong et. Al. [3]. They used frame difference of two types. First is difference between current frame and previous frame. Second is difference between current frame and first frame.

Wei Shuigen [4] makes the system, in which temporal frame differencing is taken of two gray scale frames. For removing noise low pass filter is used. Next is optical flow field is calculated with the help of Horn's algorithm.

3. System Development

One of the common methods used for developing moving object detection system is frame difference. As background subtraction method requires more time to compute background. It is only efficient for stable background. Next optical flow method require more time to computation. Frame differencing is one of the easiest methods among all three methods.

A. Frame difference of two consecutive frames:

Let N_i is the current frame and N_{i-1} is the previous frame, the absolute difference between these two frames is given by N_D shown below,

$$N_D = |N_{i-1} - N_i| \quad (1)$$

B. Conversion of difference into gray scale

Contour is nothing but edges of detected motion. It is not closed loop. So to minimize the holes in detected motion colored image converted into gray.

C. Binary threshold

Segmentation of detected image is takes place i.e. the motion pixels separate out from static pixels. Depending of environmental condition or requirements threshold value is set. If pixel value goes below threshold value white pixel assigned otherwise black pixels were kept.

D. Filtering

It is process to remove unwanted contours. Gaussian filter is used to remove the holes in output window [5].

E. Contour tracking

When motion is detected, contour of that motion is computed. To track the moving object one rectangular box is drawn around the moving object.

4. Experimental result

Results of the system are shown by various windows are as follows:

1. When there is no motion in video: If video shows stable background then difference between two back to back frame shows zero. As no pixel intensities will be changed it shows black window.



Fig. 2. (a)Previous frame (b) Current frame (c) Absolute Difference (d) Tracking

2. When there is motion in video: If some pixel intensities will change due to motion in video it will show some white pixel. Absolute difference never zero for moving video frames.



Fig. 3. (a) Previous frame (b) Current frame (c) Absolute Difference (d) Tracking

3. Command window: Output on command window shown below. It will print the status of moving object. If object is in motion it will print contour area as well.

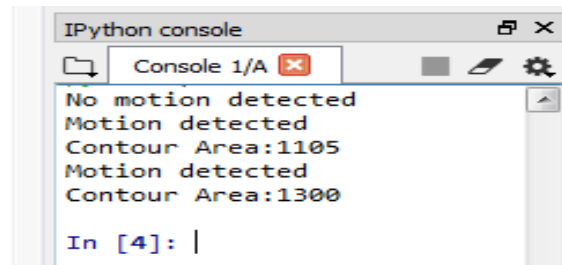


Fig. 3. Output Console

5. Conclusion

This system finds application in many security systems. Frame differencing is the effective algorithm for detecting motion in live video. It is simple and cheap method as it computes absolute difference between two consecutive frames, no information will be lost.

References

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