A Review for An approach Object Detection and Object Tracking using Background Subtraction

[1]Divya N. Lad, [2]Tejal Patel

Department of Computer Science & Engineering
Parul Institute of Engineering &Technology, Waghodia, Vadodara

ABSTRACT: **Now-a-days computer become more pervasive in society. Till now human can interact with computer using some input devices like keyboard, mouse etc. and some technologies like GUI, Command line interface, Touch user interface etc. Object tracking allows user to interact non-static background from different environment. In this work, perform object detection and tracking using the filter method which can properly extract feature for detecting object and analyze the role of moving object to increasing illumination for detection object performed by user. Usually, the video based object tracking deal with non-stationary image stream that changes over time. Robust and Real time moving object tracking is a problematic issue in computer vision research area. Multiple object tracking has many practical applications in scene analysis for automated surveillance. Our comprehensive experiments on real as well as for multiple moving object show that our techniques are effective and provide moderate result for complicated tracking problems.**

KEYWORDS: **Image processing, object detection, object tracking, background subtraction**

INTRODUCTION

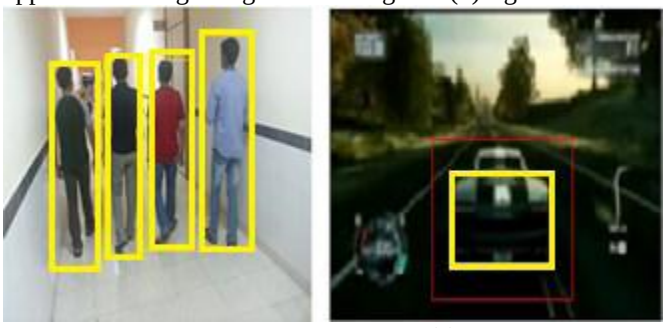
Image processing is processing of images using mathematical operations by using any form of signal processing for which the input is an image, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. Image Processing is a technique to enhance raw images received from cameras/sensors placed on satellites, space probes and aircrafts or pictures taken in normal day-to-day life for various applications.

The goal of object detection is to detect all instances of objects from a known class, such as people, cars or faces in an image. Typically only a small number of instances of the object are present in the image, but there is a very large number of possible locations and scales at which they can occur and that need to somehow be explored. Object detection involves identifying whether a known object is in a scene and, if so, determining the location of the object detection in images and videos is important in a wide range of applications that intersect with many aspects of our lives: surveillance system and airport security, automatic driving and driver's assistance system in high-end cars, human-robot interaction and immersive and people-finding for military application [1].

Object detection is to identify objects of interest in the video sequence and to cluster pixels of these objects. Object detection involves identifying whether a known object is in a scene and, if so, determining the location of the object [5].

Object tracking means identifying and following same object in sequences of video frames. Camera is used as input sensor to acquire frames to form the video. The object of interest once detected and recognized can be easily tracked. Tracking involves tracing path followed by the object of interest. Real tracking is achieved using simple and fast motion detection method based on frame substation. Object tracking is defined as the process of finding an object of interest in the video by keeping track of its motion, orientation, and occlusion, etc. to get the useful information [5].

Tracking can be defined as the problem of approximating the path of an object in the image plane as it moves around a scene. The purpose of an object tracking is to generate the route for an object above time by finding its position in every single frame of the video. Object is tracked for object extraction, object recognition, detection and tracking, and decisions about activities [3]. Object to be tracked depends on application. People may be targeted in various area such as buildings, corporate offices, airports, railway stations, market places, public places for surveillance as shown in figure 1(a) left. Target may be a moving car in an application like gaming shown in figure 1(b) right [1].



(a) (b)

Figure 1 Examples of targets for video tracking: (a) people, (b) moving car

Tracking becomes difficult for target object due to is change in the appearance when projected on image plane (pose change) showing in figure 2(a) left. Target oject get

occluded by the other objects such as bridge, wall, etc. shown in figure 2(b) right [1].

(a)

(b)

Figure 2 Example for (a) Pose change of girl, (b) Object Occlusion

RELATED WORK

(1) Tracking Learning & Detection (TLD)

Tracking Learning & Detection (TLD) framework for video tracking was proposed by Kalal [1]. There are a number of challenges that have to be addressed in order to get a more reliable tracking system. TLD framework has a problem with respect to articulated objects such as pedestrians. In case of restricted scenarios, e.g., static camera, an interesting extension of TLD would be to include background subtraction in order to improve the tracking capabilities [1].

(2) Frame difference

The presence of moving objects is determined by calculating the difference between two consecutive images. Its calculation is simple and easy to implement. For a variety of dynamic environments, it has a strong adaptability, but it is generally difficult to obtain complete outline of moving object, responsible to appear the empty phenomenon, as a result the detection of moving object is not accurate [4].

(3) Background subtraction

First step for background subtraction is background modeling. It is the core of background subtraction algorithm. Background Modeling must sensitive enough to recognize moving objects. Background Modeling is to yield reference model. This reference model is used in background subtraction in which each video sequence is compared against the reference model to determine possible Variation. The variations between current video frames to that of the reference frame in terms of pixels signify existence of moving objects. Currently, mean filter and median filter are widely used to realize background modeling. The background subtraction method is to use the difference method of the current image and background image to detect moving objects, with simple algorithm. Background subtraction technique is used for motion segmentation in static technique is used for motion segmentation in static scenes. It detects moving regions by subtracting the current image pixel-by-pixel from a reference background image that is created by averaging images over time in initialization period [1]. Background subtraction is widely-used concept utilized to detect moving object in videos taken from a static camera [4].

(4) Mean-shift tracking

Mean-shift tracking tries to find the area of a video frame that is locally most similar to a previously initialized model. The image region to be tracked is represented by a histogram. A gradient ascent procedure is used to move the tracker to the location that maximizes a similarity score between the model and the current image region. In object tracking algorithms target representation is mainly rectangular or elliptical region. It contain target model and target candidate. To characterize the target color histogram is chosen. Target model is generally represented by its probability density function. Target model is regularized by spatial masking with an asymmetric kernel [6].

(5) Distance metric Learning (DML)

Distance Metric Learning (DML) in combination with Nearest Neighbor (NN) classification for object tracking. Initially a video file is read and the frames in the video are accessed individually. The object in that video is first detected using canny edge detector. We assume that the previous appearances of the object and the background are clustered so that a nearest neighbor classifier can be used to distinguish between the new appearance of the object and the appearance of the background. Using Nearest Neighbor classifier it is able to distinguish the object from other objects. The process is repeated for all the frames. Then the object is tracked using the Distance Metric Learning algorithm using normalized correlation between the frames. The human appearance model is identified using the Blob detector which uses the skin color to identify the object. Then the bounding box is fixed for the object in that frame. Then the video is reconstructed with the processed frames. Feature extraction is done using Region Props which threshold the image and extract the features. Measure the gray level co-occurrence matrix and match the best similar one.

APPLICATION OF OBJECT DETECTION & OBJECT TRACKING

1) Motion based recognition: - Human identification based on gait, automatic object detection, etc.

2) Automated surveillance: - Monitoring a scene to detect activities or unlikely events.

3) Human computer interaction: - gesture recognition, eye gaze tracking for data input to computer, etc.

4) Traffic monitoring: - Real-time gathering of traffic statistics to direct traffic flow.

5) Vehicle navigation: - video-based path planning and obstacle avoidance capabilities

CONCLUSION

In existing work, combination of PN learning and PCA method is used for single object tracking and detection. Its gives more accuracy than other existing method like camshaft, template matching. But it fails in multiple object tracking, learning and detection in term of more computing time required. For solving this kind of problem by using improved algorithm or different filter technique like particle and notch filter, which works better for detection in multiple objects. With increasing of real time object detection. Future work will focus on the particular tracking methods to apply to video captured from a freely moving camera.

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