A Survey on Moving Object Recognition using Video Analytics

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Abstract— the process of recognizing of moving object is considered as a difficult task in the image processing .Moving Object recognition is an important task of computer vision because it is inclusion of the success of certain applications in computer vision. A number of algorithm and system has been put forward but still a challenging task because of illumination changes, background sub traction & occlusion. This survey paper formally introduces a different technique in the field of computer vision &moving object recognition. Mainly in this paper a review and study of the various procedure of object detection.

In this paper we discussed about the background subtraction, object tracker SURF algorithm and analytical methods to recognize the moving object .we also compare the perfection and limitation of these methods.

Keywords— Security, Background subtraction, classification tracking, Object recognition.

I. INTRODUCTION

Recognition and detection are the two parts of moving object recognition. The goal of object recognition is to categorize an object into several predefined category based on different features. Object detection is the first step in the process which gives information about background and foreground object.since the detection of object only determine the object but to verify and validate the object we need to do the recognizing the object based on feature extraction. In earlier time video data need to be compressed for video surveillance but now we just convert the video to images to detect the specified object. [6]In many part of the background subtraction methods, the object recognition are persuaded by the background information which leads to false detection. Further, an effective classifier is required to segregate the target in cluttered environments Recent approach in computer vision has significantly reduced the difficulty of object classification and recognition. Robust feature detector and descriptor algorithms are particularly useful, forming the basis for much recognition and classification applications. In the expected method, 2D(DCT) discrete cosine transform used for video compression because of its highest energy compacting and to achieve less storage requirements. SURF descriptors algorithm (speed up robust feature) is used to detect and recognizing the objects, people or faces, to reconstruct the 3D scenes, to track object and to extract the area of interest. The algorithm has its three main sections: (1) interest point detection, (2) local neighborhood description and (3) matching. [7]The main idea of the expected stabilization algorithm is to first determine the affine image transformations between all neighboring frames of the video by using a Random Sampling and Consensus (RANSAC) method applied to point correspondences between two images and consider the inlier points and reject the outlier points. Then the video frames are enfold to achieve a equalize video. In this survey paper we presented distinct approaches of recognizing object using different method such as background subtraction, temporal differencing, optical flow, point detector. and we will try to analyze the data using RANSAC and SURF descriptor algorithm to get accurate results. The feasibility of discovering new technology for recognition and feature extraction . The paper is arranged as follow: Section II covers issues and challenges facing in object recognition Section III presenting the object recognition analysis. Section IV presenting the related work, and finally, we conclude in section V with acknowledgement.

II. ISSUES&CHALLENGES

A. Coloring:
It is difficult to recognize the pixel of same color of same object and it possibly that same color different object is also available and RGB Extraction possibly for same color different object will captured. Considering [1] RGB-D sensor brings more robust results.

B. Position:
The location of object will change from place to place so if filter matching is used, system must handle such image accurately.

C. Rotation:
The object some-time rotate and difficult to recognize the object as not matching to save image so the orientation of object may not affect the recognition of object.

D. Lighting:
The lighting condition may differ when the object image get captured. But the system must recognize the object for eg: human eye easily determine the cat in dark light as well as in day light.

E. Occlusion
The condition when the object in image is not completely visible. [3] The result is regarded fully correct if the occluded part is entirely same or partially correct if one or two part is correctly predicted.

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F. Scaling

Changing in the size of object may not affect the definitude of the object recognition system. Above stated are some issues and challenges arise during object recognition.

III OBJECT RECOGNITION USING ANALYSIS

Moving object detection and recognition are playing decisive role in computer vision operation, such as video surveillance and autonomous robot routing. Object detection is to identify an interested object in video frame and it needed before we proceed to recognizing the object is to intend to locate target object in video sequence. The analytical algorithm has chosen to extract good accuracy for object recognition.Boosted tree classifier, Random forest classifier, Decision tree classifier, Logistic regression classifier. In Random forest classifier it has been observed that over fitting for some dataset with noisy classifier. Logistic regression is a robust to small noisy data but it doesn't perform well when the space is too large. Decision tree classifier is able to handle non-direct feature data but giving no ranking score as results. Boosted tree classifiers have an impressive model for predictive analysis and it has many tuning parameters to extract better accuracy like max_iteration: control the number of tree in final, max_depth: prevent over fitting. So among this algorithm boosted tree classifier will increase the accuracy to get better results. Few methods of moving object recognition are described as follow:

A.   Background subtraction
[10]It is particularly a used technique for detecting an object in images. It will detect the moving region by deducting the current image pixel by pixel from mentioned background image, the pixel undergoing change are marked as a moving object and reserve for later processing .this action is called as a background subtraction. Gaussian mixture and approximate median method used to check the certainty and time efficiency. This method is simple and exactly extracts the characteristic of target data but it is delicate to change of exterior environment.

B. *Optical Flow*
[8] Optical flow involves in calculating the image's optical flow field and doing cumulate process according to the optical flow distribution characteristic of images. Recovering image gesture at each pixel from spatial-temporal image is careful possible motion will be caused by changes in lighting without any actual motion. As lucas-kanade feature tracker works better for texture pixel, operation can be done in one frame at a time. This is not appropriate for real time detecting an object and recognizing an object.

C. *Frame differencing*
[10] The straightforward form of background subtraction. In this method the existence of moving object is finding out by evaluating the difference between two successive images. It has a strong adaptability for a range of dynamic environment, but it is also showing an error in obtaining outlines of moving object, which is responsible for the hollow phenomenon and the accuracy of detection of moving object is very low.

D. *Temporal differencing*
[6] In this the moving region is detected by taking pixel by pixel differencing of successive frame in a video sequel. It is most common method for recognizing moving object where the camera is also moving. Moving object is recognized by taking the difference of successive frame t-1 and t. Yet the motion of camera and motion of object are mixed in moving camera. Therefore in some technique motion of camera is estimated first.

(a) Present frame (PF)   (b) previous frame (prev)   (c) result=PF-prev

A two frame difference method is presented by Lipton where the pixels that delight the following equation are mark as foreground subtraction.

$$|I_t (x, y)\ I_{t-1} (x, y)| > th$$

Collins developed a hybrid method that combine three frame differencing with an adaptive background subtraction model. The hybrid algorithm divides the moving region in video without the defects of temporal differencing and background subtraction.

E. *Point Detector*
Point detector is used for finding some effective points in image which have a thoughtful texture in their respective localities a useful interest point is one which is invariant to change in lighting and camera viewpoint. KLT detector [6] the Kanade Lucas Tomasi on an iterative image registration technique that makes a use of spatial intensity gradients to guide the search towards the best match.

IV. RELATED WORK
Many studies have been organized on detecting moving object and recognize the moving object. We proposed computation of object recognition using a video data which is being converted to image and the feature extraction and matching the interest point of images with the database images and using analytics to show that which feature algorithm is giving the best results.
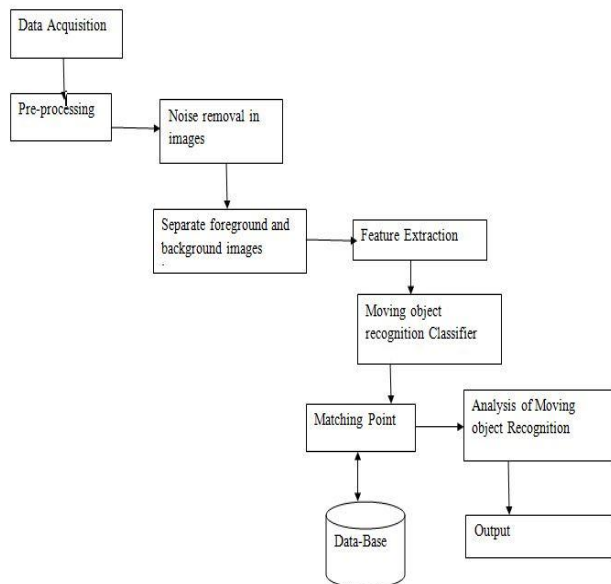
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Fig 1: Flowchart of proposed Method.

1) *Data acquisition*

Data acquisition is an essential step in recognition of moving object. The quality of images should be good in size and pixel.

2) *Pre-processing*

The objective of preprocessing is an improvement of the image data that conquer unwanted distortion or enhancing some images features important for further processing.

3) *Noise removal in images*

Images are disposed to variety of types of noise, using linear filtering, and Gaussian filter for removing grain noise from the images. Median filter is also able to remove outlier without minimizing the sharpness of images.

4) *Separate foreground and background*

Splitting the image in two parts foreground image and background image using optical flow and thresholding algorithm is suitable for segmentation of object if the image is less noisy as already noise reduction is done in previous step it will give clear intensity level variation in foreground and background.

5) *Feature Extraction*

Feature extraction is a type of measurable reduction that efficiently represents interesting part of an image as a compact feature vector. This correspondence is useful when the size of image is large and reduced feature representation is required to quickly complete the task functioning as image matching.

6) *Moving object recognition classifier*

Adapting an analytical motion detection and Fourier descriptor for shape based moving object recognition. Feature vector to describe the shape of object. A hybrid classification system can be used to recognize the moving object based on motion and appearance feature simultaneously.

7) *Matching point*

To establish a matching between features of two comparable images a relational graph is built. Matching point based on three principles: exclusion: that is one feature that can only be

matched with a single feature in other frame and delete the ambiguous matches, proximity and rigidity.

8) *Analysis of moving object recognition*

Analyzing the moving object through several algorithm and classifier Boosted tree classifier, Decision tree classifier, random forest classifier, logistic regression classifier and in all boosted tree classifier will give high accuracy of recognizing the moving object.

V CONCLUSION

In this survey paper all the main technology of object recognition has been addressed. These includes object detection methods, feature extraction, object classification using classifier. Most commonly used and well organized methods for these have been explained in details. Different method of object recognition like background subtraction, optical flow, temporal differencing, point flow, frame differencing .Most commonly used method is background subtraction. Classification of objects is one of the most important parts of object recognition system. Among the many methods most of the researcher prefers color based and texture based classification. Advance study may often a part of to find the efficient algorithm to decrease the time required for recognizing the object and to reduce the computational cost for variety of video containing different characteristic and to increase more accuracy rate.

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