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ANALYSIS OF COLOUR DETECTION OF OBJECT WITH BACKGROUND SUBTRACTION IN OBJECT TRACKING

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Abstract - Tracking and detecting of object is most important and use for motion detection of various objects on a given video or an image. The applications of object detection and tracking are farming, military, transportation, civil, security and commercial use. Some methods commonly use in it are background subtraction, Frame difference, template matching and shape based methods. In this paper different methods and algorithms are discussed for object tracking and detection and their merits and drawbacks.

***Index Terms*— object tracking, frame detection, Kalman filter, mean shift algorithm.**

I. INTRODUCTION

Object tracking in video file is a popular topic in the field of computer vision and various fields. Object tracking aims at deriving the trajectory over time of moving object in video sequences [1]. Object tracking has various applications in the areas like security, surveillance, clinical applications, education, entertainment, biomechanical applications, human robot interaction etc. There are two key steps in object tracking process:

- Object detection: detection of an object in a given scenario.
- Object tracking: frame by frame tracking of object.

Tracking of objects is very complex in nature due to several problems. Following difficulties come during object tracking:

- The object's shape and size may vary from frame to frame.
- Partial and full object occlusion.
- Presence of noise and blur in video.
- Luminance and intensity changes.
- Object's abrupt motion.

To perform tracking in video sequences, an algorithm analyses sequential video frames and outputs the movement of target between the frames. Many tracking algorithms have been proposed so far. These object tracking methods are classified according to their tracking behavior.

1.1. Classification is based on

- What kind of feature is to be extracted from an image?
- How should we represent the motion, appearance, and shape of the object?

In the following literature review various moving object tracking techniques are broadly classified which provide inclusive descriptions of the illustrative methods in each classification.

1.2. Features for Object Tracking

Selecting the accurate feature play a critical part in the tracking. Feature selection is strictly associated to the object representation. For instance, color is used as a feature for Histogram based appearance representations, whereas for contour-based representation object edges are usually used as features. In general, many tracking algorithms use combinations of these features. Common visual features are described below.

1.2.1. Color:
All video frame formats are based on different color spaces model. The data of different frame can be stored in dissimilar color spaces ranging from gray scale, RGB, YCbCr and HSB (hue, saturation, value) color spaces. The data is stored in each frame is the brightness in each spectral band. Color images are denoted as red(R), green (G) and blue (B) layers or RGB. Other distinctive color spaces used in the area of object tracking are Y c b Cr and HSV [7].

1.2.2. Edges:
Object boundaries generate strong changes in image intensities. These changes are identified by Edge Detection. A key Property of edges is that they are less sensitive to illumination changes compared to color features. Most of the algorithms use edge as the main agent in object tracking.

1.2.3. Texture:
Texture gives the intensity difference of a surface which helps in measuring properties such as smoothness and regularity. On comparing with color space model, texture requires a processing step. On basis of color, the texture features are less sensitive to illumination changes as same as to edge features.

1.2.4. Optical flow:
Optical flow is a heavy field of displacement vectors which defines the translation of each pixel in a region. Optical flow is commonly used

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as a characteristic in motion-based segmentation and tracking applications.

1.3. Categories of Object tracking

The goal of a moving object tracking is to create the path for an object above time by finding its position in every single frame of the video. The job of detecting the object and creating correspondence between the object occurrences through frames can either be accomplished separately or jointly. In the first stage, Region of interest (ROI) in each frame is achieved by means of an object detection algorithm, and then tracking corresponds to objects across frames. In final stage, the object region is projected by iteratively updating object location obtained from previous frames [2]. Few Object Tracking methods have been categorized below.

II. LITERATURE REVIEW

Automated Surveillance system finds a very crucial role in the field of security. Moving object can be tracked with the use of surveillance system in lucid ways. The detection is started by tracking the object moving objects in the video .The detected object will be tracked in the next phase. In this paper, moving object has been detected by the simple background subtraction and Kalman filter used to track the single moving object. Standard surveillance video datasets have been achieved successfully by absorbing algorithm. Static Camera are used for capturing the images for the testing which are placed inside as well as outside having complex environment .In this paper, a visual surveillance system with moving object detection and tracking capability has been presented. Hitesh A Patel [1] has done object tracking of any single moving object has been successfully implemented on standard surveillance dataset using Kalman filter. The system works on videos of indoor as well as outdoor environment taken using static camera under moderate to complex background condition. This implemented module can be applied to any computer vision application for moving object detection and tracking has used Kalman filter to track single object.

Moving Object is tracked in video synchronously using camera. The main purpose of the video tracking is to detect a targeted object in different video frames. The main difficulty was rise up in this video tracking is that the motion of the targeted object is fast as compared to the frame rate and another difficulty is raised due to the changing its orientation over time. So these generated complexities due to fast moving object are tracked and detected by the algorithm , Real time moving object in different frames of video are tracked. In this paper Shubham Srivastava [2] has proposed an algorithm to track the real-time objects on the basis of region properties such as Centroid, Bounding box, etc, using the colour property of the object as a feature. In the context, Median filtering is a non-linear operation often used in image processing to reduce noise during the real-time object tracking. A median filtering is more effective than convolution when the goal is to simultaneously reduce noise and preserve edges. May the contents discussed in this paper can give valuable insight into this important research topic and encourage new research.

Individual frames are used to track and detect the multiple objects. Such an approach can be made very robust to the occasional detection failure: If a moving object is not captured in frame but is in previous and following ones, a correct trajectory will nevertheless be produced. By contrast, false-positive detection in a few frames will be ignored. However, when we deal with multiple object tracking it raise up the complexities in sequence due to overlapping of images, the sequence process results in a difficult optimization problem in the space of all possible images of trajectories. This deal with the dynamic programming, which can easily miss the global optimum. In this paper, Jer´ ome Berclaz [3] has shown that reformulating that process as a constrained flow for the optimized results in a convex problem. Advantage of this particular structure to solve the fast moving object with the K-shortest path algorithm.

Combining foreground an image from multiple views by projecting them onto a common ground-plane has been recently applied within many multi-object tracking approaches. These planar projections introduce severe artifacts and constrain most approaches to objects moving on a common 2D ground-plane. To overcome these limitations, we introduce the concept of an occupancy volume – exploiting the full geometry and the objects' center of mass – and develop an efficient algorithm for 3D object tracking. Individual objects are tracked using the local mass density scores within a particle filter based approach, constrained by a Voronoi partitioning between nearby trackers. Our method benefits from the geometric knowledge given by the occupancy volume to robustly extract features and train classifiers on-demand, when volumetric information becomes unreliable. We evaluate our approach on several challenging real-world scenarios including the public APIDIS dataset. Experimental evaluations demonstrate significant improvements compared to state-of-theart methods, while achieving real-time performance. Horst Possegger [4] proposed a real-time capable multi-object tracking approach based on local mass densities of visual hull reconstructions. In contrast to existing tracking approaches for calibrated camera networks with partially overlapping views, we are not constrained by the common ground-plane assumption and additionally reduce artifacts rising from noisy foreground masks. In particular, individual objects are tracked using the local mass density scores within a particle filter framework, constraining nearby trackers by a Voronoi partitioning. Furthermore, we continuously exploit the reconstructed 3D information to robustly extract features on-line. These features are used to train discriminative classifiers in situations where pure geometric information becomes unreliable. To demonstrate the bene- fits of our proposed approach, we generated several challenging datasets and additionally evaluated our approach on the publicly available APIDIS basketball dataset. In both cases, state-of-the-art methods can be outperformed in terms of precision and accuracy, as well as runtime. Future work will concentrate on extracting different features to allow for more robust handling of objects with similar appearance (e.g., relevant for APIDIS).

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To track the vehicle there are many ways but more important need is visualization which is depend on resolution which is very much low in our traffic camera this generate the difficulties to track the object for the clear visualization, this problem successively generate when two similar objects are moving simultaneously. In this paper many ways are discussed for detecting the multiple objects, where the objects are vehicles. Many vehicles are varies and unknown. Kalman filters are used for tracking and detection of all moving objects, color feature and distance of it from one frame to the next. So this method is used to differentiate all vehicles individually. This algorithm is used for tracking and detecting the all the moving objects. Amir Salarpour [5] In this paper we presented a tracking method for processing video data in order to perform tracking by a machine vision system. The objective of the presented approach is to minimize the time, and use the feature of vehicles for the best tracking. The outcome of our approach is the acquisition of route related data such as travel times and tracing of traffic streams, which can highly increase the efficiency of traffic control systems. This method is combined of two categories of algorithms. Region based and feature based. First we use displacement of vehicle for predict the position of it in the next frame, then we use two features of vehicle, color and size to make correspondence. The proposed algorithm can deal with the tracking problem such as appearance, disappearance and occlusion. It can work in clutter scene and the results are satisfactory.

Amr El Maghraby [6] discuss about the problems of multiple moving detection and tracking people in streaming video. Tracking and Detection are always used for different task and future research in Human Computer Interaction (HCI). This object tracking and detecting for multiple people in video streaming are so much time consuming processes because of the amount of the video data is more due to illumination changes, different backgrounds and occlusions that comes people change the position with time. This study gives an idea for developing automated system and its objective is to Detecting and tracking multiple people in video streaming, by analysis of sequential video frames based on hybrid detection algorithm, and tracking and detection is also based on the structure of human body. This automated system is used for testing the data number of times in experiment in human computer and to identify it. Clustering is used for identifying the data. A.Maghraby [7] researcher was using the mean shift algorithm and applied a pattern for recognition the object. “Meanshift” is a pattern matching algorithm with no parameter estimation, and can be easily combining with other object tracking algorithms. It is using the kernel function histogram model for objecting. M.Abdalla,[8] researcher was using “Mean Shift” algorithm for object tracking. But the mean shift algorithm can’t capable to updating the object model in the detection of object tracking, which was result in inaccurate and non correct scale locating and object losing while object's scale varies obviously.

HOSTETLER L D [9]focused on developing full automatic face detection to locate eyes, mouth, nose and suratip in an image with typical and uncertain backgrounds, and covering the detection tasks, landmark localization and measure facial part physical location with the help of different technologies and algorithms. Comaneci D; Meer P, [10]researcher using Hybrid Face Detection System using Combination of Viola - Jones Method and Skin Detection for object was tracking. Main aim of this paper to increase the performance of face detection systems in terms of improving the face detection speed and avoiding or decreasing false positive rate in still images with typical and uncertain background . This algorithm based on 3 types of hybrid detector. The primary hybrid detector use Viola Jones upper body model for high probability of searching face in complex background. In order to find a correct and clear face in complex background, Viola-Jones face detector was using as a secondary detector to improve accuracy and reduces false negatives. Third detector pixel based, this detector using for skin detection which is applied on the upper body region of interest. This detector can’t detect face using the secondary detector. The third detector specifies each pixel as skin or non-skin individually.

III. PROBLEM FORMULATION

Tracking of multiple moving objects is needed in real time environment. The complete system with capabilities of detection and tracking can be used for applications domain like security, human computer interaction, scene analysis and activity recognition, event detection in real time.[1]

Significant progress has been made in object tracking during the last few years. Several robust trackers have been developed which can track objects in real-time in simple scenarios. However it is clear that the assumptions used to make the tracking problem tractable, for example smoothness of motion, minimal amount of occlusions, illumination constancy, high contrast with respect to background etc

Thus in real time object tracking the tracking and associated problems of feature selection, object representation, dynamic shape and motion estimation are very active areas of research and new solutions are continuously being proposed.[2]

Few more difficulties which are raised due to multiple moving object are same color , shape ,density ,path , single framing for all moving objects. So to overcome these difficulties mean shift algorithm is being used.

IV. DIFFERENT METHODS AND ALGORITHMS FOR OBJECT TRACKING

3.1. Methods During Our literature review we study the basic method for the Object Detection and tracking, all that methodologies are describe bellow:

3.1.1. Background Subtraction Method

A very widely used method which is simple to implement by just subtracting the current frame from previous frame and obtaining threshold value of difference between given pixel value and obtained pixel value. If threshold value is greater than the given the pixel it is considered as foreground. This and gives false rate detection.

3.1.2. Real Time Background Subtraction and Shadow Detection Technique Theory

This method is published in [2] by Mr. Deep joy Das and Dr. Sarat Saharia, it describes two type of distortion namely brightness distortion and chromaticity distortion based on RGB values of pixels in given image. This method is accurate up to some extends as it also detect the shadow part of object.

3.1.3. Template Matching

Template Matching is probably the best method for some specific environment. It's the most accurate although sometimes there is lack of originality in object detected. Object can be detected for one specific video using a template cropped from the video. However, there is no guaranteed accuracy because all that is known is the best match for each frame; no scanning is done on the percentage template matches the frame. It only works if the object is always in the video, otherwise it will create a false detects.

3.1.4. Shape Based

Shape based method is used to detect objects in real-world images. The shape features are more striking as compared to local features like SIFT because most object categories are better described by their shape then texture, such as cows, horses and cups and also for wiry objects like bikes, chair or ladders, local features contain large amount of background noise. Thus shape features are often used as a replacement to local features.

3.2. Difficulties in Object Recognition under Varied Circumstances

All these methods have some feature and limitation in certain circumstances which are defined as follows:

Lightning:

Light differs in many circumstances low light adds darkness in image while more light adds shadow of object. [8]

Positioning:

As stated above in 3.1.3 template matching needs uniform position or else it is unable to detect object even if it is present in image. [8]

Rotation:

Image can be rotated in any direction. In this case some shapes are unable to be identified if shape matching method is used. [8]

Occlusion:

Object behind the object is sometimes not completely visible so it cannot be detected and useful part can be ignored. [8]

V. CONCLUSION

The discrete Kalman Filter is described for the purpose of the object tracking and mean shift algorithm is used for segmentation problem along with its implementation in C#. Using the color property of the object as a feature in real time environment using web cam.The source and sample code are the part of Accord.NET Extensions Framework, a framework that brings many advanced algorithms primarily for image processing, object detection and tracking, all packed as fluent extensions and simple and intuitive generics, so do not forget to take a peek.

REFERENCES

[1] Hitesh A Patel1, Darshak G Thakore2Tracking of Moving Object Using Kalman Filter, International Journal of Computer Applications, Issue. 4, April 2013

[2] Shubham Srivastava, Pratibha Singh has done Real-Time Object Tracking Using Colour Feature, International Journal of Innovative Technology and Exploring Engineering (IJITEE), Volume-3, Issue-8, January 2014

[3] Jerome Berclaz, Franc¸ois Fleuret, Engin T¨uretken, and Pascal Fua, Senior Member, IEEE, Multiple Object Tracking using K-Shortest Paths Optimization.

[4]RobustReal-Time Tracking of MultipleObjects by Volumetric Mass Densities. Horst Possegger Sabine Sternig Thomas Mauthner Peter M. Roth Horst Bischof , Institute for Computer Graphics and Vision, Graz University of Technology.

[5] Amir Salarpour1and Arezoo Salarpour2and Mahmoud Fathi2and MirHossein Dezfoulian1, Vehicle Tracking Using Kalman filter and feature, An International Journal (SIPIJ) Vol.2, No.2, June 2011

[6]Amr El Maghraby , Mahmoud Abdulla , Detecting and Tracking of Multiple People in Video based on Hybrid Detection and Human Anatomy Body Proportion ,International Journal of Computer Applications (0975 – 8887) Volume 109 – No. 17, January 2015

[7] A.Maghraby M.Abdalla O.Enany,Hybrid Face Detection System using Combination of Viola - Jones Method and Skin Detection, International Journal of Computer Applications , May 2013

[8] A.Maghraby M.Abdalla O.Enany, Detect and analyze face parts information using Viola-Jones and Geometric approaches, IJCA September 2014

[9]FUKUNAGA K; HOSTETLER L D. The estimation of the gradient of a density function, with applications in pattern recognition, IEEE Transaction on Information Theory [J].

[10] Comaneci D; Meer P. Mean shift analysis and applications. IEEE Int. Conf. on Computer Vision[C].