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A Survey on Different Approaches for Motion Based Object Tracking

Gunjan Gujarathi[1], Smt. S. M. Patil[2]
Research Student[1], Assistant Professor[2],
Department of Electronics &Telecommunication,
Government College of Engineering,
NMU, NH-6, Jalgaon,
Maharashtra-India

ABSTRACT
Object detection and tracking is generally performed in higher-level applications that require the location and/or shape of the object in every frame. In the last 15 years many different methods have been proposed over by many researches. In this paper we give a brief survey including few published approaches related to scene detection in videos and object tracking. So these is classify them according to their methods or base and try to make first scene detection in videos approaches and then applying to useful algorithm for object detection and tracking. Results of such different approaches can be efficiently useful for researchers to select most suitable method for designing the higher-level applications in proper way. At the end, we have to give future challenges for scene with object tracking and from these we have to design new method that will overcome all the shortcomings for given algorithms. This is a survey paper of object detection and tracking in videos to develop in future a new system to make a successive in all fields of applications.

Keywords:- Scene detection, object tracking, key-frame extraction, object detection.

I. INTRODUCTION

In the recent years the rapid progress in computer technologies there has been an increase in the amount of visual information [1]. This information is generated, stored, accessed, transmitted and analyzed. Video indexing, retrieval and analysis are quite difficult due to this increase in amount of data constantly produced. Video is represented as a sequence of number of following in order of frames each of which a constant time interval. The smallest physical segment of video is shot which is defined as an unbroken sequence of frames.

The visual content of each shot of the video represented by one or more multiple frames called key frames. A scene can be series of related meaning in correlated shots. To extract the characteristics frames and shots on which video queries can be applied [2]. Also efficient detection of scene from an image sequence is useful for designing the applications when different methods can be used according to the scene content. This is our first step towards object detection and tracking, now we have to go for our goal.

Moving object detection and tracking is a key challenge for higher-level applications that is monitoring traffic behavior and video surveillance. These has been extensively studied by researchers in computer vision and the ITS field [14].

Now, many opportunities have opened for the development of richer applications in various areas such as video surveillance, content creation, personal communications, robotics and natural human–machine interaction. One fundamental feature is essential for design applications are to see, understand and react to the environment is their capability to detect and track objects of interest. The process of estimating over time the location of one or more objects using Camera is referred to as object tracking. The rapid improvement both in quality and resolution of imaging sensors, and the dramatic increase in computational power in the past decade have favored the creation of new algorithms and applications using object tracking.

In section II we have to give a survey based on classification for scene detection in videos and object tracking. The algorithms can be classified according to base and type of methods used. Also in section III give a future challenges taken into account for all these algorithms be a helpful in higher-level system design. At the end in section IV to conclude our survey and added the references.

II. RELATED WORK

In the survey of object detection and tracking first we have to consider Key frame extraction in videos. So that scene detection algorithms are analyzed according to the method that how shots are compared sequentially or group-wise and temporal distance functions. The moving object detection and tracking problem is widely studied all around the world.

There are lots of methods and algorithm that detect motion and trace the moving objects some of them describe below. The published approaches are sorted chronologically by the year of publication. The given scene detection approaches are classified mainly into three groups are visual-based, audio-based, and text-based also combination of each other. But we

have to only take visual-based detection so that given published approaches are relying on visual-based.

In today's world towards all are in automatic process so first method towards scene change detection using video database system proposed in [7]. In this automatic segmentation, annotation and indexing of video data was done. They provide taxonomy that classify existing SCD algorithm into three categories full video image based, compressed video based, model based. SCD algorithm uses DC images and DC sequences using that they extract useful information from the video, also measurement of inter-frame difference in that template matching, color histogram are calculated. After the evaluation for the performance of SCD algorithms this only rely on color or intensity information, the information such as caption, motion, camera and object shapes such low level parameter are not extracted.

After that more improving algorithm was developed using unsupervised segmentation and object tracking proposed in [2]. It focusing on the uncompressed video data and propose an innovative scene change detection method. In this method for partitioning a video frames that start with a random partition and employs an iterative algorithm to estimate the partition and the class parameters jointly. From the testing results the method define was sensitive to the small change in luminance or colors.

So a new method was developing for scene detection by graph modeling [4]. In this video was represented as a complete undirected graph and optimally partition the graph. When scene changes are detected then video structure was constructed by the sequence of scene, clusters, shots, sub-shots and key-frames. It was the class of graphical based method for scene detection. In this each node represents a shot and edges, between the shots are by their similarity for color and motion information. First divide the video into shots using a color histogram intersection method proposed by Haering in [10]. For scene detection used shot similarity graph in which each node represents a shot and edges are weighted by their similarity then use normalized cuts to detect scene in video. This algorithm was vigorous not attending the film category and the recall and precision values are providing a good assessment of any data-retrieval system.

So that to use only frame pixel values without any motion estimation process therefore economical complexity was maintained this makes very attractive for real time video applications proposed in [13]. In this introducing a two phase strategy, frames are first tested against mean absolute frame differences based on that most of the scene changes so quickly to screen out them. The rest of the frames are then normalized via a histogram equalization process. For testing two methods used color histogram comparison and likelihood method. Frames in that using this algorithm give superior performance for variety of contents even in the case of difficult videos.

The more attractive method was video scene detection by the link-constrained & affinity-propagation proposed in [6]. It explores pair-wise visual cues of near duplicate objects for link-constrained and affinity-propagation without using the key-frames. In this scene detection based not only on pair-wise shot similarity but also on matching similar objects or backgrounds between shots. After that for scene detection they use near-duplicate key-frames and provide relatively to link two shots. Apply soft-link constraints to clusters shots in the same scene and introduce the affinity-propagation. From that these approaches performed better result in most cases and useful to deal with the video scene detection problem but are not suitable for some real-time application.

From the above approaches for scene detection in videos were gives different methods and improving algorithms which are useful towards successively completing the designing the higher-level application. For that it is necessary to distinguish objects from each other in order to track and analyze their actions reliably.

Currently there are two major approaches towards moving object classification, which are Shape-based and motion-based methods. The shape-based method uses the objects' 2D spatial information whereas motion-based methods uses temporal tracked features of objects for the classification solution. There have been a number of algorithms related to object detection, classification, tracking and activity analysis. In this survey we give here that covers only those works that are in the same context as general tracking system.

The first method was background subtraction to detect moving regions by subtracting the current images was pixel-by-pixel from a reference background image that was created by averaging images over time in an initialization period [3]. But they are usually sensitive to dynamic changes when stationary objects uncover the background or sudden illumination changes occur.

More advanced methods that make use of the statistical characteristics of individual pixels have been developed to overcome the shortcomings of the method for basic background subtraction. Foreground pixels are identified by comparing each pixel's statistics with that of the background model. This approach is becoming more popular due to its reliability in scenes that contain noise, illumination changes and shadow.

Temporal differencing method was to detect moving regions by making the use of the pixel-by-pixel difference of consecutive frames in a video sequence. This method is highly adaptive to dynamic scene changes but it generally fails in detecting whole relevant pixels of some types of moving objects. The last method is hybrid algorithms are successfully segments the moving regions in video without the defects of temporal differencing and background subtraction. We have to take survey of hybrid approaches that are better than all above methods.

The hybrid method was robust visual object tracking using multi mode anisotropic mean shift and particle filters proposed in [8]. In this they combine to make the use of particle filters and multi-mode anisotropic mean shift was called hybrid method and it includes online learning of reference object. In which basically to use object appearance and the shape for tracking given by the particle filter and dynamic appearance was allocated by mean shift that combine in particle filter. The tracker was to allocate the best object

region in each image frame by using particle filter and employing the mean shift that locates similar appearance object to the reference object. Test results had shown that the scheme was very robust resulting in considerable improvement on reducing the all low feature in tracking but nearly reaches its limitation as computational speed and when too many objects.

So that next modified method was used laser scanning to increase the speed of tracking and detection of moving objects at intersection using a network of laser scanners algorithm proposed in [14]. It focuses on an algorithm for moving-object detection and tracking in given sequence of distributed laser scan data of an intersection.

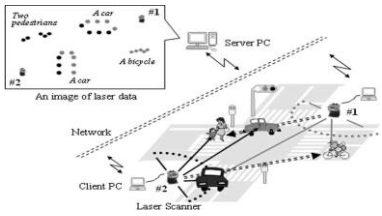

Fig. 1 The system

The system was shown in Fig. 1 that laser scanners are set on roadsides, profiling the each scanner was controlled by a client computer, which collects raw measurements from the sensor and performs preliminary processing. In this first take moving object detection for that single integrated frame and extracts feature parameters for an object model. After that they define object model in which the laser scanner performs counterclockwise scanning and horizontal contour of an object was measured by a sequence of laser points. Even if occlusions happen object was not blocked from the view of all laser scanners and object can be detected and tracked but algorithm limited to laser scan range.

After that more advanced method was the spectrum based object detection and tracking technique for digital video surveillance in [12]. This method was to design that for video surveillance of high performance brilliant video analytic system was an actual practical task. Motion analysis algorithms are based on processing of multiple-regression pseudo spectrum. So that they decided on each frame number of moving objects with their unique IDs and number of new or disappeared objects with their unique IDs too. This technique was presented gave best result but faster pseudo spectrum should exit the signal.

So next modified method was robust method for feature object tracking & recovery was using phase correlation proposed in [5]. In this define problem in computer vision and distinguish between current object from its surrounding background could give tracking failure without recovering. This technique was use the compressed image was divided into overlapping box of fixed size. These blocks are sorted using lexicographic sorting and duplicated blocks are identified using phase correlation. Phase correlation provides rigid translational motion between two images based on Fourier shift property. Phase difference in the frequency domain of the Fourier Transform.

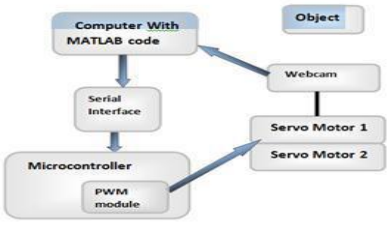

Fig. 2: Block diagram

The hardware construction shown in Fig. 2 the technique use camera as sensor was interfaced to PC by USB cable where MATLAB code was running on PC will capture sequence of images. The whole process was done by using microcontroller and PWM module. This system will enable to track object even though object are lost. This algorithm tested using a series of images from a different sensor platform or with different spectral bands to examine accuracy and robustness. It works even for images detection was more difficult by applying noise and JPEG quality level changes.

For real time application method was person or object tracking and velocity estimation in real time videos proposed in [11]. In this aim had to develop that estimate velocity, distance parameters using image difference algorithm. It focus on detection and tracking in a scene that was tracked and detected people as long as they stay in the scene also estimate moving people and velocity. It present a simplified single object detection method based on image difference and Blob matching tracking algorithm. By using smart antenna record the video this divide into individual frames and then converted into PGM image format also give hexadecimal values and store in files which are input to code composer studio, noise that removed by median filter.

Segmentation shows the objects and boundaries in an image use histogram based method and single Gaussian background method. Euclidean distance measure the distance between sequences of frames and values distance with respect to frame rate. Also velocity stored in an array. This algorithms could also were extended for the use of real time application and object classification.

The above given approaches of object detection in videos from that many approaches are previously given are helpful in designing the higher-level applications but sometimes they are not useful in some parameters is the low-level feature extraction and key frame extraction.

III. FUTURE CHALLENGES IN OBJECT TRACKING

This comprehensive survey reveals the scene with object detection and tracking has been an active research topic in last 15 years, but it is difficult to make comparisons related the accuracy of different algorithm. Many research efforts have already been made in social networks had incredible growth in

recent years, but there is still potential for further investigations.

The approaches that focus on domains with an unclear scene structure and detected object where no object information is available and provide a big challenge. In future, researchers in this field should tend to produce more comparable results. It is not only difficult to compare the accuracy of current approaches but also comparisons of the computational complexity of different algorithms are hardly possible.

Widespread cameras and Smartphone enable people to capture the photos and videos anytime and anywhere. The content is sheared using social networks and web communities. By combining content from different people a situation shown from different viewpoints, reveling more details and thus higher-level applications will be design.

IV. CONCLUSION

In this paper we have to take a survey of motion based object detection and tracking in the last few years. For key-frame extraction scene can be detected first in videos and classified the algorithms are visual-based, audio-based and text-based but we only disuses visual-based algorithms. Also object detection algorithms are classified according to their methods that is background subtraction, statistical characteristics and temporal differencing the last method is hybrid algorithms these gives very effective result.

Taken into account all these algorithms we have to give future challenges. Moreover fully automatic system will be design that their future work should also investigate to incorporate users and social networks to get more accurate results. This survey can be used to future research activities in this field and for selecting an appropriate approach for a certain application.

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