



A Survey on Moving Object Detection Using Image Processing Techniques

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ABSTRACT: Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Humans perform object recognition effortlessly and instantaneously. This paper is to review of various moving object detection and object tracking methods. Moving object detection is a technologically challenging and practically useful problem in the field of computer vision. Object detection deals with identifying the presence of various individual objects in an image. Object tracking is performed using monitoring objects, spatial and temporal changes during a video sequence, including its presence, position, size, shape, etc. It is used in several applications such as video surveillance, robot vision, traffic monitoring, Video in painting and Animation. A lot of research is being done in the area of object recognition and detection during the last two decades. Due to environmental conditions like illumination changes, object segmentation becomes difficult and significant problem. This paper reviews the various aspects of object detection and the challenges involved.

KEYWORDS: Object Detection, Kalman filter, Object Tracking, Video Surveillance and Statistical Methods.

I. INTRODUCTION

Digital image processing is the use of computer algorithms to perform image processing on digital images. The two types of methods used for digital image processing are analog and digital image processing. Analog or visual techniques of image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. The image processing is not just confined to area that has to be studied but on knowledge of analyst. Association is another important tool in image processing through visual techniques. So analysts apply a combination of personal knowledge and collateral data to image processing.

Digital processing techniques help in manipulation of the digital images by using computers. As raw data from imaging sensors from satellite platform contains deficiencies. To get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all types of data have to undergo while using digital technique are pre- processing, enhancement and display, information extraction. Videos are actually sequences of images, each of which called a frame, displayed in fast enough frequency so that human eyes can percept the continuity of its content. It is obvious that all image processing techniques can be applied to individual frames. Besides, the contents of two consecutive frames are usually closely related. The identification of regions of interest is typically the first step in many computer vision applications including event detection, video surveillance, and robotics. A general object detection algorithm may be desirable, but it is extremely difficult to properly handle unknown objects or objects with significant variations in colour, shape and texture. Therefore, many practical computer vision systems assume a fixed camera environment, which makes the object detection process much more straightforward. An image, usually from a video sequence, is divided into two complimentary sets of pixels. The first set contains the pixels which correspond to foreground objects while the second and complimentary set contains the background pixels. This output or result is often represented as a binary image or as a mask. It is difficult to specify an absolute standard with respect to what should be identified as foreground and what should be marked as background because this definition is somewhat application specific. Generally, foreground objects are moving objects like people,



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boats and cars and everything else is background. Many a times shadow is classified as foreground object which gives improper output.

Object detection includes detecting objects and recognizing patterns in the frame of a video sequence. An object detection mechanism is needed in any tracking method either in each frame or when the object first appears in the video. Using information in single frame is the most familiar method for object detection. If the objects are always in one stable position in the scene, then they can be considered two-dimensional. If the images of objects can be obtained from arbitrary viewpoints, then an object may appear very different in its two views, then they can be considered three-dimensional.

II. LITERATURE SURVEY

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. Kinjal A Joshi and Darshak G. Thakore [4] describes, monitoring of video for long duration by human operator is impractical and infeasible. Automatic motion detection can provide better human attention. There are varieties of applications in video surveillance like access control, person identification and anomaly detection. Intelligent Visual Surveillance (IVS) refers to an automated visual monitoring process that involves analysis and interpretation of object behaviors, as well as object detection and tracking, to understand the visual events of the scene. Main tasks of IVS include scene interpretation and wide area surveillance control. Scene interpretation detects and track moving objects in an image sequence. It is used to understand their behaviors.

Dilip K. Prasad [7] says that, object detection is a technologically challenging and practically useful problem in the field of computer vision. Object detection deals with identifying the presence of various individual objects in an image. Great success has been achieved in controlled environment for object detection/recognition problem but the problem remains unsolved in uncontrolled places, in particular, when objects are placed in arbitrary poses in cluttered and occluded environment. A lot of research is being done in the area of object recognition and detection during the last two decades. This paper reviews the various aspects of object detection and the challenges involved. The aspects addressed are feature types, learning model, object templates, matching schemes, and boosting methods.

Himani S. Parekh, Darshak G. Thakore and Udesang K. Jaliya [11] explains that, various phases of object tracking system viz. object detection, object classification and object tracking has been studied. Available methods for these phases have been explained in details and a number of shortcoming and limitations were highlighted in each and every technique. Different methods for object detection are frame difference, optical flow and background subtraction. Object tracking can be performed using various methods like kalman filter, particle filter and multiple hypothesis tracking. It can be summarized background subtraction is a simplest method providing complete information about object compared to optical flow and frame difference for detecting objects. Advance study may be carried out to include find efficient algorithm to reduce computational cost and to decrease the time required for tracking the object for variety of videos containing diversified characteristics.

J. KomalaLakshmi and M. Punithavalli [3] explains that, shape representation method results in a non-numeric representation of the original shape (e.g.) a graph. So that the important characteristics of the shape are preserved. The shape description refers to the methods that result in a numeric descriptor of the shape and is a step subsequent to shape representation. Skeletons are one such shape descriptors. The skeleton of a two-dimensional object is a transformation of the shape object into a one dimensional line introducing skeleton shape descriptors. Many operations like shape representation and deformation can be performed more efficiently on the skeleton than on the full object, as skeleton is simpler than the original object. The parameters such as thresholds, bounds and weights have to be tuned for the successful performance of the object recognition system. This paper provides an overview of estimating the parameters for performance evaluation of the object detection techniques, and a survey of Performance evaluation of junction detection schemes in digital image processing.



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Jamal Raiyn [9] explains, video surveillance system is the most important issue in homeland security field. It is used as a security system because of its ability to track and to detect a particular person. To overcome the lack of the conventional video surveillance system that is based on human perception, we introduce a novel cognitive Video Surveillance System (CVS) that is based on mobile agents. CVS offers important attributes such as suspect objects detection and smart camera cooperation for people tracking. According to many studies, an agent-based approach is appropriate for distributed systems, since mobile agents can transfer copies of themselves to other servers in the system.

Manoj Shrikrishna Nagmode [8] uses Optical flow is also used but frame separation and GMM based methods are more precise. Moving object segmentation is used for object detection only. By this we can detect and classify the object using different classifier. HOG descriptor, HAAR classifier, Bayes classifiers are classifier for object detection. Tracking is based on ROI, feature which are extracted, predefined model based, contour based. Now a days as the security issue increases, the need of more accurate result from video monitoring system increases. Monocular cameras exist in most of the video surveillance systems but stereo or multi camera system is required to get better results.

Amanpreet Kaur and Er. Priyanka [14] says that, the survey on detection of diverse objects in the given high-resolution satellite image and then recognizes it. This work is accomplished with the help of edge detection method along with segmentation. These edges make the rough estimation of an object. To make the detection possible certain difficulties must be handled, which can hamper our task of identification, i.e. lightning conditions, size, appearance, pose, occlusion, camera parameters, background etc. From the complex environment of multitude of objects in a given image, the detected objects are then recognized to categorize their identity.

Sunil Tiwari N. and Ravikumar A.V. [12] describe that, real-time human detection and tracking is a vast, vibrant yet inconclusive and complex area of computer vision. Due to its increased utilization in surveillance, tracking system used in security and many others applications have propelled researchers to continuously devise more efficient and competitive algorithms. Automatic visual human counting and video surveillance have important applications for home and business environments. Moving human detection and tracking is often the first step in applications such as video surveillance. The main aim of project is moving human detection and tracking system with a static camera has been developed to estimate velocity, distance parameters we propose a general moving human detection and tracking based on vision system using Harr based Human Mask Generation Method. This project focuses on detection of moving humans in a scene for example moving people meeting each other and tracking and detects people as long as they stay in the scene. This is done using Harr based Human Mask Generation algorithm and difference algorithms with Mat-lab software and we could calculate distance frame per time velocity.

III. CONCLUSION

In this survey paper all the main terminology of object detection have been addressed. These include object detection methods, feature selection and object classification. Most commonly used and well recognized methods for these phases have been explained in details. Different methods for object detection are like frame difference, optical flow and background subtraction. Most commonly used method is background subtraction. The advance forward feature of methods behind the object detection can be achieved by two main feature types like edge-based feature type and patch based feature type. This theory is already proven so yet no practical implementation done without this theory. Classification of objects is one of the most important parts of an object detection system. Among the many methods of object classification most of the researchers prefer texture based and colour based object classification. This study of review may open the paths to find efficient algorithms to reduce computational cost and to decrease the time required for detecting the object for variety of videos containing different characteristics and to increase accuracy rate.

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