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Survey of Moving Object Detection

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Abstract— moving object detection captured from mobile camera or cctv camera is an significant task in application like surveillance. For civilizing public well-being and in particular safety of human life, the demands for surveillance related information are increasing. Many security sensitive areas like banks, department stores, highways, crowded public places and borders video surveillance has been used to monitor. Voting based motion estimation, temporal difference and background subtraction mainly this three algorithm are used for the motion detection. In this paper survey related to moving object detection has been studied.

Keywords— Motion detection, Visual Surveillance System, Detection algorithm

I. INTRODUCTION

Application like video surveillance moving object detection and tracking is a first and important step. The history of video surveillance consists of three generations of systems which are called 1GSS, 2GSS and 3GSS [1].First generation surveillance system based on analog sub system for image acquisition, transmission and processing. It requires high bandwidth and it is difficult for online event detection these are main two drawbacks for this system. Second generation surveillance system is hybrid means they use both analog as well as digital sub system. It focuses on real time event detection and filtering out spurious events. Third generation surveillance system allow video data to be used for online alarm generation. It provides smart system. By using some of image processing techniques moving object velocity is also estimated. Video surveillance of human activity frequently needs people to be tracked. It is an essential to security purpose and traffic control which is also used to take necessary step for avoid undesired interaction. For commonly used techniques for object detection are background subtraction, statistical models, temporal differencing and optical flow. Due to dynamic environmental conditions such as illumination changes, shadows and waving tree branches in the wind object segmentation is a difficult and significant problem that needs to be handled well for a robust visual surveillance system. Moving object detection, classification, tracking and activity analysis needs fast, reliable and robust algorithms for creation of video surveillance system smart. Currently, there are two major approaches towards moving object classification, which are shape-based and motion-based methods [2]. Main feature involved in shape based classification is bounding rectangle area and gradient of detected object region. Motion based classification based on temporal self-similarity of a moving object. Moving object detecting has something similar to object detection in still images. Only moving object detecting is more relying on the motion characteristics of objects, i.e. the continuity of time, which is the difference between moving object and object detection in still images [3]. The need of real-time object detection for video surveillance has spawned a huge amount of our daily life, especially in some domains where it has received considerable attention, for instance: criminology, sociology, statistic, traffic accident detection and military applications. Moving object detection is considered to be the most important task in automated video surveillance systems. It represents the low level image processing technique which is the basic of automated video surveillance [3]. For getting the desirable result moving object detection must be accurate. For estimating velocity, distance etc. parameters a static camera has been developed for detection and tracking of moving object [4]. Applications in areas like video

surveillance, traffic monitoring and image recognition moving object detection and tracking is the first step which has attracted a great interest from computer vision researchers.

II. PROPOSED METHDOLOGY

Here we discussed algorithms for moving object detection.

A. Background Subtraction

For indoor and outdoor monitoring this algorithm is used. Background subtraction is particularly a commonly used technique for motion segmentation in static scenes [5]. For starting the system a reference background is initialized with the first few frames of video and updated to adapt to short and long term dynamic scene changes during the operational period. By subtracting estimated background models from images background subtraction detects moving objects. Dilation and erosion this two morphological operation are also used for reducing the effect of noise and for enhancing the detected object. This algorithm is also implemented on FPGA. Background subtraction means difference of current image and the background image. For accurate detection of moving object this is generally used. Background subtraction algorithm gives many advantages like low cost, high performance and used in application like shape detection.

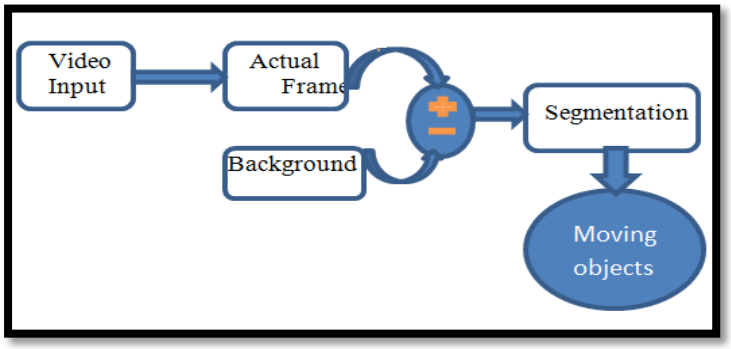

Fig.1. Background Subtraction Technique[6]

B. Temporal Difference

By making use of the pixel-by-pixel difference of consecutive frames (two or three) in a video sequence temporal differencing technique is used to detect moving region. For dynamic scene changes this method is highly adaptive but generally it fails in detecting whole relevant pixels of some type of moving objects. Sample objects for inaccurate motion detection are as shown in below figure

Fig.2. Temporal differencing sample. (a) A sample scene with two moving objects. (b) Temporal differencing fails to detect all moving pixels of the object on the left hand side since it is uniform colored. The detected moving regionsare marked with red pixels. Processing

C. Optical Flow

By using flow vectors of moving objects over time to detect moving regions in an image this method is used. From both static as well as moving camera this method can be used to detect motion in a video sequence. Most of the optical flow methods are computationally complex and cannot be used real-time without specialized hardware[2]. The steps involved in motion detection and tracking system are as follows-

i) Extraction of image sequences from the input video.

ii) Finding the moving objects for consecutive frames using Lucas - Kanade and background subtraction algorithm.

iii) Segmenting the regions where there is movement using thresholding operation.

iv) Enhancing the segmented result using morphological operations.

v) Highlighting the multiple objects tracking using edge or boundary box over centroid[8].

D. Voting Based Motion Estimation

For correctly estimating the motion of moving objects this algorithm is proposed. For indoor surveillance the powerful and speedy VBME algorithm is proposed to estimate the camera motion without tracking features and knowing explicit knowledge of camera motion. Due to mobile camera the motion estimation utilizes the voting decision from the set of motion vectors which are determined by the edge feature of static objects and/or background to accurately estimate and compensate for the shifting motion. The voting-based motion estimation algorithm can decrease the computational complexity and avoid incorrect feature tracking due to only the edge characteristics are employed [9]. Content based temporal sampling and priority based spatial coding these two algorithms are involved in voting based detection method.

A) Content Based Temporal Sampling- In this movement vector is calculated by considering two static images. According to content based temporal sampling algorithm, the most important information would be preserved carefully and the redundant or similar frames would be effectively removed [10].

B) Priority Based Spatial Coding- In spatial domain it consist of two parts that is important region and unimportant region. Spatial coding algorithm can be used to encode the region with important information into a frame of higher visual quality and region without important information into a frame of lower visual quality [10]. It includes two main parts that is- (a) set priority to region- based on result of moving edge detection. In this pixels in the contour maps are categorized into 3 types that is moving edge, static edge and no edge and their respective priorities is high, middle and low.(b) Generate image code based on priority- In this set partitioning in hierarchical tree (SPIHT) algorithm is used. This algorithm first partitions all the blocks with the same priority. Overall, the encoding process could upgrade the quality on the regions occupied by the edges of moving objects but degrade the quality of the other regions. Therefore, when available bandwidth is limited, the quality of high-priority information could be maintained [10].
Following steps are involved for motion detection-

i) Frame acquisition
ii) Camera motion estimation
iii) Camera motion correction
iv) Moving object edge detection
v) Correction of detected edges and enhancement

vi) Voting based motion detection of moving objects
vii) Estimation of motion

III. PRIVIOUS WORK

Y.-N. Li et al. have proposed a fast shot detection framework employing pre-processing techniques including thresholding and bisection-based comparisons to eliminate non-boundary regions [11]. The factors that lead to high detection speed in the proposed framework are three folds. On Simulations and comparisons, significant speed up is achieved in the proposed framework, while the precision and recall rates can get in a satisfactory level.

Taeho Kim and Kang-Hyun Jo proposed how to generate background model and detect moving objects based on multiple background model [12]. The multiple background models is effectively estimate background scene for each frame, it has weakness when a background is temporally changed. This method is good to detect moving object even though camera will move. However, this approach has disadvantages of camera shaking and moving objects. In spite of this limitation, proposed algorithm successfully generates multiple background models and detect moving object with low cost.

A fast coarse-to-fine video shot segmentation algorithm has been proposed by Liu and Jian-Xun Li [13]. The camera motion, object motion and gradual shot transition can be differentiated through this method. The proposed algorithm is based on the statistical properties of the characteristics, hence compared to the single characteristic detection algorithm; the computational complexity is reduced effectively. This algorithm is reduces both the computational complexity and error detections caused by the camera/object motion effectively.

S. Araki, T. Matsuoka, N. Yokoy a, and H. Takemura proposed the algorithm for Real-time tracking of multiple moving object contours in moving camera image sequences [14]. In this the new method is used for detection and tracking of moving objects from a moving camera image sequence using robust statistics and to find out active contour models for showing the moving object by contours. For tracking moving objects active contour models are also promising.

Block matching algorithm is proposed by the Aroh Barjatya. This algorithm is one of those algorithms which are used to detect the motion estimation in video compression [15]. This implements and compares 7 different types of block matching algorithms which have range from the very basic Exhaustive finding to the recent advance adaptive algorithms like Adaptive Rood Pattern Search. The algorithm in this has been used in implementing various standards, ranging from MPEG1 / H.261 to MPEG4 / H.263. While ISO MPEG sets the standard. The most popular and efficient of the various motion estimation techniques block matching techniques.

Yang Xu et al. have proposed 3- DWT based motion suppression for video shot boundary detection [16]. In this method adaptive threshold is selected, so that gradual transition and motion are adequately discriminated. This method is more efficient to detect the gradual transition and also solves the problem of motion information which suffers from noise and illumination.

IV. CONCLUSION

Survey related to detection of motion of moving object are to be studied by using various algorithms such as voting based motion estimation, temporal difference, background subtraction and optical flow.

V. FUTURE SCOPE

In the future, the robustness of moving object detection under any motion types of mobile camera and various environments will be first examined. The asset of our method lies in the capability to detached background and foreground in correct and applied in simple way with low time

consumption and less noise, and demonstrated efficiently in both static and dynamic background texture scene.

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