E-ISSN: 2321–9637
Volume 1, Issue 5, December 2013
International Journal of Research in Advent Technology
Available Online at: http://www.ijrat.org

EFFICIENT BACKGROUND SUBTRACTION AND SHADOW REMOVAL TECHNIQUE FOR MULTIPLE HUMAN OBJECT TRACKING

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ABSTARCT:
The main objective of this project is to develop multiple human object tracking approach based on motion estimation and detection, background subtraction, shadow removal and occlusion detection. A reference frame is initially used and considered as background information. While a new object enters into the frame, the foreground information and background information are identified using the reference frame as background model. Most of the times, the shadow of the background information is merged with the foreground object and makes the tracking process a complex one. The algorithm involves modeling of the desired background as a reference model for later used in background subtraction to produce foreground pixels which is the deviation of the current frame from the reference frame. In the approach, morphological operations will be used for identifying and removed the shadow. The occlusion is one of the most common events in object tracking and object centroid of each object will be used for detecting the occlusion and identifying each object separately. Video sequences will be captured and will be detected with the proposed algorithm. The algorithm will works efficiently in the event of occlusion in the video sequences.

Keywords: Background subtraction, shadow removal and Occlusion detection.

1. INTRODUCTION

Object tracking is one of the most important task in computer vision. Object tracking method can be categorized in three 1) template based object tracking 2) probabilistic method and 3) pixel wise. While the template-based method represents the object in a suitable way for tracking, the probabilistic method uses intelligent searching strategy for tracking the target object. Similarly, the similarity matching techniques are used for tracking the target object in pixel-based methods. However template based approach is suitable for many real time applications. In this category of tracking method similarity of the predefined target is being calculated with the object translation.

Applications:

A very fundamental and critical task in computer vision is the detection and tracking of moving objects in video sequences. Possible applications are as follows

(i) **Visual surveillance:** A human action recognition system process image sequences captured by video cameras monitoring sensitive areas such as bank, departmental stores, parking lots and country border to determine whether one or more humans engaged are suspicious or under criminal activity.

(ii) **Content based video retrieval:** A human behavior understanding system scan an input video, and an action or event specified in high-level language as output. This application will be very much useful for sportscasters to retrieve quickly important events in particular games.

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(iii) **Precise analysis of athletic performance:** Video analysis of athlete action is becoming an important tool for sports training, since it has no intervention to the athletic.

In all these applications fixed cameras are used with respect to static background (e.g. stationary surveillance camera) and a common approach of background subtraction is used to obtain an initial estimate of moving objects. First perform background modeling to yield reference model. This reference model is used in background subtraction in which each video sequence is compared against the reference model to determine possible variation. The variations between current video frames to that of the reference frame in terms of pixels signify existence of moving objects. The variation which also represents the foreground pixels are further processed for object localization and tracking. Ideally, background subtraction should detect real moving objects with high accuracy and limiting false negatives (not detected) as much as possible. At the same time, it should extract pixels of moving objects with maximum possible pixels, avoiding shadows, static objects and noise.

2. LITERATURE REVIEW AND RELATED WORK

In template-based approach category, mean-shift method [3] and Kernel-based tracking method [4] have been proposed, where the color histograms of the target object is constructed using a Kernel density estimation function. Since, the color histogram is invariant feature for rotation, scaling and translation, it is considered as one of the suitable feature for handling the problem of change in the scale, rotation and translation of target object. Various ways of representing or describing target objects have been proposed such as object appearance [1, 2], image features [5,6], target contour [7, 8] and color histogram [4].

While tracking non-rigid objects, the probabilistic based tracking methods have given better performance. Some of the approach in this category can be found in [10, 11]. In one of the probabilistic method [11], the factors such as motion detector, region tracker, head detector and active shape tracker have been combined for tracking the pedestrian.

Object tracking is also performed by predicting the object position from the past information and the predicted current position. These types of methods combine both statistical computation and the parameter vector [11]. However, for real-time object tracking systems, it is found to be difficult for constructing the proper feature vectors. This method has been extended by Khan, et al. [11], for dealing with the problem of interacting targets. The Markov Random Field (MRF) has been used for modeling the interactions. This has been achieved by adding an interaction weighted factor. However, in this method the tracking fails while there is an overlap between targets.

In contrast to model-based tracking methods, the pixel-wise tracking methods are data-driven methods. In pixel-wise tracking method, prior model of the target is not required. A parallel K-means clustering algorithm [10] has been used by Heisele, et al. [9, 10] for segmenting the color image sequence and moving region is identified as target.

3. ANALYSIS OF PROBLEM

Human motion analysis and detection are the foremost task in computer vision based problems. Human detection aims at segmenting regions corresponding to people from the entire image. It is a significant issue in human motion analysis system since the subsequent processes such as tracking and action recognition follows the motion detection. The motion detection and foreground object extraction algorithm.

4. PROPOSED WORK AND OBJECTIVE

The main objective of this project is to develop an algorithm that can detect human motion at certain distance for object tracking applications. Various tasks are carried out such as motion detection, background modeling and subtraction, foreground detection, shadow detection and removal, morphological operations and identifying occlusion.

Some are the major steps as follows

1] Take some samples of frames / images without human object
2] Averaging samples and model as background
3] Now take images with human object

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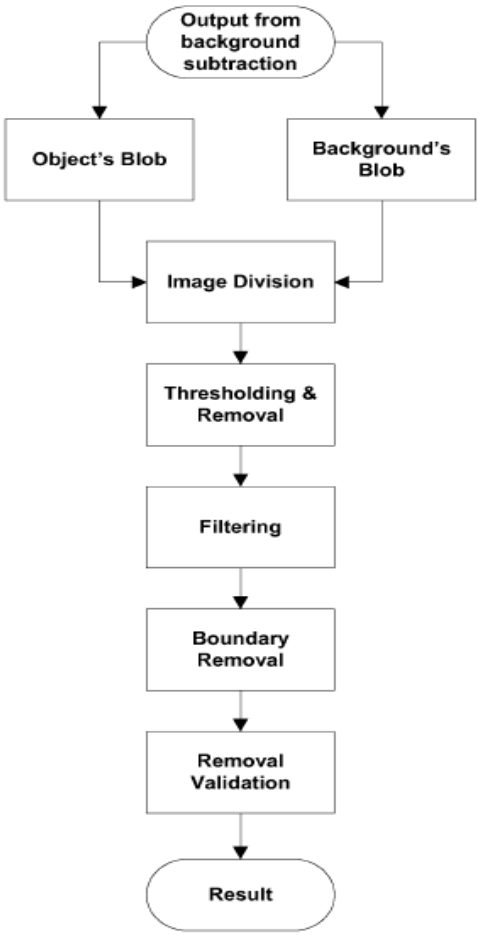
4] Perform subtraction between these two backgrounds and foreground to extract object
5] Perform some morphology process
5] Labeling the different object as 1 2 3 etc
6] Get properties of available objects
7] Filter the other small or lager objects from image using area threshold
8] After filtering shadows of different objects are detected and remove
8] Draw bounding box and human object tracking



5. DESIRED IMPLICATION

In this project, an approach capable of detecting motion and extracting object information which involves human as object will be described. The algorithm involves modeling of the desired background as a reference model for later used in background subtraction to produce foreground pixels which is the deviation of the current frame from the reference frame. The deviation which represents the moving object within the analyzed frame is further processed to localize and extracts the information.
1] We get/detect the human object in an image.
2] We can enhance the picture content by removing shadows of object in an image
3] We can locate the position of human objects in an image
4] We place boundary box around detected human objects in an image
5] We can also count the number of objects in an image

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6. CONCLUSION

In this paper, an approach capable of detecting motion and extracting object information which involves human as object has been described. The algorithm involves modeling of the desired background as a reference model for later used in background subtraction to produce foreground pixels which is the deviation of the current frame from the reference frame. The deviation which represents the moving object within the analyzed frame is further processed to localize and extracts the information. The occlusion has also been dealt effectively.

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