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A New Hybrid Video Segmentation Approach to Detect Moving Objects

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Abstract: *Video segmentation plays an important role in the MPEG-4 standard for multimedia applications. Segmentation of videos into their respective foreground and background articulate its importance in Video compression, human-computer interaction, video editing and manipulation etc. Video sequences are converted into frames and processing is done. The key perspective consider in this paper is the moving object detection with noise reduction. The video segmentation is done by detecting the moving objects on each frames and then labeling on it. A hybrid algorithm is proposed that quickly and efficiently extract the moving objects from the video sequence. Background difference is involved so as to acquire the initial object masking and to solve the uncovered background problem in the frames. The combination of noise reduction and background difference will yield the moving object within the video sequences with accuracy. The proposed algorithm is evaluated with varying input video sequences and results are produced. The experimental results show the method defers low computational complexity and better results in real time applications.*

Keywords: *MPEG-4 Standard, Video Segmentation, Filtering, Noise Removal, Background Difference, Object Detection.*

1. INTRODUCTION

Video files are entered in every area of information technology now – a – days. It is incorporated in various applications, captured off through the televisions or through the compact disks for use as attachments as e-mail items [1]. Video signals are considered as a sequence of pictures or even more called as frames. Similar pixels are arranged as neighboring pixels it shows redundancy in the video. This is categorized into two types namely the spatial redundancy and temporal redundancy. Basically, the input color video frame is represented using 24 bits each is independently divided into three bands 8 bits for Red, 8 for Green channel and other 8 for Blue channel. Video Coding Standard, the MPEG – 4 standard relies on the content of the multimedia file and the way how it is represented. In order to generate the video content, video has to be segmented into video objects and tracked as that transverse across then video frames. Hence, Video segmentation technique is used to extract the content of the video. This have been considered as a unique technique to extract the visual information and plays vital role in digital video processing, pattern matching, pattern recognition etc [2]. Moving object detection and tracking are important parts in intelligent video surveillance system. Obtaining the dynamic information of the target accurately is significant to the subsequent target identification, tracking, behavior understanding and descriptions [3]. Moving target detection is to detect moving objects from the changing background images in continuous video images. Moving target tracking is to find various locations of the moving object in the video sequences. The common used moving target detection algorithms include background subtraction, the frame difference method and optical flow method [4]. Moving object detection is the basic step for further analysis of video. Every tracking method requires an object detection mechanism either in every frame or when the object first appears in the video. It handles segmentation of moving objects from stationary background objects. This focuses on higher level of processing. It also decreases computation time. Some of the common methods in moving object detection include the Frame difference, optical flow, background subtraction method etc. Mostly the threshold measure is applied to find the moving object detection in the proposed method. The moving object detection is the initial part in recognition of the objects in the video. The main aim is to detect and extract the moving objects with background which can either be static or in dynamic. Spatial or the temporal information is evaluated in the image sequences to perform the moving object to detect and to find out the pixel intensity [5]. The online and offline mode of video sequence, the selection of threshold values plays a vital role according to the milieu of the implementation. The offline mode approach is useful in such circumstances where security is not much

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important [7]. A common approach for object detection is to use information in a single frame. From the past decades for the real-time information the motion detection is very important in the surveillance area such as in military reconnaissance, mobile robot navigation and also in the path planning. In this paper, the problem of detecting and tracking moving objects in the context of video surveillance is addressed. There exist three types of video surveillance activities. They may be manual, semi- autonomous or completely autonomous [6]. The paper is organized as follows; we first describe in section 2 that shows a brief review of background study done on the topic of the moving object detection. The proposed technique is represented in section 3. Section 4 constitute of the experimental results obtained on the set of processed videos. Section 5 comes out with the conclusion for the proposed technique.

2. RELATED WORKS

The algorithm proposed by Tripty Singh et.al, [7], a method for moving object detection, in high secured arenas, which is deployed both in the static position and in the dynamic position is provided. Author's main objective is to increase the efficiency of the moving object detection both at the online and offline processing of video sequences. Their implementation is carried out by reducing the noise at background, calculating frame difference and producing snapshots for every sequence.

In the method proposed by Yasira Beevi and S.Natarajan [8] a video segmentation algorithm for MPEG-4 camera system by means of change detection, background registration methods and real time adaptive threshold techniques are analyzed. Their algorithm provides better segmentation results with low computation complexity. It uses a shadow cancellation mode, that can able to handles both light changing effect and shadow effect. Moreover, the algorithm has also applied real time adaptive threshold techniques through which the parameters can be determined automatically.

Saad A. Yaseen and Sreela Sasi, expresses their view on object detection and tracking in dynamic environment. It is accomplished via the modified version of enhanced SURF (Speeded Up Robust Features) algorithm. It is one of the best approach for feature extraction and suitable for the real time applications. Enhance SURF algorithm exhibits the performance factors efficiently compared with the existing. This approach is more robust since it can detect the moving object even after a short absence of 4 or 5 frames [9].

Optimization technique to analyze the frame rate in real time Object Detection and Tracking is done by Laxmi Agarwal, Kamlesh Lakhwani. The method concentrates on the object that uses the static camera to detain the video frames and to track the objects. Histogram Matching, Absolute frame subtraction is done to extract the object. To recognize the object OTSU segmentation is applied. The OTSU algorithm converts the given frame pixels to respective binary values. By the binarization the computational time could be saved [10].

Mengxin Li et.al, proposes the combination of the inter-frame difference method with improved background subtraction method which makes use of color and texture information and dual-threshold is used to detect moving targets and makes multiple judgments. Kalman filter is used which combines Mean shift algorithm, to avoid the occlusion problem. From the results analyzed by the authors the algorithm given is adopted to detect the moving target accurately and can resist interferences brought about by the slow slight movements in the scene with better robustness [11].

Barga Deori and Dalton Meitei Thounaojam made a survey on moving object detection in video sequences. From the authors perspective it is given that most of the methods include object segmentation using background subtraction. The tracking strategies use different methodologies like Mean-shift, Kalman filter, Particlefilter etc. The performance of the tracking methods vary with respect to background information [12].

3. PROPOSED METHOD

3.1 Moving Object Detection

Tracking objects in video sequences is demanding application from past decades. The proposed algorithm is done for offline mode video sequences. Optimum threshold values are calculated so as to find the solution on frames. The given video sequence is separated to independent frames respectively. The proposed algorithm consists of the frame extraction process, the conversion of given frame to respective RGB color Model. Each Frame of the RGB color images converted to the Grayscale. Preprocessing is done using the wiener filter so as to reduce the noise level. After preprocessing, the background subtraction on frames is done on the binarization frame. After background registration process taken place, the moving object is detected and labeled through it is shape specification. The block diagram for the proposed algorithm is given as in figure.

3.2 Input Video Acquisition

The proposed algorithm considers the AVI (Audio – Video Interleave) file as the input file. The AVI file

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format is capable for storing the audio as well as the video file container under Resource Interchange File Format. Basically the video file is compressed since it holds large space for storage. The input file is converted into respective frame sequences. The frame rate is usually 15 fps in order to reduce the frame size of the video clip involved. This single video frame is again divided into multiple frames to reduce the computational complexity of the algorithm.

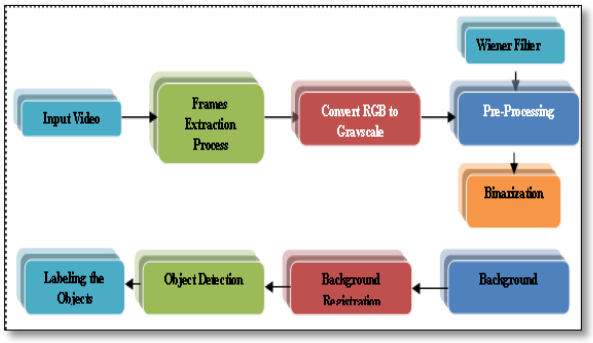

Figure 1: Block Diagram for the Proposed Hybrid Algorithm

3.3 Frame Extraction Process

The input file thus separated to frames with 15 fps is applied for extraction process. Generally, the object detection in dynamic environment is the process of locating or detecting the moving object within the given video frame. This will change continuously from frame to frame. There placed much method in literature such as inter- frame subtraction, optical flow method etc., to detect the moving objects between the frames. In the proposed algorithm, the background subtraction and registration method is applied for the frames.

3.4 Conversion of RGB to Grayscale

Video segmentation is categorized into two major types named as spatial and temporal segmentation. The digital image processing falls under the spatial segmentation. The video sequence is collected in static background, with RGB color pixels. For accurate results the RGB pixel is separated to autonomous red channel, green channel and blue channel. After the respective separation, the conversion to gray scale is taken place. All the frames are completely converted into grayscale intensity images. Gray scale images are acquired without color, and levels from 0. The conversion takes place to reduce the complexity when the segmentation takes place.

3.5 Pre – Processing

The Pre – Processing is the step where the noise on the image should get removed. The method for removing the noise from video signal is termed as video de-noising. Because of the noise in images, it will disturb and there is a chance for image quality degradation. Hence, the noise reduction should be taken place so as to enhance the video quality. Based on the interpretation of the pixels the noise level varies. Mainly two type of filtering algorithms were imposed to remove noise from the images, named as linear and non-linear filtering.

The background noise present in the frames is reduced using filter technique in the video sequences. In the proposed algorithm the "Weiner Filter: is used for de-noising. The Wiener filter is applied to filter out the noise that has corrupted a signal. The Wiener filter approaches filtering from a different angle. Wiener filters are characterized based on the Performance criteria such as minimum mean -square Error, assumption and requirement.

3.6 Binarization

Binarization is a technique by which the gray scale images are converted to binary images. Binarization separates the foreground text to the background information. The most common method for binarization is to select a proper threshold for the intensity of the image and then convert all the intensity values above the threshold to one intensity value and all intensity values below the threshold to the other chosen intensity (i.e From White to Black). The noise free image is now through binarization converted to binary image without noise.

3.7 Background Difference and Registration

The next step with the noise reduced binary image is the computation of background. Once images are in use, the algorithm performs a background subtraction of the image to isolate the images and create a mask. The background subtraction involves in two steps. First, is to subtract the pixels between the foreground and background objects channel wise. They are summed up and threshold is calculated. The key step algorithm is that, the background modeling and updating. The basic idea of the background difference method is to do differential between current image and background image. When the pixels values between moving target and the background are not very close, the complete moving target can be detected. The method is very sensitive to light and shadow objects. The frames with the background difference are registered and summed up to indicate the foreground and background objects that are above the threshold.

3.8 Object Detection

The difference between the successive frames along with the sensitivity is calculated in the background

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difference step. The values that is greater than the threshold is detected in this step.

3.9 Object Labeling

The final step is the object labeling step. The threshold values that are calculated in the above steps are labeled according to the shape based retrieval. Shape based image retrieval is the measuring of similarity between shapes represented by their features. Shape content description is difficult to define. Feature extraction and similarity measurement between the extracted features are the two steps taken place in similarity measure calculation. Shape descriptors can be divided into two main categories: region based and contour-based methods. In the proposed system the labeling is made through the rectangular box.

4. RESULTS AND DISCUSSIONS

The Experimentation data consists of a different videos collected from various sources. The video is preprocessed by de-noising technique using the wiener filter then the segmentation has been applied on the video frames of individual moving object detection and labeling is done.

Original Video Frames – sample 1(Multi object)

motion frames – sample 1(multi object)

Figure 2. Moving Object Detection using Hybrid Approach

Noise reduction is done as the pre process in video in order to improve its quality. The results show the moving object through the rectangular box shape. This falls under the region based method that uses complete area for the shape description.

5. CONCLUSION

The proposed research work, gives a hybrid algorithm for video segmentation based moving object detection. It uses the filtering technique to remove noise from the frames and background difference method to calculate the threshold. Wiener filter is best suited for Gaussian noise to remove. The implementation is carried out by reducing the noise in the background, checking frame difference and generating the labeling for each object that are detected. Hence, in this paper a new hybrid algorithm for detection of moving objects in video is designed and implemented, which is useful in various applications like security and video surveillance etc.

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References

[1] **Mitesh Shah, Hetal Patel, "Design of a New Video Compression Algorithm Using Accordion Function", in International Journal of Science and Modern Engineering, Volume-1, Issue-6, May 2013, pp:40 – 43.**

[2] **Garrison, L., Oliveras, A., & Salembier, P, " Motion analysis of image sequences using connected operator". In Proc. of visual communication and image processing, 1997,pp:546–557.**

[3] **Wan Ying, Han Yi, Lu Hanqing," Discussion on moving target detection algorithm", The computer simulation. 2006; 221-226.**

[4] **Li Junshan, Yang Wei, Zhang Xiongmei, "Infrared image processing, analysis and integration Beijing", Science Press. 2009.**

[5] **Mahamuni P. D, R. P. Patil and H.S. Thakar, "Moving Object Detection Using Background Subtraction Algorithm Using Simulink", in International Journal of Research in Engineering and Technology, Vol 3, issue 6, June 2014, pp: 594- 598.**

[6] **Kinjal A Joshi, Darshak G. Thakore, "A Survey on Moving Object Detection and Tracking in Video Surveillance System", in International Journal of Soft Computing and Engineering, Volume-2, Issue-3, July 2012, pp:44-48.**

[7] **Tripty Singh, Sanju S and Bichu Vijay, "A New Algorithm Designing for Detection of Moving Objects in Video", in International Journal of Computer Applications (0975 – 8887) Volume 96– No.2, June 2014, pp:4-11.**

[8] **Yasira Beevi and Natarajan. S, "A Hidden Markov Model Framework for Video Segmentation Using Audio and ImageFeatures", citeseerx.ist.psu.edu/viewdoc/ download?doi=10.1.1.20.**

[9] **Saad A. Yaseen and Sreela Sasi, "Robust Algorithm for Object Detection and Tracking in a Dynamic Scene", in Journal of Image and Graphics, Volume 2, No.1, June, 2014, pp:41-45.**

[10] **Laxmi Agarwal, Kamlesh Lakhwani, "Optimization Of Frame Rate In Real Time Object Detection And Tracking", in**

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WINGS TO YOUR THOUGHTS.....

International Journal of Scientific & Technology Research Volume 2, Issue 7, July 2013, pp:132-134.

[11] Mengxin Li, Jingjing Fan, Ying Zhang, Rui Zhang, Weijing Xu and Dingding Hou, "Moving Object Detection and Tracking Algorithm", in TELKOMNIKA, Vol. 11, No. 10, October 2013, pp. 5539 – 5544.

[12] Barga Deori and Dalton Meitei Thounaojam, "A Survey On Moving Object Tracking In Video", in International Journal on Information Theory (IJIT),Vol.3, No.3, July 2014,pp:31-46.