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Review on: Moving Object Detection Using Temporal Information in Surveillance System

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Abstract: This paper presents automatic moving object detection by using the temporal information method from the capture video. This method is efficient in segmentation which is useful for real time video surveillance and object tracking. Based on the continuous symmetric difference between the adjacent frames full saliency map of current frame is generated .The moving object with higher saliency value is generated for background. The maximum entropy sum method is used for calculating threshold of area. The general common method is extracting the foreground using the Gaussian Mixture Method followed by the shadow. This method is useful for removal of noise the object is detected .In the background the removal of noise is done by pre-processing and Morphological processing.The final image is obtained by the modification of Fuzzy logic. Then the basic function of this detected target is controlled by ARM7 controller which is used to display the presence of human body or animal. Also buzzer is implemented for security purpose. GSM modem interface for providing the massages about the detection of object for security purpose. So in this proposed model we detect the moving object using the time domain information and different applications are operated for security purpose using ARM 7 controller. So in this proposed model we detect the moving object using the time domain information and different applications are operated for security purpose using ARM 7 controller.

Keywords: moving object detection, temporal information, saliency map, frame difference.

I. INTRODUCTION

Detecting moving objects have been used in the in computer, so it plays and crucial role for researchers in the area of image processing domain. However, because the surroundings in the real-world the moving object detection is still a challenging problem. As indicated in [1], there are three factors that make section of object more difficult from videos. (1) the complex background, e.g., dynamic background with swaying trees, (2) Motion of camera, e.g., tripod vibration, (3) requiring prior knowledge of foreground and background, e.g., for background data modelling Furthermore, the algorithms crated for the moving object detection are not intelligent or robust enough for that they need user interaction or experiential parameter tuning. To get rid of with these problems, we propose a motion detection method based on temporal information (TI), which is time based inspired by distribution-based algorithms.

The motion detection methods can be divided into three approaches, namely temporal-based, spatial-based, and combined approach. For moving object detection, motion plays the most reliable information, so a mass of moving object detection methods are designed based on temporal information, such as frame difference [2][3] and background subtraction [4][5]. Frame difference is simple and can fast extracts moving objects. Background subtraction, which removes the background model from the input images, is a common approach to detect moving objects. Now, a multiple of algorithms for background modelling have been developed, such as GMM (Gaussian Mixture Model) [6], MRF (Markov Random Field) [7] and BBM (Bayesian background model) [8].

Hence, background modelling methods require extensive computational time to estimate the background, and it is sensitive to illumination changes. In order to model the background, the prior knowledge the training data is required. The spatial-based object detection is applied to object detection in static images and the results are usually undesirable as the lack of temporal information.

Some researchers tried to combine the temporal and spatial information. Y. Nonaka et al. [9] presented an integrated background model based on spatial and temporal features. S. Zhang et al. [10] .In this method they consider the local binary patterns in the spatial domain and also in the temporal domain. The new dynamic online texture extraction operator is used to model the background. Y. Wu et al. [11] then the combined saliency measurement with spatial and temporal coherence to detect moving object. The combination of temporal and spatial information leads to enhance the saliency of the moving objects, but the spatial saliency is generally calculated with low-level features, e.g., edges, colors, and textures.

The proposed method consists three major steps. 1) The temporal saliency map is generated based on the difference of the adjacent frames.2) A threshold is adaptively calculated using the maximum entropy sum method to binaries the temporal saliency map and get the candidate areas. Then the salient points of each candidate area are selected as the attention seeds. Finally, from each attention seed, modified fuzzy growing is performed on

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the saliency map until no points can be grouped and the contours of the moving objects are obtained.

II. MOVING OBJECT DETECTION

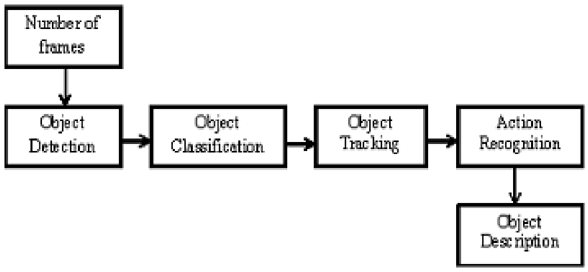

Figure1.A generic framework for smart video processing algorithms.

Each application that benefit from smart video processing has different needs, thus requires different treatment. However, they have something in common: moving objects. Thus, detecting regions that correspond to moving objects such as people and vehicles in video is the first basic step of almost every vision system since it provides a focus of attention and simplifies the processing on subsequent analysis steps. Due to dynamic changes in natural scenes such as sudden illumination and weather changes, repetitive motions that cause clutter (tree leaves moving in blowing wind), motion detection is a difficult problem to process reliably. Frequently used techniques for moving object detection are background subtraction, statistical methods, temporal differencing.

A. Motion Saliency Generation

In the field of biological branch they are providing more attention to the visual system i.e. attention to conspicuous objects in natural scenes is widely used by way of saliency map. The Frame difference directly reflects to motion cues. Hence the motion saliency generation methods are used which is based on the frame difference between adjacent two frames [12]. On the other hand, spatiotemporal filtering is another branch of motion saliency generation methods.

A. Belardinelli et al. [13] presented a method to address the issue of attending to motion based on the extraction of coherent motion information in the form of energy with some of preferred directions. The main drawbacks of their method are requiring of parameters tuning Hence by using the temporal analysis method is designed for the objects with salient motion and the symmetric difference of the adjacent frames is proposed to generate the saliency map. Motion saliency map is generated by in which the saliency of the moving objects that have the motion characteristics is enhanced while the saliency of the background is inhibited... Morphological opening operation is used to remove small, bright details, while leaving the overall intensity levels undisturbed. Fig. 2.shows the (Top row) Video frames (bottom row) motion saliency maps.

Figure 2. (Top row) Video frames (bottom row) motion saliency maps.

B. Attention Seeds Selection

The fixed cut threshold is not beneficial for moving objects extraction based on saliency maps, because the grey levels of real-world images are not consistent they are constantly changing. The region growing algorithm has been applied it. Then, to find the best attention seeds are done. A reasonable seed should be the focus of the moving objects. For each point, the higher the saliency value is, the more likely it belongs to the moving objects. In the system, the maximum entropy sum method is used which is based on the maximization of the information measure. This method is used to calculate an optimal threshold to binaries the saliency map and extract the candidate attention areas. After that, we select the most salient location of each area as the attention seed. Fig. 3 shows the samples of the candidate attention areas and the selected seeds, which are marked by highlighted red boxes.

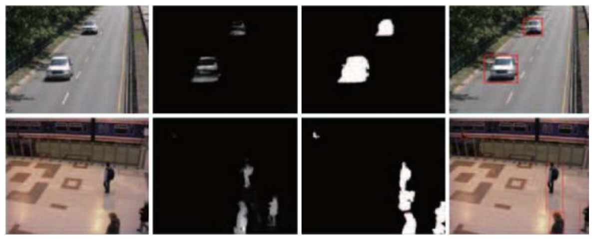

Figure3. (Top row) Candidate attention areas and (bottom row) foreground seeds.

C. Moving Object Detection

To extract the moving objects motion we apply the fuzzy growing method to grow the attention seeds. The figure denotes the grey level and the variables that determine the shapes of the membership functions. As the probability of the grey levels that are closer to decreases slowly and the probability of the grey levels that are closer to increases slowly, which are more according with the human vision perception characteristics for edges. Starting from the attention seeds, pixels will be grouped if their grey-levels satisfy the following criteria.

The important characteristic of this generated motion saliency maps is dark and low-contrast. Experimentally, we observe bad results by performing the above process directly on them. To enhance the saliency map, histogram equalization is performed firstly. Figure 4 shows the result of fuzzy growing and the moving objects in the scene have

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been accurately detected and segmented. The maximum entropy sum method is harsher than the fuzzy growing method, so the threshold is much higher. When there are no moving objects then situation will be reversed, i.e. is smaller than which is selected as the criterion to judge whether there are moving objects or not.

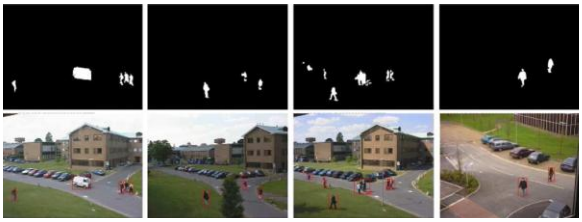

Figure 4. Saliency binary graphs (Top row), Attention region detection results (Bottom row).

III. BLOCK DIAGRAM OF PROPOSED SYSTEM

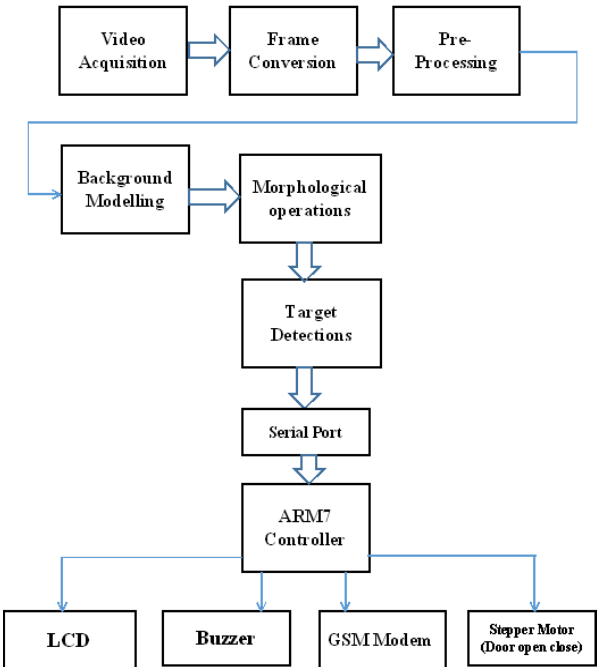

Figure 5.Block Diagram of the proposed system

This proposed system detect the moving object and by video acquisition process then conversion of this videos into the frames by segmentation method. Preprocessing must be done on it and implementation of morphological operations such as opening, closing etc. removal of noise is done.

Then the basic function of this detected target is controlled by ARM7 controller which is used to display the presence of human body or animal. Also buzzer is implemented for security purpose. GSM modem interface for providing the massages about the detection of object for security purpose.So in this proposed model we detect the moving object using the time domain information and different applications are operated for security purpose using ARM 7 controller.

IV. CONCLUSION

The topic moving object detection method using temporal information in surveillance system has been presented in this paper. We use the temporal information to generate the motion saliency map, in which the saliency of the moving objects that have obvious moving characteristics is enhanced while the saliency of the background is inhibited. The maximum entropy sum algorithm and the modified fuzzy growing method are applied to adaptively extract the ground truth of the moving objects. The proposed method does not require user interaction or parameter tuning as most of the preceding works did. The system detects moving objects with high accuracy and robustness. The proposed whole-body object tracking algorithm successfully tracks objects in consecutive frames. The proposed algorithm is based on the frame difference. Another extension is to use the proposed approach for some consumer video applications in bank security systems. The system can be made more robust by incorporating different fire color spectrums and fusion of thermal images. These methods we presented for “smart” visual surveillance show promising results and can be both used as part of a real-time surveillance system or utilized as a base for more advanced research such as activity analysis in video. The advanced technics such as GLCM (grey level co-occurrences matrix) is also implemented for improved features and accuracy.

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