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A SURVEY ON VIDEO OBJECT TRACKING AND SEGMENTATION WITH EFFECTIVE THRESHOLD DECISION IN SMART SURVEILLANCE SYSTEMS

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Abstract: Video object segmentation and tracking these are two important factors of smart surveillance systems. However, there are several issues that need to be resolved. Effective Threshold decision is a difficult problem for video object segmentation with a multi-background model. In this project, video object segmentation and tracking framework is proposed for smart cameras in visual surveillance networks with two major building blocks. Firstly, a local threshold decision algorithms which will be effective for video object segmentation with a multi-background model. The local version of automatic threshold decision can be developed to reduce the required memory size by generating the threshold values. In Second, a video object tracking framework based on a particle filter function composed of diffusion distance for measuring colour histogram and motion clue from video object segmentation is used. In addition, more powerful post processing for the object masks, such as Shadow and ghost region removal, can be further integrated into the object segmentation subsystem.

Keywords: Threshold Decision, Diffusion Distance (DD), Particle Filter, Tracking.

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INTRODUCTION

The prevalence of surveillance in our society grows by leap and bound .Scarcely, a day goes by without a story in the media about some new surveillance activity that has just come to light. The emergence of "smart "surveillance technology and the combinations of such technologies. Surveillance system and technologies are no longer confined to law enforcement authorities, intelligence agencies and the military - modern information technology has manifested surveillance as everyday phenomenon. Surveillance technology monitors traffic on road and passengers on the underground; government services use surveillance technology to check who is really entitled to social services. [1]Smart cameras are real-time distributed embedded systems that perform computer vision using multiple camera are being studied. They represent a prominent example for embedded computer vision. [2]In recent year, video segmentation & Tracking get the most attention as they are critical building blocks for other smart surveillance system. & continuously increasing interests to support a variety of video applications. Such as video monitoring, annotation and indexing. The moving object tracking in video pictures has attracted a great deal of interest in computer vision. For object recognition, navigation systems and surveillance systems, object tracking is an indispensable first step. Object tracking has significance in real time environment because it enables several important applications such as Security and surveillance to recognize people, to provide better sense of security using visual information. [5] Video segmentation, which extracts the shape information of moving object form the video sequence. However the shape information of moving objects may not be available from the input video sequences; therefore, segmentation is an indispensable tool to benefit from this newly developed coding scheme. [10] In visual surveillance Foreground segmentation is an important component, which segments foreground objects from the background scene for high-level processing.[3]Foreground Objects could be moving, Background subtraction is a typical approach for foreground detection, which detects foreground regions by evaluating the difference between the input image and a reference background image.[4] Histogram-based local descriptors are used widely in various computer vision tasks such as shape matching , image retrieval and texture Analysis .Histogram-based local descriptors are very effective for these tasks because distributions capture rich information in local regions of objects. [6] A local threshold decision algorithms which will be effective for video object segmentation with a multi-background model. A multi-background registration scheme proposes to model complex and dynamic backgrounds. The local version of automatic threshold decision can be developed to reduce the required memory size by generating the threshold values. Hence, it can enable good performance for conditions with dynamic backgrounds without threshold tuning by developers. [7] In addition, it is based on a

mechanism that is different from that of background subtraction-based video object segmentation, which can prevent possible error propagations.

I. RELATED WORK

In 2002 Shao-Yi Chien and Shyh-Yih Ma proposed a background registration technique is used to construct a reliable background image from the accumulated frame difference information. The moving object region is then separated from the background region by comparing the current frame with the constructed background image [10]. Latter, in 2004 Shao-Yi Chien& Yu-Wen Huang showed that a fast video segmentation algorithm for MPEG-4 Camera systems. With change detection and background registration techniques, this algorithm can give satisfying segmentation results with low computation load [11] .Then, Kyungnam Kima and Thanarat H. Chalidabhongsea proposed real-time algorithm for foreground–background segmentation. Sample background values at each pixel are quantized into codebooks which represent a compressed form of background model for a long image sequence [7]. Recent background subtraction methods with respect to the challenges of video surveillance suffer from various shortcomings. To address this issue, first identify the main Challenges of background subtraction in the field of video surveillance [3].In 2010, a novel Differential EMD (DEMD) algorithm based on the sensitivity analysis of the simple method and offers a speedup at orders of magnitude compared with its brute force Counterparts. The DEMD algorithm is discussed and empirically verified in the visual tracking context. The deformations of the Distributions for objects at different time instances are accommodated well by the EMD, and the differential algorithm makes the use of EMD in real-time tracking possible [5]. In the next-generation visual surveillance systems, content analysis tools will be integrated. In this paper, to accelerate these tools, it is proposed to integrate a hardware content analysis engine into a smart camera system-on-a-chip [1].

III. PROPOSED PLAN OF WORK

A. Threshold decision for video object segmentation

In threshold decision for video object segmentation play an important role with a multi-background model. The system focused on the model complex and dynamic backgrounds. To make it fully automatic for variant conditions, an automatic threshold decision technique that can automatically and precisely determine the threshold values for dynamic Backgrounds is propose and presented. The segmentation algorithm is also designed with a low memory requirement for background storage.

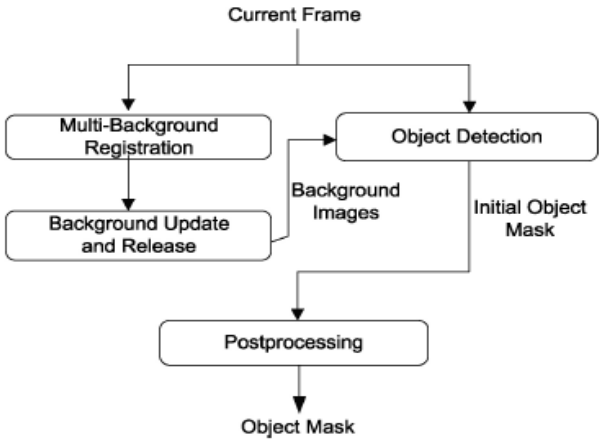

Fig. 1. Block diagram of the video segmentation algorithm.

1. Video Object Segmentation with Multi bacekground Registration

In this phase focused on an online multilayer background modelling technique called multibackground registration (MBReg), whose block diagram is shown in Fig.1. The key concept in this algorithm is the fact that it models the background with N layers of background images Instead of a single background layer. For each pixel position, the corresponding pixel in each layer of the background image represents one possible background pixel value.

2***. Threshold Decision***

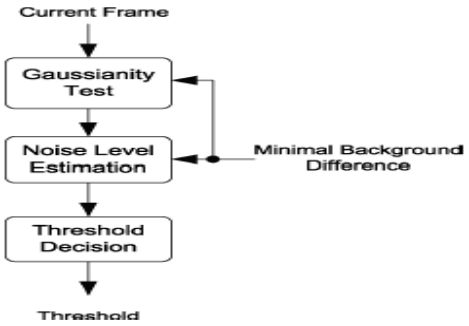

Fig.2. Block diagram of threshold determination algorithm

The threshold decision algorithm for our video object segmentation algorithm with multiple backgrounds. In addition to the ability to address dynamic backgrounds, the threshold decision algorithm required must have several desirable characteristics. First, it must be able to determine the optimal thresholds without any user input. Second, since background

subtraction-based video object segmentation may cause an error propagation problem while updating the per-pixel background model, a threshold determination algorithm that is based on a different mechanism is required. The threshold decision algorithm outlined in Fig. 2. The algorithm is based on the assumption that the camera noise is in the zero-mean Gaussian distribution, and the camera noise is the only factor affecting the optimal thresholds. The algorithm consists of three sections: Gaussianity test, noise level estimation, and threshold decision.

B. Video Object Tracking

Video tracking is the process of locating a moving object (or multiple objects) over time using a camera. Video tracking can be a time consuming process due to the amount of data that is contained in video. Adding further to the complexity is the possible need to use object recognition technique for tracking, a challenging problem in its own right[8].

1. Particle Filter

The particle filter is a sampling, importance measuring, and resampling (SIR) framework to estimate the underlying posterior distribution of the system state.

2 .Colour Histogram

In video object tracking, different kinds of features, such as color, texture, and gradient can be utilized to measure the importance of particles, where the distance functions, which are defined for those features, between the tracked object of the previous frame and each assumption (particle) in the current frame are calculated. For tracking no rigid objects, a color histogram is usually utilized since the stability of a color histogram is better than that of other features under the no rigid motion. However, a color Histogram suffers from appearance variations due to changes in illumination. Therefore, a histogram distance calculation scheme that is robust to changes of illumination is critical for object tracking [6].

IV.CONCLUSION

There are several future directions for the framework. First, local thresholds should be effective for some conditions, and the local version of automatic threshold decision can be developed to reduce the required memory size by generating the threshold values on-the-fly. In addition, more powerful post processing for the object masks, such as shadow and ghost region removal, can be further integrated into the object segmentation subsystem.

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