REAL-TIME VIDEO OBJECT SEGMENTATION ALGORITHM BASED ON CHANGE DETECTION AND BACKGROUND UPDATING

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ABSTRACT. This paper proposes an efficient real-time video object segmentation algorithm based on change detection and background updating. The basic idea is to use the change detection technique to analyze temporal information between successive frames for extracting the change region. Then, the combination of frame difference mask and background subtraction mask is employed to quickly acquire the initial object mask and further solve the uncovered background problem and still object problem. Moreover, the novel hierarchical boundary refinement is introduced to overcome the shadow influence and residual background problem. The objective evaluations of the proposed algorithm demonstrate that the spatial accuracy can be maintained above 95% for most normal cases.

Keywords: Video object segmentation, Change detection, Background updating

1. Introduction. Conventional video-coding standards, such as H.261/H.263 and MPEG-1/MPEG-2 that employ the frame-by-frame coding policy, can’t provide high-level feature of video contents. The MPEG-4 coding standard [1] has introduced the concept of a video-object plane (VOP) as the basic coding element for supporting visual multimedia communication and will be applied to many multimedia content descriptions [2], and intelligent signal processing, such as, digital video surveillance system and video conference. Each VOP contains the shape and texture information of semantically meaningful object in the scene. In order to encode video objects using object-by-object in video sequences rather than frame-by-frame and achieve the content-based manipulation for video content, automatic video segmentation will play an important role of deriving VOP from video sequences in MPEG-4 video part. For many practicable multimedia applications of real-time demand, a fast and efficient video segmentation algorithm will be very important.

Basically, video object segmentation algorithm can be coarsely classified into two types, semi-automatic and automatic. In semi-automatic algorithm [3,4], user must first defines a high level semantic object of interest to be segmented and detect the object’s boundary in keyframe by way of manual. Then, the extracted object of interest region is used to segment this object occurred in the video sequences. The user interaction based algorithm can give better segmentation results than automatic algorithm, but it may be unsuitable in real-time applications due to the fact that an interest object needs to be specified by