

FOREGROUND EXTRACTION-BASED VIDEO OBJECT SEGMENTATION USING MOTION INFORMATION AND GRADIENT COMPENSATION

WU-CHIH HU AND JUNG-FU HSU

Department of Computer Science and Information Engineering
National Penghu University of Science and Technology
No. 300, Liu-Ho Rd., Makung, Penghu 880, Taiwan
{ wchu; d98523002 }@npu.edu.tw

Received March 2010; revised July 2010

ABSTRACT. *This paper proposes a foreground extraction-based method for video object segmentation using motion information and gradient compensation. In the proposed method, the coarse foreground extraction and fine foreground extraction are obtained by using the motion, edge and gradient-variation information. Then, the video object is extracted by using the horizontal/vertical filling scheme based on the coarse foreground extraction and fine foreground extraction. Finally, video object refining is used to obtain more accurate video object segmentation. Experimental results show that the proposed video object segmentation has good performance in sensitivity, specificity, spatial accuracy and execution time.*

Keywords: Video object segmentation, Motion information, Foreground extraction

1. **Introduction.** Segmentation of objects in video sequences is very important in many aspects of multimedia applications. Video object segmentation is an important key technology for content-based video coding, representation, indexing, and retrieval. Video object segmentation can be described as a method of extracting the foreground object (moving object) from each frame of a video sequence. Video object segmentation requires consistent object labeling throughout the video sequence, where the consistent object labeling would be color, texture, motion, spatial-temporal structure, etc. Video object segmentation can also be applied to some interesting and potential applications, such as video surveillance [1,2], digital watermarking [3], behavior analysis of sport video [4] and advanced story retrieval [5].

Many methods have been proposed for video object segmentation. Generally, these methods can be roughly classified into two types [6]: background construction-based video object segmentation [6-9] and foreground extraction-based video object segmentation [10-13]. In background construction-based video object segmentation, the background information is first constructed. Then, an initial video object is obtained based on the difference between the background and the current frame. Finally, a video object in the successive frame can be obtained by using object tracking or background subtraction. Background construction-based video object segmentation can keep object tracking with fast moving objects. Furthermore, its computational cost is low and its implementation is easy.

In foreground extraction-based video object segmentation, temporal information, spatial information, or temporal-spatial information is first used to obtain an initial video object. Then, the video object in the successive frame can be obtained by using motion information, change information and other feature information. In contrast to background