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STATISTICAL BINARY EDGE FREQUENCY ACCUMULATION MODEL FOR MOVING OBJECT DETECTION

Mahbub Murshed, Adin Ramirez, Jaemyun Kim and Oksam Chae

Department of Computer Engineering
Kyung Hee University
Yougin-si, Gyeonggi-do 446-701, South Korea
mmurshed@gmail.com

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Abstract. *We propose an edge segment based statistical background modeling algorithm and a moving edge detection framework for the detection of moving objects using a static camera. Traditional pixel based methods create difficulties to update the background model. They also bring out ghosts while a sudden change occurs in the background. Although edge based methods are robust to illumination variation and noise, existing edge-pixel based methods suffer from scattered moving edge pixels since they cannot utilize edge shape information. Moreover, traditional edge-segment based methods treat every edge segment equally creating edge mismatch due to non stationary background. This paper presents an edge-segment based statistical approach to modeling the background by using ordinary training images that may even contain moving objects. The proposed method relies on background edge segment matching; thus it does not leave any ghost behind. Moreover, the proposed method uses a statistical model for every background edge segment individually that makes the approach robust to handle camera movement as well as adapt to background motion (moving tree branches). Experiments with natural image sequences show that our method can detect moving edges efficiently under the above mentioned difficulties.*

Keywords: Background modeling, Statistical distribution map, Moving edge segment, Edge segment matching

1. **Introduction.** Detection of moving objects has been an important research topic for the past few decades having prevalent applications in a variety of disciplines. A simple but popular method for moving object detection is the background subtraction. Here moving objects are obtained from the difference image, made from the difference between the current frame and the background model. Existing approach to background model initialization assumes that a sequence of motion free frames is available prior to building the background model [1]. In case of a surveillance area, a busy street or in a public place, it is very difficult to collect training background frames without any moving objects in it. Background modeling becomes more challenging while there are illumination variations and noise in the background. This becomes worse in the outdoor environment due to weather condition, reflectance, motion in the background (waving tree branch), and unintentional camera motion. Moreover, color, pattern or shape of a background sometimes resemble a moving object [2]. Thus, to adapt to this changing environment, the background model needs to be updated in every frame with an adaptation rate. Existing methods do not consider object's motion for the selection of optimal update rate but rather they set a common rate for updating every background pixel. Thus the pixel intensity based moving object detection methods leave ghosts (especially when a sudden change occurs for slowly moving objects) behind them [3]. Additionally, to segment the