Moving Objects Detection Based on the Precise Background Compensation Under Dynamic Scene

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ABSTRACT

In order to detect the moving object under dynamic scenes accurately, this paper proposes a moving object detection method which is based on the precise background compensation. First, the SURF (Speeded-Up Robust Features) algorithm is used to extract feature points, and the BBF (Best-Bin-First) search algorithm is adopted to match feature points, in addition the reverse constraint strategy is employed to remove the mismatching points. To enhance the accuracy of the background compensation, a dynamic threshold is set to remove the target feature points influence for the global motion parameters. At last, a combination of interval three-frame-differencing and morphological method is used to detect the moving objects. Experimental results show that this method has good performance on multiple moving targets detection.

Keywords: Background Compensation, Dynamic Scenes, Moving Object Detection, Outliers Filter, SURF (Speeded-Up Robust Features)

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INTRODUCTION

The main task of the moving object detection is how to detect moving objects from video sequences accurately. It is the relevant content in the area of computer vision and essential to the following steps of target identification, tracking and behavior analysis in video sequences. It is necessary to detect moving targets in real time and accurately in practical applications.

Currently, the research of moving object detection under a static scene is relatively experienced. The classical algorithms of which are background model, optical flow and inter-frame difference method (Papageorgiou, Oren, & Poggio, 1998).

Due to the impact of the camera movement, most of the algorithms under the static scene are unfit for dynamic scenes except for optical flow method. The methods is based on the consistency of the moving target vector in a small area, as well as the difference of the background and moving object motion vector (Zhang, Kiselewich, Bauson, & Hammoud, R, 2006; Maddalena & Petrosino, 2008). Then extract the moving object. However, it is sensitive to light, and large amount of calculation limit the application. Some researchers have proposed moving target detection method based on the statistical models (Li, Huang, Gu, & Tian, 2004; Ugeau, & Perez, 2007). They adopt simple algorithm to estimate the motion vector field roughly, and then establish the discontinuity point distribution model of the motion vector field. The moving object can be extracted through the detection of discontinuities. In Cootes, Hill, and Taylor (1994), authors proposed a method of combining the statistical models and the Snake model algorithm, which can extract the moving targets efficiently. But perfect accuracy highly relies on the prior knowledge. Many scholars have proposed moving target detection method based on background compensation to ensure real-time detecting. In Tuzel, Fatih, and Peter (2006), authors proposed a moving target detection algorithm based on region-matching. But the area is difficult to be divided reasonably and extracted accurately. In Hariharakrishnan and Dan (2005) and Gyaourova, Kamath, and Cheung (2003), authors proposed moving object detection algorithm based on block-matching, which has good performance in the simple background. But in the case of complex background, rotation and translation of the camera or other significant nonlinear motion, the accuracy will be greatly reduced. The precision of background compensation and running time of the algorithm depends on the block size greatly. Thus, in (Lowe, 1999) a moving target detection algorithm was proposed based on the thoughts of feature points matching. The method used the feature extraction algorithms to extract meaningful feature points, then matches the points and calculates the global motion parameters to compensate the background of the movement. The precision of the background compensation may be affected by the accuracy of the feature points matching and the interference of the target feature points on the global motion estimation. The moving objects detection based on the background compensation largely depends on the accuracy of the background compensation. Thus, paper proposes a moving object detection method based on the precise background compensation.

This paper is organized as follows: First we give a brief review of the algorithm. Then provide the Global motion estimation, the solution of the global motion parameters and
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