Reliability Analysis of Multi-Objective Spatio-Temporal Segmentation of Human Motion in Video Sequences

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ABSTRACT

In view of the problem of uneven distribution of edge contour of multi-target human motion image in video sequence, which leads to the decline of target detection ability, an algorithm of multi-target spatial-temporal segmentation of human motion in video sequence based on edge contour feature detection and block fusion is proposed. Firstly, a multi-target spatial-temporal detection model of human motion in video sequence was constructed, extracting video image frame sequence, using discrete frame fusion method to segment and fuse moving target image, matching moving multi-target in video sequence, secondly segmenting motion features in moving target image, combining with SURF algorithm (speeded up robust features, accelerated robust features) to detect and extract human motion objects in video sequence. The experimental results show that the gray histogram of human motion multi-target space-time segmentation is close to the original image histogram, and the detection and recognition ability of human motion target is improved.

KEYWORDS

Fusion, Human Motion, Multi-Objective Space-Time Segmentation, Reliability, Video Sequence

1. INTRODUCTION

With the development of image processing technology, video sequence monitoring methods are used to monitor human motion targets, and the ability to detect and recognize human motion in video sequences is improved. In a multi-frame video sequence, the amount of information carried by the video sequence is increasing. At this time, the edge contours of the video image are unevenly distributed, which reduces the reliability of the spatiotemporal segmentation of the moving multi-target and affects the acquisition of external world information. Therefore, it is of great significance to study the reliability analysis method of human motion multi-target spatiotemporal segmentation in video sequences (HUANG et al., 2014).

Video motion segmentation is a relatively important research area in the field of computer vision. Advances in computer technology have brought about greater development for video motion image segmentation. The quality of the segmentation conditions determines the development process of related research content. It has many applications in moving target tracking and target recognition. High-precision segmentation can guarantee the understanding of moving targets (SHEN et al.,2015).

A high-resolution recognition model of motion features in human motion target images in video sequences is constructed, and fuzzy correlation feature detection method is used to optimize detection of motion features in human motion target images in video sequences (Zhao et al.,2018). And analyze the motion feature information in the human moving target image in the video sequence. In the traditional methods, the spatiotemporal segmentation of human motion in a video sequence mainly includes wavelet segmentation, edge contour feature segmentation, and gray-invariant moment segmentation (NIU et al.,2016).

For segmentation of multi-target moving human body regions in video, the mainstream methods include background difference method, optical flow method, inter-frame difference method and minimum energy method (LV et al.,2016; RADENOVIC et al.,2016). In the traditional background difference method, in the moving target detection based on the background difference method, the accuracy of background image modeling and simulation directly affects the detection effect. Regardless of any moving target detection algorithm, it must meet the processing requirements of any image scene as much as possible (AZIZPOUR et al.,2015), but due to the complexity and unpredictability of the scene, as well as the existence of various environmental interference and noise, such as sudden changes in lighting, actual background images The fluctuation of some objects, the shaking of the camera (AZAVIAN et al.2016; MENG et al.,2017), the influence of moving objects in and out of the scene on the original scene, etc., make the modeling and simulation of the background more difficult.

Aiming at the above problems, this paper proposes a multi-target spatiotemporal segmentation algorithm for human motion in video sequences based on edge contour feature detection and block fusion. Construct a multi-target spatiotemporal detection model of human motion in a video sequence, use discrete frame fusion to fuse human motion target images in a video sequence, and establish a human motion multi-target block matching model in a video sequence. Combined with the SURF algorithm to detect and extract motion features in human moving target images in video sequences, multi-target spatiotemporal segmentation was performed based on edge contour distribution. Finally, simulation experiments are performed. The first part of this paper introduces the introduction and related work, the second part introduces the algorithm of this paper, the third part introduces the results and discussion, and finally the conclusion.

2. RELATED WORK

Literature (Yang et al.,2017) proposed a multi-granularity segmentation algorithm based on time-frequency analysis. The algorithm uses sparse reconstruction to pre-segment the motion sequence in the time domain analysis stage. The multi-scale time-series correlation method is used to segment the original motion sequence into independent behavior fragments and mixed motion primitives to achieve coarse-grained segmentation. Further, in the frequency domain analysis stage, feature extraction is performed on each independent behavior segment at the main frequency. Combined with zero-speed crossing detection and adaptive K-means algorithm, each independent behavior segment is divided into multiple repeated sub-period segments to achieve fine-grained segmentation. Literature (Zhao et al.,2018) proposed a multi-objective evolutionary adaptive threshold image segmentation algorithm combined with multiple groups. Under the joint evolution framework of multiple grouping populations, the image threshold is obtained by simultaneously optimizing the inter-class variance criterion and the fuzzy entropy criterion. During the evolution process, self-adjusting crossover and mutation operations are used to generate the offspring population and the threshold number is automatically determined. However, in the threshold acquisition process, the edge contour distribution of the image is uneven, which reduces the adaptability of image segmentation. Literature (Wang and Liu,2018) proposed a multi-target image segmentation algorithm based on local features. The algorithm uses a binocular camera to collect scene images, preprocesses the scene images, and simultaneously obtains the depth information of the scene through stereo matching. Determine the target area by

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