Video Abnormal Behavior Detection Based on Generating Countermeasure Network

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Abstract: Video surveillance, as a widely used security monitoring technology, has been given great significance since the beginning of its development. In order to make correct abnormal judgment, it is necessary to track the moving target accurately. Intelligent surveillance technology is an important application field of computer vision, which has great research and application value in military and civilian applications. In the anomaly detection model based on clustering and classification, anomaly detection is considered as a pattern recognition problem. In the judgment of abnormal targets of public monitoring, human behavior has great contingency, and various environments are also very different. Pedestrian and abnormal behavior detection techniques face many challenges and opportunities in the fields of computer vision and pattern recognition. This paper is based on the generation of confrontation networks, with intelligent surveillance video analysis as the main research content, and targets human abnormal behavior detection. The research status and development of intelligent video surveillance system are elaborated.

1. Introduction

With the progress of society, people's quality of life has been further improved. Video surveillance, as a widely used security monitoring technology, has been given great significance since the beginning of its development. In order to make correct abnormal judgment, it is necessary to track the moving target accurately [1]. The main research content of computer vision is to analyze and process video images or multi-dimensional data by using computers instead of human beings, including various pictures and confrontation networks. Intelligent surveillance technology is an important application field of computer vision, which has great research and application value in military and civilian applications [2]. With the gradual decline in the price of surveillance equipment such as cameras, video capture cards, etc., video surveillance systems have been widely used in a variety of applications. Video anomaly detection mainly includes three steps: moving target detection, moving target tracking classification and information extraction and abnormal target judgment [3]. The purpose of video surveillance is to detect anomalous events. Therefore, automatic monitoring, that is, letting the computer analyze and detect the abnormality in the video itself can save manpower and material resources. In the optical flow field algorithm, each pixel in the image needs to construct a motion vector to record the state of the pixel.

Intelligent surveillance video analysis uses computer vision theory and video analysis methods to analyze the confrontation network recorded by cameras and other monitoring devices without human intervention [4]. As an important part of the field of computer vision, the emergence of video content analysis, especially the research of anomaly detection algorithms, also points out a new development direction for the use of surveillance video information [5]. Scholars have studied video anomaly behavior detection from different angles. In the abnormal behavior detection model based on clustering and classification, anomaly detection is considered as a pattern recognition problem [6]. In the judgment of anomalous targets in public surveillance, people's behavior is very contingent, and various environments are also very different [7]. Intelligent video analysis technology is the application of artificial intelligence, computer vision and bioinformatics technology in the field of video analysis and monitoring. For intelligent surveillance system, target detection in scene, real-time tracking of target and analysis of target behavior are its core issues [8]. Regarding the monitored area as a whole, the energy related to group movement is extracted, and

then the normal or abnormal behavior is judged by comparing with the threshold value.

2. Principle of Abnormal Target Detection Method

Moving object detection is to segment the moving object in the scene, and its processing results directly affect the accuracy of subsequent moving object tracking. The emerging digital video surveillance system has gradually replaced the traditional analog video surveillance system and become the mainstream in the field of video surveillance. Pedestrian and abnormal behavior detection technology in video has special and important needs and significance in people's daily production and life as well as in the military field. The set of optical flows in the scene form a vector field, which is also referred to as the optical flow field. As the basis of video analysis technology, optical flow field method is an important step in the implementation of algorithms such as target tracking, behavior analysis and anomaly detection. The inferred abnormal behavior detection model considers that the video positive anomaly has certain regularity. Anomaly detection is the law of discovering an event, and it is inferred whether an abnormality occurs according to the law.

In the trajectory-based method, it is first necessary to track the objects in the video and acquire the trajectory of each object, and then model based on the features of the trajectory to detect the abnormality. Abnormal behavior in various abnormal behavior judgment systems is subjectively defined, and there are great differences between different systems. The commonly used foreground extraction method is analyzed, and a foreground extraction method based on the improved mixed Gaussian model to construct the background model is proposed to extract the motion foreground from the confrontation network. If the object of interest is not well segmented and well tracked, it is difficult to conduct a better behavior analysis [9]. In the aspect of moving target detection, it is difficult to get a sTable background because the outdoor background often changes. In the process of behavior analysis, foreground characters are obtained by background modeling and segmentation. The tracking results and training templates are used to analyze the behavior according to certain rules. The motion of the target is usually reflected in the gray level change between the adjacent frames of the countermeasure network, which maps the energy field generated by the motion to the optical flow field.

In the field of machine vision, there may be several scene changes in a video. For a fixed scene, the image in the scene may evolve continuously. If there is a moving object, that is, there is relative motion between the moving object and the background image. The velocity vectors formed by moving objects are different from those of neighborhood background. There are some gaps in intelligence, especially in practical applications, which are limited by many factors, and need to be further improved. Figure 1 is the framework of motion detection and tracking system using dense parallax variance technology.

The video anomaly detection can be divided into a trajectory-based method and a local motion feature based method according to different motion feature extraction. Motion-based methods use optical flow or background difference methods to extract features from the original video and then use the extracted features to train a model. In the aspect of target tracking, the method of search matching is used to transform the tracking problem into a search matching problem. This method is simple and feasible, and is suiTable for real-time monitoring requirements. Abnormal behavior detection based on supervised learning can not only learn the information of normal behavior, but also integrate the useful and more critical information of abnormal behavior into the model. Because the background is often affected by the surrounding environment, it is difficult to accurately describe the pixel value of the background point with only one Gauss distribution function. Abnormal behavior detection is a process that distinguishes normal behavior from abnormal behavior. Dynamic shadows are the shadows caused by the uneven sunshine and illumination of the moving object during its movement, because it moves with the moving object. Therefore, in the detection of moving area, it will always be regarded as part of the moving target, because the moving position of the target is different.
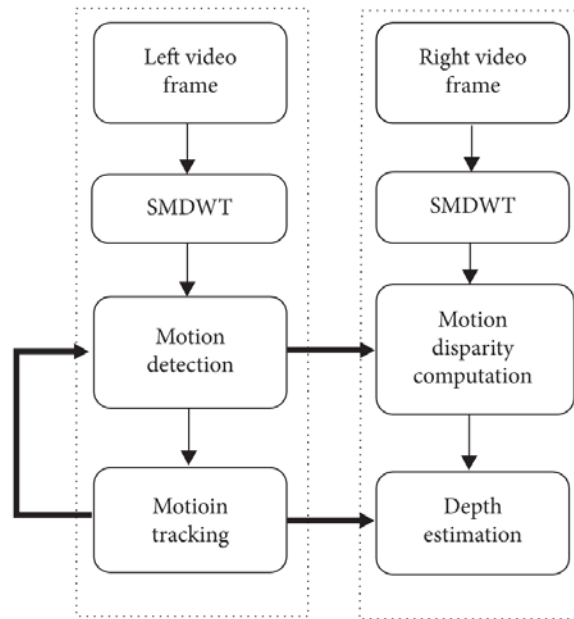
Fig. 1 Motion detection and tracking system framework using dense parallax variance technique

3. Video Abnormal Behavior Detection Based on Generating Countermeasure Network

There are two main types of shadow processing: model-based and feature-based. Video abnormal behavior detection by active learning method needs to solve two problems: learning engine and selection engine. Learning engine is responsible for maintaining a benchmark classifier, such as support vector machine. According to the statistical characteristics of shadows, a statistical model of shadows is established. Finally, the trained model is used to determine whether each pixel belongs to the shadow area. Usually space-time blocks are used to describe part of the behavior, expressing the overall behavior by using a combination of multiple space-time blocks. To perform shadow detection, an accurate and timely background restoration map must be obtained. When using time-space blocks to detect abnormal behavior, we inevitably encounter problems of behavioral diversity, even if the behavior of the same concept has different patterns.

To obtain the motion information of the target, it is necessary to extract the state information of the target at different times. It is very important to achieve sTable and reliable motion area detection and foreground extraction in different environments. On an image plane, the motion of an object is often manifested by the difference in the grayscale distribution of different images in the sequence of images. The algorithm expects the variance of the data to be the largest in the projected dimension, so that the data can retain more original attributes under the premise that the dimensions are as low as possible. In video analysis, the current motion information used to describe video is mainly the optical flow method [10]. In gray-scale image, the gray-level information of the target is the most important information representation of the image. Although it loses the spatial information of the target, it is still the most useful feature information in gray image retrieval and matching. When the motion field in space is transferred to the image, it is shown that the optical flow field reflects the change trend of gray level at each point in the image. Optical flow field is a two-dimensional vector field. The information it contains is the instantaneous motion vector information of each image point.

The unbalanced distribution of positive and abnormal samples is fully considered when recommending sample markers. The abnormal and uncertain samples are selected by active learning method, and the detection model is updated iteratively through expert interaction. If the pixel features or pixel regions of the corresponding locations have a certain degree of difference, then the pixel or pixel regions of the locations in the frame video image are considered to have changed. These change regions are then extracted according to different judgment criteria to constitute a foreground target motion region. Figure 2 shows the human height estimation model using the
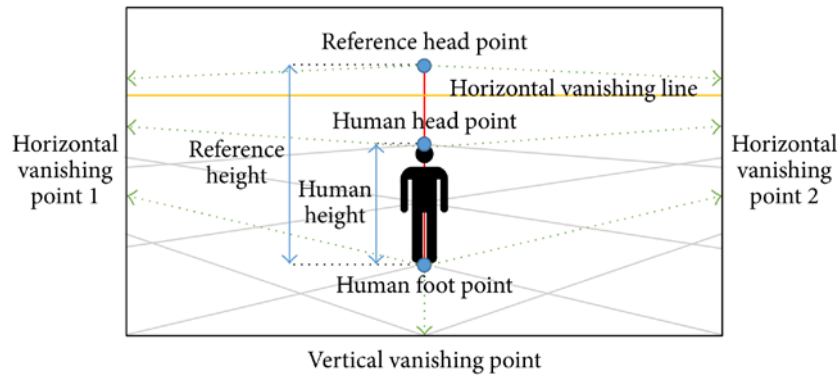
reference height.

Fig. 2 Human height estimation model using reference height

For complex scenarios, a single background extracted from the adversarial network is no longer applicable. The two-dimensional velocity field is correlated with the gray level, and the optical flow constraint equation is introduced to obtain the basic algorithm of optical flow calculation. Different applications have different definitions of positive anomalous behaviors, and even for the same database, the abnormal behaviors defined by different research applications are not the same. The main task of image segmentation is to identify and analyze specific regions of the image with special properties, and to separate and extract these regions of interest. In the foreground extraction against the network, the current video frame and the background are generally subtracted to obtain a background difference map. Then the foreground mask is obtained by choosing the appropriate threshold to binarize the background interpolation. Gray histogram is usually used to organize gray information based on target gray level, while Bhat-tacharyya coefficient and Euclidean distance are most commonly used to calculate gray level similarity. Pixels in different regions have different characteristics, which can refer to the gray level, color, texture and so on. The purpose of image segmentation is to find representative feature attributes and classify the pixels with the same feature attributes into the same region.

4. Conclusion

With the great improvement of the ability of computer to process video information, and the price of surveillance equipment such as camera, video capture card and so on, the demand of video surveillance system has been greatly increased. Pedestrian and abnormal behavior detection technology faces many challenges and opportunities in the field of computer vision and pattern recognition. The research of these two technologies is of great theoretical and practical significance to scientific research and production. Social development inevitably produces various kinds of social problems, among which public security, as a major issue related to personal life and property security, is also the focus of public attention. The traditional anomaly detection algorithm usually performs unified feature extraction on the abnormality in a general way, which will cause unreasonable use or even loss of motion information, and thus cause a high false detection rate of abnormality detection. When small targets overlap together. Since there is no original record, it will be detected as a target, causing false detections and missed judgments. This paper mainly uses the target anti-network information to detect and match, and can add other information such as texture to obtain more accurate judgment.

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