Research on Detection and Recognition of Abnormal Behavior in Video

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Abstract. In order to solve the problems of low detection efficiency and long working time in traditional video surveillance systems for abnormal behavior detection and recognition methods, a new method for abnormal behavior detection and recognition in video surveillance systems is proposed. This method first completes image preprocessing through four steps: video image noise filtering, image grayscale correction, binarization processing, and image edge detection; then, based on the characteristics of the image abnormal target, the key frame of the abnormal image is detected and the data is dissected to complete the abnormal behavior detection of the video monitoring system; finally, analyze the video image rules through adaptive algorithms, and use the computer's visual detection principle to change with the scene environment to identify the abnormal behavior of the video surveillance system. In order to detect the effect of the method, a comparative experiment was set up. The experimental results show that the new method can accurately detect abnormal behavior in a short time and has a strong working ability.

1. Introduction

In the context of comprehensive economic and social development, social security issues have gradually become one of the main problems of society. Therefore, a large number of high-definition camera monitoring devices are distributed in cities. However, most monitoring equipment only serves as a record. It is impossible to alarm the abnormal behavior. Traditional camera monitoring equipment cannot monitor abnormal behavior for a long time based on manual operation, and this equipment is very wasteful of resources. It is impossible to analyze and process the monitored behavior, which has great limitations in terms of use [1].

Relevant experts and scholars have conducted in-depth research on abnormal behavior detection and recognition methods in video surveillance systems, and are committed to improving the problems of low detection rate and long working hours. Li Ming et al. Proposed a laboratory abnormal behavior detection method based on video image processing, that is, first continuously collecting multiple frames of video images in a video surveillance system, using a filtering method to construct a background image, and introducing an improved background difference algorithm on the background image Extract the complete target contour, then integrate the contour features according to the linked list method, and use the SVM classifier to detect abnormal behavior [2]. This method can accurately detect abnormal behavior in video surveillance, but the detection step is cumbersome and takes a long time The method for detecting and locating abnormal targets in the video surveillance system proposed by Hu Zhengping and Eigenday extracts the two-dimensional visual features in the video surveillance system according to the video frames, obtains the information between the video frames, and tracks the video targets according to the information; using the 3D spatio-temporal feature learning method, Describe the spatiotemporal interest block containing motion information, use pattern classification to detect
abnormal behavior, and locate the location of abnormal behavior. This method improves the detection efficiency and reduces the time spent on work based on the above traditional methods. But still can not achieve the desired effect [3].

In response to the above problems, this paper designs a new method for detecting and identifying abnormal behaviors in video surveillance systems. This method finds certain motion laws and uses adaptive algorithms to process and analyze the laws to achieve the purpose of detecting and identifying abnormal behaviors in the video surveillance system.

2. Video information image preprocessing
After the video image is segmented, the specific characteristics of the video moving target cannot be expressed normally, so it is necessary to preprocess the video information image. The preprocessing mainly includes basic operations of video image detection, information recognition, original image noise filtering, grayscale correction and other operations.

The first step: video image noise filtering [4].

When collecting the target image, the electronic video image will suffer from external system interference, so it is necessary to use the image processor to improve the clarity of the video image, and then improve the accuracy of the video image through processing and analysis. The data is filtered in the spatial domain and in the exchange domain. The filtered image sound wave diagram is shown in Figure 1.

![Image sound wave diagram](image_url)

The second step: image grayscale correction.

In order to reduce the amount of calculation of the image algorithm and avoid the occurrence of distortion to a certain extent, the bilinear interpolation algorithm is used to correct the grayscale of the video image to obtain clearer video information.

The third step: binary processing.

Binary processing of video images can simplify video images, while reducing the number of system operations, clarifying target contour information, and reprocessing images on this basis.

The fourth step: image edge detection.

In the image change, the digital images are marked with icons with clear brightness, reducing the amount of image data to be analyzed, deleting irrelevant information content, while retaining the basic frame attributes of the image, and adopting three techniques of filtering, enhancement and detection.
3. Video image abnormal moving target detection
By statistically calculating the gradient histogram of the video image, the clear image abnormal target features are obtained, and the key frames of the moving abnormal target image are detected and the data is dissected. Through the comparison of the video image frame, it is analyzed whether the image has changed, and in the case of the image unchanged, the image frame is further analyzed and processed according to the JPEG standard encoding. After the standard JPEG image encoding process, what is captured is a relatively continuous image key frame. For these key frames, first use the frame as the basic unit through the decoding process and continue to place it in the memory buffer space, and then use the function algorithm to convert the continuous associated frame in the buffer space into a bit-shaped video image and place it in the Contrast analysis in other spaces, analyze image target features, and conduct regular query. Differential calculation is performed on two or three frames of image information that are continuous in time, and the corresponding points of different images are subtracted. From this calculation result, it can be inferred whether the gray index of the image exceeds the standard threshold. It can be judged as a feature of a moving target, and the relevant image laws can be obtained, so as to realize the query of the moving target image.[5]

In the process of the three-frame difference method, an appropriate threshold should be selected. If the threshold is too small, the system cannot control the noise interference in the differential image; when the threshold is too large, it will cover part of the information in the differential image. For the above situation, the difference image can be processed according to the changes of the light path O and the light path O1 of the video image scene. The smaller the light value in the scene, the closer the additional value of the data image is to 0; the larger the light value in the scene, the additional value of the data image will also be larger and larger, so that the detection result of the video image moving target can be avoided. The influence of light, and at the same time reduce the interference factors of image query and acquisition. The basic steps of moving target recognition are as follows: extract the characteristics of the acquired moving target, construct an image database of the acquired moving target, use a system image processor with strong timeliness, extract the feature information of the unobtained moving target, analyze and compare the movement. The target's image database. In order to better express the feature representation of the moving target and perform a high-level understanding of the behavior, further identification measures should be taken: feature model matching, matching the test feature model sample and the constructed training sample moving target feature for similar value information matching, and Use this to determine the type of behavior in the video. State space construction. According to the change trend of the parameter model over time, the motion evolution process of the moving target is estimated. At the same time, the hidden Markov model, dynamic Bayesian network and conditional random algorithm are combined to calculate the state information of the moving target.

4. Abnormal behavior recognition in video surveillance system
The identification method designed in this paper takes the advantages of the detection algorithm as the basic framework, taking into account the performance of the video surveillance system and the system operation time, and makes the system operation time adaptively adjust with the image data input.

The input of image data is mainly composed of a set of n operable algorithms N with different indices, and the data set S to be evaluated is called a training data set. The training data set can be decomposed using data classification methods and combined with a set of algorithm indices obtained by different parameter algorithms to obtain the data set K. Set the operation time value on the system, according to the correspondence between different algorithms and calculation indexes, realize the optimal combination of image data parameters in the data set K, and under the constraints of the calculation conditions, look for the calculation platform with the corresponding calculation basis. After that, the optimal algorithm exponential combination is performed to make it the training mark Z under the constraints of the computing conditions.
5. Experimental research
In order to verify the effectiveness of the abnormal behavior detection and recognition method in the video surveillance system mentioned in this paper, the method is compared with the traditional abnormal behavior detection and recognition methods to detect robbery behavior.

5.1. Establishment of robbery detection model
After an in-depth analysis of the robbery scene, the characteristics of the robbery behavior are as follows: In the same monitoring scene, there are two or more targets. There will be relatively clear contacts between goals. In terms of behavioral characteristics, the robber and the normal person are obviously different, and the movement speed will exceed the movement speed of the normal person. In order to better analyze the instantaneous speed difference of the suspect, the robbery process is divided into three processes: tracking, approaching and running away. The parameters set for the robbery abnormal behavior are: pre-judgment parameters. The number of targets in the monitoring effective area. Effective target characteristic parameters. The speed difference of the suspect and the minimum distance between the suspect and the victim. Conditions for robbery. The distance between the robber and the victim is less than the minimum safe distance.

5.2. Experimental results and analysis
The laboratory abnormal behavior detection method based on video image processing and the abnormal target detection and positioning method of the video surveillance system are used as the comparison method of the abnormal behavior detection and recognition method in the video surveillance mentioned in this paper. The duration is the test index for simulation comparison experiment. The image position gap of adjacent frames is a direct influence indicator that affects the detection and recognition effect. When the gap is large, the image will overlap, and it is impossible to obtain a more perfect moving target. After testing, the comparison results of the gaps between the image positions of the adjacent frames by the three methods are obtained.

6. Conclusion
In this paper, the new abnormal behavior detection and recognition method developed on the basis of traditional detection and recognition methods has improved the detection efficiency of video abnormal behavior to a certain extent, shortened the detection time of the system, and has higher promotion value and can better maintain the local social order, and is conducive to solving social disputes. However, this experiment has certain requirements on the upper limit of the number of abnormal behaviors. In the future, in-depth tests will be conducted on the detection and recognition effects of an unlimited number of abnormal behaviors to improve the method proposed in this article.

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