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Research on Face Recognition Technology Based on Deep Reinforcement Learning

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Abstract:

With the rise of deep neural networks, face recognition technology has developed rapidly. However, the low-quality video S2V face recognition under the conditions of poor lighting conditions and low resolution still does not achieve the expected effect due to the heterogeneous matching problem between the low-quality test video and the high-definition image of the sample library. Aiming at this problem, a low-quality video face recognition method based on super-resolution reconstruction is proposed. First, multi-dimensional features can be extracted by training video data with convolutional neural network; secondly, video features are input into the attention model, and local face features, face positions and temporal memory units are obtained according to the temporal continuity information of video data; finally, Q-learning is adopted. Iteratively calculates the output of the attention model, finds the optimal frame sequence containing the face, and uses this to calculate the video matching accuracy.The experimental results show that the method can effectively improve the accuracy of video face recognition in complex backgrounds.

Keywords*: Big data technology; innovative; training method.*

I. INTRODUCTION

Face recognition uses camera equipment to collect face images, which is a technology for identification based on the facial feature information of the target to be detected. With the popularization and application of computer network technology, face recognition technology is widely used in many fields such as gate access control, attendance management, and face payment [1-3]. Traditional biometric technologies [4-5], such as fingerprint recognition, voice recognition, and iris recognition, may be seriously affected by internal and external factors, resulting in low recognition efficiency, or they may be difficult to identify.

Software and hardware facilities have high requirements and are difficult to popularize and apply. Compared with traditional biometric technology, face recognition technology can more intuitively and conveniently verify personnel identity information through video surveillance equipment[6-10]. It has the characteristics of simplicity, efficiency, economy and scalability. control and many other aspects. The problem of heterogeneous matching between the low-resolution video frames to be recognized and the high-resolution images in the sample library is the main difficulty in the research of low-quality

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video face recognition[11-14]. In order to solve this problem, this paper proposes a video face recognition model based on super-resolution reconstruction, which solves the problem of heterogeneous matching by reconstructing low-resolution view frames and improves the recognition accuracy. The model selects key frames according to the face pose design algorithm, which solves the problem of low stability of recognition accuracy in the random selection algorithm. A super-resolution reconstruction model S2V-SR suitable for low-quality video face recognition is established, and the reconstruction results of more identity features are obtained; the model uses the video face recognition network to extract depth features from the reconstructed key frames for Classification prediction improves recognition accuracy.

II. APPLICATION OF DEEP LEARNING TECHNOLOGY IN FACE RECOGNITION

2.1 Face Detection Technology

In the face recognition module, face detection is a very important link. However, there are many factors that will affect the detection accuracy, such as illumination and posture [15]. In order to eliminate the influence of these factors, the detection method has been innovated, such as detection based on features or appearances. The former can be detected based on skin color features and can be detected in complex environments, but it has higher requirements for chroma. The latter can be detected based on subspaces and neural networks, which can simplify the detection process and has a good use effect, but the detection efficiency is low, and the real-time detection cannot be guaranteed.

2.2 Facial Feature Extraction Technology

Since the features of a face can be layered into different categories according to different regions, such as overall features and point features, there are many different types of extraction methods, such as statistical-based methods or prior rule-based methods. Statistical-based methods are currently widely used methods, which can transform and subdivide target information, and combine it with convolutional neural networks to further improve detection efficiency and accuracy [16]. The method based on a priori rules can effectively improve the accuracy of face detection, and the operation is relatively simple[17]. It is extracted according to the previous understanding and experience of relevant personnel, but it requires the image to have high definition, which limits its scope of application.

2.3 Feature Classification Technology

This link is the most critical part of face recognition. One of the more common classifiers is support vector machine, which has high recognition accuracy, but cannot perform real-time recognition. The other is the face recognition method that is often used at present, that is, convolutional neural network. Compared with the traditional neural network, the convolutional neural network has a certain generalization effect, which can reduce the parameters of the convolutional layer and make the network simpler [18]. And with the change of the type of processing data, the number of layers will also change,

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which can handle complex classification problems, is more convenient for training, and has better universality.

III. MODEL BUILDING

This paper proposes a dual-drive adaptive multi-scale super-division reconstruction algorithm for target detection, which mainly includes an adaptive multi-scale super-division reconstruction module and a dual-drive module. The specific structure is shown in Figure 1. This module contains the adaptive multi-scale feature extraction block and integrates the optional multi-scale The feature extraction and feature gating unit can flexibly fuse the multi-scale features of remote sensing images and enhance the target features. Then, considering the particularity of the subsequent target task, send the super-divided optical remote sensing image to the task driving module, that is, the target detection module, and pass the task driving loss to the previous super-dividing network to obtain the final remote sensing image detection result.

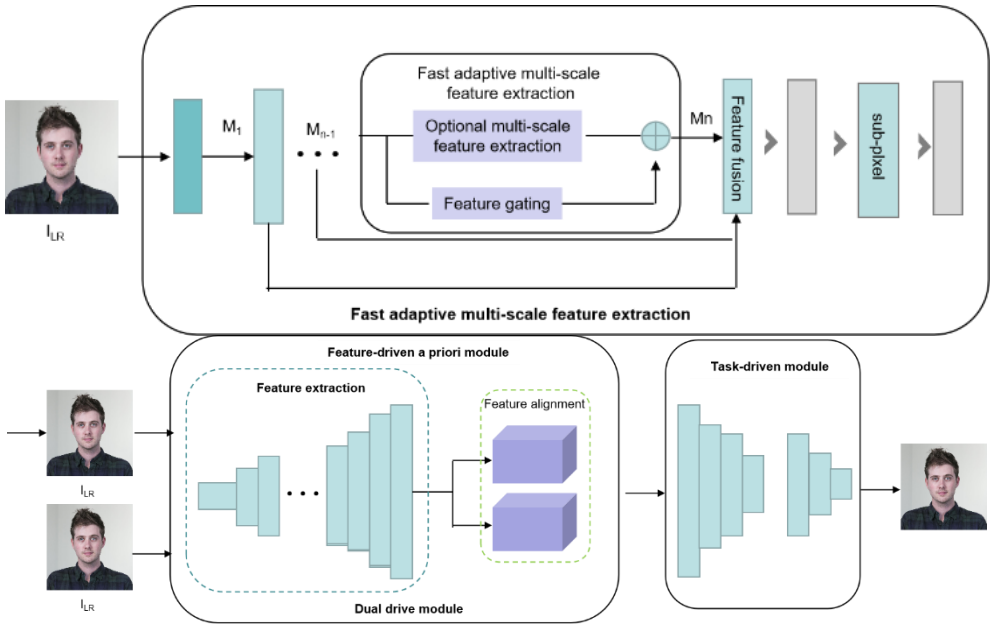

Fig 1 Overall network structure

Recent studies have shown that, compared with traditional sparse coding, considering the geometric structure of the image in sparse coding will help improve the sparse coding ability. An important a priori condition for image geometric structure is that natural images often contain repeated structural blocks.

$$\varepsilon_1 = \sum_{i=1}^{n} \| s_i - \sum_j \omega_{ji} s_j \|_2^2 = \| S - SW \|_2^2, \quad (1)$$

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IV. EXPERIMENT

The experimental results obtained by using the algorithm in this paper are shown in Table 1, and the results of the face recognition method are shown in Table 2. It can be seen that the recognition rate of the proposed method is significantly higher than that of the PCA+SVM method. The obtained texture features can better represent the information of the face, which is more conducive to the learning of the network, and it can be seen from the experimental results that with the increase of hidden layer nodes, the recognition rate also increases. The reason for the low recognition rate of the PCA+SVM method is that on larger training samples, other factors such as illumination and human posture are all concentrated on the principal vector of the principal component analysis [19], resulting in a decrease in the recognition rate. Therefore, the proposed method has good advantages in both recognition rate and robustness.

TABLE 1: Ablation experiment results

Method	structure	Recognition rate	time consuming
reinforcement learning	100-100	92.5	165.21
	150-100	94.7	297.62
	200-100	98.3	329.21

TABLE 2: Compare with other methods

Method	Recognition rate
Our	96.3
PCA+SVM[20]	89.2

V. CONCLUSION

This paper proposes a deep reinforcement learning face recognition algorithm. In the experimental comparison on the ORL face database, the method in this paper has a significant improvement in the recognition rate compared with the face recognition algorithm of PCA+SVM, which reflects the advantages of the LBP+DBN method.

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REFERENCES

[1] Gu Fengwei, Lu Jun, Xia Guihua. Face recognition method based on facenet Pearson discriminant network [J]. Journal of Intelligent Systems, 2022, 17(01): 107-115.
[2] Liu Tao, Song Guixiang, Zhang Ming, Xu Pei, Liu Haoyu. Security Research and Practice Based on the Application of Face Recognition Technology [J]. Telecommunications Engineering Technology and Standardization, 2021,34(12):40-45.DOI: 10.13992/j.cnki.tetas.2021.12.008.
[3] Wang Xu. Failure risk and institutional reconstruction of face recognition access rules [J]. Journal of Dalian Maritime University (Social Science Edition), 2021, 20(06): 54-65.
[4] Liu Junping, Yang Zhiqing. Face recognition data protection dilemma and its legal response [J]. Science and Technology and Law (Chinese and English), 2021(06):18-28.DOI:10.19685/j.cnki.cn11-2922/ n.2021.06.003.
[5] Wang Zongxin, Jin Kai, Bai Xiaojun. Design of Candidate Identity Verification System Based on Face Recognition [J]. Information and Computer (Theoretical Edition), 2021, 33(23): 166-169.
[6] Sun Junjie. An Analysis of my country's Face Recognition Protection Legislation [J]. Chinese Lawyers, 2021(12):86-87.
[7] Zheng Yujie. Legal Attributes and Criminal Law Protection of Face Recognition Information [J]. Journal of Beijing Police College, 2021(06):13-18.DOI:10.16478/j.cnki.jbjpc.20211208.003.
[8] Yang Yi. Research on trusted medical electronic signature scheme based on face recognition [J]. Network Security and Informatization, 2021(12):36-38.
[9] Lin Ling. Research on the Protection of Face Recognition Information "Personality Right - Usufruct" [J]. China Publishing, 2021(23):41-46.
[10] Hao Tianran. Application of face recognition technology in intelligent public security system [J]. Digital Communication World, 2021(12):5-7.
[11] Bai Ru. Face recognition classroom monitoring system based on video streaming media [J]. Electronic Design Engineering, 2021, 29(23): 166-170. DOI: 10.14022/j.issn1674-6236.2021.23.034.
[12] Feng Ying. Research on face recognition application in hospital library based on spatiotemporal cache database [J]. Electrical Automation, 2021, 43(06): 111-114.
[13] Jin Lang. Research on the application and protection path of face recognition [J]. Journal of Qiqihar University (Philosophy and Social Sciences Edition), 2021(11):88-91.DOI:10.13971/j.cnki.cn23-1435/c .2021.11.022.
[14] Ruan Jing. Research on the practice of artificial intelligence curriculum design based on the cultivation of computational thinking—taking the lesson of "Face Recognition" as an example [J]. China Modern Educational Equipment, 2021(22):18-20+23.DOI :10.13492/j.cnki.cmee.2021.22.006.
[15] Wang Jing, Yao Yuan. Implementation of CNN face recognition method based on feature distance [J]. Journal of Xinjiang Normal University (Natural Science Edition), 2021, 40(02): 67-70. DOI: 10.14100/j. cnki.1008-9659.2021.02.012.
[16] Liu Xiuli, Chen Rui. Discussion on Face Recognition Technology and Application Scenarios Based on Deep Learning [J]. Heilongjiang Science, 2021, 12(22): 12-13+17.
[17] Chen Junjie. Analysis of the application of face recognition technology in the field of public transportation [J]. Industrial Control Computer, 2021, 34(11): 45-46.
[18] Yu Yang. Preliminary discussion on medical application of face recognition [J]. China Informatization, 2021(11):80-81.
[19] Ma Huaiqing, Zeng Qingning. Research on the application of face recognition and credit payment in AFC system [J]. Modern Urban Rail Transit, 2021(S1): 100-104.
[20] Zhou Guangquan. The key issues of crimes involving face recognition [J]. Comparative Law Research, 2021(06):13-29.