Application analysis of image recognition based on multiple intelligence algorithm

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Abstract. Image recognition technology based on artificial intelligence algorithm has entered a rapid development stage. According to the development and research status at home and abroad, we can see that PCA, ANN, SVN and other technologies can effectively realize the recognition and generation of images, especially the extraction and prediction of face features, classification and recognition. The analysis and application of the generation countermeasure network (GAN) technology is mainly embodied in the realization of the generation and analysis of handwritten numbers, and the accurate prediction of the promotion and application of SVM technology, as well as the comprehensive and accurate analysis of the generation effect. This paper mainly studies the comparative analysis and application of human face database (ORL) through the relevant data. By extracting 50 face samples, 500 face images are produced for recognition analysis and application.

1. Introduction
The image recognition and generation technology of artificial intelligence algorithm is advancing constantly. With the continuous integration of new technologies, the future market of new products has a clear development direction. The development of image recognition and generation technology in artificial intelligence mainly focuses on the integration of new technologies. According to the expected method and mode, it can run autonomously in a specific environment. The application of artificial intelligence algorithm to image recognition and generation mainly adopts the method of no human management, which can make its technology meet the needs of the work in terms of requirements [1-2].

At present, the world's public security issues are constantly emphasized, and the technology of criminal activities is becoming more and more advanced. It is required to accelerate the development of video surveillance system based on active warning and biometric identity authentication. In the new biometrics, there are two kinds of biological characteristics: one is physiological characteristics (fingerprint, iris, facial features, DNA, etc.), the other is behavioral characteristics (gait, keystroke habits, etc.) It is like the characteristics of human face, fingerprint, iris, palmprint, action, ear, vein, lip, brainwave, DNA, body odor, etc., or the characteristics of handwriting, click habit, action, voice, etc.
Based on the analysis of image recognition and generation of artificial intelligence algorithm, we mainly apply image recognition technology to modern information computing technology, including expected processing and acquisition from information, extraction features and selection, design classifier and decision classification. In this paper, the related technologies of image recognition and generation, and processing results of artificial intelligence algorithm are described and applied comprehensively [3-5].

2. Application and analysis of PCA dimension reduction technology

2.1. Overview of PCA dimension reduction technology
PCA dimension reduction technology (principal components analysis) is mainly reflected in: the comparative analysis and processing of the main components, that is, the comprehensive analysis and application of the main components. In general, the technology makes use of the idea of dimension reduction to carry out correlation analysis and multi index correlation transformation, which turns into the application of a few comprehensive indexes. The above technologies are used to compare, analyze and process the recognition images of the average face in the database. PCA technology is used to process the dimensionality reduction of the face recognition image. After the dimensionality reduction is changed, at the same time, the data retained after the dimensionality reduction is analyzed and the impact is recorded.

2.2. Average face recognition technology
In the image recognition and generation technology of artificial intelligence algorithm, the main purpose of processing average face recognition technology is to store 500 face images in the database into a matrix, analyze and compare their behaviors, and then calculate the parameter characteristics of the face. That is to say, average each dimension, and analyze the characteristics of the average face of the new row vector. Among them, it is necessary to use the average value to analyze and recognize the contour of the face. This technology is not able to recognize the local details of the face.

2.3. Technology of reducing face to different dimensions
Based on the technical analysis of the average face, the reduction of different dimensions is now analyzed. According to the above data and the relevant cases extracted, the relevant images are comprehensively analyzed, and the images selected with the same face reduced to 10, 30, 50, 100, 200, 250, 300, 350, 500. From the above cases, it can be analyzed that if more and more dimensions are preserved, the sharpness of the image will be higher and higher, and the gap will be smaller and smaller by comparing the original image with the difference technology.

2.4. Extraction of single dimension features for reduction
In order to restore the face features, we need to analyze and use the single dimension related features, which is mainly reflected in the use of different face features for different dimensions. This technology mainly uses PCA technology to analyze each feature synthetically, at the same time, extracts each feature vector separately, and then carries on the restoration and recognition to the related face, the most important is that the average face does not participate in the restoration process, and studies the related problems of histogram equalization.

According to the relevant results and research contents of PCA technology, the following conclusions are made through the analysis and application: the accumulated processing of its features, in the generated chart, the ratio obtained by dividing the retained image feature value by all the feature values, forms the vertical coordinate. For example, if the k-dimension information is preserved and the sum of these K eigenvalues is divided by the sum of 500 eigenvalues, the calculated result will form the value of the ordinate. Extract single dimension features for reduction technology and application analysis, and draw the following conclusion: if 100 dimension is reserved, about 92% of the features
of the face can be clearly preserved, if the reserved dimension is increased, the change of this proportion will be less and less obvious.

3. Analysis of SVM for face classification

3.1. Overview of SVM for face classification
The main research and application of support vector machine (SVM) was first proposed and applied by foreign countries, and was proposed and developed by Corinna Cortes and Vapnik in 1995. For the application of machine learning, this technology uses related learning algorithm to carry out relevant supervised learning model, and support vector machine in the research process, and then analyzes the relevant data and related information content, and carries out the pattern recognition operation, mainly for regression analysis and classification analysis and other content.

3.2. Making multiple classifiers
After PCA technology is applied to face dimensionality reduction method, SVM image processing technology is used to study the above face recognition classification. According to the principle, the first five photos of each person are combined to generate a training set, and then the last five photos of each person are combined to generate a test set. Noting that before manufacturing multiple classifiers, we need to generalize and use the data analyzed by PCA technology, and adjust each element of image matrix to (-1, 1) by mapping.

3.3. Parameter selection of data and information and analysis of program results
First, from the above Section 2.2, we can take the method of classification data for gap analysis. The training set stores the first five photos of each person, and the test set stores the last five photos of each person, in which the face image of oneself is not added. SVM parameter setting: k = 75 (PCA reduced to 75 dimensions) sigma = 30; C = 15; prediction accuracy: accuracy = 0.8950. Second, each person takes out the first five for training and the last five for testing (adding their own faces). SVM parameter setting: k = 75 (PCA reduced to 75 dimensions); sigma = 30; C = 15; prediction accuracy: accuracy = 0.8585. According to the above results, we can draw the relevant analysis conclusion: when we add our own face image, the accuracy of prediction decreases, which is probably caused by the light, angle and other reasons when taking photos.

4. ANN face classification technology and analysis

4.1. Overview of face classification technology
Artificial neural networks (ANNs) are short for neural networks (NNs), or connection models. It is an algorithmic mathematical model that imitates the behavior characteristics of animal's neural system and network to distribute and process information. In order to achieve the goal of dealing with the relevant information, the network uses the complexity of the system to adjust the connection among many internal nodes. In view of the convenient and fast application of SVM technology, we analyze the above results and find that the results are the same as those of the test set and training set in ANN technology, which is the result of analysis without adding our own face.

4.2. Results of ANN technology and comparison with SVM technology
The classification and comparison contents of ANN technology are analyzed, and the relevant parameters are set. The specific contents are as follows: learning rate, activation function, L2 regularization, epoch and batchsize, classification error rate and accuracy and other related technologies are processed and applied in combination with computer information method.

ANN classification results include Ann parameter setting: 1 hidden layer, including 200 neurons; learning rate: 1; dropout fraction: 0.5; activation function: sigmoid; L2 regularity: 0.0001; Epoch: 200; batchsize: 50; classification error rate (accuracy rate): 93.5%.
According to the results and summary of the above-mentioned ANN technology classification, it mainly analyzes the variation of its difference in accuracy, which is very high in accuracy, and there are many image accuracy, mainly in the space of accuracy rising, mainly in the adjustment of parameters analysis. Compared with SVM, Ann is mainly used in the analysis and application. The analysis shows that the database analysis of relevant parameters is carried out, and the accuracy of the above technology is comprehensively analyzed and compared.

5. Analysis of the technology of generating handwritten numbers by GAN

5.1. Overview of GAN generating handwritten numeral technology
GAN is a kind of deep learning model. In the original GAN theory and technology, neural networks are not necessarily selected as G and D models, but the corresponding generating function and discriminant function are required to be fused. Generally, in the process of practical application, the depth neural network is selected as the G and D models.

5.2. Parameter setting and program result analysis in GAN Technology
GAN technology, for the result analysis of parameter setting and related computer processing information, selects one of all handwritten font sets, and selects the first 5000 of all the fonts in the data set as the training set for application and processing. The process is as follows. Parameter setting:

Generator:
Input layer, hidden layer and output layer have 100, 512, 784 neurons respectively.

Discriminator:
Input layer, hidden layer and output layer have 784, 200, 1 neuron respectively.

Learning rate: 0.01, Batchsize: 50, number of iterations when updating discriminator: 1. Generate training set:

```matlab
load('mnist_uint8');
classify_num = 9;
classify_matrix = zeros(1,10);
classify_matrix(classify_num+1) = 1;
choose = zeros(size(train_x,1),1);
for i=1:size(train_x,1)
    if(train_y(i, :) == classify_matrix)
        choose(i) = choose(i)+1;
    end
end
choose = logical(choose);
train_x = train_x(choose, :);
train_x = train_x(1:5000, :);
train_x = double(reshape((train_x, 5000, 28,28))/255;
train_x = permute(train_x, [1,3,2]);
train_x = reshape(train_x, 5000, 784);
```

Figure 1. Generate training set

Although the loss of generator is not great, it is basically stable in the end.
5.3. SVM technology classifies and analyzes the generated handwritten numbers
The application of SVM technology mainly lies in the comprehensive classification and analysis of the handwritten numbers of GAN technology, that is to say, the handwritten numbers of 0-9 are used to generate pictures respectively. This picture is used as a test set, and the relevant classification is combined with SVM for correct analysis and operation. The result matrix stores the voting result information, and the calculation result is obtained by subtracting one sequence number from the one with the largest number of votes. For the classification application of SVM technology, it is mainly used in face recognition technology, that is, multiple classifiers generated by 45 (C (10, 2)) one-to-one classifiers.

6. Conclusion
In this paper, the image recognition and generation technology of artificial intelligence algorithm is comprehensively analyzed and applied. Using PCA technology to reduce the dimension of the original data can not only retain the original processing information, but also improve the efficiency of execution. By combining the two classifiers of SVM to generate multiple classifiers to realize face recognition, the accuracy rate is as high as 89.5%. Finally, GAN technology is used to achieve the correct classification of handwritten fonts.

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