The Function and Application of Pattern Recognition Technology in Image Processing

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Abstract: Video surveillance is no longer the traditional image intake, but towards a more intelligent direction. On the basis of clustering method of Topology, pattern recognition has been developed. Because of its geometric properties, it is difficult to build models by common mathematical methods. Therefore, it is necessary to transform topology theory into algebraic elements on the basis of geometry, and pattern recognition is the key technology in computer aided processing. The combination of geometry and algebra is a typical representative of image pattern recognition. Because cluster analysis and topological theory belong to different disciplines, namely algebraic science and geometric science, this paper can realize the digital preprocessing of images in the analysis, and reasonably avoid the necessary links of topological theory, let BP neural network replace Topology identification work.

1. Introduction

Based on the clustering method of topology theory, pattern recognition has been developed. Because topology theory and clustering belong to different disciplines, the rigid mathematical method cannot effectively complete the modeling in computer. Therefore, transforming topological theory into algebraic elements is an important part of computer-aided processing. The analysis of this paper is to identify the core pattern of systematic lattice data, and to explore the scientific nature of the clustering algorithm based on topological theory.

2. The Role of Pattern Recognition Technology in Image Processing

Under the rapid development of computer technology and information technology, intelligent identification is widely used in various fields, and it can accurately identify the unique information of things in the application. Thereby improving the quality and efficiency of their identification, thereby improving people's work efficiency. Pattern recognition is more prominent in the application of intelligent and automatic features. Pattern recognition can be applied to different system modules in the computer, and the computer can automatically recognize and have good recognition effect on words, languages and graphics. The application of pattern recognition technology in various fields can effectively play its role, and under the imitation of human brain recognition mode, it can automatically identify and calculate a large amount of data, thus providing convenience for people's life and work.

3. Requirement analysis

3.1 Data Acquisition and Data Exchange Analysis

BMP bitmap is input data, or BMP bitmap format, which is converted by JPEG or GIF in reverse coding. The one-dimensional value of the output data is based on the double-byte long integer

variable when constrained. At this time, the byte is specified, the minimum is 0, and the maximum is 65530. The output of the one-dimensional value will be equal. There are different target cluster center values in the interval, and the clustering of the clustering center of the output results is judged, and the pattern recognition processing method is produced [1].

3.2 Data Preprocessing

Convert the BMP bitmap to an image with a height of 480 pix and a width of 640 pix, which will result in 2 bytes of data, amounting to 307,200. Since there are 307,200 data in the input layer of BP neural network, it is necessary to integrate these data reasonably and then input them.

After calculating the average value of each block, A data is obtained. After calculating the standard deviation of each block, B data is obtained, red point is calculated, C1 data is obtained, blue point is calculated, C2 data is obtained, green point is calculated, and C3 data is obtained. Statistics on these data revealed that a total of 3072 sets of data were obtained, a total of 15,360, and these data were input into the BP neural network.

3.3 Processing Flow

BP neural network is used to process the data. The input of data can be divided into 3072 groups, each group contains 5 data, and through three hidden layers, one input is obtained, which can accumulate to 3072 input of the next level. On the basis of 4*4 matrix, when data is processed, three hidden layers are processed for every 16 layers, and then one input is obtained, which can be accumulated into 192 input of the next layer. The 192 data are calculated according to 192 nodes in the two-to-two intersection mode, so that the three hidden layers can be calculated, and the output value can be calculated according to the two-to-two intersection mode in different nodes. The final value is the double-byte long integer variable.

3.4 Core Technology Needs

3.4.1 BP Neural Network

At this point, the relevant information should be assumed that:

The vector information of the input layer, the vector information of the output layer, the target output vector, the input layer, the intermediate layer, the output layer, the number of neuron nodes, the weighting matrix of the intermediate and input layers, and the enhancement matrix of the intermediate and output layers are respectively: x (p), y(p), t(p), n, m, r, W, V.

At this time, the initial value of a random node is given, expressed as Wij.

Set the threshold: $\theta_j=n_j*w$, x(m) is -1, and you will get:

$$a_j^{(p)} = f(\quad w_{ij} \cdot x_i^{(p)}\quad)(j=1,2, \ldots, , m-1)$$

The output equations are defined as:

$$a_0^{(1)} \cdot \quad v_1 \cdot r + \quad a_0^{(1)} \cdot \quad v_2 \cdot r + \ldots + \quad a_m^{(1)} \cdot \quad v_m \cdot r = t \cdot \quad r^{(1)}$$

$$a_0^{(2)} \cdot \quad v_1 \cdot r + \quad a_1^{(2)} \cdot \quad v_2 \cdot r + \ldots + \quad a_m^{(2)} \cdot \quad v_m \cdot r = t \cdot \quad r^{(2)}$$

…

$$a_0^{(p)} \cdot \quad v_1 \cdot r + \quad a_2^{(p)} \cdot \quad v_2 \cdot r + \ldots + \quad a_m^{(p)} \cdot \quad v_m \cdot r = t \cdot \quad r^{(p)}$$

Av=T can be obtained by sorting out the above formulas.

Repeat the above calculation steps. When the factorial of the number of nodes is completed, this can be very close to the result.

3.4.2 Cluster Analysis

Assuming that the system takes a set of data as M and finds out K cluster centroids, the centroids can be expressed as:

$\mu_1, \mu_2, \ldots, \mu_k \in \quad R^m$

Through the repeated calculation of the above formula, the convergence is finally obtained:

In this way, the distance between the center points in several samples can be calculated. If the

number of samples is expressed as i, the distance between the center points can be expressed as:

$$C^{(i)} = \arg \min_j \left\| x^{(i)} - \mu j \right\|_2$$

Through the cluster combination μj, the centroid is calculated and the centroid is reintroduced and completed in the following formula:

$$\mu_j = \frac{\sum_{j=1}^{m} 1\{c^{(i)} = j\} x^{(i)}}{\sum_{j=1}^{m} 1\{c^{(i)} = j\}}$$

In the formula, the given number of clusters is k, and the class closest to the k classes is $c^{(i)}$, and the value of $c^{(i)}$ is determined, which can be one of 1-k. μ_j is the centroid, which means that the guess of the center point of the sample in the same kind of sample is explained on the basis of the cluster model. It can be understood that k clusters are formed under the aggregation of all stars. First, randomly select the points of the K universes and use them as the centroids of the k clusters. Secondly, we calculate the distances of each cluster and get the distances of K clusters. Thirdly, the nearest star cluster is recorded as $c^{(i)}$, so that each star cluster can be represented. At the same time, the centroid of the cluster should be calculated and the coordinates of each star should be averaged. In this way, J can be validated in calculation:

$$J = \sum_{i=1}^{n} \sum_{j=1}^{k} r i j \left\| x^{(i)} - \mu_j \right\|_2$$

In this formula, it is the qualitative expression of kmeans algorithm. $x^{(i)} \in R^m$, The first sample has a category of μ_j, and the data point $x^{(i)}$ is classified to 1 when it is classified to μ_j. Otherwise, 0 is used.

4. Application of Pattern Recognition Technology in Image Processing

4.1 Cell recognition Technology

The technology is widely used in the diagnosis of diseases. During the diagnosis process, doctors diagnose the disease according to the method and improve the diagnostic accuracy [2]. At present, under the study of microscopic cell images, some diseases can be effectively diagnosed, but some diseases are still not effectively diagnosed under current medical devices. Therefore, under the use of computer technology, the automatic recognition of fine cell images has been paid attention to and studied by relevant experts. However, because the composition of cells is too complex, it is necessary to complete functional analysis in order to continuously improve the accuracy of cell recognition.

4.2 Character Recognition Technology

In the application of this technology, the text and data information are mainly processed. In the process of text information processing, the object of processing is text information, including printed and written text information, which can be technically recognized. In data information, it mainly includes statistical data, numbers and other reasonable analysis. Numbering is very common in life, such as easy journals, notes, etc. The identification of these data information requires effective development and application of handwritten digit recognition technology.

4.3 Speech Recognition Technology

This technology has been involved in many fields, and has achieved good application results. Voice print recognition has attracted widespread attention in biometric recognition, and it is popular because of its precise recognition effect and convenient operation. In speech recognition technology, the continuous hidden Markov model is its main recognition method. In this way, the calculation can be performed on the basis of the algorithm of the gene. The speech recognition method based on this can complete the recognition more quickly and efficiently.

4.4 Fingerprint Recognition Technology

There are many types of human fingerprints, which can be generally divided into left vortex and right vortex. Currently existing fingerprint recognition technologies include neural networks, grammar analysis, and the like. Under the application of fingerprint recognition technology, one-to-one recognition of objects can be realized, which can improve the recognition accuracy. However, there are still many problems in the use of this technology, especially in recognition speed, accuracy and other aspects, there is still a lot of room for improvement [3].

5. Case Study of Pattern Recognition Technology in Image Processing

Video surveillance has been increased in different aspects with the steady progress of China's Skynet project in recent years. This makes video surveillance no longer a simple urban image capture, in the direction of intelligence, video surveillance is more advanced. At present, it is a problem to be excavated that the value of data covered in video surveillance is infinite. In the era of big data, the amount of data is very large. It is necessary to process the data under the use of computer technology and mathematics. In the process of collecting video images in the previous paragraph, it must be strict and meticulous. With the continuous maturity of computer network technology and image processing technology, video surveillance has been effectively improved and plays an important role in China's security system [4].

5.1 Traffic Control

The statistical model is established in the computer, and the data of traffic volume and congestion degree of different sections are collected and analyzed, so as to provide more authentic and open reference for traffic management in China. At the same time, it can also discover the deck vehicles and regulate the traffic management in China.

5.2 Predictive Analysis of Vehicle-related Crime

In the application of pattern recognition technology in image processing, it is possible to collect the trajectory information, establish a model of vehicle-related crime activities, excavate suspicious vehicles, and prompt through the early warning system, thus providing a good reference for the public security organs, and then proceeding Investigation and control [5].

5.3 Analysis of Criminal Acts of Shielding and Replacing Vehicle License Plates

As the card system is more common in people's daily life, it also provides a chance for criminals to avoid the card in the process of shielding the number plate and changing the vehicle number plate, which makes the card system on the license plate recognition system appear many loopholes and crises. Therefore, it is necessary to analyze the big data collected by the system and effectively identify the vehicle type, thus completing the automatic identification of the model and license plate number. Under the application of the feature area image search technology, the annual inspection marks, ornaments, etc. can be effectively identified, so that criminals can be effectively attacked [6].

6. Conclusion

In this paper, the role and requirements of pattern recognition technology in image processing are analyzed. The technology has many technologies such as cell recognition technology, character recognition technology and speech recognition technology, which can be applied to image processing and play a good role. At the same time, this paper also analyzed the application of this technology through the actual case of video surveillance, and found that this technology has a broad application market and development prospects, and can provide more effective help for people's life and work, thereby improving the image processing ability.

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