Research on Curriculum Design Method of Teaching Resource Library based on Deep Learning Technology

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Abstract. In order to improve the ideological understanding of computer majors and establish a correct world outlook, outlook on life and values, the ideological and political goals of computer majors are designed; (1) A new deep learning face recognition algorithm is proposed. Aiming at the limitations of many current methods of artificially designing image description features, this algorithm proposes an unsupervised big data-driven deep image feature learning and representation mechanism. (2) A new idea of single-target tracking algorithm DPL is proposed. Single target tracking is a hot research topic in the field of computer anxiety. Our proposed DPL algorithm is still very competitive with the best algorithms in the field of object tracking. Several key technology research and model design schemes for computer major courses are proposed, which enriches the relevant research content of deep learning in the field of computer vision, and has certain theoretical and practical significance.

Keywords: Curriculum Design; Deep Learning; DPL Algorithm; Transfer Learning.

1. Deep Learning

1.1 Feature Extraction

Artificial features, such as PCA, LPP, SIFT63 and HOG26, etc., have been successfully applied in many object recognition methods. However, after analysis, it is not difficult to find that these traditional artificial features are often limited to low-level image features at the pixel level, and when designing and capturing higher-level image feature information, these traditional image feature representation methods have been proven. is difficult to achieve [1].

1.2 Machine Learning

As an important branch in the field of machine learning, deep learning methods have proposed better image feature representation methods: obtaining multi-level image feature information, including low-level features, mid-level features, and High-level Semantic Features [2]. On the other hand, traditional face recognition algorithms mainly rely on our manually selected feature methods, and it is very difficult to artificially design an image representation feature and requires heuristics through people's experience and luck. Exploratory, because none of these methods allow the algorithm itself to automatically learn and determine the features of these images from the original images. In contrast, deep learning can automatically extract image features and use a framework of multiple nonlinear transformations to simulate the representation of multiple levels of features in the data. Next, we will analyze the learning process and related definitions of deep learning for the stacked denoising autoencoder deep learning model we use [3].

1.3 Artificial Intelligence Theory and Practice

(1) Back propagation algorithm

Similar to the fully connected feedforward neural network, the convolutional neural network also uses the backpropagation algorithm to train the network model and modify the parameters of the entire network 0={W,b,}, the main way is to minimize the training result and the true value The loss function formed between is as follows:

$$L = -\frac{1}{|X|}\sum_{i=1}^{|X|}\ln\left(p\left(y^i | X^i\right)\right) \tag{1}$$

Here, |X| represents the number of training data, x-i. and ,y-i. represent the training sample and its corresponding ground-truth label, respectively. Next, we use the stochastic gradient descent method to calculate and update the network parameters , after which a new error result will be obtained in the next iteration calculation. In this way, step by step, after many iterations, a perfect deep neural network is trained. Now let's talk about how the update of this network parameter is implemented [4]:

To be able to further derive the sorting function, we refer to the method used by *h* et al. [2]. Thus, we need to find such a function :ℝ-d.×, -d*d*.→ℝ, for example:

$$\forall v_i, u_j \in \mathbb{R}^d, R\left(v_i, u_j\right) > 0 \Leftrightarrow R\left(v_i, 0\right) > R\left(u_j, 0\right) \tag{2}$$

After that, the sorting function r can be simplified as:

$$\forall x \in \mathbb{R}^d, r(x) = R(x, 0) \tag{3}$$

According to the set of preference relations generated by formula (3), we can use the following constraints to determine the function R:

$$R\left(v_i, u_j\right) > 0 \text{?and?} R\left(u_j, v_i\right) < 0, \quad \forall\left(v_i, u_j\right) \in PJ \tag{4}$$

Therefore, we can construct a binary classifier. Here, our DPL2 algorithm uses a support vector machine as a classifier by optimizing the following error function:

$$\begin{aligned} &\min_{\omega,\xi}\frac{1}{2}\|\omega\|^2 + C\sum_{i,j}\xi_{ij} \\ &\text{s.t.?} < \omega, v_i - u_j > \geq 1 - \xi_{ij} \\ &\xi_{ij} \geq 0, \forall\left(v_i, u_j\right) \in PJ \end{aligned} \tag{5}$$

In fact, W here is the preference parameter we require. Finally, we can use this preference parameter to sort the candidate target image blocks. The sorting formula is as follows:

$$r(x) = < \omega, x > = \sum_{i,j}\beta_{ij} < v_i - u_j, x > \tag{6}$$

Here,β-*ij*. represents the Lagrange multiplier of the so-called support vector. The symbols <,> represent the inner product operation of two elements. It should be noted that there is no bias term added here, because in the preference relation set, the positive and negative sample pairs are symmetric with respect to the origin, so there is no need for a bias term [5].

2. Exploration of the Ideological and Political Path of Computer Major Courses

2.1 Unsupervised Learning Courses

The main purpose of the offline training process of stacked denoising autoencoders is to learn generalized features of images through unsupervised learning [6]. As we introduced before, a denoising self-encoder is the basic unit of this stacked denoising self-encoder network, and its most important feature is that it can restore a disturbed image to the original image state, so as to obtain a very Strong robustness feature. By reverting from the disturbed state to the undisturbed state, this denoising autoencoder has more efficient and superior performance than traditional autoencoders in discovering robust features [7]. Moreover, through analysis, we can also find that the stacked denoising autoencoder has a good ability to handle and discriminate the effects of occlusion and illumination in the process of face recognition. In this case, we use the tiny database to assist offline training of a stacked denoising autoencoder to complete the learning of generalized image features for this deep model [8].

2.2 Virtual Open Experiment System

Based on a brief description of the basic knowledge of single-chip microcomputer, this characteristic textbook enables students to have a certain ability to solve engineering practice problems by means of a series of modular case analysis and hands-on practice. Using the new domestic serial programmable microcontroller STC89C52 microcontroller, the convenient serial port programming greatly simplifies the development cost and cycle of the microcontroller. Students can not only do confirmatory experiments, but also design new experiments on experimental circuits by themselves [9]. The system has the following features:

(1) Adopting an open structure design, all pins of the single-chip microcomputer are open to the outside world, and the connection with the peripheral circuit can be completed by the students themselves, and a variety of single-chip microcomputer experiments can be carried out;

(2) Keil uVision2 programming simulation environment is provided, which supports assembler and C language programming. Students can write their self-compiled programs into the single-chip microcomputer, and they can master the whole process of single-chip microcomputer development after completing a single-chip microcomputer experiment;

(3) The Proteus hardware simulation environment is provided. When students design the single-chip microcomputer system, they can use the software to simulate [10] first when there is no hardware.

(4) The instrument provides more than 10 kinds of peripheral circuit equipment of single-chip microcomputer for students to choose freely;

(5) The serial port programmable single-chip microcomputer is used on the instrument, no other programming equipment is required, and the program is written into the single-chip microcomputer instantly through the serial port line. The test results are shown in the figure below.

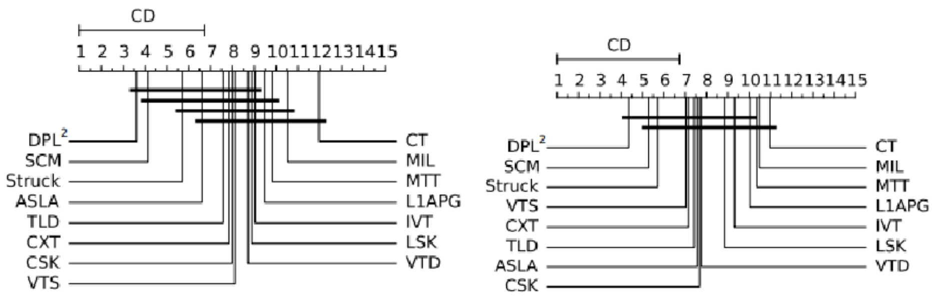


Figure 1. Comparison of Nemenyi test results of each target tracking algorithm with respect to the success rate AUC value (left) and accuracy value (right)

3. Experimental Setup

Analysis of experimental results

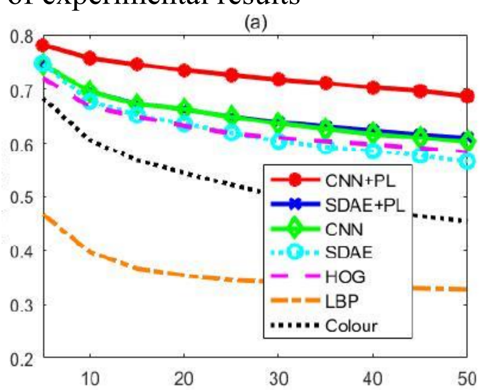


Figure 2. Number of matches for Top n

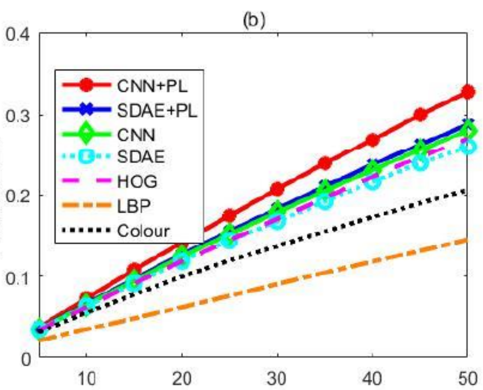
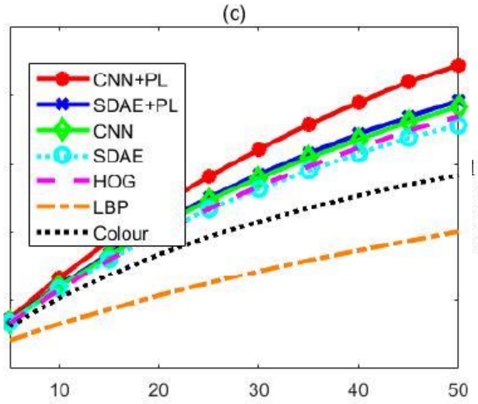


Figure 3. Number of matches for Top n



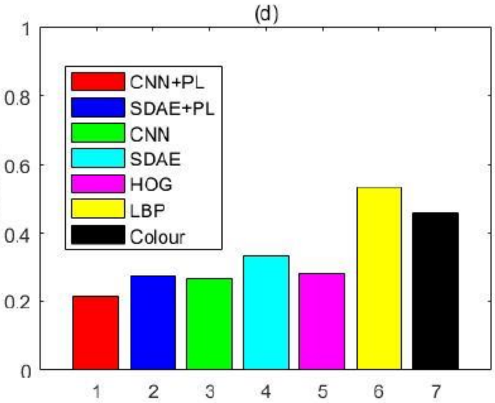


Figure 4. Number of matches for Top n **Figure 5.** Algorithm descriptor

Note: (a) means average retrieval precision (ARP); (b) means average retrieval recall rate (ARR); (c) means F value; (d) means ANMRR index.

In addition to the two retrieval methods proposed according to our teaching system, namely CNN+PL and SDAE+PL, we also compared another popular biomedical image retrieval system, LBP, followed by four traditional and popular general image retrieval Algorithms are also added to our comparative experiments, namely CNN, SDAE, HOG and Colour. Then, according to the definition of the retrieval evaluation criteria earlier in this chapter, namely ARP, ARR, F and ANMRR, we calculated the numerical results corresponding to each variable. 5 to top 50, with an interval of 5, the results of all corresponding evaluation metrics. For the specific experimental comparison chart, please refer to Figure 5.5.

Further, in order to demonstrate the robustness and comprehensiveness of our proposed algorithm, we also test its tracking effect when the number of targets is one, that is, single target tracking. Therefore, it can be seen that our algorithm is a comprehensive target tracking system that integrates single-target and multi-target tracking. Finally, in this experiment, we set the parameter $\lambda = 0.001$, and the size of the update threshold is 0.8.

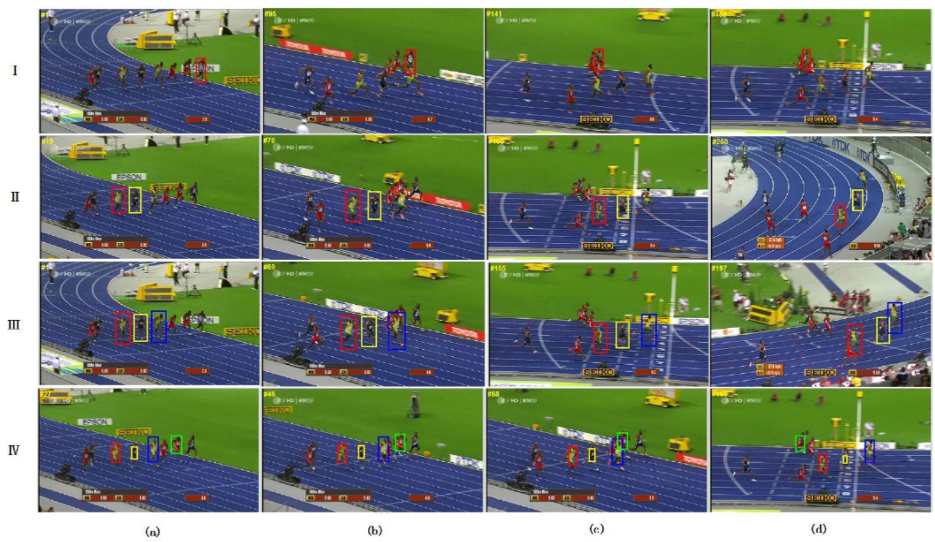


Figure 6. Results of sports experiment

4. Conclusion

The modular teaching mode and practice system of the single-chip microcomputer course based on the working process of this subject has been fully practiced in the electromechanical major since 2020, and has achieved remarkable results, which has high theoretical significance and promotion value. This paper proposes a deep preference learning retrieval system for curriculum design image retrieval. First, we have proposed a new retrieval system which is different from other retrieval algorithms through frame analysis and research on the algorithm. We studied the two most popular deep neural network models in deep learning, namely fully connected network and convolutional neural network, respectively trained and processed them, and migrated the deep feature representation module for biomedical image feature extraction and Express. A preference retrieval model for preference retrieval in different categories is designed. Finally, the two are perfectly integrated into a complete deep preference learning retrieval system.

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