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Computer-Aided Design AND APPLICATIONS

Construction of Computer Aided Instruction System for Art Design Based on Image Feature Recognition

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Abstract. In the field of computer-aided instruction (CAI) of art design, image recognition and understanding is an important skill. In this article, the construction of CAI system of art design based on image feature recognition is studied, and an algorithm of artistic image feature recognition based on moment feature extraction is proposed, which is applied to art design teaching. Considering the shortage of low-order moment in matching accuracy, the high-order moment is introduced into the matching process, and an improved strategy is proposed. The algorithm realizes the automatic recognition and processing of artistic images by extracting the moment features of images. The results show that this algorithm has high accuracy and stability in the recognition and processing of artistic images, and has higher matching accuracy compared with other algorithms. The application effect of the system is assessed from two aspects: innovation ability and artistic accomplishment, which shows that it strengthens students' artistic design ability. Through the application of CAI system, the automatic recognition and processing of artistic images are realized, and a more intelligent and personalized learning experience is provided for students.

Keywords: Image Feature Recognition; Computer-Aided Instruction; Art Design; Moment Characteristic
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1 INTRODUCTION

By constructing a computer-aided teaching system for art design based on image feature recognition, it can provide students with more personalized and accurate learning guidance, and improve the teaching effectiveness of art design. At the same time, the system can also provide useful teaching aids for teachers, helping them better guide students in art design. Based on the results of matching and recognition, the system can generate teaching suggestions for art design. These suggestions can include image recommendations with similar styles, tips on design techniques, and guidance on color matching. The system can optimize teaching suggestions using machine learning algorithms to improve the quality of recommendations. The system should also

include a student feedback system to collect feedback information from students on teaching suggestions. This feedback can be used to improve the recommendation algorithm of the system and improve its performance. After image preprocessing, it is necessary to extract image features using computer vision and machine learning techniques. These features can include color, texture, shape, etc. Existing feature extraction algorithms such as SIFT, SURF, ORB, etc. can be used, and new feature extraction algorithms can be developed based on specific needs. CAI can provide a more vivid instructional mode by using computers. Through the multimedia form of the computer, not only rich and varied character information can be presented, but also images and sounds can be output, which makes the instructional content livelier and outstanding, and enhances the expressive force of teaching. The multi block color binary statistical image method provides an effective new approach for single sample face recognition. In future research, we can further explore the application of this method in other facial related tasks, such as facial verification, facial clustering, and facial synthesis. At the same time, we can also try to apply this method to other types of image recognition tasks to verify its universal applicability. Adjabi et al. [1] conducted a series of experiments. We collected a dataset of facial images containing various lighting, facial expressions, and posture changes. By comparing with traditional feature extraction methods, we found that the multi block color binary statistical image method performs better in single sample face recognition tasks. In the Internet era, the education of art design specialty should be directly in line with the demand of market talents, and based on the changes of art design thinking and form and technology, an art design teaching system with design thinking and scientific and technological thinking as the core should be constructed to promote the changes of art design industry. Ayachi et al. [2] analyzed convolutional neural networks for object detection and recognition in large-scale visual data. In this case, the parameters of the CNN model trained on a large-scale dataset can be migrated to new object detection or recognition tasks. This allows the new model to extract information from the already learned features, thereby accelerating training speed and improving performance. Then, the migrated model can be fine-tuned on a specific dataset to adapt to new object detection or recognition tasks. In the CAI field of art design, image recognition and understanding is an important skill. In order to realize this skill, the recognition algorithm based on image features is widely used in the analysis and processing of artistic images. These algorithms can classify, match and recognize images by extracting their features.

Bhatt et al. [3] conducted a review on object detection in deep neural network graphic pages. For training deep learning models to detect graphic page objects in document images, a labeled dataset is required. This dataset should contain graphical page objects for document images and tags. During the training process, the deep learning model learns how to extract features from images and predicts the bounding boxes and categories of objects based on these features. After training, the deep learning model can be used to detect graphic page objects in new document images. After inputting a new document image, the model will automatically extract features and predict the bounding box and category of the object. This information can be used to automate document processing and information extraction processes. Under the background of Internet, art and design disciplines pay more attention to design practice rather than formal aesthetic problems. Therefore, under the background of deepening the reform of tertiary education, the traditional teaching paradigm of basic teaching, professional courses and professional core courses has been gradually banned. After the introduction of creative thinking, art design teaching is building a new system to meet the development requirements of the Internet era. The innovation of art design teaching system is to help students better adapt to the changes of the times, adapt to the requirements of new jobs, adjust the previous teaching route, and continuously improve students' skills and quality. There are still some problems in the instructional mode of art design specialty in the new era, such as the slow change of teaching ideas of some teachers and the inadequate application of new technology instructional mode. Therefore, we should accelerate the innovation of art design education reform to promote the further growth of art design industry. Image recognition technology not only plays a very important role in agriculture, industry, medicine and high-tech industries, but also has increasingly penetrated into the field of art education. This article studies the construction of CAI system of art design based on image feature recognition,

aiming at meeting the market demand for innovative and applied art design talents. The application of CAI system can not only improve teaching efficiency, but also cultivate students' autonomous learning ability and practical operation ability.

(1) This article introduces an art design teaching CAI system based on image feature recognition, which can provide personalized teaching scheme and real-time feedback and suggestions by using advanced image feature recognition technology and CAI, thus helping students to better play their own innovation and artistic potential.

(2) This article proposes a feature recognition algorithm for artistic images based on moment feature extraction. The algorithm combines the feature extraction methods of low-order moments and high-order moments, which provide stable feature description with low-order moments and richer texture information with high-order moments.

(3) CAI system of art design teaching based on image feature recognition can automatically analyze students' artistic works and provide immediate feedback and suggestions, thus improving teaching efficiency, enabling teachers to pay more attention to students' individual differences and needs and provide more targeted guidance.

Firstly, this article introduces the present situation and existing problems of traditional art design teaching; Then, the application of CAI system in art design teaching is analyzed, and an artistic image feature recognition algorithm based on moment feature extraction is proposed, and the implementation process and principle of the algorithm are introduced. The experimental part will verify the effectiveness and reliability of the algorithm through experiments, compare and analyze it with other algorithms, and assess the application effect of the system; The fifth part will summarize the research results and contributions of this article, and put forward the direction and prospect of future research.

2 THE PRESENT SITUATION AND EXISTING PROBLEMS OF TRADITIONAL ART DESIGN TEACHING

Deep learning-based object detection algorithms face some unique challenges when processing remote sensing images. Remote sensing images typically have the characteristics of high resolution, large area, and multiple targets, where the size of the targets may vary greatly, and there may be high similarity between different categories of targets. This makes target detection a challenging task. Due to the high similarity between target classes in remote sensing images, a feature learning method that can distinguish different categories is needed. This can be achieved by using advanced deep learning models such as Siamese networks and triplet loss functions. The targets in remote sensing images are usually related to the contextual information around them. Therefore, Cheng et al. [4] attempted to improve the accuracy of object detection by utilizing contextual information. For example, existing object detection models can be enhanced by introducing a context aware module. In order to improve the generalization ability of the model, data augmentation can be used to increase the diversity of training data. The comprehensive baseline method proposed by Ding et al. [5] combines deep learning and traditional computer vision technologies to improve the accuracy and robustness of object detection through multi-stage fusion and fine tuning. This method includes three main stages: feature extraction, candidate region selection, and fine tuning. At each stage, we adopted different technologies and algorithms to achieve optimal performance. By testing and evaluating the comprehensive baseline method on the DOTA dataset, we found that this method achieved excellent performance in aerial image object detection, surpassing other existing methods. In addition, we also evaluated various other object detection algorithms using the ODA benchmark testing program, further demonstrating the effectiveness and practicality of the DOTA and ODA datasets. Huo and Yu [6] proposed interactive local corner extraction algorithms and interactive local edge detection algorithms. The interactive local corner extraction algorithm calculates the second derivative of the local image and adopts a certain threshold strategy to extract corners. The interactive local edge detection algorithm selects some key points through user interaction, and then calculates the

gradient of the image based on these key points to obtain the edges. The stereo vision system introduced by it based on two-dimensional image modeling technology can effectively extract three-dimensional information from multiple images and perform model reconstruction. This system has broad application prospects, such as robot navigation, 3D measurement, virtual reality, etc. Especially the interactive local corner extraction algorithm and interactive local edge detection algorithm we propose can greatly improve the flexibility and accuracy of the system. Machine learning is a branch of artificial intelligence (AI) that enables computers to learn new knowledge without explicit programming. In recent years, machine learning has been widely applied in various fields, including art and design. In short, machine learning technology can bring many new opportunities and challenges to art and design.

Liow et al. [7] learned the basics of machine learning, found suitable application scenarios, explored new algorithms, and collaborated with data scientists. Artists and designers can better utilize these technologies to achieve more innovation. Pulse Coupled Neural Network (PCNN) is a neural network that simulates biological vision systems and is widely used in the field of image processing. PCNN can automatically achieve image segmentation, feature extraction, edge detection and other functions, and has good robustness and real-time performance. Liu et al. [8] introduced the application progress of PCNN in image processing, including image denoising, image segmentation, image enhancement, and other aspects. PCNN was initially applied to image denoising. By applying the PCNN model to noisy images and utilizing the pulse emission characteristics of neurons, it can effectively remove noise from images. With the deepening of research, PCNN is gradually being applied in other fields such as image segmentation and image enhancement. For example, PCNN can automatically achieve image segmentation and has strong adaptability to changes in lighting, shadows, etc. In recent years, deep learning has achieved great success in the field of image recognition, and more and more researchers are attempting to apply it to object detection in microbial images. Among them, Convolutional Neural Network (CNN) is one of the most commonly used deep learning models. By learning from a large amount of image data, CNN can automatically extract image features, thereby achieving efficient object detection. In addition, some researchers have applied three-dimensional convolutional neural networks (3D CNN) to object detection in microbial images to better capture the spatial information of the images. Due to the large computational resources required for the collection and processing of microbial images, some researchers have begun to study lightweight object detection methods. These methods are mainly aimed at resource constrained scenarios such as mobile devices and embedded systems to achieve efficient object detection [9]. Rj and Wei [10] proposed a new interactive high-dimensional feature selection algorithm based on dimensionality reduction (RHDSI). This is a new feature selection method that combines dimensionality reduction with machine learning. This method can process high-dimensional data, merge interaction items, and perform statistically interpretable feature selection. And enable existing classical statistical techniques to process high-dimensional data. Mo et al. [11] analyzed the modeling of product information that captures design intent in assisted intelligent assembly modeling. In computer-aided intelligent assembly modeling, capturing product information modeling for design intent is a key step. The goal of this process is to capture the designer's design ideas and decisions, transforming them into a product information model that can be understood by computers. This can facilitate subsequent automation and optimization steps. In order to capture design intent, it is usually necessary to introduce design knowledge, including design principles, design rules, design experience, etc. This knowledge can serve as constraints or guidance to help optimize and automate the design process. At the same time, attention should also be paid to maintaining flexibility as much as possible during the design process to adapt to different design intentions and requirements.

In computer-aided intelligent assembly modeling, this process can be automated through artificial intelligence and machine learning techniques. Wuhu iron painting is a traditional handicraft with distinct local characteristics, known for its unique forging iron technology and artistic expression. Among them, the most core skills lie in the blacksmith's forging and welding techniques. After thousands of years of inheritance and development, these technologies have

become representative cultural heritage in the Wuhu region. Zhang and Chu [12] conducted a preliminary exploration of the application of modern advanced processing technology in the design of non-traditional cultural and creative products. Modern advanced processing technology is a modern manufacturing technology characterized by digitization, intelligence, and automation. The development of these technologies has greatly improved production efficiency and quality. For example, 3D printing technology can achieve rapid prototyping of complex structures, while CNC machining technology can achieve high-precision and high-efficiency machining. The application of these technologies provides new possibilities for the innovation of traditional intangible cultural heritage technologies. The teaching goal of the art course in the field of landscape design is to cultivate students' aesthetic, practical, and professional application abilities. In order to achieve this goal, Yao et al. [13] conducted curriculum reform and practical research. Practice base training can help students better understand and master the aesthetic principles and design techniques in landscape design, while also improving their practical abilities. In the practical process, students can deepen their understanding of theoretical knowledge through practical operations and improve their practical abilities by solving practical problems. Introducing practical projects into practical courses allows students to improve their practical abilities and deepen their understanding and mastery of landscape design by completing practical projects. Organize students to participate in extracurricular practical activities, such as garden tours and landscape design, to better understand the practical applications and market demands of garden design. Emphasis is placed on the cultivation of application abilities in the course, enabling students to understand the application of landscape design in practical work and improving their professional application abilities. Zhang et al. [14] used multi-scale convolutional layers and extended convolutional layers to extract multi-scale features from the original image to adapt to targets of different sizes. At the same time, through residual connections and bottleneck layer design, the representation ability of features and the robustness of the model are enhanced. In the intermediate stage of the detection network, a global pooling layer is introduced to fuse feature maps of different scales to improve the detection performance of the model for targets of different scales. In addition, the target detection results are further optimized through adaptive threshold selection and connection mechanism. It adopts adversarial training strategy to improve the robustness and generalization ability of the model through the adversarial process between the generator and discriminator. In addition, a loss function is introduced to optimize the detection performance of small targets and improve the overall detection performance. Zhao et al. [15] integrated the characteristics, advantages, and original ecological concepts of local agricultural products into packaging design, and enhanced consumer recognition of agricultural product brand image and product quality through visual elements and information transmission of packaging. Based on the above analysis, develop a computer-aided packaging design system. The system will provide a visual interface to facilitate online editing and design by packaging designers, while also supporting adjustment and optimization of design elements to meet the needs of different consumer groups. By constructing a computer-aided packaging design model, the needs of consumers, the value of local agricultural products, and the concept of original ecology are effectively integrated into agricultural product packaging design, aiming to enhance the brand image and market competitiveness of agricultural products. The establishment of this model will have a positive impact on the development of the agricultural product industry, and has certain reference significance for the packaging design of other similar products.

3 CAI SYSTEM OF ART DESIGN

3.1 Feature Recognition of Artistic Images

The growth of art design CAI system has attracted more and more attention. In this field, the technology based on image feature recognition is an important research direction, and its purpose is to improve the effect of art design teaching by recognizing the features in artistic images. Compared with other image feature extraction methods, moment feature has the advantages of

good stability and high computational efficiency, and is suitable for feature recognition of artistic images. Specifically, the moment features of the image can be extracted by calculating the first, second and higher moments of the image. By calculating these moment features, the statistical features of artistic images can be extracted for subsequent feature matching and recognition. The process of artistic image feature recognition is as follows:

Image preprocessing: First, the input artistic image is preprocessed, including image graying, noise reduction, binarization and scale normalization to improve the accuracy and efficiency of feature extraction.

Extracting moment features of images: extracting moment features of images by mathematical methods. Specifically, it is to calculate the zero-order, first-order, second-order and high-order moments of the image to form the moment feature vector of the image. These moments describe the invariant features of the image, such as shape, size, translation and rotation, and provide basic data for subsequent recognition.

Feature matching: After extracting the moment feature vector of the image, the system will match it with the known artistic images in the database. In the matching process, Euclidean distance is used as similarity measure to calculate the similarity between the current image and each image in the database.

Identification result output: the system outputs the most similar artistic image or gives a number of possible candidate images according to the matching result. Moreover, it can also provide other information related to the current image, such as author, creation year, genre, etc., to assist students in art learning and appreciation.

Manual intervention: In order to improve the recognition accuracy, the system also provides an interface for manual intervention. Users can correct and supplement the system identification results according to their own aesthetics and knowledge. This not only helps to improve the recognition performance of the system, but also makes the system better adapt to different artistic styles and fields.

Through the above steps, the CAI system of art design based on image feature recognition can automatically recognize and process artistic images, providing a powerful auxiliary tool for art teaching. The artistic image feature extraction model is shown in Figure 1.

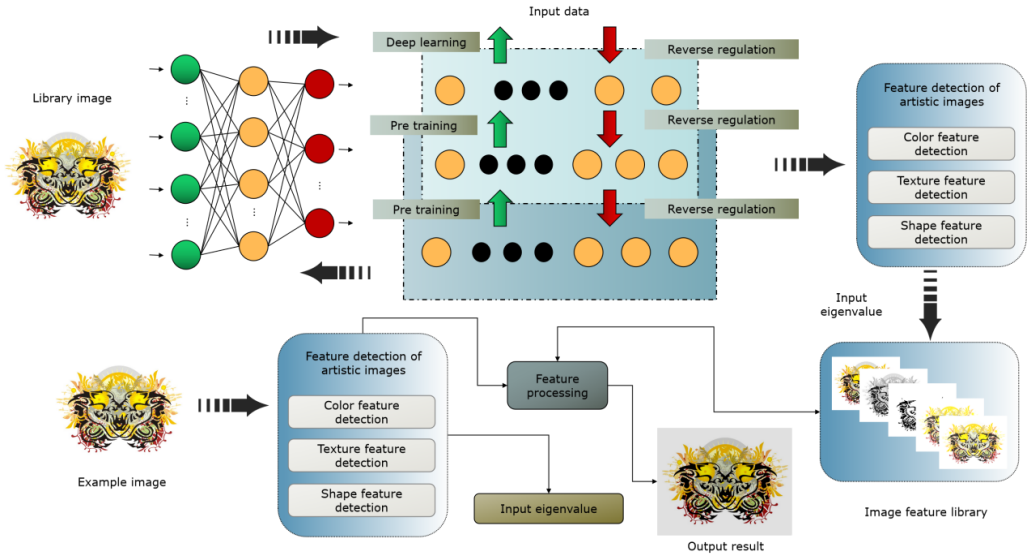

Figure 1: Feature extraction model of artistic images.

In this study, firstly, the features of artistic images are extracted, and then the moment features of images are extracted by using the feature recognition algorithm of artistic images based on moment feature extraction. See Figure 2 for the identification and fitting process of artistic image data.

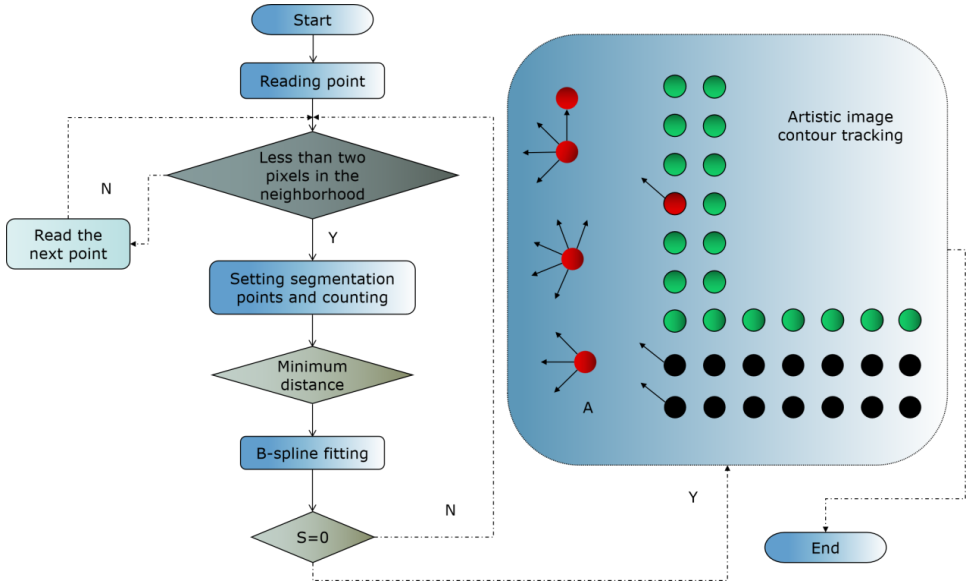

Figure 2: Artistic image data identification and fitting process.

Moment feature is a numerical value describing the distribution characteristics of images, which is obtained by mathematical integration of images. For an image, its moments can be used to describe the position, size, direction and other information of objects in the image. In the process of recognition, the extracted image features (namely moment features) are compared with the known image features in the database to find the most similar image. This process can be realized by calculating the Euclidean distance or cosine similarity between two feature vectors. However, the low-order moment may be insufficient in matching accuracy, so we introduce the high-order moment. Higher-order moments can provide more information about image distribution, such as the characteristics of image bending and distortion, thus improving the matching accuracy. The formula of fuzzy distribution function for moment feature recognition is:

$$\mu(x)=\frac{1}{2}-\frac{1}{2}\sin\frac{\pi}{a_2-a_1}\left(x-\frac{a_1+a_2}{2}\right) \tag{1}$$

Where x represents the magnitude of the characteristic difference.

The membership matrix μ between features of the same dimension is constructed by fuzzy distribution function:

$$\mu=\begin{bmatrix}\mu_{11} & \mu_{12} & \cdots & \mu_{1Q}\\ \mu_{21} & \mu_{22} & \cdots & \mu_{2Q}\\ \vdots & \vdots & \ddots & \vdots\\ \mu_{M1} & \mu_{M2} & \cdots & \mu_{MQ}\end{bmatrix} \tag{2}$$

The pixel value $H(v)$ of the feature distribution of art design images is:

$$H(v)=L_{xx}(x,\sigma)+\frac{1}{\sqrt{L_{yy}}}\exp\left(\frac{j\pi}{4}\right)\exp\left[\frac{-j\pi}{L_{yy}S(t)}\right] \tag{3}$$

Among them, $L_{xx}(x,\sigma)$ is the ambiguity function of multi-scale transformation, and L_{xx}, L_{yy} is the wavelet high-frequency coefficient and low-frequency coefficient of feature decomposition of artistic design images.

The coding adopts the principle of vector quantization:

$$c_{i,j}=\begin{cases}1 & if \quad j=\arg\min\limits_{j=1,2,\cdots,M}\left\|p_i-f_j\right\| \\ 0 & else\end{cases} \tag{4}$$

Here c_i represents the weight of the corresponding code sub- f_i.

Through the calculation of the following formula, the P_i with the highest probability is obtained:

$$P_i=P_r(S|\lambda_i) \tag{5}$$

The low-order and high-order moments can be calculated separately and combined as the feature vectors of the image. This process can be repeated, and each iteration will update our database and matching results until the best matching result is found or the preset number of iterations is reached.

3.2 Teaching Assessment of Art Design

When assessing the application effect of art design CAI system based on image feature recognition, the proposed model is carried out from the following aspects:

Feedback of students' use of the system: Understand the frequency and duration of students' use of the system, and their feelings during the use. This information can be collected by designing questionnaires or conducting interviews. In addition, we can also compare the learning effects before and after using the system to assess the degree of help of the system to students' learning.

Recognition accuracy: Assess the accuracy of the system in recognizing artistic images, and compare the recognition results of the system with the judgments of professionals. If the recognition accuracy of the system is high, it shows that the application effect of the system in art design teaching is good.

Teaching efficiency: whether the system can improve the efficiency of art design teaching can be assessed by comparing the teaching time, teaching cost and students' learning effect before and after using the system. If the system can reduce teaching time, reduce teaching cost and improve students' learning effect, it shows that the system can improve the efficiency of art design teaching.

Quality of students' works: whether the system can improve the quality of students' works can be assessed by comparing the students' works before and after using the system. If the quality of students' works is obviously improved, it shows that the system has a positive impact on art design teaching.

Given an information system $\langle U, C \cup D, V, f \rangle$, $R \subseteq (C \cup D)$, $\forall X \subseteq U$ and the division $\pi(U) = \{X_1, X_2, \cdots, X_n\}$ of the universe U independent of the equivalence relation R, the importance of knowledge R about the set X is defined:

$$sig_R(X) = \frac{|U - bn_R(X)|}{|U|} \tag{6}$$

The importance of knowledge R in dividing $\pi(U)$ is defined as:

$$sig_R(\pi(U)) = \frac{\sum_{i=1}^{n} |U - bn_R(X)|}{n|U|} \tag{7}$$

The concepts of support and confidence are introduced into association rule algorithm:

$$P(A|B) = \frac{P(AB)}{P(B)} \tag{8}$$

The relationship between support and confidence can be converted by probability calculation:

$$Conf = (Y|X) = P(Y|X) = \frac{P(XY)}{P(X)} \tag{9}$$

In order to assess the application effect of the system more comprehensively, we can also make long-term observation and comparison, such as using the system in multiple classes or for a long period of time, to further understand its long-term impact. Based on the above assessment results, we can get a comprehensive assessment of the application effect of the system in art design teaching.

4 RESULT ANALYSIS AND DISCUSSION

4.1 System Test

In order to verify the effectiveness and reliability of the artistic image feature recognition algorithm based on moment feature extraction proposed in this article, the experimental verification and comparative analysis are carried out. The results show that this algorithm has high accuracy and efficiency in artistic image recognition and processing, and has higher matching accuracy compared with other algorithms. In the research, the F1 values of SVM algorithm, CNN algorithm and this algorithm are tested, as shown in Figure 3.

For SVM algorithm, RBF kernel function is used, and the parameters are optimized to obtain the best performance. For CNN algorithm, the common CNN structure is used, and some adjustments are made to adapt to the task of artistic image classification. In this article, the algorithm combines moment features and deep learning methods. Firstly, the edge information of the image is extracted by edge detection algorithm, and then the moment features of the image are calculated, and these features are input into a deep neural network for classification. Comparing the F1 values of the three algorithms, we can find that the performance of SVM algorithm is relatively poor, while the performance of CNN algorithm and this algorithm is relatively good. Among them, the algorithm in this article is the best, which shows that the method of combining moment features of images with deep learning can effectively improve the accuracy and stability of artistic image classification.

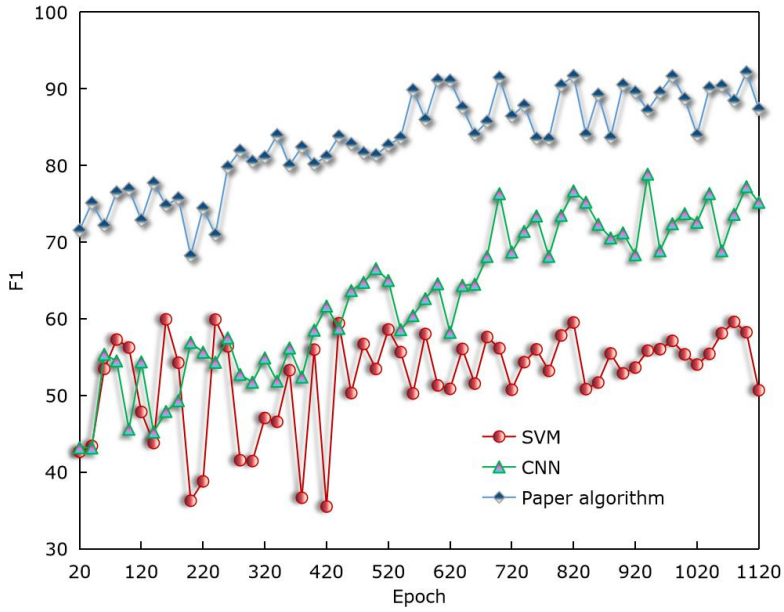

Figure 3: F1 value test results.

In addition to testing the F1 values of SVM algorithm, CNN algorithm and this algorithm, their response speed is also tested. Response speed refers to the time required for the algorithm to process the input data and output the results. The response speed test results of different algorithms are shown in Figure 4.

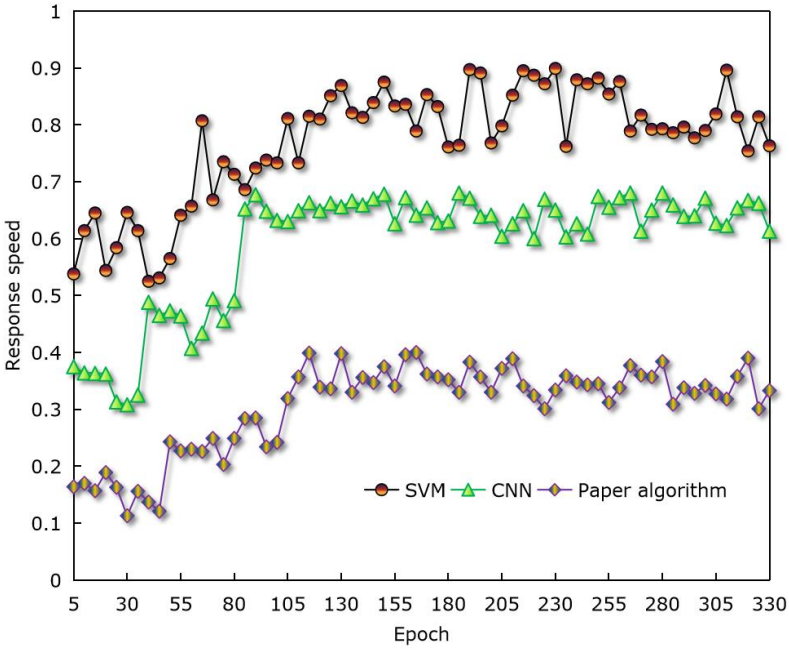

Figure 4: Response speed test results.

Comparing the response speed of the three algorithms, we can find that the response speed of SVM algorithm is relatively slow, while the response speed of CNN algorithm and this algorithm is relatively fast. This algorithm has some advantages in efficiency and performance. Combined with the results of F1 value, we can draw a conclusion that the algorithm in this article has good performance in classification accuracy and response speed, and provides an effective auxiliary tool for art design teaching.

4.2 Assessment of Students' Artistic Design Ability

The assessment model of art design teaching mentioned above is used to score students' innovative ability and artistic accomplishment. The assessment model is based on image feature recognition technology, which combines various elements of art design and can objectively assess students' art design ability. By comparing the score changes of students' artistic design ability under conventional education with those after the application of the CAI system of artistic design, we can analyze the assessment results and further understand the role of the CAI system of artistic design in improving students' innovative ability and artistic literacy. The assessment model is based on image feature recognition technology. By analyzing students' works of art, feature information, such as lines, colors and composition, is extracted and converted into numerical indicators for assessment. In the scoring process, the scores of innovation ability and artistic accomplishment are combined to form the final assessment result. The assessment process is objective and comprehensive, which can effectively reflect students' artistic design ability.

Figure 5 shows the changes of students' artistic design ability scores under regular education. Figure 6 shows the changes of students' artistic design ability score after the application of CAI system for artistic design.

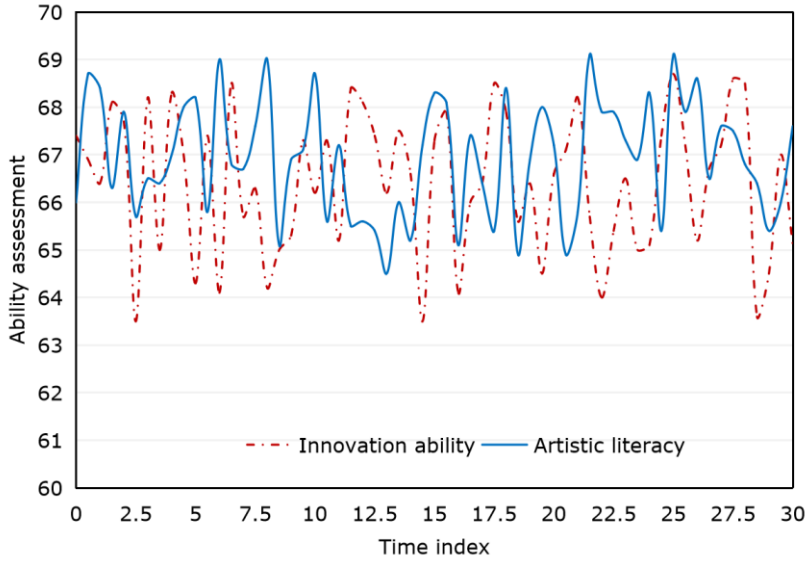

Figure 5: Students' innovative ability and artistic accomplishment scores under conventional education.

The disorderly change of students' innovative ability and artistic accomplishment under the conventional instructional mode means that the traditional instructional method is not effective in improving students' two abilities. However, after the introduction of the new CAI system, although the assessment of students' innovation ability and artistic accomplishment did not change obviously in the early stage, with the passage of time, an obvious acceleration trend can be seen. This result shows that the CAI system of art design teaching based on image feature recognition

has a positive impact on the cultivation of university students' innovative ability and artistic accomplishment. Compared with the conventional education mode, the students' artistic design ability score has been obviously improved after applying the CAI system of artistic design. In particular, this shows that the CAI system of art design plays an active role in stimulating students' innovative thinking and improving their artistic creation skills. Moreover, the score of artistic literacy has also improved, which shows that the system has also played an important role in cultivating students' artistic literacy and aesthetic ability.

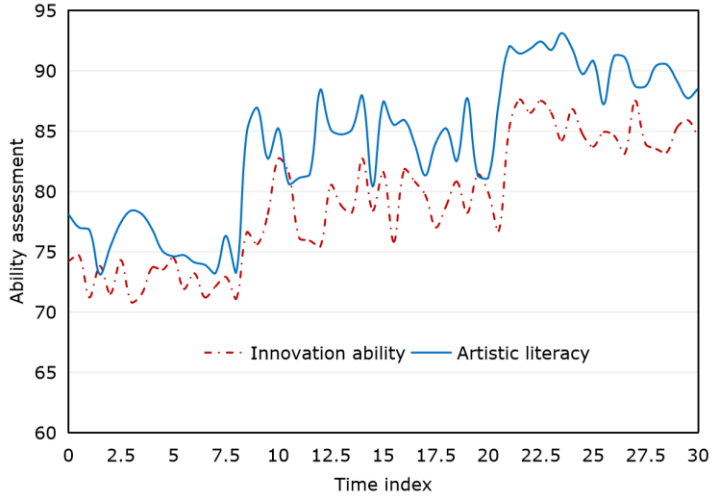

Figure 6: Students' innovative ability and artistic accomplishment scores after the introduction of the new CAI system.

Figure 7 shows the subjective assessment results of students and teachers on traditional art instructional methods and new instructional methods. As can be seen from the figure, students and teachers generally rate the new instructional method higher than the traditional instructional method.

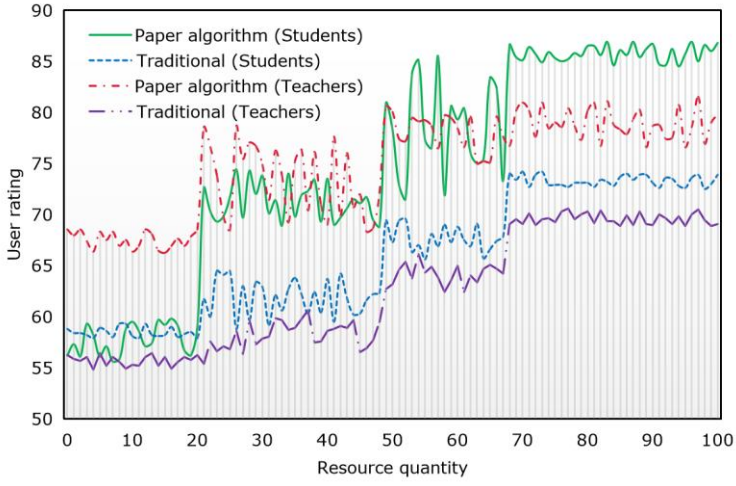

Figure 7: System score.

Students and teachers generally give high marks to the new instructional methods, which shows that the new instructional methods have advantages in art design teaching. Specifically, the new instructional method can better stimulate students' innovative thinking, arouse their learning enthusiasm, improve students' artistic skills, stimulate their interest, promote classroom interaction and improve teaching quality and effect. Compared with the traditional art instructional method, the new instructional method has more advantages. Traditional art instructional methods may pay more attention to teachers' teaching and skills mastery, while new instructional methods pay more attention to the cultivation of students' initiative and innovation ability. In addition, the new instructional method also pays more attention to classroom interaction and students' participation, creating a positive learning atmosphere.

CAI system of art design teaching based on image feature recognition can provide personalized teaching scheme according to students' individual differences and needs. By identifying the characteristics of students' artistic works, the system can provide targeted feedback and guidance to help students better play their own innovation and artistic potential. The system can analyze students' artistic works in real time and provide immediate feedback and suggestions. This helps students to know their own advantages and disadvantages in time, adjust their learning strategies, and constantly improve their innovative ability and artistic accomplishment. Through image feature recognition technology, the system can present students' artistic works and compare them with others, thus stimulating students' sense of competition and curiosity. This will help to mobilize students' learning enthusiasm and urge them to study and create harder. CAI system of art design teaching based on image feature recognition can transform abstract art design knowledge into intuitive images and data, and help students better understand and master knowledge.

CAI system of art design teaching based on image feature recognition is of positive significance in cultivating university students' innovative ability and artistic accomplishment. In order to further enhance these two abilities of university students, educational institutions can actively introduce and apply such advanced teaching systems, and at the same time, combine with other effective instructional methods to provide students with richer, more flexible and innovative learning experiences. In addition, teachers also need to constantly learn and update their educational concepts and technical knowledge in order to better adapt to and cope with the new educational environment and challenges.

5 CONCLUSIONS

In the CAI field of art design, image recognition and understanding is an important skill. In order to realize this skill, the recognition algorithm based on image features is widely used in the analysis and processing of artistic images. In this article, the construction of CAI system of art design based on image feature recognition is studied, and an algorithm of artistic image feature recognition based on moment feature extraction is proposed, which is applied to art design teaching. The results show that the algorithm has high accuracy and stability in the recognition and processing of artistic images, and has higher matching accuracy compared with other algorithms. This shows that the algorithm can be better applied to art design teaching. By introducing this system, teachers can pay more attention to students' individual needs, explore students' innovative potential and improve teaching quality and effect. The new instructional method can better stimulate students' innovative thinking and artistic creation ability, improve their learning interest and participation, and promote classroom interaction and teaching quality. The application of CAI system can not only improve the teaching efficiency, but also cultivate students' autonomous learning ability and practical operation ability. In the future, we will further study the construction of CAI system of art design based on image feature recognition, continuously improve the level of intelligence and automation of the system, and provide better support for cultivating innovative and applied art design talents.

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