

Application of Computer Software Technology in Art and Technology Creation

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Abstract

With the rapid development of computer software technology, the ever-changing application fields of software technology are becoming more and more extensive. The application of computer software technology in the creation of art and science and technology has promoted tremendous changes in the traditional forms of artistic expression. The application of computer software technology in the field of art includes interactive media design, digital images, virtual reality design, new media art, etc. The purpose of this article is to explore the application of computer software technology in artistic and technological creation. This research first deeply analyzes and explores the impact of computer software technology on art and technology creation, the promotion of key technology development to art creation, the opportunities brought by the development of cutting-edge technology to art creation, and the analysis and prediction of the development trend of art and technology. This paper proposes a computer digital art graphics aesthetic classification method, which scores the subjective aesthetics of design graphics, and establishes a digital art graphics aesthetic classification image library. Design a method for fusion of aesthetic features and general image statistical features, and establish a classifier through the SVM algorithm to achieve the classification of high and low aesthetic images. The method proposed in this paper has a classification accuracy of 89.21% and an AUC value of 0.9246 for the images in the computer digital art graphics aesthetic classification image library. According to the experimental data, the accuracy of image classification of the computer digital image technology is higher than the combination based on other features, and the classification performance for the aesthetic level of computer digital art graphics is better than other typical algorithms.

Keywords

Computer Technology; Technology and Art; Art and Technology; Digital Media Technology.

1. INTRODUCTION

With the rapid development of global digitization, the application fields of computer software technology are becoming more and more extensive. The application of computer software technology in the field of art design has promoted huge changes in traditional art expressions [1-2]. A variety of artistic expressions have quickly come to people's eyes through the spread of the Internet, and this progress has greatly improved people's artistic feelings in their lives [3-4]. Computer software technology is widely used in all levels of art and technical creation, and has become an important part of modern society's visual culture [5-6]. Driven by new technologies, it merges with related application fields to form new media forms and art categories [7-8]. The dual characteristics of technology and computer software technology,

combined with modern social culture, industrial economy and other factors, have made rich contributions and expansions to the development process [9-10].

Regarding the application of computer software technology in art and technological creation, many scholars have conducted research on it and achieved very impressive results. For example, Wang YH has conducted research on computer art, which has laid an important foundation for the development of 3D animation art [11]. Xi S Q gave a more detailed description of the development process of computer graphics, and analyzed the basics of computer graphics, fractals, computer animation, and three-dimensional computer graphics hardware systems [12].

This research takes the application of contemporary computer software technology in art and technological creation as the research object, and systematically discusses and analyzes the status quo of new media under the integration of art and technology from multiple angles. And it will conduct research and discussion from four aspects: the historical and cultural background, characteristics of computer software technology and artistic creation, the development of art and technology, and the future development of art under the combination of technology. This research aims at extracting the aesthetic characteristics of computer digital art graphics to establish an image aesthetic feature model, using the SVM algorithm to train the features extracted from the computer digital art graphics aesthetic level image library, and establishing a computer digital art graphic aesthetic level classifier to achieve the aesthetic classification of computer digital art graphics has achieved good results and has been analyzed through experiments. Through the summary of the creative practice skills of computer software technology in art and technology and the construction of the basic theoretical framework, this research provides creators and art researchers with innovative ideas and research ideas with reference value.

2. APPLICATION OF COMPUTER SOFTWARE TECHNOLOGY IN ARTISTIC AND TECHNOLOGICAL CREATION

2.1. Innovative Performance of Computer Software Technology in Artistic and Technological Creation

(1) Static performance of digital image art

Digital imaging technology has the following characteristics in terms of its static beauty expression: first, the static expression is first expressed in the static visual aesthetics. In the static image digital works, the "beauty of humanity", "beauty of human relations" and "beauty of art" are all typical portrayal of static beauty.

The second feature of the static expression form of digital imaging technology is the diversification of static expression forms: digital static pictures are the most common form of digital expression, pictures after digital image processing technology have typical technical beauty and texture, and can be easily carried out. The subsequent processing and processing can attract a large number of customers to visit and appreciate; the static web technology based on multimedia technology is also a digital technology developed in recent years. The html web page using the b/s structure is known for its high information content and simplicity the static webpages can best bring viewers intuitive information acceptance content, which has become a typical representative of contemporary digital expressions.

The third static expression feature of digital imaging technology is the aesthetic feature of digital technology: the use of digital image processing tools such as PS or 3D MAX can bring the reviewers a kind of technical beauty, whether it is the beauty of the layer design or the topology of the cut map The beauty can bring a kind of physical and mental pleasure to the operator.

(2) The dynamic performance of digital image art

The dynamic beauty of digital imaging technology is mainly displayed in the form of digital animation. The beauty of motion and modeling of dynamic technology is a significant feature of digital animation art: for the movement in digital animation, it can show what other art cannot. The beauty of sports, expresses the exaggerated interpretation of modeling and movement understood by animators with two-dimensional or full three-dimensional digital animation art, which further reflects the real and exaggerated artistic appeal and visual impact of digital animation art.

2.2. Promotion of Computer Software Technology to Artistic and Technological Creation

(1) The connection between art and technology

The holographic imaging technology appears more and more frequently in people's daily life, and you can experience clear, realistic, three-dimensional and vivid three-dimensional images without wearing any equipment. Three-dimensional printing and digital molding technology provide a convenient and fast way to establish the reality of virtual creations.

The visual reality and aesthetic characteristics of 3D animation will enter the stage of innovation in existing art forms after completing the simulation of the appearance of real world objects and physical laws. The development of 3D technology will focus on the re-creation of existing art forms, using the convenient features of technology and creative processes in an internalized way, and will bring many benefits in terms of improving efficiency and reducing costs. The existing appearance features will gradually solidify into one of many external art forms. Three-dimensional technology will target multiple artistic styles and intervene in the creation process of the work as a creative technique and a way of organizing the creative process.

(2) Personalization of the theme of art and technology creation

The popularization of technology has prompted individual creators and small teams to participate more in the activities of 3D animation art creation, and more varied skills are derived between technology and art. Individual differences and individual performance demands will inevitably be reflected in the works. Realize the collaboration between creators on a more extensive exchange platform, and work together to complete the creation of more artistically expressive works.

2.3. Opportunities Brought by Computer Software Technology to Art and Technology Creation

(1) Interaction and biosensing technology to achieve interactive immersive experience

The development of interactive technology and biosensing technology is bound to have a revolutionary impact on the presentation of three-dimensional animation. Break the technical limitations of the two-dimensional presentation of images and images, and realize the immersion and interactive experience in the virtual space.

(2) Deep learning technology taps autonomous simulation capabilities

Machine deep learning is based on the analysis and training of big data, which can help creators complete a large amount of data operation analysis and provide feedback on many common results. The advancement of artificial intelligence technology and deep learning will provide more credible and realistic simulation capabilities for the daily behavior of animated characters. Independent simulation technology will promote the integration of traditional animation, film and television creation methods and modern game technology construction methods, effectively improve the efficiency of animation creation, so that creators can have more time and energy to focus on the creative itself.

2.4. Art Image SVM Classification Algorithm

Training sample set $D = \{(x_i, y_i) \mid i=1, \dots, N\}$, $y_i = -1$ indicates that the training sample is a negative sample, and $y_i = +1$ indicates that the training sample is a positive sample. The linear discriminant function of the sample in the N-dimensional space is:

$$g(x) = w \cdot x + b \quad (1)$$

Where w is the N-dimensional normal vector, and b is the offset. Then the equation of the classification surface is: $w \cdot x + b = 0$. The sample on the hyperplane that is closest to the classification surface and parallel to the optimal classification surface in the sample is called the support vector.

In order to find the optimal classification surface, the kernel function $k(x_i, x)$ is used to replace the dot product ($x_i \cdot x$), and the SVM classification decision function is:

$$f(x) = \text{sgn}\{w^* \cdot x + b^*\} = \text{sgn}\left\{\sum_{i=1}^n a_i^* \cdot y_i \cdot k(x_i, x + b^*)\right\} \quad (2)$$

Common kernel functions include linear, polynomial, radial basis, etc. The kernel function in this study uses linear kernel function, such as formula (3):

$$K(x_i, x) = x_i^T x \quad (3)$$

3. EXPERIMENTAL RESEARCH ON THE APPLICATION OF COMPUTER SOFTWARE TECHNOLOGY IN ART AND TECHNOLOGICAL CREATION

3.1. Experimental Procedure

(1) Build an image library

This research uses the fractal flame algorithm to create digital art graphics and subjectively evaluates these graphics. Image aesthetics is the study of the relationship between aesthetic image characteristics and human subjective emotions. In this article, many testers will subjectively rate images (1-7 points). Each digital graphic art created by the computer is evaluated by 5 art experts. Digital art graphics with an average number higher than 5.8 are defined as high aesthetic categories, graphics with scores lower than 4.2 are defined as low aesthetic categories, and other scores are the image aesthetics of digital graphics that have not been selected in the image library.

(2) Build a feature library

The characteristics selected in this study are shown in the table, which can be divided into the following three categories:

Aesthetic features: the complexity of image processing and content complexity are used as the aesthetic features of advanced digital graphic art. Considering low-level features such as image, color, composition and texture from an aesthetic point of view, the general texture features of the composition, a total of 19-dimensional features.

General statistical characteristics. Select general statistical features such as blur feature, dark channel, measurement feature and contrast, brightness feature to represent the statistical properties of digital graphic art, a total of 7-dimensional features.

Aesthetic features and general statistical features are combined, and there are 26-dimensional features in total.

(3) Output result

This research uses support SVM algorithm to classify image samples. This algorithm solves the "curse of dimensionality" problem calculated in high-dimensional space, has good generalization performance, and has obvious advantages in solving small sample problems, nonlinear, and high-dimensional recognition schemes.

4. ANALYSIS OF THE EXPERIMENTAL RESULTS OF THE APPLICATION OF COMPUTER SOFTWARE TECHNOLOGY IN ART AND TECHNOLOGY CREATION

4.1. Computer Digital Art Graphic Aesthetic Classification

For the results of the experiment, the calculation classification accuracy rate, ROC curve and AUC are used as indicators for analysis. The correct rate refers to the proportion of positive samples identified by the classifier to all positive samples, and the error rate refers to the proportion of negative samples that the classifier mistakenly considers positive samples to account for all negative samples. See table 1 for the classification results of digital art graphics based on different feature classifiers. It can be seen from the table that the classification accuracy rate of the general statistical feature classifier is 75.78%, the classification accuracy rate of the aesthetic feature classifier is 82.91%, and the classification accuracy rate after fusion of the two features is improved to 87.16%.

Table 1. Digital art graphics aesthetic classification results based on different feature classifiers

result	General statistical characteristics	Aesthetic characteristics	Aesthetic features + general statistical features
Classification accuracy(%)	75.78%	82.91%	87.16%
AUC	0.8664	0.9200	0.9243
Maximum error rate(%)	72.213%	69.425%	58.274%

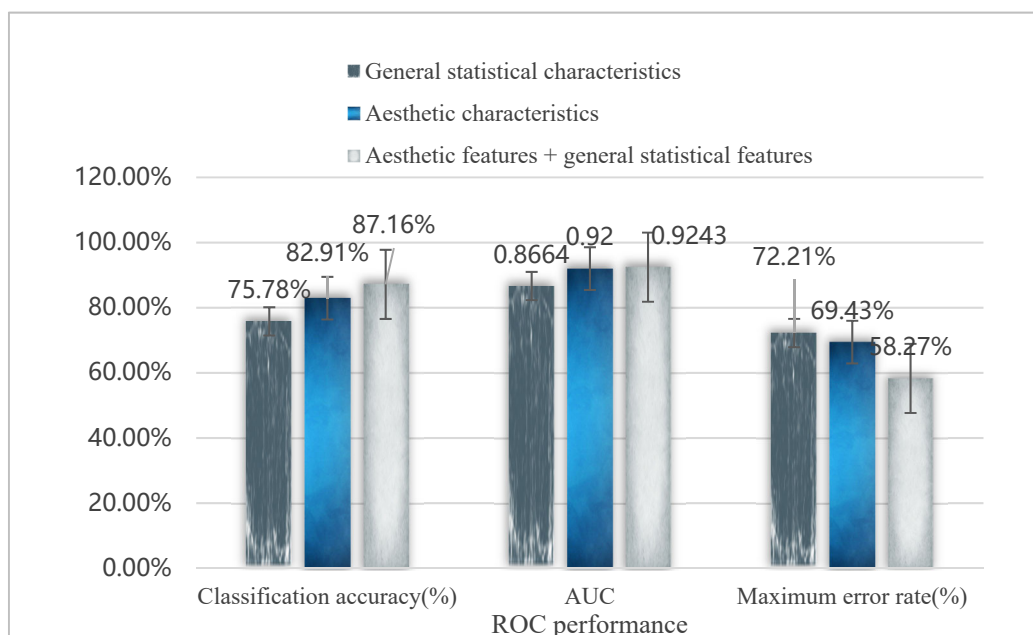


Figure 1. ROC curves of different feature models

It can be seen from Figure 1 that the AUC value of the method proposed in this paper reaches 0.9243, which is higher than the values of 0.8664 and 0.9200 of the other two types of features. It can be seen that the feature fusion method used in this paper has better performance than the model that only uses general statistical features. The performance of the aesthetic feature model is slightly better.

From the above data, it can be seen that the evaluation algorithm proposed in this study improves the accuracy of computer graphics and digital classification by supporting the SVM classifier to merge the two basic features. Since the general statistical characteristics of images do not consider the artistic characteristics of digital graphics in aesthetics, the selection of aesthetic characteristics in this study considered human emotions and aesthetic knowledge when designing digital graphics art, so the selection can compare the aesthetics of digital graphics design characteristic art has been well reflected in human aesthetics and has achieved good classification results.

4.2. Visual Effects of Digital Art Graphics

Comparing the methods proposed by Datta and LO of the University of Pennsylvania, comprehensively considering the low-level features of the image such as color, texture, shape, and size, as well as 56-dimensional high-level features such as depth of field, the rule of thirds, and regional contrast, and verify it with the image library of this research. The comparison results are shown in table 2.

Table 2. Classification results of digital art graphics aesthetics based on different methods

result	Datta method	Lo method	Essay research technology
Classification accuracy(%)	72.26%	81.46%	89.21%
AUC	0.8872	0.9066	0.9246
Maximum error rate(%)	67.265%	62.413%	57.468%

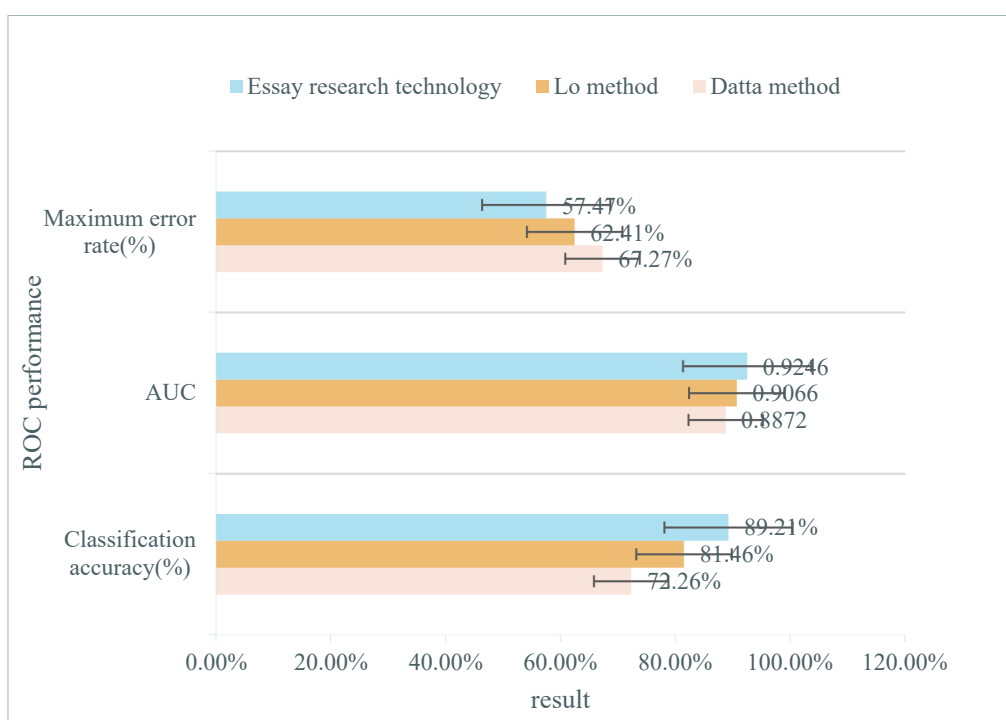


Figure 2. Classification results of digital art graphics aesthetics based on different methods

It can be seen from Figure 2 that compared with the Datta and Lo methods, for the classification results of high and low aesthetic digital art graphics, the classification accuracy of the computer digital art proposed in this paper reached 89.21%, and the AUC value reached 0.9246. The error rate is lower than the error rate of the other two methods, and the overall performance is higher than the other two methods, which is more in line with human visual and aesthetic thinking of computer digital art graphics.

5. CONCLUSIONS

As the most cutting-edge technology and art method, computer software art is changing our way of life imperceptibly. It represents the most advanced development force and reflects the return and sublimation of human sensibility and rationality. The combination of art and technology at home and abroad is the general trend, the general direction, in such a general trend direction, through the combination of computer software technology and artists to discover the truth and beauty in life. During a certain period of art development, the media technology of art creation and production will undergo relatively drastic changes, which will act on the laws of art and change the aesthetic characteristics. Creators need to construct the connection between computer software technology and native art forms from the dimensions of technology and aesthetics, and avoid copying technical processes rigidly. The cognition and understanding of art and technological creation should get rid of the current misunderstanding of one-sided pursuit of realism, and should be flexibly adjusted according to the needs of the art form and content to improve the transformation and transplantation of skills. In-depth exploration of the potential connection between the realization of computer software technology and the characteristics of art and technology, and the artistic creation process and cultural attributes.

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