Design of Print Creation System Based on Digitization

Yongjun Song¹*, Xiayan Liao¹

¹Leshan Normal university Academy of fine arts,Sichuan Leshan,614000

*Corresponding author e-mail: 3329515505@lsnu.edu.cn

Abstract: In recent years, China's digital technology has been rapid development, the transformation and upgrading of traditional industries through digital technology is one of the current mainstream trends. In this context, a new concept of digital art is put forward, and the traditional art creation forms affected by this have been completely changed, which also includes print creation. However, there are still many deficiencies in the existing digital print creation system. Therefore, this paper puts forward the design and research of digital print creation system. This paper makes a detailed investigation on the main advantages of digital technology on print creation. Through the survey results, it can be seen that the use of digital technology can enrich the color and form, make the picture more realistic, enhance the artistic value, enhance the function application, create more efficient, and create more novel and so on. However, there are still some shortcomings in the existing creation system, such as poor painting effect, lack of originality and novelty. Therefore, this paper optimizes and improves the digital print creation system. The traditional inertia thinking is broken through genetic algorithm, and personalized optimization is carried out according to the characteristics of print creation, which not only simplifies the calculation steps, but also improves the calculation accuracy. In order to further verify the effectiveness of this method, this paper compares the traditional methods and analyzes the final synthesis effect. The experimental results show that the signal-to-noise ratio of the print image processed by this method is much higher than that of the traditional method, which proves the effectiveness of the proposed method.

Keywords: Digital Technology, Print Design, Optimized Design, Digital Art

1. Introduction

With the development of the information age, digital technology is becoming more and more mature, our way of life, thinking has also undergone great changes. In a broad sense, digital technology refers to the digital technology developed from computer to human life in various fields. With the application of digital technology in design, the form and connotation of digital technology have changed [1-3]. Digital art design not only takes digital devices as tools, but also takes digital devices as media of transmission and display, and also takes digital devices as purposes. We can use the digital method to analyze, integrate and cover the image at multiple levels, so that the design can transform it into a
system expression. A variety of digital software also provides designers with easy storage and access to information, enhancing the visual effect of space and plane [4-6].

Traditional print art is well-known, is an important part of Chinese art. With the popularization of information technology and the improvement of computer application level, the traditional print art is quietly undergoing earth shaking changes [7-8]. In today's picture reading era, print art, as a combination of creative painting and creative design, is rapidly updated with the continuous progress of science and technology. In the digital information age, the requirements for print art are more contemporary and personalized, and the expression methods, production means and media are also more colorful [9-10].

In this paper, the advantages of digital technology in print creation are deeply studied, and it is known that the use of digital technology in print creation mainly has the functions of rich color and form, more realistic picture, improving artistic value, enhancing functional application, creating more efficient, and creating more novel. But at present, the technology is still not mature enough, the use of digital technology for print creation is still in the research stage, so there are many deficiencies. Therefore, this paper puts forward the design and research of print creation system based on digitization. In this paper, according to the needs of print design, combined with the characteristics of digital technology, integrated with advanced art design concept, based on genetic algorithm, the existing print creation system is optimized. Through the advantages of genetic algorithm, this paper breaks the traditional inertia thinking and enriches the content of creative resource database. And simplify the calculation steps, optimize the system structure, effectively improve the overall performance of the creative system. Analysis shows that the application of digital technology has played an important role in promoting the reform of traditional print creation.

2. Digital Art and Print Creation

2.1 Concept of Digital Art

The concept of digital art is literally understood as the digitization of art. The so-called digital art is the digitization of art. It refers to the art form composed of 1, 0 digital sets, computer application software and corresponding art forms on the computer platform. In the past, the application of computer in printing graphic art was less, and the traditional printing creative art was difficult to effectively combine with computer technology, which was mainly due to the limitation of computer software and hardware. In today's digital information age, computer digital technology involves the field of art, and more and more art forms are produced, and more and more common, it is now widely known as digital art, is the application of printing and illustration art in the digital information age. The specific application fields of digital art include: animation design, advertising design, environmental art design, packaging design, film and television design, and of course, digital print design.

2.2 A Brief Introduction to Print Art

Print is the basic form of information transmission to a large extent. Based on this, print art still belongs to the field of art. With its unique art form, print art conveys and embodies its connotation through beautiful image form. It must embody the connotation and guarantee of the times. Printmaking originated from books. With the changes of the times and the increasing demand for functions, print art is no longer limited to words or books, and its application is more and more extensive. Influenced by the continuous development of economic form and globalization, and by the continuous development of economic form, modern print art is gradually combined with commercial factors. Especially in the development of information technology, print art has been gradually applied in the fields of commercial advertising, media design, animation and film.

3. Questionnaire Survey on the Main Advantages of Digital Technology in Print Creation

In any era, the creativity of art is important, especially in today's digital reproduction, the innovation
of art works is the real vitality of art. Works of art are always closely related to the artist's personality and world outlook, with the unique personality of the creator. The discovery of new technology has no trace of the discoverer's personality, and will be popularized with the passage of time; and the personality of art is the key to distinguish art. With the emergence of new technology, traditional media and emerging media can be used as means to express ideas. At this time, artists should highlight what can reflect their artistic identity, artistic personality and style is very important. Digital print design has brought many advantages to print creation. In order to further study the effect of digital technology on print creation, this paper has carried out relevant investigation and research.

A total of 480 questionnaires were distributed to relevant practitioners and 471 questionnaires were collected. According to the statistical survey results in Table 1, after the use of digital print creation, it has played a major role in enriching the color and form, making the picture more realistic, enhancing the artistic value, enhancing the functional application, creating more efficient, and creating more novel works. The analysis shows that digital print creation has played a positive role in promoting the development of China's print field.

| Serial number | Advantage                  | Serial number | Advantage                  |
|---------------|----------------------------|---------------|----------------------------|
| 1             | Rich color and form        | 2             | The picture is more realistic |
| 3             | Enhance artistic value     | 4             | Promotion function application |
| 5             | More efficient creation    | 6             | Creation is more novel      |

4. Discussion

4.1 Simulation Experiment and Result Analysis

In order to verify the application performance of this method in the process of digital analog synthesis, a simulation experiment is designed. The experiment is designed by MATLAB. The digital image element level is 1500 * 2000, the Gaussian kernel parameter setting is 8, the template feature matching block size is 280*260, and the learning steps of digital analog synthesis are 200-500. In order to better compare the effect of this paper, this paper compares and analyzes two traditional methods which are widely used at present.

The experimental results in Figure 1 show that the SNR of the layout output processed by this paper is higher than that of the traditional method at the same iteration times, which fully proves that the quality of the proposed method is better than that of the traditional method. The analysis shows that the local binary fitting method can realize the analog synthesis of print digital image, and the output image quality is high and the synthesis effect is good.
Figure 1. Comparison of output signal to noise ratio of three methods of digital analog synthetic painting

In addition, in order to further verify the actual effect of the finished works, this paper makes a survey and analysis on the perception and satisfaction of the final product. According to the results of Figure 2, the printmaking works created by this method have higher scores than the traditional two methods in color, form, creativity and satisfaction. The analysis shows that through the optimization of the improved algorithm, the comprehensive performance of the digital virtual synthetic printmaking system is further improved, and higher user satisfaction is obtained. Better in line with the needs of the public aesthetic.
Figure 2. Comparison results of three methods of digital analog synthetic painting

4.2 Design Method of Digital Print Based on Genetic Algorithm
Genetic algorithm is an evolutionary algorithm based on Darwinian evolution theory. It simulates natural selection, natural selection and survival of the fittest. Through n generations of inheritance, mutation, cross replication to solve the problem of the optimal answer. In order to break the inertia of thinking, through the analysis and induction of print creation, breaking the inertia of thinking. The artistic creation of analog digital printmaking generally needs a variety of patterns. A pattern gene library is generated by genetic crossover and mutation transformation of the actual coding genetic algorithm.

(1) Pattern generation based on genetic algorithm
After the material is collected, the required pattern is simulated, and the contour curve of the pattern is generated through the plane, and \( O_{\text{cur}} = (\rho_i, \gamma_i, \theta_i), i = 0, 1, 2, \cdots, n \) represents the curve. In this paper, the curve is represented by real number coding:

\[
O_{\text{cur}} = \langle (\rho_0, \gamma_0, \theta_0), (\rho_1, \gamma_1, \theta_1), \cdots, (\rho_n, \gamma_n, \theta_n) \rangle
\]

Where: \( \rho_i \) is the radius of the upper half curve of polar angle \( \theta_i \); \( \gamma_i \) is the radius of the lower half curve of polar angle \( \theta_i \).

(2) Fitness function based on user satisfaction
Users are mainly divided into ordinary user \( a \) and professional user \( b \), which are set with different weights of 0.4 and 0.6 respectively:

\[
X_j = 0.4a + 0.6b
\]

Finally, it also includes the score of patterns in digital print, that is, the user satisfaction value is:
\[ f(X) = \sum_{j=1}^{K} X_j \alpha_j \]  

(3)

Where: \( \alpha_j \) is the weighted value of style; \( K \) is the number of patterns.

4.3 Creative Artistic Thinking of Print Based on Digital Technology

Digital technology is widely used by artists in all aspects of creation, which stimulates the enthusiasm of print creators, but also greatly reduces the threshold of painting creation. However, no matter how digital develops in the future, under the control of the creative process and final effect, creators always hold an active attitude and use their aesthetic choices to adapt to the contemporary aesthetic requirements. Under the guidance of artistic thinking, printmakers have created a specific art form.

Thinking innovation requires bold integration and combination of digital technology, breaking the production order, adding a variety of creative technologies to form a new visual image. Therefore, the use of interesting and unpredictable graphics to disrupt the computer layout, resulting in new images, but it will be limited to graphics. At the same time, we can use various tools to create and reconstruct images. These tools can help us create and create images using various technologies.

4.4 Diversified Development Direction

With the continuous development of the digital information age, print art also presents diversity. As far as visual art is concerned, print in the digital information age has been applied to packaging design, advertising design, film and television, animation, engineering modeling, web page optimization and other fields. I believe that in the near future, with the progress of information technology, print art will also usher in a brilliant era. Therefore, in order to meet people's high-level art needs, print art should develop to diversification in the digital information age, and then match with the multimedia market. Therefore, we can draw a conclusion that in the digital information age, the future development of print is very optimistic, and the development prospect is very broad. But for the printmaker also put forward higher requirements. The creators should not only combine the market demand, the characteristics of the times and meet the public aesthetic to design, but also ensure its functionality and ensure the print art to move towards a more diversified direction.

5. Conclusions

In the research of the design of the print creation system based on digital technology, this paper makes an in-depth investigation and Research on the digital technology and the advantages in the field of print creation. The analysis shows that digital technology has changed the traditional print creation mode, and has changed greatly in the way and connotation. The traditional mode of print creation has great shortcomings, especially in the innovative thinking and functional application has been greatly restricted, but the application of digital technology can better solve this problem and play a certain role in making up for it. In view of this, based on the digital technology combined with the characteristics of print creation, this paper puts forward the optimization and improvement measures innovatively. The improved digital print creation system not only effectively improves the creation effect, but also enriches the color matching and the change of artistic thinking. This paper analyzes the development prospects of digital technology in the field of print creation, and thinks that in the future of print creation, digital technology is one of the indispensable important auxiliary tools, and plays a leading role in the development of print creation field. The analysis shows that the research in this paper has achieved ideal results and made a contribution to the research of digital technology in the field of print creation in China.

References

[1] Yu, Y., Zhang, W. B., Liu, X. J., Guo, C. B., Yu, G. Y., & Peng, X. (2016). A new procedure assisted by digital techniques for secondary mandibular reconstruction with free fibula flap. Journal of Craniofacial Surgery, 27(8), 2009-2014
[2] Gjelvold, B., Chrcanovic, B. R., Korduner, E. K., Collin-Bagewitz, I., & Kisch, J. (2016). Intraoral digital impression technique compared to conventional impression technique. A randomized clinical trial. Journal of Prosthodontics, 25(4), 282-287.

[3] Chakraborty, S., Dasgupta, P., Chakraborty, S., & Das, C. (2016). Efficient two-phase heuristic routing technique for digital microfluidic biochip. Iet Computers & Digital Techniques, 10(5), 233-242.

[4] Tong, Q., & Choi, K. (2017). Activity correlation-based clustering clock-gating technique for digital filters. International Journal of Electronics, 104(7), 1095-1106.

[5] Tetsuro, Itakura, Tomohiko, Sugimoto, Naoya, & Waki and the like. (2017). A 0.7 v 12b 160ms / s 12.8fj / conv. Calibration-free pipelined-sar adc in 28nm cmos with digital amplifier technique. Electronics, Information and Communication Engineers Technical Research Report. Integrated Circuits and Devices, 117 (167), 115-116.

[6] Gonzales, C. A., Behnke, R. A., & Woodman, R. F. (2016). Doppler measurements with a digital ionosonde: technique and comparison of results with incoherent scatter data. Radioence, 17(5), 1327-1333.

[7] Hu Chao, & Ma Feifei. (2018). When the imprint contains the fragrance of books: an experimental exploration of the use of convex print art style in manual book design. Design Art Research, 008 (005), 76-82.

[8] Abramovitch, I. (2015). Felsen on the art of the print. Elle Decor, 26(9), 160-160.

[9] Haldane, John. (2015). Edwin la dell and the art of popular printmaking. Art Book, 11(1), 30-32.

[10] Mcconaghy, M., McMullen, G., Parry, G., Mcconaghy, T., & Holtzman, D. (2017). Visibility and digital art: blockchain as an ownership layer on the internet. Strategic Change, 26(5), 461-470.