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# Fusion Application of Computer Vision and Image Transmission in Digital Image Art Design

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**Abstract.** Combining computer vision and image transmission with digital image art design can expand the creative space and provide more creative tools and technologies. To solve the problems in digital image art design, such as the limitation in high level and semantic understanding of images, this paper discussed the integration of computer vision and image transfer in digital image art design, synthesized the related study of histogram equalization, computer vision, edge computing and image transfer and other fields. The key issues in the process of digital image art design were analyzed and discussed in depth. This article applied computer vision algorithms to the analysis of digital images, used edge detection methods for image contour detection, analyzed the efficiency issues of different fusion methods, and introduced computer vision and image transmission into digital image art design. Specific measures for computer vision and image transmission in digital image art design were proposed, and computer vision algorithms were used for experimental analysis. Through comparison, it can be seen that computer vision had an average increase of 0.27 for real-time interaction of digital image art design, 0.27 for augmented reality, 0.28 for virtual reality, 0.28 for style conversion, 0.29 for image generation, and 0.29 for data and information visualization. The improvements in real-time interaction, augmented reality, virtual reality, style conversion, image generation, and data and information visualization were within a reasonable range. Applying image transmission in digital image art design could significantly improve the creative expression, visual style exploration, artistic creation process, audience experience, and response of digital images, ameliorating the effectiveness of digital images.

**Keywords:** Digital Image, Computer Vision, Image Transmission, Art and Design System, Edge Algorithm
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## 1. INTRODUCTION

The integration of computer vision and image transmission technology in digital image art design has brought artists a vast creative space and infinite imagination. Computer vision technology simulates the human visual system, enabling computers to understand and interpret image content and providing powerful image analysis and processing capabilities. Image transmission technology, on the other hand, uses digitization and transmission technology to transmit and share image information online, enabling artists to share their works with global audiences. This article explores the fusion application of computer vision and image transmission in digital image art design and analyzes its impact on artistic creation and viewing experience.

This article aims to explore the fusion application of computer vision and image transmission in digital image art design. Analyzing existing technologies and algorithms and combining computer vision algorithms, histogram equalization, and other technologies are used to optimize digital image art design. Firstly, an application method of computer vision and image transmission in digital image art design is proposed. By applying techniques such as feature extraction analysis, image recognition and segmentation, style conversion, and synthesis, useful information can be extracted from a large amount of image data. By analyzing the characteristics of images, conceptual design can be carried out to create personalized and distinctive character images. Secondly, remote cooperation and sharing of image transmission in digital image art design can be established. By constructing computer vision algorithms, key features in images can be automatically extracted, and digital images with good visual effects can be generated. By transferring and sharing digital images, it is possible to work together on projects, to share and complement each other's ideas, and to complete works together. Compared with traditional methods, computer vision and image transmission have shown significant advantages in the effectiveness and efficiency of digital image art design.

## 2. RELATED WORK

With the rapid development of computer technology, various network technologies have become indispensable components in digital image art design. Daniel Reagan found that in recent years, 3D (three-dimensional) digital image correlation systems have demonstrated their effectiveness in providing accurate quantitative information on large-scale structural deformation, full-field strain, and geometric profiles [1]. Mehdi Boroumand described a deep residual architecture aimed at minimizing the use of heuristic and external forcing elements, which was universal and could further improve performance, especially in digital image design [2]. Martin Zeilinger discussed the use of blockchain technology in creating a proprietary digital art market and believed that the emerging business platform has formed a proprietary digital art market [3]. Muhammad Jaleed Khan proposed an advanced deep learning method for ink mismatch detection in hyperspectral document images, extracting the spectral response of ink pixels from hyperspectral document images [4]. Linwei Fan's research found that with the explosive increase in the number of digital images captured every day, the demand for more accurate and visually pleasing images was increasing. He provided a formula for image-denoising and proposed image-denoising technology [5]. Although computer vision technology has many potential and innovative spaces in digital image art design, there are still certain limitations in high-level and semantic understanding of images.

The development of technology has brought convenience to digital image design. Under the premise of satisfying both material and spiritual life, people have higher requirements for visual perception. Kemal Gokhan NALBANT aimed to study metaverse technology from computer vision and a general perspective. He comprehensively reviewed the concept of metaverse in computer vision and explained the impact of metaverse on the development of digital images and what needs to be done to adapt to this technology [6]. Khan and Salman described and discussed case studies related to the application of convolutional neural networks in computer vision, including image classification, object detection, semantic segmentation, scene understanding, and image generation [7].

Annemarie J. Nanne believed that with the increasing popularity of visual-oriented social media platforms, the penetration rate of user-generated content related to visual brands was also increasing [8]. V. Suma provided an overview of computer vision and believed that it contributed to the interaction between humans and machines [9]. The fusion application of image transmission technology in digital image art design provides a way for the transmission of artistic works, but there are still issues such as dependency.

## 3. APPLICATION OF COMPUTER VISION ALGORITHMS IN DIGITAL IMAGES

Computer vision algorithms are a method of processing and analyzing images and videos, aimed at enabling computers to simulate and understand human visual systems [10-12]. This method has wide applications in image recognition, object detection, face recognition, image segmentation, and human pose estimation.

In this paper, histogram equalization in a computer vision algorithm is introduced to enhance the image. This method is based on probability theory. Through the operation of gray points, the histogram is transformed to achieve image enhancement. The histogram equalization method can use histogram homogenization to increase the grayscale interval of the image or to evenly distribute the image and increase contrast, thereby improving the details of the image.

In practical applications, a normalized digital image can generate a value $s$ for any value $p$ within the [0,1] range by setting the normalized original image grayscale and the histogram-corrected image grayscale $s = F^{-1}(\mathrm{p})$ .

The transformation relationship from $s$ to $p$ is:

$$p = F^{-1}(s) \quad (1)$$

The gray level of the image after discretization is set as:

$$p = \{p_0, p_1, p_2, \ldots, p_{n-1}\} \quad (2)$$

The probability of $p_k$ is:

$$h_p(p_k) = \frac{n_k}{N}, 0 \le p_k \le 1, k = 0,1,2,\ldots, j-1 \quad (3)$$

In the formula, $j$ is the maximum grayscale level; $\mathrm{h}_p(p_k)$ is the probability of taking the $k$ grayscale value; $N$ is the total number of pixels in the image.

The discrete transformation function is:

$$P_k = F(s_k) = \sum_{i=0}^{k} \frac{n_i}{N} = \sum_{i=0}^{k} j_p(p_i), 0 \le p_i \le 1, k = 0,1,2,\ldots, j-1 \quad (4)$$

The inverse transformation is:

$$p_k = F^{-1}(s_k) \quad (5)$$

The image enhancement result by applying histogram equalization is shown in Figure 1. Figure 1 analyzes the image effect after image enhancement using histogram equalization. The left picture is the original image and the right picture is the image effect after image enhancement using histogram equalization. In this paper, edge computing in computer vision algorithms is used for image analysis. Edge computing can be used to increase real-time and reduce network delay in image fusion. In this paper, an edge algorithm is used for digital image fusion. It can adjust the weight of each image during the fusion process by setting alpha and beta and then linearly combining the two images according to the weight to obtain the fused image.


**Figure 1:** Image enhancement using Histogram equalization.

The edge detection method is used to detect the image contour. If $f(x,y)$ represents an image, the two-dimensional Gaussian function is used to smooth the image for noise reduction, which is expressed as:

$$G(x,y)=\exp[-\frac{x^2-y^2}{2a^2}] \quad (6)$$

Among them, $\alpha$ is the width of the Gaussian convolution kernel and $(x,y)$ the coordinate. The image is convolved with the Gaussian function and smoothed, expressed as:

$$U(x,y)=G(x,y)\cdot f(x,y) \quad (7)$$

The partial scores of $p(x,y)$ and $q(x,y)$ are calculated by the following equation:

$$p(x,y)=-\frac{x}{a^2}\exp[-\frac{x^2-y^2}{2a^2}] \quad (8)$$

$$q(x,y)=-\frac{y}{a^2}\exp[-\frac{x^2-y^2}{2a^2}] \quad (9)$$

The image amplitude and direction are:

$$M(x,y)=\sqrt{P^2(x,y)+q^2(x,y)} \quad (10)$$

$$\varepsilon(x,y)=\arctan\left(\frac{q(x,y)}{p(x,y)}\right) \quad (11)$$

This algorithm searches for edges on the contour that can be connected at 8 adjacent points of $U_1(x,y)$ to achieve edge detection. The specific application of the algorithm in image edge detection is shown in Figure 2. Figure 2 analyzes the specific application effect of computer vision algorithms in image edge detection. The left image shows the original image and the right image shows the image effect after edge detection. This article analyzes the multi-sensor image fusion technology, which can achieve the combination of digital image art design and image transmission. Multi-sensor image fusion belongs to the category of multi-sensor information fusion.

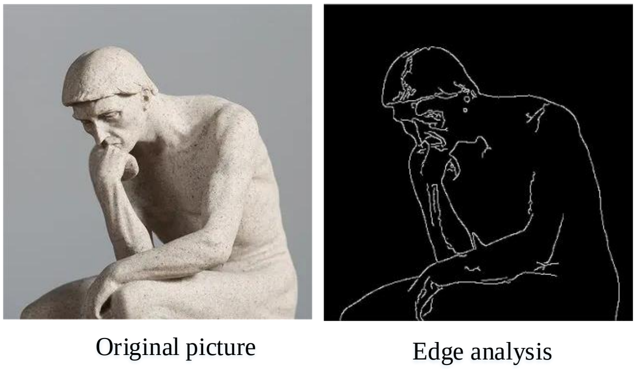


**Figure 2:** Specific application of computer vision algorithms in image edge detection.

It is the process of obtaining a composite image using some fusion technology from the same scene in digital images acquired by different sensors or from the same sensor in different digital images, after denoising, temporal alignment, spatial alignment, and resampling. In response to the problems in multi-sensor data fusion, this project plans to divide multi-sensor data fusion into three levels: feature-level fusion, data-level fusion, and decision-level fusion.

Feature-level image fusion is the process of comprehensively processing information such as edges, shapes, and contours after the feature extraction of an image. The processing process is shown in Figure 3.

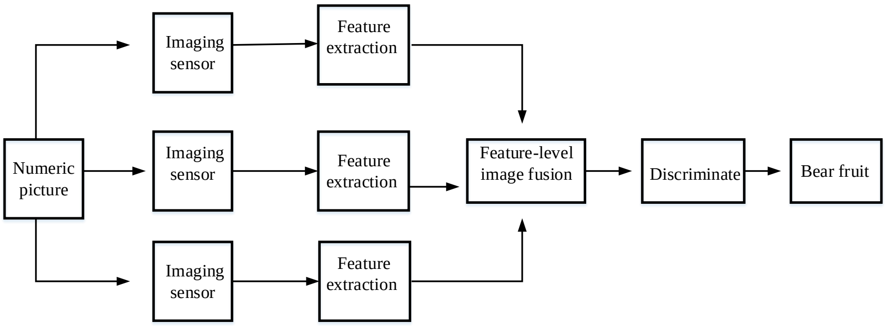


**Figure 3:** Feature-level image fusion.

Pixel-level image fusion refers to the process of directly synthesizing information from the pixels of each image. Pixel-level image fusion can help observers more easily detect or recognize potential targets, as shown in Figure 4.

Before decision-level image fusion, each sensor has independently completed the decision or classification task and the fusion work is essentially to make the global optimal decision. The processing process is shown in Figure 5.

By combining different image fusion technologies, the optimal image fusion framework is compiled for image analysis. The image fusion framework is shown in Figure 6 and the digital image fusion is shown in Figure 7.

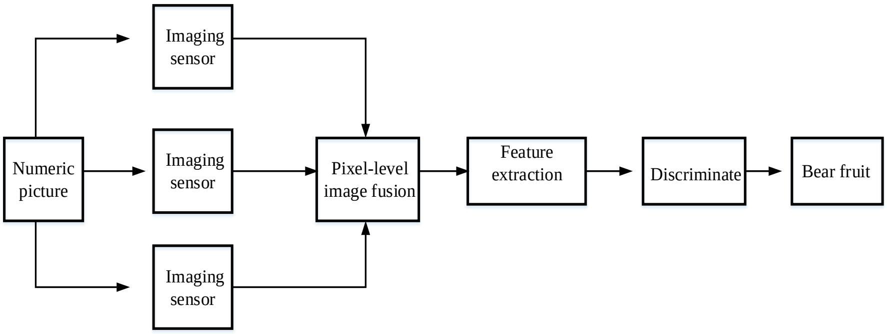


**Figure 4:** Pixel-level image fusion.

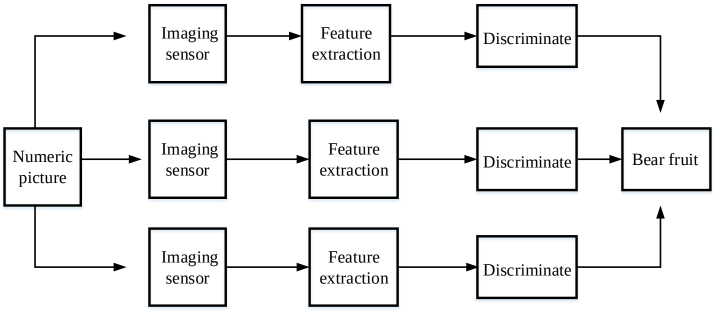


**Figure 5:** Decision-level image fusion.

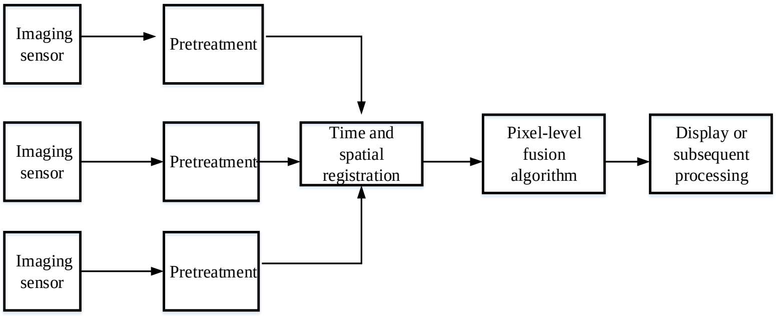


**Figure 6:** Image fusion framework.

Figure 7 analyzes the digital image fusion effect after fusion using multi-sensor image fusion technology. The left image shows the original image and the right image shows the digital image fusion effect after fusion using multi-sensor image fusion technology. The two digital images are fused and the image size and pixel content are adjusted to fuse the images.


Figure 7: Digital image fusion.

## 4. APPLICATION OF COMPUTER VISION AND IMAGE TRANSMISSION IN DIGITAL IMAGE ART DESIGN

### 4.1 Application of Computer Vision in Feature Extraction and Dissection in Digital Image Art Design

In the field of digital image art and design, the feature extraction and analysis function of computer vision provides a large amount of creative materials and inspiration [13-14]. Computer vision algorithms can recognize the boundaries of an image, that is, the boundaries between objects or the boundaries of color and brightness [15-16]. This article applies edge detection results to enhance the structure and shape of the image, resulting in a powerful visual effect. Then, computer vision is used to analyze the color information in the image, including hue, saturation, and brightness. Based on these color features, color-matching schemes are selected to create specific emotions and visual effects. Texture information is extracted from the image, including the texture and details of the object's surface. The extraction of image texture information is shown in Figure 8.

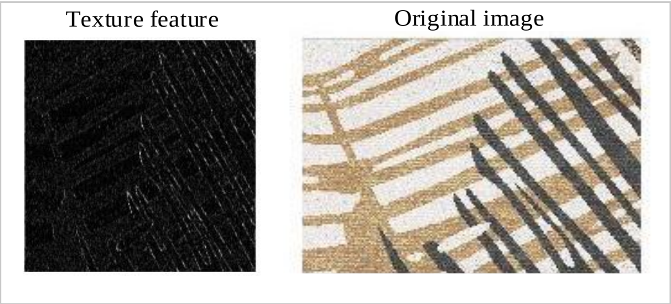


Figure 8: Extraction of image texture information.

Figure 8 shows the use of edge detection technology for image texture information extraction. The left image shows the extracted texture information and the right image shows the original image. Computer vision algorithms can also analyze and classify the features in the image, using shape features to classify different objects or using face recognition technology to recognize people in the image. By analyzing these characteristics, conceptual design can be carried out to create personalized and distinctive character images.

### 4.2 Image Recognition and Segmentation of Computer Vision in Digital Image Art Design

In digital image art design, computer vision provides more creativity and creative possibilities for image recognition and segmentation. Computer vision algorithms can recognize different objects in images through learning and training, such as people, animals, buildings, etc. Computer vision is used to extract image features, as shown in Figure 9.

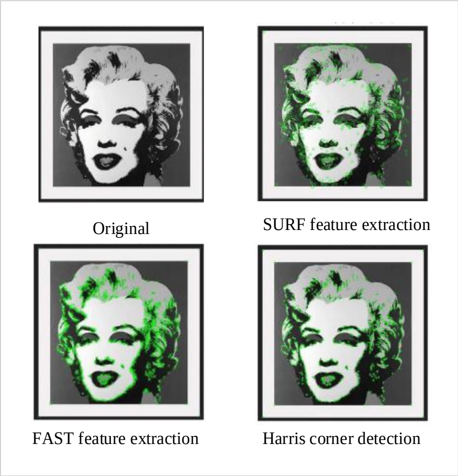


**Figure 9:** Image feature extraction using computer vision.

Figure 9 shows the use of computer vision for image feature extraction, using different feature extraction techniques for analysis. The upper left corner of Figure 9 shows the original image; the lower left corner of Figure 9 shows the FAST (Features from Accelerated Segment Test) feature extraction image; the upper right corner of Figure 9 shows the SURF (Speed Up Robust Features) feature extraction image; the lower right corner of Figure 9 shows the Harris corner detection feature extraction image. By identifying the target, new processing can be carried out on the target or adjustments can be made to existing targets to produce special artistic effects. On this basis, this article proposes a new method based on facial recognition and applies it to facial expression transformation, feature emphasis, character combination, and other aspects to create artistic images that are both personalized and expressive. Computer vision technology is used to identify the scenery in the image, such as natural landscapes, urban street scenes, etc. By identifying the scene, modifications, additions or creations can be made to the scene, creating a unique background and atmosphere for the work [17].

### 4.3 Style Conversion and Synthesis of Computer Vision in Digital Image Art Design

In digital image art design, the style transformation and combination technology of computer vision can create unique artworks for people. By using computer vision algorithms, not only can different types of images be learned and the content of one image be fused with the style of another image to generate new images, but various elements in the image can also be combined to produce new artworks. By using filters to extract texture features of images, virtual image elements are generated to add dreamy, fantasy, or science fiction effects to artworks. The texture features of images are extracted using filters, as shown in Figure 10.

Figure 10 shows the texture features extracted from an image using a filter. The above image shows the original image and the following image shows the texture features extracted using a filter. The horizontal axis of the data in the figure represents the image's grayscale and the vertical axis represents the range of changes in the image's grayscale. It can be observed that after extracting the texture features from the image through the filter, the pixel value of the image has been significantly improved and the texture features of the image are more obvious. Using the filters can generate virtual image elements and add dreamy, fantasy, or science fiction effects to an artwork.

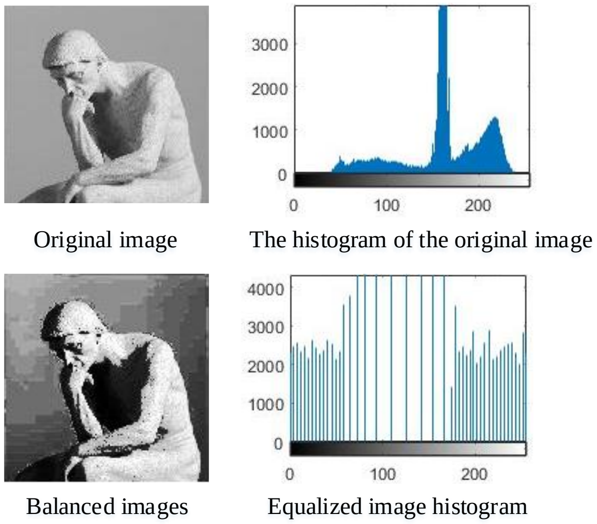


**Figure 10:** Extracting Texture Features of Images Using Filters.

### 4.4 Remote Cooperation and Sharing of Image Transmission in Digital Image Art Design

This article analyzes the problems currently encountered by designers in digital image art design and proposes solutions. The problems encountered by designers are shown in Figure 11. The application of image transmission technology in digital image art design provides artists with the convenience of remote cooperation, sharing, and communication, promoting the globalization of creation and cooperation. Image transmission technology can be used to collaborate remotely with other artists located in different geographical locations for creation.

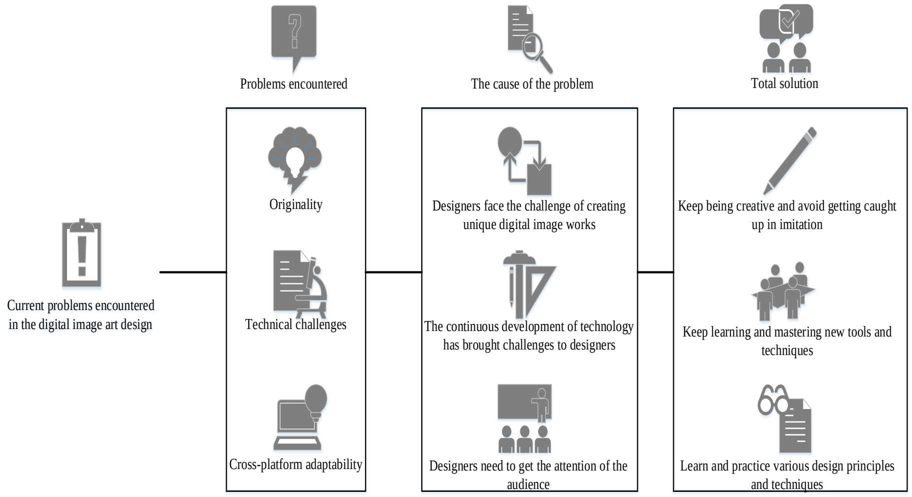


**Figure 11:** Current problems encountered by designers in digital image art design.

Figure 11 mainly represents the problems encountered by designers in the current digital image art design, analyzes the reasons for their occurrence, and proposes solutions. Among them, the problems are the originality and technical challenges of digital image art design. The reason for these problems is that designers face the challenge of creating unique and eye-catching digital images. The continuous development of digital image design tools and technologies has brought new challenges for designers to learn and adapt. This article proposes to maintain creativity and avoid falling into the dilemma of imitation or replication to address these issues. The artists should continuously learn and master new tools and technologies to ensure that they can fully utilize those to implement ideas.

The application of image transmission technology enables artists to transmit their works, skills, and experiences to others for remote art education and guidance. Through image transmission, artists can conduct real-time demonstrations and explanations, provide feedback and suggestions, and promote the globalization of learning and artistic exchange. The remote cooperation and sharing function of image transmission technology has broken regional restrictions, enabling seamless connection with other creators, audiences, and learners worldwide and strengthening the cross-platform display and distribution of image transmission in digital image art design. This cooperation and sharing approach has brought more inspiration, creative opportunities, and innovative potential to digital image art design.

## 5. EXPERIMENTS USING COMPUTER VISION ALGORITHMS

To analyze the fusion effect of digital image design under different fusion methods, this paper introduced Histogram equalization for image enhancement and introduced computer vision algorithm and image transmission technology into digital image design to optimize digital image art design. This article analyzed the average fusion method, wavelet fusion method, computer vision, and image transfer fusion method, selected 20 digital images, and analyzed the image fusion efficiency under different fusion methods. The peak image fusion efficiency was 1, with 0.6-0.74 being qualified and 0.75-1 being excellent. The specific investigation is shown in Table 1.

| *Figure serial number* | *Mean fusion method* | *Wavelet fusion method* | *Fusion method of computer vision and image transfer* |
|---|---|---|---|
| 1 | 0.65 | 0.69 | 0.80 |
| 2 | 0.66 | 0.66 | 0.79 |
| 3 | 0.73 | 0.65 | 0.84 |
| 4 | 0.65 | 0.67 | 0.76 |
| 5 | 0.68 | 0.72 | 0.76 |
| 6 | 0.68 | 0.75 | 0.83 |
| 7 | 0.65 | 0.71 | 0.83 |
| 8 | 0.67 | 0.70 | 0.82 |
| 9 | 0.68 | 0.68 | 0.77 |
| 10 | 0.74 | 0.74 | 0.76 |
| 11 | 0.68 | 0.71 | 0.81 |
| 12 | 0.66 | 0.65 | 0.78 |
| 13 | 0.67 | 0.67 | 0.84 |
| 14 | 0.66 | 0.65 | 0.81 |
| 15 | 0.71 | 0.65 | 0.80 |
| 16 | 0.71 | 0.66 | 0.79 |
| 17 | 0.67 | 0.72 | 0.81 |
| 18 | 0.65 | 0.74 | 0.82 |
| 19 | 0.70 | 0.68 | 0.81 |
| 20 | 0.73 | 0.66 | 0.78 |
| Mean value | 0.68 | 0.69 | 0.80 |

**Table 1:** Fusion effects of digital image design under different fusion methods.

After applying the average fusion method, wavelet fusion method, computer vision, and image transfer fusion method to fuse 20 digital images, it was found that the fusion efficiency of all 20 digital images under the average fusion method was qualified, but the fusion efficiency of the excellent ones was 0. The fusion efficiency of all 20 digital images under the wavelet fusion method was qualified and the fusion efficiency of the excellent digital images was 1. The fusion efficiency of 20 digital images under the fusion method of computer vision and image transfer was not only qualified but also excellent.

Subsequently, this article applied the average fusion method, wavelet fusion method, and computer vision and image transfer fusion method to analyze the fusion efficiency of 50 digital images, including tactile experience analysis, element addition analysis, style transformation analysis, and information synthesis analysis. The efficiency was set at 1-100, with below 60 points being unqualified, 60-80 being qualified, and 81-100 being excellent. The specific analysis is shown in Figure 12.

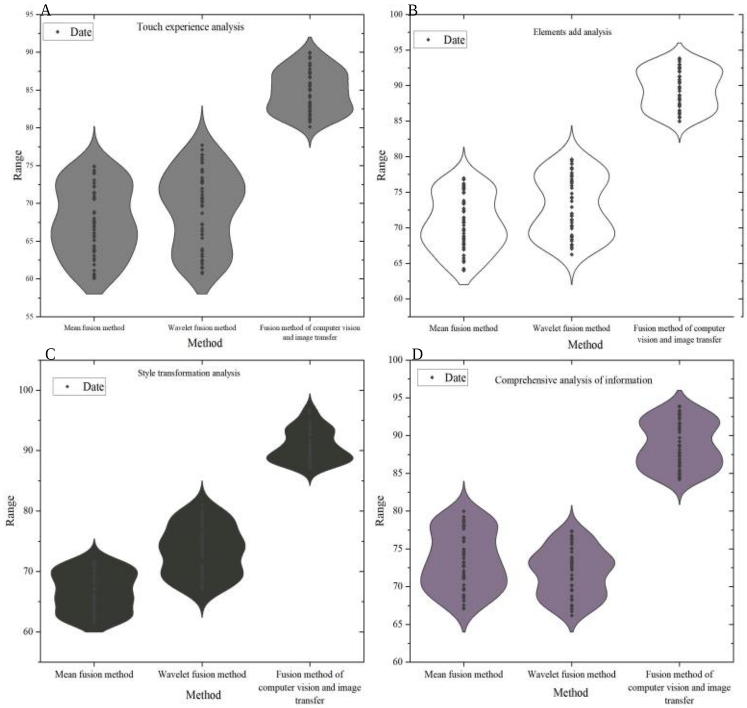


Figure 12: Analysis of different aspects of digital image fusion efficiency under different fusion methods. A: Analysis of the tactile experience of digital images under different fusion methods. B: Analysis of element addition in digital images under different fusion methods. C: Analysis of style conversion of digital images under different fusion methods. D: Analysis of comprehensive information on digital images under different fusion methods

This article analyzed the fusion efficiency of different fusion methods. Figure 12 shows the different aspects of digital image fusion efficiency under different fusion methods. Among them, Figure 12A shows the tactile experience analysis of digital images under different fusion methods, and Figure 12B shows the element addition analysis of digital images under different fusion methods, Figure 12C shows the style conversion analysis of digital images under different fusion methods, Figure 12D shows the comprehensive information analysis of digital image under different fusion methods.

The X-axis in Figure 12 represents the average fusion method, wavelet fusion method, computer vision, and image transfer fusion method. The Y-axis represents the fusion efficiency range and the legend represents the range of digital image data. After experimental analysis, it was found that the tactile experience, element addition, style conversion, and information comprehensive efficiency of the average fusion method were all qualified, with an average of 67.67, 70.65, 66.67, and 73.41, respectively. The tactile experience, element addition, style conversion, and information synthesis efficiency of the wavelet fusion method were all qualified, with mean values of 69.19, 72.95, 73.42, and 71.84, respectively. The tactile experience, element addition, style conversion, and information synthesis efficiency of computer vision and image transmission fusion methods were excellent, with an average of 84.84, 89.55, 90.79, and 88.81, respectively. It could be seen that the efficiency of computer vision and image transmission fusion methods was higher than that of average fusion methods and wavelet fusion methods.

This paper analyzed some current problems and challenges faced by digital image art design and interviewed 30 digital image art designers about the efficiency of current digital image art design technology and digital image art design technology under computer vision to solve problems. Taking credibility, originality, sustainability, and copyright protection as examples, the peak problem-solving efficiency satisfaction was 1, with below 0.6 being poor, 0.61-0.79 being average and 0.80-1 being excellent. The specific survey is shown in Figure 13.

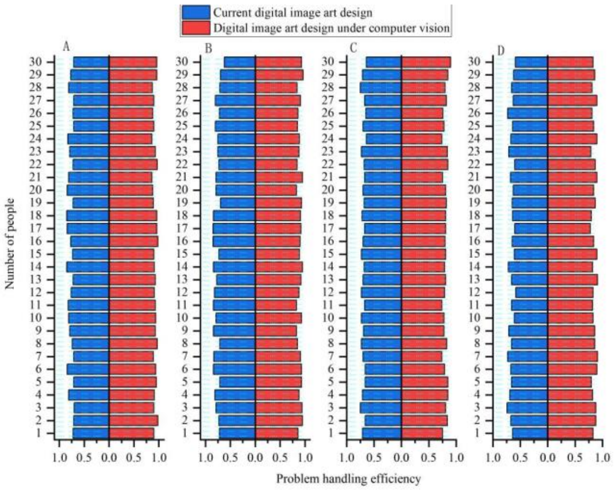


Figure 13: Efficiency of current digital image art and design technology and computer vision digital image art and design technology in solving different problems. A: Efficiency of current digital image art and design technology and computer vision digital image art and design technology in solving credibility problems. B: Efficiency of current digital image art and design technology and computer vision digital image art and design technology in solving originality problems. C: Efficiency of current digital image art and design technology and computer vision digital image art and design technology in solving sustainability problems. D: Efficiency of current digital image art and design technology and computer vision digital image art and design technology in solving copyright protection issues.

Figure 13 shows the efficiency of current digital image art design technology and computer vision digital image art design technology in solving different problems. Among them, Figure 13A shows the efficiency of current digital image art design technology and computer vision digital image art design technology in solving credibility problems; Figure 13B shows the efficiency of current digital image art design technology and computer vision digital image art design technology in solving originality problems; Figure 13C shows the efficiency of current digital image art design technology and computer vision digital image art design technology in solving sustainability problems; Figure 13D shows the efficiency of current digital image art and design technology and computer vision digital image art and design technology in solving copyright protection issues. The X-axis in Figure 13 represents the efficiency of the processing; the Y-axis represents 30 designers; the legend represents the current digital image art and design technology and the digital image art and design technology under computer vision.

Among the 30 art image designers interviewed, there were different opinions on the current digital image art design technology and the digital image art design technology under computer vision. The 30 art image designers believed that the average credibility under the current digital image art design was 0.77; the average originality was 0.77; the average sustainability was 0.69; and the average copyright protection was 0.66. 30 art image designers reckoned that the average credibility of digital image art design under computer vision was 0.92; the average originality was 0.90; the average sustainability was 0.80; the average copyright protection was 0.85. It could be seen that digital image art design under computer vision had more advantages than current digital image art design. Compared to current digital image art design, the average credibility of digital image art design under computer vision has increased by 0.15; the average originality has increased by 0.13; the average sustainability has increased by 0.11; the average copyright protection has increased by 0.19.

In digital image art design, the fusion application of computer vision can bring many innovative and experimental effects. To analyze the application effect of computer vision on digital image art design, the fusion application of computer vision in digital image art design was analyzed. Ten digital image tests were conducted to analyze the improvement of computer vision on real-time interaction, augmented reality, virtual reality, style conversion, image generation, and data and information visualization of digital image art design. The improvement effect was generally between 0.1-0.35. The specific analysis is shown in Table 2.

| *Test number* | *Real-time interaction* | *Augment reality* | *Virtual reality* | *Style Conversion* | *Image production* | *Data visualization* |
|---|---|---|---|---|---|---|
| 1 | 0.30 | 0.24 | 0.23 | 0.29 | 0.28 | 0.33 |
| 2 | 0.26 | 0.27 | 0.29 | 0.24 | 0.34 | 0.26 |
| 3 | 0.29 | 0.28 | 0.25 | 0.28 | 0.29 | 0.30 |
| 4 | 0.25 | 0.25 | 0.31 | 0.27 | 0.31 | 0.29 |
| 5 | 0.24 | 0.30 | 0.32 | 0.29 | 0.29 | 0.27 |
| 6 | 0.27 | 0.25 | 0.31 | 0.28 | 0.32 | 0.23 |
| 7 | 0.27 | 0.28 | 0.27 | 0.28 | 0.28 | 0.33 |
| 8 | 0.24 | 0.24 | 0.26 | 0.32 | 0.24 | 0.31 |
| 9 | 0.29 | 0.31 | 0.25 | 0.23 | 0.29 | 0.27 |
| 10 | 0.25 | 0.32 | 0.26 | 0.34 | 0.30 | 0.29 |
| Mean value | 0.27 | 0.27 | 0.28 | 0.28 | 0.29 | 0.29 |

**Table 2:** Application Effects of Computer Vision on Digital Image Art Design.

After analyzing the fusion application of computer vision in digital image art design, it was found that computer vision has significantly improved real-time interaction, augmented reality, virtual reality, style conversion, image generation, and data and information visualization of digital image art design. After ten digital image tests, computer vision was found to improve real-time interaction for digital image art design by an average of 0.27, for augmented reality by an average of 0.27, for virtual reality by an average of 0.28, for style transformation by an average of 0.28, for image generation by an average of 0.29 and data visualization by an average of 0.29. The improvement of real-time interaction, augmented reality, virtual reality, style conversion, image generation, and data and information visualization was within a reasonable range.

Image transmission was applied to digital image art design, analyzing the creative expression, visual style exploration, artistic creation process, audience experience, and the response of artists and audiences after image transmission in digital image art design and comparing it with digital image art design before image transmission. A survey of 20 audiences and artists was conducted and the satisfaction score was 100 for the survey content, with below 60 being unqualified, 61-80 being qualified and 81-100 being excellent. The specific investigation is shown in Figure 14.

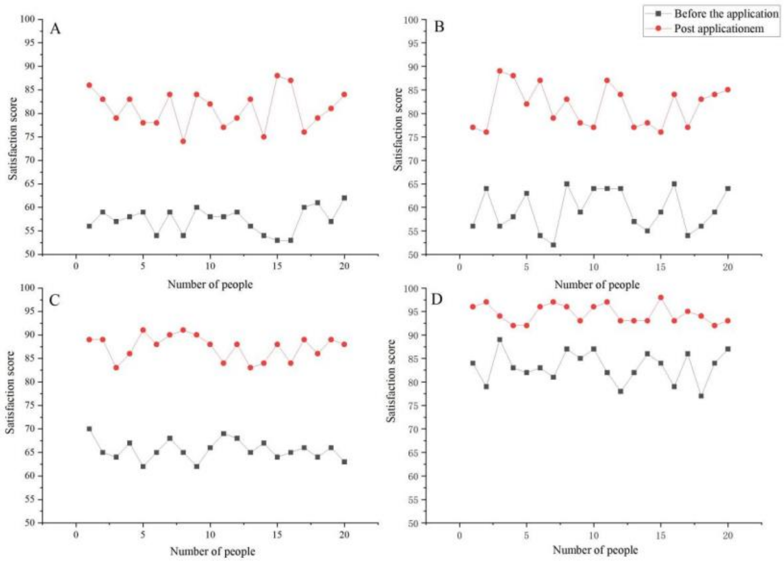


Figure 14: Comparison of satisfaction of audiences and artists with the survey content before and after image transmission in digital image art and design applications. A: Comparison of artists' satisfaction with creative expression before and after image transmission in digital image art design application. B: Comparison of artists' satisfaction with exploring visual styles before and after image transmission in digital image art design application. C: Comparison of artists' satisfaction with the art creation process before and after image transmission in digital image art design application. D: Comparison of audience experience and response satisfaction before and after image transmission in digital image art design application

Figure 14 shows a comparison of audience and artist satisfaction with the survey content before and after the application of image transmission in digital image art and design. Figure 14A shows a comparison of artist's satisfaction with creative expression before and after the application of image transmission in digital image art and design. Figure 14B shows a comparison of artist's satisfaction with visual style exploration before and after the application of image transmission in digital image art and design. Figure 14C shows a comparison of artists' satisfaction with the art creation process before and after the application of image transmission in digital image art design. Figure 14D shows a comparison of audience experience and response satisfaction before and after the application of image transmission in digital image art design. The X-axis in Figure 14 represents the number of visitors; the Y-axis represents satisfaction; the legend represents before and after the transfer of digital image art and design application images.

Among the interviewed audience and artists, it was believed that the average score of creative expression before image transmission in digital image art design was 57; the average score of visual style exploration was 59; the average score of artistic creation process was 66; the average score of audience experience and reaction was 83. Among them, the average score of creative expression and visual style exploration was unqualified. Among the interviewed audience and artists, it was believed that the average score of creative expression after image transmission in digital image art design was 81; the average score for visual style exploration was 82; the average score for the artistic creation process was 87; the average score of audience experience and reaction was 94. Among them, the average scores of creative expression, visual style exploration, artistic creation process, and audience experience and reaction were all excellent. It could be concluded that the application of image transmission in digital image art design could significantly improve the creative expression, visual style exploration, artistic creation process, and audience experience and response of digital images, ameliorating the effectiveness of digital images.

## 6. CONCLUSIONS

In summary, the fusion application of computer vision and image transmission in digital image art design has brought new development opportunities for art creation. By utilizing computer vision technology, image analysis, and processing could be utilized to generate special image effects and artistic expressions. Simultaneously, the advancement of image transmission technology also allows artists to quickly showcase their works to audiences around the world and interact and communicate with them. The digitization and online display of artistic works provide artists with greater exposure and business opportunities. However, there are still certain challenges when applying computer vision and image conversion technology to fusion. Firstly, one must be proficient in using computer vision algorithms and tools and be able to apply them to image transmission technology. For traditional artists, this may be a new attempt that requires continuous learning and adaptation. Secondly, the convenience of digitization and online display has also brought about issues of piracy and copyright protection, and corresponding measures need to be taken to protect one's works from infringement and embezzlement.

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