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An Innovative Approach to Skill Transmission and Education of Traditional Folk Crafts Empowered by Neural Network Algorithms

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Abstract

As an important part of traditional Chinese culture, the integration of traditional folk handicrafts into the educational curriculum is conducive to innovative curriculum planning in conjunction with the educational goals of the new era. In this paper, based on the protection and inheritance of handicraft culture, we design a help program for handicraft design. Using ultra-high resolution technology, the image is enhanced and restored to realize the reconstruction of the image. Construct the cubic basis function and combine the double cubic interpolation method to preprocess the image. A DLSS neural network model is built and a temporal dimension is added to the spatial sampling to increase the range of sampling number. An autoencoder recognition function is utilized to capture the spatial and temporal variations of the features. Consumers are taken as the core to establish an innovative teaching model to help the inheritance and innovation of traditional folk handicrafts. In the group cognitive law, the subjects' cognitive bias increases from 0.1264 to 2.2998, and the cognitive rate gradually decreases from 1.4284 to 0.5966, which show the opposite trend of change, and every effort should be made to avoid the design being too abstract in the process of dissemination of folk traditional handicrafts inheritance. In terms of dissemination willingness, 63.425% of the audience is willing to disseminate folk traditional handicraft culture, and the dissemination willingness is strong.

Keywords: Ultra-High Resolution, Image Enhancement, Bicubic Interpolation, DLSS Neural Network, Traditional Handicrafts.

Introduction

China is a country with a wealth of folk handicrafts, which unfold from folk wisdom and cultural inheritance. Many handicrafts have a long history, some of which have been inherited for thousands of years so far, but with the development of the society, many of them have fallen into the situation of being lost [1-4]. Therefore, inheritance and innovation have become important ways to protect Chinese folk handicrafts. In order to protect and pass on folk handicrafts, governmental departments around the world have also given full play to their roles by formulating policies and measures for the protection of handicrafts and encouraging people to protect, pass on and promote folk handicrafts [5-8]. At the same time, the government also encourages people to combine handmade skills with modern technology and pass them on in innovation. For example, some obsolete skills can be digitized and mechanized to improve efficiency, integrating the skills with modern technology, and at the same time making it more enjoyable for young people to learn and pass them on [9-12].

Inheritance and innovation are always closely related. Innovation is an important way to protect handicrafts. On the basis of inheritance, the education of handicrafts should utilize imagination and creativity to add new elements to traditional handicrafts to make them more modern, sustainable and artistic [13-14]. For example, in clothing design, new clothing styles can be created based on traditional embroidery techniques by adding modern pattern designs. In this way, traditional handicrafts are not only protected and inherited, but also injected with new vitality, so that traditional handicrafts are more adapted to the needs and

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development of modern society [15-17].

The skills of traditional folk handicrafts are valuable historical and cultural heritage, and the inheritance of handicraft skills in the new era is a major challenge that requires the joint efforts of all sectors of society. Only through the protection and inheritance of the skills of traditional folk handicrafts can we better inherit and carry forward traditional Chinese culture. Literature [18] describes the Central Plains Tribe, an aboriginal Sedig tribe in Taiwan Province of China, which has explored a variety of paths that enable the development of ethnic weaving crafts. By analyzing the challenges and breakthroughs faced by the tribe's traditional weaving skills in their transmission, as well as the formation and support system of the craft village, and drawing the corresponding conclusions. Literature [19] aims to examine the challenges faced by traditional crafts in developing countries and to address these challenges in order to promote the transmission and development of traditional craft heritage. The traditional craft heritage of Pakistan is taken as an example and coping strategies are proposed to address the problems faced by it. Literature [20] emphasizes the gradual attention paid to traditional crafts in China in recent years, and the rescue and protection of traditional crafts has become the consensus of the Chinese people. And it focuses on the protection, inheritance and development of traditional crafts. Literature [21] took Chongqing Rongchang pottery as the research object and analyzed its production techniques, craft inheritance and creative development. It indicated that the inheritance and development of intangible cultural heritage should pay attention to the interaction of people, objects and spatial and temporal landscapes as well as creative design at the same time. The commonalities between traditional culture and modern life were also discussed to promote the protection, inheritance and creative development of cultural heritage. Literature [22] emphasized the importance of understanding the formation mechanism of master-disciple transmission of traditional handicrafts and the factors affecting the transmission for the transmission of intangible cultural heritage. Four traditional handicrafts inheritance organizations were used as research objects, and interviews were conducted with the inheritance parties and master-disciple pairing groups, and the results described the formation mechanism of inheritance and the factors affecting inheritance, which is of certain reference significance for improving the master-disciple relationship in order to promote the effective inheritance of handicrafts. Literature [23] indicates that traditional handicrafts, as an important part of intangible cultural heritage, are facing serious challenges in the new era, and explores the protection of traditional handicrafts based on the perspective of intellectual property system to supplement the deficiencies of administrative law in this field.

Folk traditional handicraft inheritance and innovation of the important carrier, has a profound historical precipitation and unique artistic charm, through the education of inheritance and innovation, can better protect and pass on the excellent traditional culture, but also to cultivate students' creativity, aesthetic ability and cultural identity, folk traditional handicrafts can also be in the modern society with new vitality and vigor. Literature [24] pointed out that the main ways of inheritance of non-heritage handicrafts at present include two kinds of inheritance in higher vocational colleges and universities and inheritance in natural society, and analyzed these two kinds of inheritance, and put forward the development strategy of combining and dividing the inheritance, which is aimed at realizing the purpose of inheritance of non-heritage handicrafts skills. Literature [25] discusses the combination of art and design education and traditional handicrafts, aiming to revitalize handicrafts through modern innovative technology. Strategies such as refining traditional craft elements to enhance cultural and creative products, using traditional technology to improve product value, and using science and technology to inject new value are discussed, as well as the important role of branding traditional crafts in market competition. Literature [26] proposes the research and practice of STEAM class extension program with the theme of traditional handicrafts, which not only brings contemporary and cultural teaching content to China's STEAM extension program, but also provides development ideas for traditional handicraft teaching. The STEAM extended curriculum is also discussed with the example of porcelain in Guangdong Province. Literature [27], in order to examine the innovative practice of heritage education in Chinese universities, took “shell clothing culture” and “Quanzhou traditional embroidery techniques” as examples, and conducted questionnaire surveys on technology, non-heritage creative products and activities. Analysis using SPSS and AMOS revealed that the sustainability of NCS education requires appropriate adjustments, while the innovation of NCS requires people to change their cultural concepts. Literature [28] fused artificial intelligence and traditional handicraft

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skills and studied the inheritance and dissemination of traditional handicraft skills. It is argued that the fusion of artificial intelligence and traditional culture is an important way to promote the inheritance and innovation of traditional handicraft skills, which has led to the new development of this skill. Literature [29], in view of the current situation of teaching the content "Folk Crafts and Artistic Design" in the university teaching program "Technical Education", suggests measures to improve the educational and methodological support for the development of professional competence of technical teachers as a goal, and focuses on the creation of educational tools and their application in the teaching of technical teachers. By combining multimedia technology and digital collection, classification and display of folk craft culture, literature [30] examines the protection and promotion of folk craft culture in Guangxi in the digital era, aiming to promote the inheritance and sustainable development of folk crafts in the digital era.

In this paper, the design help revitalization strategy of folk traditional handicrafts is proposed from the two directions of innovation design and service design. Combined with deep convolutional network technology, super-resolution reconstruction of images is realized. After downsampling, the mapping from low-dimensional space to high-dimensional space is found from the image information by sub-pixel convolution method. The DLSS neural network model is constructed to complete the identification of function features using autoencoder. Through the correlation and change of adjacent frames in the time domain, the motion between adjacent frames is calculated, and the use of convolution is learned to compute the original color moments to produce a clearer rendering effect. The introduction of oversampling technology into the digital revitalization interaction design of handicrafts provides an innovative teaching method for the education and inheritance of traditional folk handicrafts.

Research on the "living heritage" of traditional folk handicrafts and the design of educational innovations

Design-assisted revitalization approach to handicrafts

Innovative Design for the Purpose of Craft Conservation

Crafts is a living cultural heritage, in the protection and inheritance of handicraft culture based on how to design revitalization is an important role in the continuation and development of the traditional cultural lineage of Jiangxi [31]. Craft conservation revitalization design is not a copy of traditional handicrafts, but also should be designed on the basis of the innovation it carries. Design through innovative design into the modern fashion elements, to meet the needs of people's lives now, to promote economic development to stimulate the function of handicraft poverty alleviation, design innovation to drive the development of local huge social and economic benefits of traditional handicraft industry.

Design for poverty alleviation should be combined with the characteristics of local production and life, focusing on the protection of traditional handicrafts, effectively improving the poverty situation. Based on traditional handicrafts design cultural and creative products, improve the efficiency of traditional handicraft production.

Service Design to Facilitate Handmade Cultural Creations

The term "service design" refers to the activity of planning and organizing the human, infrastructural, communication and physical components of a service in order to improve its quality and the interaction between service providers and users. Service design can serve as a way to notify changes to existing services or to create new services altogether. The purpose of service design methodology is to establish best practices for designing services based on user needs and merchant capabilities. Using service design to help handicraft culture and innovation can effectively and systematically revitalize the non-heritage handicraft manufacturing industry in poverty-alleviating regions.

In today's society that emphasizes informationization, Internet technology has become a mainstream social tool. Its main purpose is to promote the development of regional economy and drive local craftsmen out of poverty. Design-centered, combined with Internet technology is the main tool in the post epidemic era.

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Guided by design, the main purpose is to optimize the production cycle of regional handicrafts, improve productivity and conform to modern industrialized production. Conducting a detailed service design analysis can uncover more design paths.

Image Super-Resolution Reconstruction Based on Deep Convolutional Networks

Image Degradation and Restoration

Super-resolution technology was initially proposed to solve the problem of image restoration, due to a variety of factors, the image in the preservation, transmission process is very easy to lose some information, so the need to utilize a certain technology to process it to restore it to the original image [32]. Nowadays, super-resolution technology also belongs to the category of image enhancement, image enhancement and image restoration are generally similar, but the difference is that the purpose of image restoration is to realize the inverse process of image degradation as much as possible to restore it to the target original image, while image enhancement is to exhaust all the means that can increase the image perception and the quality of the image to improve the quality of the image. Similarly, understanding the process of image degradation can shed light on the study of super-resolution.

There are many factors that can cause image degradation, such as relative motion, improper focal length settings, atmospheric disturbances, and defective optical lenses, among other things, and the degradation of a given image f to image g can be represented by the following process:

$$g(i,j)=s\left(\iint_{(a,b)\in C} f(a,b)h(a,b,i,j)dadb\right)+v(i,j) \tag{1}$$

where s denotes some nonlinear mapping and v denotes noise. The process is generally simplified to the following form by ignoring the nonlinearities and assuming that the degeneracy function h is independent of the image position:

$$g(i,j)=(f*h)(i,j)+v(i,j) \tag{2}$$

In general, image restoration techniques are categorized into deterministic and stochastic ones. Deterministic methods are generally used in cases where the noise effect is relatively small and the degradation function is known, in which case only the inverse function of the degradation function needs to be found and applied to the degraded image. Stochastic methods are generally used to deal with cases where the degradation process is unknown, and find the optimal restoration result of the degraded image according to certain stochastic criteria, such as the least squares method.

Downsampling and Upsampling

The process of reducing an image is generally called downsampling, and the process of enlarging an image is generally called upsampling.

The implementation of downsampling is generally simpler, because the input image of downsampling is too complete for the output image, so it is generally only necessary to sample the original image pixels at a certain ratio interval, or according to the neighboring regions of the pixel calculation to get the downsampled image.

Unlike downsampling, upsampling faces a much more complex problem, and image super-resolution essentially belongs to a complex upsampling process, in fact, super-resolution models generally contain multiple upsampling steps. For image up-sampling, it is a non-adaptive problem, i.e., it is necessary to find a mapping from the low-dimensional space of the image to the high-dimensional space, and this mapping is not unique, the good thing is that the image has the nature of local information correlation, so the

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information contained in the image itself can be utilized to perform up-sampling [33].

- *Up-Sampling Based on Interpolation*

Up-sampling by interpolation has the advantage of fast and efficient, in the early days, the interpolation method once became the main way of image restoration, and now many studies in the image preprocessing process is also often used in this type of method.

Nearest neighbor interpolation: Nearest neighbor interpolation, also known as zero-order interpolation, is achieved by assigning the values of the four pixels closest to the position to be interpolated to achieve upsampling, and the I_H process of upsampling to $x_d \times y_d$ for I_L with size $x_s \times y_s$ can be expressed as:

$$I_H(i,j) = I_L\left(\left\langle i*\left(x_s/x_d\right)\right\rangle, \left\langle j*\left(y_s/y_d\right)\right\rangle\right) \tag{3}$$

Where $\langle\ \rangle$ denotes rounding, since this interpolation method is too simple, just for the target position of the pixel value in the input image to find the nearest pixel directly copied over, so prone to jagged traces, the effect is more general.

Bilinear Interpolation: Bilinear interpolation, also known as first-order interpolation, calculates the value to be interpolated based on the four nearest pixel values Q_{11}, Q_{12}, Q_{21}, and Q_{22} to the position to be interpolated, and the weight of each known pixel is determined by the distance of that pixel to the position to be interpolated, with the closer the closer the greater the weight. The method first calculates two intermediate points R_1, R_2 in the x direction respectively, and then calculates the final value through the two intermediate points. Let the coordinates of the nearest four points be (x_1, y_1), (x_1, y_2), (x_2, y_1), (x_2, y_2), then the pixel value of the target point P can be obtained by the following process, firstly by linear interpolation in the x direction:

$$f(R_1) = \frac{x_2 - x}{x_2 - x_1} f(Q_{11}) + \frac{x - x_1}{x_2 - x_1} f(Q_{21}) \tag{4}$$

$$f(R_2) = \frac{x_2 - x}{x_2 - x_1} f(Q_{12}) + \frac{x - x_1}{x_2 - x_1} f(Q_{22}) \tag{5}$$

Then another linear interpolation in the y direction can be obtained:

$$f(P) = \frac{y_2 - y}{y_2 - y_1} f(R_1) + \frac{y - y_1}{y_2 - y_1} f(R_2) \tag{6}$$

This kind of interpolation can make the image smooth, but it has a certain low-pass filtering effect, which will cause the image to lose certain high-frequency information.

Bicubic Interpolation: Bicubic interpolation calculates the weighted average of the last 16 sampling points in a rectangular grid to obtain the interpolated value of the target location. This method takes into account more regional information and retains more details due to the use of more complex higher order functions for fitting, making bicubic interpolation one of the most widely used methods in image preprocessing. Like other interpolation methods, bicubic interpolation is a process of fitting pixels with smooth transitions as

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much as possible, and a cubic basis function $S(x)$ is constructed for a better fit:

$$S(x)=\begin{cases}(a+2)\|x\|^3-(a+3)\|x\|^2+1, & for\ \|x\|\le 1\\ a\|x\|^3-5a\|x\|^2+8a\|x\|-4a, & for 1\le\|x\|\le 2\\ 0, & otherwise\end{cases} \tag{7}$$

The distance between each pixel and the target pixel is then taken as input to obtain its weight w_{ij} corresponding to each pixel respectively, and the final interpolation can be expressed as:

$$I_H(i,j)=\sum_{i=0}^{3}\sum_{j=0}^{3}w_{ij}x^i y^j \tag{8}$$

This means of interpolation is a little more complex, but accordingly better interpolation results can be obtained.

- *Convolution-Based Upsampling*

Although the interpolation method is simple, it often relies on certain positional relationships and calculation formulas, and the fixed interpolation calculation mode can easily become the performance bottleneck of the super-resolution model. In order to incorporate the up-sampling process into the training of convolutional neural networks, convolution-based up-sampling methods have been more widely used in the field of super-resolution, which mainly include: inverse pooling, transposition convolution, and sub-pixel convolution.

Inverse Pooling: Pooling is the main operation responsible for downsampling in convolutional neural networks, maximum pooling can obtain the information with the highest local intensity, and average pooling can retain the overall characteristics of the local data, as opposed to which, inverse pooling is also divided into inverse maximum pooling and inverse average pooling. Inverse pooling implements the up-sampling process by mapping the values of a single location to a local region as the maximum or average value. Since inverse pooling is only to make the size larger and does not add more information, it is not used much in the field of super resolution.

Transpose Convolution: Transpose Convolution is also known as Inverse Convolution or Fractional Step Convolution, for convolution operations with a general step size greater than 1, the output size is smaller than the original size, while Transpose Convolution obtains a larger image than the original image by complementing the original image with a 0-transpose and then doing the convolution. Strictly speaking, transposition convolution cannot be regarded as the inverse process of conventional convolution, but it does realize the function of up-sampling, and itself as a special convolution operation can participate in the training process of the model. Figure 1 shows the realization of the inverse convolution process.

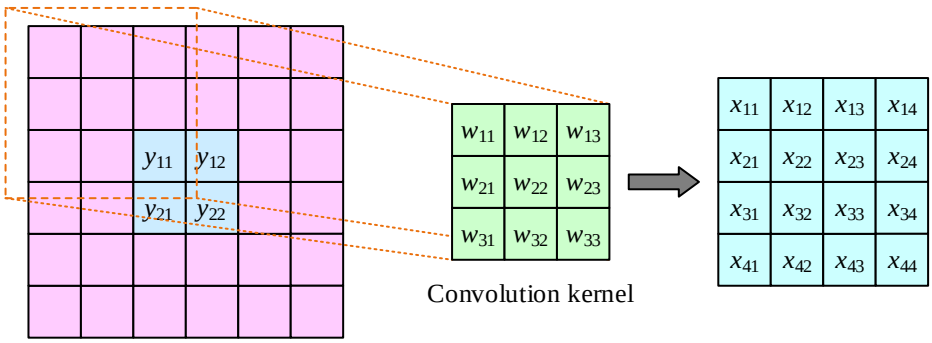

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Figure 1. Deconvolution Process

Subpixel Convolution: Subpixel convolution has been applied as an up-sampling method with high information utilization in deep learning models in various image domains, and it was first proposed as the model up-sampling part in ESPCN by Shi et al. For a sub-pixel convolution operation that requires a magnification of r times and an input size of $H*W$, a feature map of size r^2*H*W is generally obtained by convolution and rearranged into an image of size $1*rH*rW$. This step can be expressed as:

$$PS(T)_{x,y,c} = T_{\lfloor x/r \rfloor,\lfloor y/r \rfloor,C\cdot r\cdot \mathrm{mod}(y,r)+C\cdot \mathrm{mod}(x,r)+c} \quad (9)$$

Deep Learning Oversampling Techniques

The introduction of deep learning oversampling technology provides a new support for the interaction design process in the digital revitalization of non-heritage handicrafts, and can play a positive role in promoting the design strategy and design creation method. Consideration of the introduction of technology focuses primarily on the importance of innovation, and this chapter will analyze the algorithmic logic and underlying structure of deep learning supersampling technology, and conduct an in-depth study of the current living heritage of non-heritage handicrafts and the innovative design process.

Neural Network Models

- *Basic Components*

DLSS neural networks include techniques such as distributed training, mixed-precision computation, and automatic mixed-precision due to the large amount of training data and computational resources required in the training process, which can significantly improve the speed and efficiency of model training while ensuring the accuracy and stability of the model [34].

The problem of vanishing gradients is solved as much as possible by jump connections between layers, and for multilayer neural networks, improper activation functions can trigger the concatenation effect in the propagation of gradient direction, resulting in the network weights not being able to be updated or being updated minimally, and the network training failing.

The DLSS neural network structure consists of multiple levels, each with a different resolution and a different feature map. Each level uses a different image pyramid to extract and combine features by downsampling and upsampling the image. This particular network structure can be considered as a deep pyramid network.

For the sampling process, the more the number of samples within a certain pixel range, the more accurate the pixel values output to the coordinates corresponding to the large resolution. However, the accurate pixel value is only a mechanical theoretical accuracy, which does not mean the picture is accurate, and if the sampling range is enlarged one way or another, it will lead to distortion of the picture. Therefore, in order to increase the number of samples and limit the sampling range, DLSS adds a time dimension to the spatial sampling, and samples both the current frame and the previous frames, and the range of the sampled frames will be judged by the AI by virtue of the comparison of the frame generation time and the pixel values, to make sure that the frame is suitable to be included in the sampling range.

- *Key Features*

In DLSS, the autoencoder plays a key role. The encoder stage processes the input data through convolutional and downsampling layers, gradually generating smaller but deeper images until it reaches the "latent representation" bottleneck of the encoded input. If the autoencoder is trained to learn the recognition function, the decoder extends the latent representation back to the original image.

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In order to process each pixel in the image and accumulate information over time, a unit-pixel convolutional RNN training method is used, i.e., the output RNN is computed using a convolutional layer; however, if the image features are outside the sensory field of the convolutional layer, the RNN will not be able to capture the evolution of the feature data over time. Although larger convolutional kernels can be used to mitigate this problem, this approach is computationally expensive and not well adapted to different image resolutions.

Therefore, the solution, i.e., the hidden state of the RNN should be able to follow the moving features in the image to better capture the information of feature changes over time. Techniques such as deformable convolution as well as attentional mechanisms are used in the DLSS algorithmic framework to allow the model to adjust the shape of the convolution kernel or focus on specific regions in the image as needed to better capture temporal changes in features.

Inter-Frame Information Utilization

- *Motion Vector Estimation*

In recent years, with the development of deep learning technology, there are four main deep learning-based video super-segmentation methods: motion estimation and compensation methods, deformable convolution methods, 3D convolution methods, and recurrent convolutional neural network methods.DLSS uses motion vector estimation to determine the amount of movement of objects in the rendered scene between two frames, which helps to improve the clarity and stability of the image, and to reduce the blurring of the image and the appearance of artifacts. Based on the relationship between the utilization of inter-frame information, the existing methods are further classified into two main categories: aligned and unaligned methods.

- *Optical Flow Methods*

Most of the motion estimation techniques are implemented through the optical flow method. This method calculates the motion between neighboring frames by their correlation and variation in the time domain. Motion compensation methods can be categorized into traditional methods (e.g., Lucas Kanade, Druleas) and deep learning methods (e.g., FlowNet, FlowNet2.0, and SpyNet). The optical flow method takes as input two consecutive frames I_i and I_j, one of which is the target frame and the other is the neighboring frame. The method then computes the optical flow F_{i-j} from frame I_i to I_j by seeing equation (10):

$$F_{i\to j} = \left(i \to j, v_{i-j}\right) = ME\left(Ii, Ij; \theta ME\right) \tag{10}$$

Where $i-j$ and v_{i-j} represent the horizontal and vertical components respectively, $ME(\cdot)$ is a function to compute the optical flow and θ_{ME} is the required parameters. Motion compensation is used to perform image transformations between images based on motion information so that neighboring frames are spatially aligned with the target frame. Using methods such as bilinear interpolation and spatial transform network (STN), see equation (11). Where $MC(\cdot)$ is a function representing motion compensation, I, F and represent neighboring frames, optical flow and parameters respectively:

$$J = MC\left(I, F; \theta_{ME}\right) \tag{11}$$

With traditional interpolated super-resolution, the original pixels are taken and the pixels between them are calculated. For example, if there is a black pixel on the left and a white pixel on the right, then a gray pixel is inserted in between (black plus white divided by 2) to complete the transition and improve the resolution. However, in practice, this middle pixel is probably not gray, and may even be red. And this situation cannot

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be accurately measured by linear interpolation, because this part of information has been (due to the lack of resolution) completely lost.

Instead, in DLSS, the motion vector estimation technique is used in conjunction with the TAA anti-aliasing technique to further improve image quality and stability. By using motion vector estimation in combination with TAA, DLSS produces sharper, more stable and realistic images.

- *Time Domain Anti-Aliasing*

Compared to other antialiasing methods often used previously in real-time rendering, DLSS can render images at a higher resolution and use that data to fill in gaps in the original resolution. The reconstructed sequence of rendered images achieves very high multi-frame sample utilization. After the generic TAA, the alignment continues to be tuned by learning to use convolution to compute the original color moment alignment (using the same data and training procedure as the autoencoder). While the original convolution consists of only three identical 3×3 box filters, one for each color channel, the learned convolution consists of three different $3 \times 3 \times 3$ dimensions, with the extra dimensions being able to allow for merging of inter-channel dependencies.

This approach provides an efficient way to apply the TAA algorithm and allows the algorithm to be adapted to different scenes and color distributions by learning the parameters of the convolution kernel. Overall, the TAA technique of DLSS, when used in conjunction with the motion vector estimation technique, not only reduces the appearance of jaggies and other artifacts, but also optimizes the clarity and detail of the image, producing a sharper, more stable, and more realistic rendering.

Teaching Practices

Research Methodology

In the education of traditional folk crafts, the teaching methods or models of traditional crafts are under constant exploration, however, the consumer, as the core element, which influences the market and innovation demand, has been neglected. Therefore, this study proposes a consumer-centered teaching model. This teaching model is a teaching method for teachers to guide students to carry out inheritance and innovation, which meets the needs of modern handicraft education as well as the needs of the market. This paper realizes the reconstruction of folk traditional handicraft works based on the image super-resolution of deep convolutional network and applies it to the design of handicrafts to carry out the teaching practice research for the traditional handicraft creation class. And combined with the observation method and questionnaire survey method to grasp the operation of the course, as well as the feedback of the various aspects of the teaching mode. Based on the teaching practice of two classes, the experimental class and the control class, the results of the questionnaire survey and the output of the final products of the students are compared and analyzed, which serve as an important basis for this study, and help the teachers to quickly grasp the learning status of the students, as well as changes in the cognition of the students on traditional handicrafts.

Results of Regression Analysis

Descriptive Statistics of Variables

Table 1 shows the results of descriptive statistics of continuous variables, in terms of dissemination effect, the highest value of dissemination power is 15.1365, the lowest is 10.2934, and the mean value is 11.6453. In terms of dissemination targets, the top three themes with the highest cognitive approval are the cognitive approval of handicrafts, the cognitive approval of the dissemination and history of handicrafts and the cognitive approval of the cultural connotations of traditional handicrafts, and the mean value is respectively 8.7563, 5.3645 and 4.7963 respectively.

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Table 1. Descriptive Statistical Results of Continuous Variables

Variable	Mean value	Minimum value	Maximum value
Propagation force	11.6453	10.2934	**15.1365**
Handicraft cognition approval degree / %	**8.7563**	0.0000	100.0000
Handicraft communication and historical recognition acceptance / %	**5.3645**	0.0000	100.0000
Traditional handicraft culture connotation cognition approval degree / %	**4.7963**	0.0000	19.9345
Handicraft product production cognition approval degree / %	1.6963	0.0000	14.5748
Handicraft knowledge approval degree / %	0.4698	0.0000	5.4312

Regression Analysis of Impact Factors

In this study, multiple linear regression analysis is done on the independent and dependent variables using SPSS in order to explore the influencing factors of the high dissemination video of handicrafts designed based on deep learning oversampling technique. Before the regression analysis, the video theme, video duration, and background music need to be transformed into dummy variables. The video theme is the history of traditional folk handicrafts, the video duration is more than 20 minutes, the background music is no background music, and the account type is unauthenticated as the reference group.

The variance inflation factor (VIF) values of all independent variables are less than the critical value of 10, and there is no multicollinearity problem. The results of the regression analysis are shown in Table 2.

This study comprehensively examined the effects of the respective variables on the spreading power of the videos, and also examined the effects on three specific dimensions, namely, spreading breadth, spreading approval and spreading participation. The standardized Beta values for the dissemination power, dissemination breadth, dissemination identity, and dissemination engagement of the craft cognitive endorsement were -0.0456, -0.0465, -0.1651, and -0.2784, respectively, and the adjusted R^2 of the regression model fit goodness-of-fit for the four specific dimensions were 0.4925, 0.5068, 0.3648, and 0.4826, respectively.

Table 2. Regression Results of Influencing Factors of High-Spreadability Videos

Independent variable	Propagation force		Propagation span	
	Standardization Beta	VIF	Standardization Beta	VIF
The history of folk traditional handicraft is reference				
Handicraft cognition	-0.0456	1.2654	-0.0465	1.2654
Handicraft product cognitive approval	0.0616	1.9166	0.0684	1.9048
The spread of handicraft and the recognition of historical cognition	0.0488	1.2193	0.0436	1.2648
The cultural connotation cognition of handicraft	0.0652	1.6814	0.0631	1.6895
Handicraft product production cognition approval degree	-0.0596	1.6348	-0.0596	1.6378
Number of fans	0.5154***	1.6578	0.5288***	1.6528

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Regression model fitting excellence	After adjustment R^2=0.4925		After adjustment R^2=0.5068	
/	Propagation recognition		Spread participation	
	Standardization Beta	VIF	Standardization Beta	VIF
The history of folk traditional handicraft is reference				
Handicraft cognition	-0.1651	1.2365	-0.2784*	1.2247
Handicraft product cognitive approval	-0.0958	1.9034	0.0536	1.9354
The spread of handicraft and the recognition of historical cognition	0.1348	1.2648	0.0758	1.2725
The cultural connotation cognition of handicraft	0.2396	1.6178	0.1354	1.6856
Handicraft product production cognition approval degree	0.0084	1.6248	0.0514	1.6378
Number of fans	0.2641	1.6597	0.4618	1.6572
Regression model fitting excellence	After adjustment R^2=0.3648		After adjustment R^2=0.4826	

Cognizance of the Transmission of Traditional Folk Handicraft Skills

Analysis of Cognitive Patterns

The experiment shows that the degree of imagery abstraction is one of the internal factors affecting the cognition of the connotation of folk traditional handicrafts. Based on the experimental data, this paper calculates the group cognitive law under different abstraction degree of folk traditional handicrafts as shown in Fig. 2, with the gradual abstraction and complexity of the imagery, the cognitive bias of the subjects increases from 0.1264 to 2.2998, and the cognitive rate gradually decreases from 1.4284 to 0.5966, which show the opposite trend, indicating that the difficulty of processing the information gradually deepens and the cognitive load gradually increases with the increase in the abstraction degree of the imagery. This shows that as the abstraction degree of the imagery increases, the processing difficulty of the crowd for the imagery gradually deepens, the cognitive load gradually increases, and the cognitive bias also gradually increases. Therefore, in the process of spreading and passing on traditional folk handicrafts, every effort should be made to avoid designing imagery that is too abstract, which may make it difficult for people to understand the cultural connotations it expresses.

One possible explanation for the insignificant correlation between the connotation score and the shape recognition score is that it is difficult to accurately understand the connotations of handicraft works with deep cultural meanings based on the shape of the works alone. The experimental results show that to promote the dissemination and inheritance of traditional folk handicraft culture, it is necessary not only to design simple and easy-to-understand handicraft shapes, but also to strengthen traditional cultural education and improve the cultural level of the group.

In terms of quantitative indicators, the linear relationship between the cognitive bias of the cultural connotation of traditional folk handicrafts, the cognitive rate and the degree of abstraction of the imagery can provide a theoretical basis for the dissemination and inheritance of traditional folk handicrafts for different purposes, and the difficulty of the imagery of traditional folk handicrafts should be regulated in accordance with the cognitive effect that is to be achieved, so as to further promote the dissemination and inheritance of traditional folk handicrafts.

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To summarize, this paper draws out the group cognitive law under different abstraction levels of folk traditional handicraft imagery, and quantitatively organizes the linear relationship between cognitive bias, cognitive rate and abstraction level of folk traditional handicraft cultural connotation.

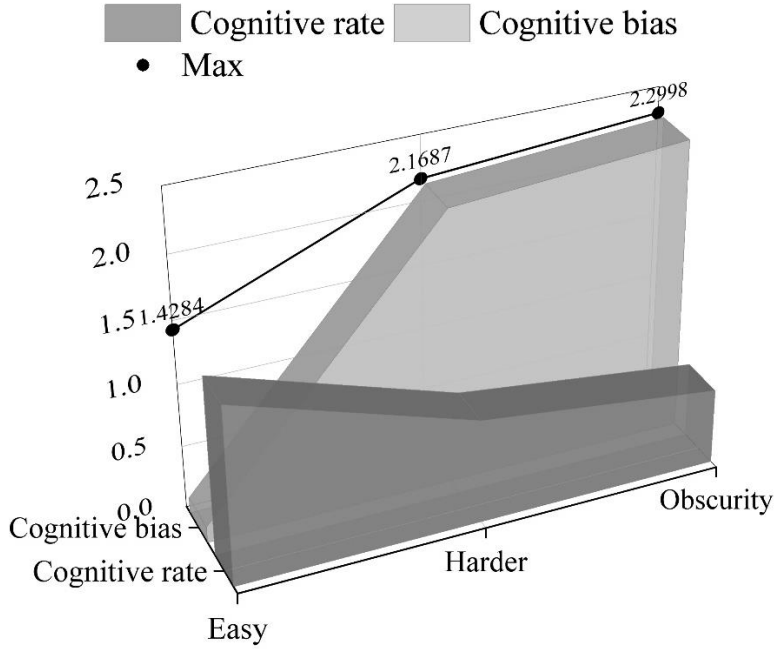

Figure 2. The Cognitive Law of Group in Different Craft Image Abstraction

Survey On the Perception of Traditional Folk Handicrafts

Figure 3 shows the public's knowledge of traditional folk handicraft skills and willingness to disseminate them. Through the processing and analysis of the collected data, it can be found that the proportion of audiences who know more about traditional folk handicraft culture is relatively high, accounting for nearly half of the audience, while the proportion of audiences who do not know anything about traditional folk handicraft culture is only 3.012%. It can be seen that the audience's understanding of traditional folk handicraft culture is relatively good. In terms of willingness to disseminate, 63.425% of the audiences are willing to disseminate traditional folk handicraft culture, which is a strong willingness to disseminate.

Folk traditional handicraft culture is rich in content and far-reaching in significance, with strong regional and national characteristics, and it is more necessary for the people in different regions to participate in the related dissemination activities. Therefore, the government and the media should make full use of their own recognition and understanding of traditional folk handicrafts culture to improve their own dissemination capacity, and increase the dissemination of traditional folk handicrafts culture through professional learning and understanding of the relevant content.

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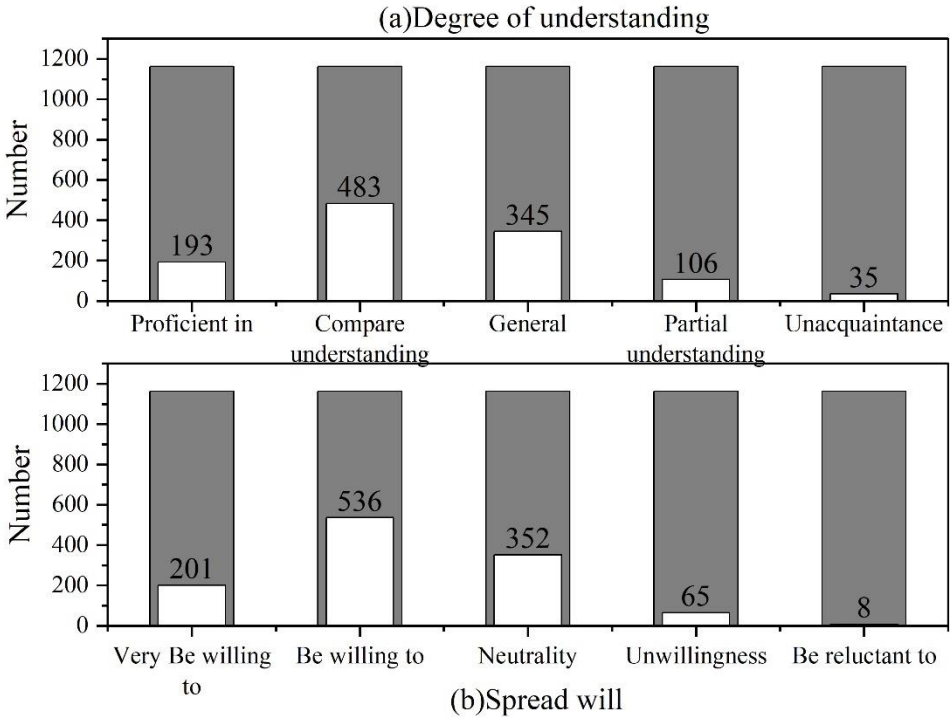

Figure 3. The Knowledge of Traditional Handicraft Skills and The Willingness to Spread

Effectiveness of Skills Education Innovations in Traditional Folk Crafts

Analysis of the Emotional Degree of Interest in Craft Understanding

Figure 4 shows the Craft Understanding Interest Sentimentality Analysis, which yields a sentiment score in the 0 to 0.5 range, with the closer to 0, the more negative the sentiment, and the closer to 0.5, the more positive the sentiment. For example, "It was really super fun and tested spatial imagination." Its score is 0.466, classifying it as a positive sentiment. "Coming from a traditional craftsman background, I always feel weird drawing 45-degree angles with an ink bucket." Its score is 0.148, classified as a negative emotion. As can be seen from the graph, the histogram represents the number of comments in each score band, and basically the higher the sentiment score (the more positive the sentiment) the higher the number of comments. The industry standard of 0.3 is used as the cut-off point for positive and negative sentiment. The proportion of positive player emotions fed back in the comments reaches 87.62%, and the number of people in the 0.4-0.5 range is 387, indicating that this folk traditional handicraft provides users with a positive emotional experience from the educational design.

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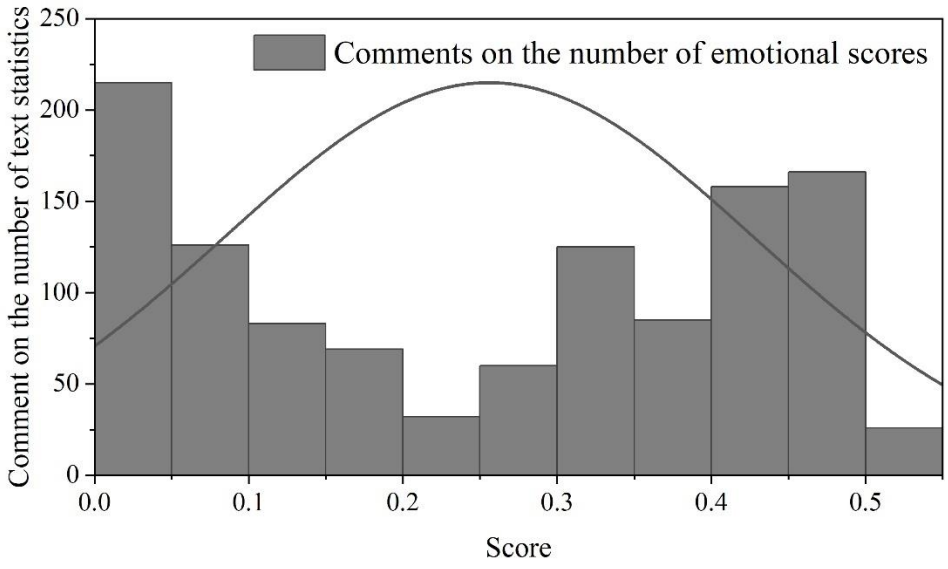

Figure 4. Handicraft Knowledge of Interest and Emotion Analysis

Analysis of the Effects of Educational Innovations

The educational innovation effect of folk traditional handicrafts was analyzed from the perspectives of "classroom learning concentration" and "learning effect and knowledge transformation", and the statistical results are shown in Figure 5. In the picture, A-J represent "I am very interested in the content of handicrafts", "I can fully understand what handicrafts are talking about", "I like this way of teaching", "I have a deep understanding of handicrafts", "I am willing to spend more time learning traditional handicrafts", "I remember the content of the last handicraft", "I am deeply impressed by the way the handicrafts were carried out last time", "I have a deeper understanding of the knowledge of traditional handicrafts", "I have begun to love traditional handicrafts through handicraft learning", " on the traditional handicraft knowledge test score".

In the assessment of "classroom learning concentration", it was found that students in the experimental group who had received experiential teaching generally scored higher than those in the control group in the descriptions of the questionnaires: experiential teaching made the students more interested in the contents of the course of "traditional folk handicrafts", experiential teaching helped students understand the contents of the course and was liked by the students more. The experiential teaching makes students more interested in the course content of "traditional folk handicrafts", the experiential teaching is more helpful to students' understanding of the course content, and it is also more popular among students. With the assistance of experiential teaching, students' understanding of the two types of traditional handicrafts and cultures is more profound, and the difference in scores between the experimental group and the control group is 0.8136, 1.3391, 0.9996, 1.3988, 0.1168, respectively.

Statistical analysis of the results of "learning effect and knowledge transformation" found that there was no significant difference between the experimental and control groups in terms of the depth of memory of the course content one week after the course was carried out. However, students in the experimental group had a deeper impression of the experiential teaching mode (4.2198). At the same time, under the effect of the interactive experiential teaching mode, the students have a deeper understanding of "traditional handicraft" culture (4.0345), and their love for "traditional handicraft" culture is significantly higher than that of the control group. The above results show that the neural network-based teaching mode is more helpful to stimulate students' interest in learning and exploring than traditional teaching, and it also has a beneficial effect on students' understanding and internalization of the knowledge of traditional handicraft skills.

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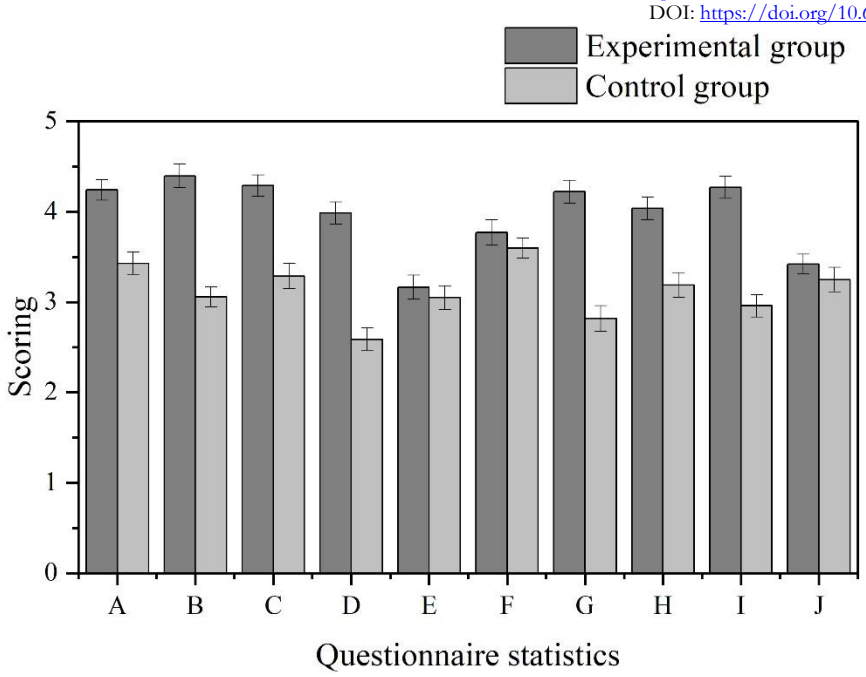

Figure 5. Questionnaire Assessment Results

Conclusion

This paper proposes a design help revitalization method for traditional folk handicrafts with the purpose of "living heritage" and educational innovation of traditional folk handicrafts. Based on deep convolutional network technology, image super-resolution is reconstructed, and the result is oversampled and introduced into the interactive design of digital revitalization of handicrafts. Consumers are taken as the core element, and a new handicraft inheritance education model is proposed, and a practical investigation is conducted to analyze the educational effect.

As the imagery of traditional handicrafts becomes more and more abstract and complex, the cognitive bias increases from 0.1264 to 2.2998, and the cognitive rate gradually decreases from 1.4284 to 0.5966. Both of them show the opposite trend of change, so in the process of spreading and passing on traditional folk handicrafts, every effort should be made to avoid designing imagery that is too abstract, which may make it difficult for the crowd to understand the cultural connotations it expresses.

According to the survey on people's knowledge of traditional handicrafts, the percentage of people who have no knowledge of traditional folk handicrafts is only 3.012%. At the same time, 63.425% of the audience is willing to spread the folk traditional handicraft culture, and the willingness to spread is strong.

In the effect of educational innovation, the degree of concentration on traditional handicraft classroom learning of the students in the experimental class is 4.2421, 4.3956, 4.2865, 3.9851 and 3.1653 respectively, which is generally higher than that of the students in the control class, which indicates that the new handicraft inheritance education mode is more effective.

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