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Research Article

New Paths for the Development of National Sports Intangible Cultural Heritage Based on Computer Nonlinear 3D Model Modeling Technology from the Perspective of Scene Theory

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Purpose. The AI era has brought rapid progress and many changes in life, which challenge the survival of cultural heritage. One of the topics that has attracted much attention at the moment is how to better inherit and develop the intangible cultural heritage of national sports. In order to improve the development level of national sports intangible cultural heritage, this article explores a new path for its development. *Methodology*. Through the analysis and research of scene theory and computer nonlinear three-dimensional (3D) model modeling technology, it can be applied to the development of national sports intangible cultural heritage. This article analyzes the scene theory, three-dimensional modeling, and intangible cultural heritage of national sports, conducts experimental analysis on its functions, and uses relevant theoretical formulas to explain. *Research Findings*. The results show that this development path is more effective than the traditional development path. It has a lower error rate than the traditional model, which differs by 0.124. The public satisfaction increased by 56.7% before and after. *Research Implications*: The new method proposed in this article provides a new path reference for the development of national sports intangible cultural heritage in the future. *Practical Implications*. This method can meet the needs of the development of intangible cultural heritage of national sports culture, and the satisfaction and development level of the masses have been greatly improved.

1. Introduction

In the era of rapid change, people are more and more alienated from national sports culture, and the traditional development methods of intangible cultural heritage cannot meet its increasing requirements in terms of breadth and integrity. 3D modeling is a computer nonlinear vision method that can construct and display stereoscopic images. Due to its advantages in image processing, it has been applied to various fields to successfully solve various image display problems. Images can give people an intuitive feeling, and it is of far-reaching significance for the inheritance and development of the national sports intangible cultural heritage to be better and more accurately displayed to people through 3D modeling. Generally speaking, 3D modeling is the use of 3D production software, through virtual 3D space. In the computer, it looks like the real world. Scenes have become an important driving force for contemporary urban innovation. The combination of technology and scene theory can better develop the national sports intangible cultural heritage. The scene is based on the traditional physical space, adding cultural and aesthetic elements, making it a social space with cultural value, emphasizing cultural quality, and displaying cultural characteristics. In recent years, scholars have used 3D modeling for cultural heritage inheritance, but there are relatively few applications and research studies combining the scene theory and 3D modeling. Therefore, it is of great significance to apply 3D modeling based on the perspective of scene theory to the research on the new development path of national sports intangible cultural heritage.

Technology has changed life, and cultural inheritance and development have received increasing attention. More and more scholars have explored the intangible cultural heritage of national sports. Among them, in order to study the cultural compatibility between tradition and modernity, He et al. revealed the local differences in dealing with the conflict between folk sports-related cultural heritage and modernity, and showed how to use folk sports culture in village governance to activate sports culture [1]. Liu and Zhao believed that Wushu carries the traditional sports culture. He expounded the difficulties and breakthrough strategies of effective Wushu teaching in colleges and universities from many aspects, in order to provide theoretical reference for the effective teaching of Wushu in colleges and universities [2]. The value of intangible cultural heritage is well worth exploring, and Kogiso considered traditions and indigenous movements to be powerful specific aspects of intangible cultural heritage and studied the process of the spread of Pelota Mixteca to the United States [3]. Ming explored the dissemination mode of national sports intangible cultural heritage to provide a reference for its wide dissemination to obtain an effective dissemination path [4]. In order to improve the cultural resilience and contribution of the intangible cultural heritage of national sports, Ode et al. inventoried and formulated a strategy to protect the cultural progress objects of the Baubau city area [5]. However, these studies have theoretical significance for the inheritance and development of national sports cultural heritage, and have made contributions to the protection of heritage and the inheritance and development of culture, but they do not provide practical methodological guidance.

Scene theory and 3D modeling can help in the development of national sports intangible cultural heritage, and have good results in actual display. Among them, Martino et al. proposed a method based on the scene theory to identify and classify objects in the scene for better 3D modeling [6]. In order to improve the 3D modeling quality of cultural heritage development and reduce the complexity of deep video interframe coding, Chen et al. proposed a fast coding unit (CU) size and mode decision algorithm [7]. Chao and Guo proposed a novel feature-based RGB-D camera pose optimization algorithm for real-time scene 3D modeling systems [8]. To model cultural heritage with 3D modeling, Kotsiubivska and Baranskyi created 3D models of historical heritage elements with the help of digitized word counts and developed 3D printing software [9]. These methods promote the development of national sports intangible cultural heritage to a certain extent, but their effects show low mass satisfaction.

In order to solve the abovementioned problems of improving the development level of national sports intangible cultural heritage, this article uses the scene theory and 3D modeling to analyze the development method of cultural heritage and simulates the 3D modeling method to achieve fast and high-quality results. The innovation of this article is as follows: using the scene theory and 3D modeling, it analyzes how the scene theory and 3D modeling technology play a role in the research on the new development path of national sports intangible cultural heritage based on computer nonlinear 3D model modeling technology from the perspective of scene theory. The proposed method is expounded, and it is found through experiments that the method is simple to use, has high modeling quality, and improves the satisfaction of the masses and the level of cultural heritage development.

2. Methods of Developing a New Path for the Intangible Cultural Heritage of National Sports

2.1. Research Content and Organization of the article. The development path of the intangible cultural heritage of national sports should be updated with the progress of technology. If the traditional method is still used to develop it, there will be many problems. For example, traditional methods cannot properly display traditional cultural heritage in a true and complete way, and the scope of dissemination and the target audience are affected. Therefore, it is very important to innovate its development path and improve the development level [10]. The traditional way of cultural heritage development is shown in Figure 1.

Through the investigation, it is found that the current research on the development path of ethnic sports intangible cultural heritage is still insufficient, and a lot of research studies have focused on the analysis and summary of the characteristics of the communication theory and experience and propose specific method paths for effective implementation, so this article proposes a new path research on the development of ethnic sports intangible cultural heritage [11, 12]. This article analyzes and applies the scene theory and 3D modeling method to the new development path of national sports intangible cultural heritage and evaluates it. The experimental analysis shows that the three-dimensional modeling based on the scene theory perspective has a better effect on the development of the intangible culture of national sports than the traditional development method. The organizational structure of the full text is shown in Figure 2.

As shown in Figure 2, the full text consists of five parts. The first part mainly introduces the research background of the development of the intangible cultural heritage of ethnic sports and leads to the problems to be solved to illustrate the purpose and significance of this research. The second part describes the organization structure and methods of the full text of this article and analyzes the content of related methods of national sports intangible cultural heritage, scene theory, and 3D modeling, and evaluates the effect of the proposed new development path. The third part describes the data source of this article in detail; the fourth part analyzes the comprehensive performance of environmental transmission and computing time in different scenarios, the corner detection and matching performance of different methods, the effect of different 3D modeling methods, and the result data of the satisfaction evaluation before and after the experiment; the fifth part is the conclusion.

2.2. 3D Modeling of National Sports Intangible Cultural Heritage. The development of national sports intangible cultural heritage can have a very significant effect on the inheritance and development of a country's national culture. Cultural heritage is the result of thousands of years of cultural transmission and is the crystallization of the common excellent culture of the whole nation [13]. This article proposes to promote the new development of national

FIGURE 1: Traditional way of development. (a) Graphic works and (b) live performance.

sports intangible cultural heritage through the perspective of the scene theory and 3D modeling technology, so as to achieve the effect of improving the quality level of the development of national traditional sports culture.

Scenario theory: what a scenario must contain is a geographically conceptual community. The second is the obvious physical building; the third is the concentration of various groups of people in a specific group (such as race, social class, gender, education, occupation, and age); and the fourth is the characteristic activity connecting these elements. These all these elements come together to form the symbolism of the scene, the shared values. Regardless of who can participate, this is due to the public nature of the scene [14]. The aesthetic dimensions selected in the scene theory are shown in Table 1:

Table 1 clearly illustrates how more complex scenarios can be created and interpreted through the combination and empowerment of several different dimensions. The rows in the table represent the dimension of the scene, the columns represent the composite scene model, the numbers represent the weights, 5 is the highest score, and the features of various models are defined and distinguished by assigning various numbers. For example, the Disneyland model has a somewhat conventional and nonconventional nature of the scene from a weight distribution point of view.

Scenes include not only time and space in the physical sense, but also people's personal activities and personal emotions when receiving information. These elements combine to form scenes in the communicative sense, and these elements are summarized as scene 5 forces [15]. The scene 5 force, namely wearable devices, big data, sensors, social media and positioning systems, it is. The popularization of scientific and technological smart devices

Figure 2: Full-text organization.

Table 1: Aesthetic dimensions.

Project	Disneyland	Bohemia	Legal Samurai Gathering	Los Angeles flashy landmark	Reano box
Traditionalism	4.21	2.11	3.31	4.24	2.21
Self-expression	2.33	4.96	3.64	3.14	4.87
Utilitarianism	3.14	1.07	2.64	3.36	1.12
Race	3.67	2.64	4.36	2.64	3.24
Indigenous	4.17	3.65	3.17	4.12	3.37
Violations and crimes	1.23	4.13	2.24	3.27	3.68

has laid the foundation for the application of the scenario theory. It is almost impossible to achieve the effect of public awareness through a single communication method as before. Today's masses tend to be influenced by multiple media. In order to realize the accurate dissemination of national sports intangible cultural heritage for each user in a specific scenario and improve the development level of national sports intangible cultural heritage, it is necessary to use big data, 3D modeling, and other technologies to achieve this in the scenario.

Computer nonlinear vision: Before 3D modeling of cultural heritage, it is necessary to obtain the relevant element parameters of the modeled object, and this process can

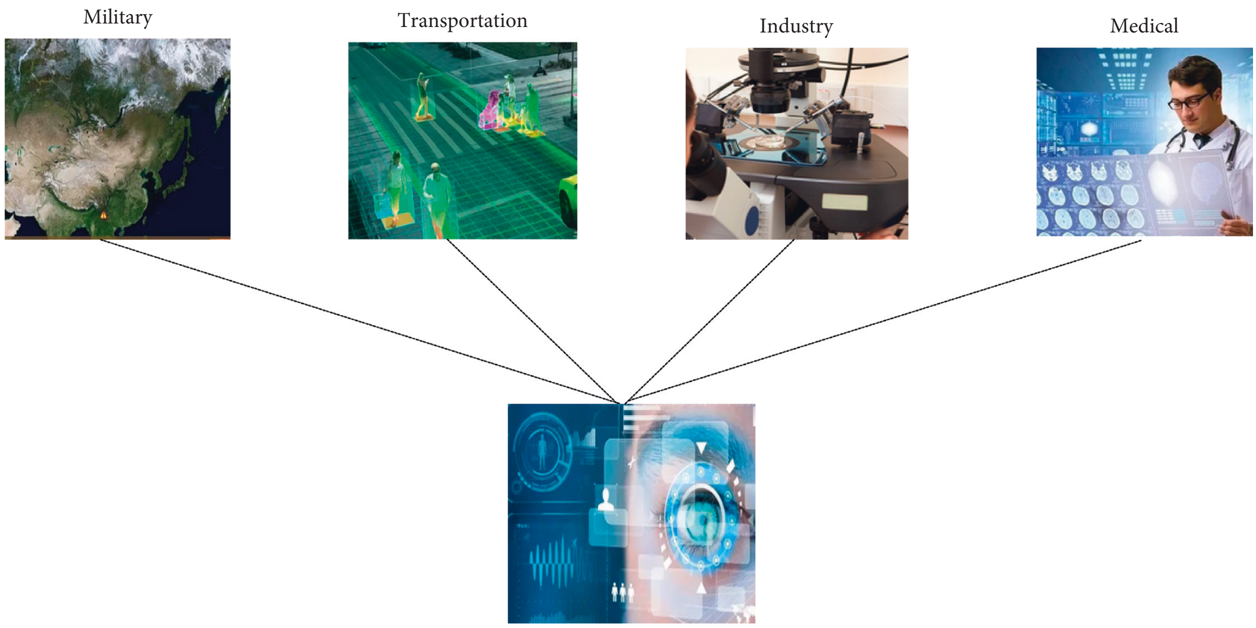

Figure 3: Computer nonlinear vision application areas.

be achieved through computer nonlinear vision. It is widely used in the fields of military defense, infrastructure construction, and scientific research and is known as the automated eye [16]. Computer vision has the advantages of high precision, strong continuity, low cost and high efficiency, and very flexible application scenarios. In general, it is faster and the process is simpler. Some of the results that have been achieved in computer nonlinear vision applications are shown in Figure 3.

As shown in Figure 3, computer nonlinear vision has been used in various aspects of various fields. For example, it is used in the military to automatically track and assist in capturing military targets, etc. Capture and detect the body and movement of pedestrians or vehicles in the field of traffic guards. The precise welding, cutting, and other processing processes of components and equipment in industrial production lines are very flexible and widely used.

For 3D modeling of cultural heritage, the acquisition and preprocessing of image data is very important. Due to the advantages of computer nonlinear vision, 3D modeling objects can be scanned accurately, thus laying the foundation for high-quality 3D modeling effects [17]. In this article, computer nonlinear vision technology is used to obtain 3D modeling parameters of national sports intangible cultural heritage to solve the problem of improving the integrity of 3D modeling objects.

The preprocessing of national sports intangible cultural heritage images is the first step we need to do. The purpose is to improve the visual effect of the image, improve the clarity of the image, and convert the image into a form more suitable for human or machine analysis and processing. The two-dimensional image preprocessing includes image smoothing filtering, contrast enhancement, and image feature extraction [18]. Errors and biases in preprocessing directly affect the accuracy of subsequent processing and decision-making. Precise preprocessing provides reliable input data for subsequent processing.

There are generally two types of image smoothing filtering: the spatial domain method and the frequency-domain method. The commonly used method for spatial image smoothing is the domain averaging method, it forms an image smoothed by the neighborhood averaging algorithm by replacing the original gray value of the pixel with the average of the gray values of the points near the pixel, and the image processed by this method can be expressed by the following equation:

$$t(z,x)=\frac{1}{X}\sum_{(i,j)\in S}\sum g'(i,j)=\frac{1}{X}\sum_{(i,j)\in S}\sum\left(g(i,tj)+\alpha(i,tj)\right), \tag{1}$$

where $\alpha(i,j)$ is white noise, $g\prime(i,j)=g(i,j)+\alpha(i,j)$ is an image with noise, S is a set of points, and X is the number of pixels.

For the noise component in the above formula, the mean and variance can be obtained as shown in the following formulas:

$$P\left\{\frac{1}{X}\sum\sum\alpha(i,j)\right\}=\frac{1}{X}\sum\sum P\{\alpha(i,j)\}=0, \tag{2}$$

$$\mathrm{F}\left\{\frac{1}{X}\sum\sum\alpha(i,j)\right\}=\frac{1}{F^2}\sum\sum F\{\alpha(i,j)\}=\frac{1}{X}\delta^2, \tag{3}$$

where P is the residual noise average result is 0 and F is the variance value, resulting in a drop, making the image distortion blurred.

Median filtering is a technique for dealing with image noise [19]. The median filter is a nonlinear image smoothing method, which is very sensitive to the impulse interference level of salt and pepper. The noise suppression effect is good, while suppressing random noise, it can effectively protect the edge from blurring, and the statistical characteristics of the image are not required in actual operation, so it is very convenient to use. Under some specific conditions, median filtering can overcome the blurring of image details caused by linear filtering and is the most effective for filtering out impulse interference and particle noise. Its mathematical description is shown in the following formula:

$$t_i = M\{x_{i=b}, x_{i-1}, x_i, x_{i+1}, \ldots, x_{i+b}\}, i \in Z, b = \frac{(k-1)}{2}, \tag{4}$$

where k is the number of elements removed in the one-dimensional sequence $x_1, x_2, \ldots, x_n$ and i is the center position.

The spatial low-pass filtering is implemented by convolution of the spatial filter impulse response matrix with the input image. The result is shown in the following formula:

$$t(z,x) = \sum_{m=0}^{L}\sum_{n=0}^{L} g\left(z + m - \frac{L}{2}, x + n - \frac{L}{2}\right) * c(m,n), \tag{5}$$

where $g(z,x)$ is the input image, which is a $M * N$-pixel array; $c(m,n)$ is the low-pass filtering impulse response, which is a $L * L$-dimensional array; and $t(z,x)$ is the low-pass filtering result.

Frequency-domain image smoothing: In a given national sports intangible cultural heritage image transformation, it can achieve smoothing by attenuating a certain range of high-frequency components in the frequency domain. This is due to the fact that at the gray level of the image, other sharp jumps such as edges and noise can greatly affect the high-frequency components of the Fourier transform. The process is shown in the following formula:

$$t(z,x) = C(z,x)M(z,x), \tag{6}$$

where $C(z,x)$ is a function, that is, a low-pass filter; and $M(z,x)$ is the Fourier transform of the target image.

Through the experimental test, the median filter has the best effect on the elimination of single noise. In this article, the nonlinear median filter is used for image smoothing.

The Roberts edge detection operator is based on the principle that the difference in any pair of mutually perpendicular directions can be regarded as an approximation method for finding the gradient, as shown in the following formula:

$$\begin{aligned} g_z &= g(i,j) - g(i+1, j+1), \\ g_x &= g(i+1, j) - g(i, j+1). \end{aligned} \tag{7}$$

Then, the gradient of the image point can be obtained as shown in the following formula:

$$t(i,j) \approx R(i,j) = \sqrt{g_z^2 + g_x^2}. \tag{8}$$

Its result is obtained by the interaction of two 2 * 2 templates, as shown in the following formula:

$$\begin{bmatrix} 1_* & 0 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}. \tag{9}$$

The effect of detecting horizontal and vertical edges is higher than that of slanted edges, the positioning is accurate, and it is sensitive to noise [20]. This is because of the use of diagonal edges in the edge detection process The difference between two adjacent pixels in the direction to estimate gradient amplitude and detect edges. In order to overcome the shortcomings of the above methods, a more accurate Laplacian operator for edge localization is proposed, and its digital image is shown in the following formula:

$$\begin{aligned} g(i,j) &= \Delta_z^2 g(i,j) + \Delta_x^2 g(i,j) \\ &= g(i+1,j) + g(i-1,j) \\ &\quad + g(i,j+1) + g(i,j-1) - 4g(i,j). \end{aligned} \tag{10}$$

Due to the influence of noise, Gaussian filtering is usually used to filter the above operators, and its function expression is shown in the following formula:

$$t(z,x,\delta) = \frac{1}{2\pi\delta^2}\exp\left(-\frac{z^2 + x^2}{2\delta^2}\right), \tag{11}$$

where δ is the filter variance. After filtering the image, a smooth image is obtained as shown in the following formula:

$$g_s(z,x) = g(z,x) * t(z,x,\delta). \tag{12}$$

Finally, the image obtained after the above operator processing is shown in the following formula:

$$\begin{aligned} T_s(z,x) &= \nabla^2 g_s(z,x) = \nabla^2[g(x,y) * t(z,x,\delta)] \\ &= \nabla^2[t(z,x,\delta)] * g(z,x). \end{aligned} \tag{13}$$

Among them, to use this operator to obtain a good detection effect, a larger window should be used.

The B-spline function is used to detect the corners of the image, and its expression is shown in the following formula:

$$B(l) = \sum_{i=0}^{n} K_i N_{i,k}(l), \tag{14}$$

where $N_{i,k}(l)$ is the harmonic function, and its definition is shown in the following formula:

$$\begin{aligned} N_{i,1}(l) &= \begin{Bmatrix} 1, c_i \le l \le c_{i+1} \\ 0, \text{other} \end{Bmatrix}, \\ N_{i,k}(l) &= \frac{(l - c_i)N_{i,k-1}(l)}{c_{i+k-1}} \\ &\quad + \frac{(c_{i+k} - l)N_{i+1,k-1}(l)}{c_{i+k} - c_{i+1}}(c_{k-1} \le l \le c_{n+1}), \end{aligned} \tag{15}$$

where c_i is the node value.

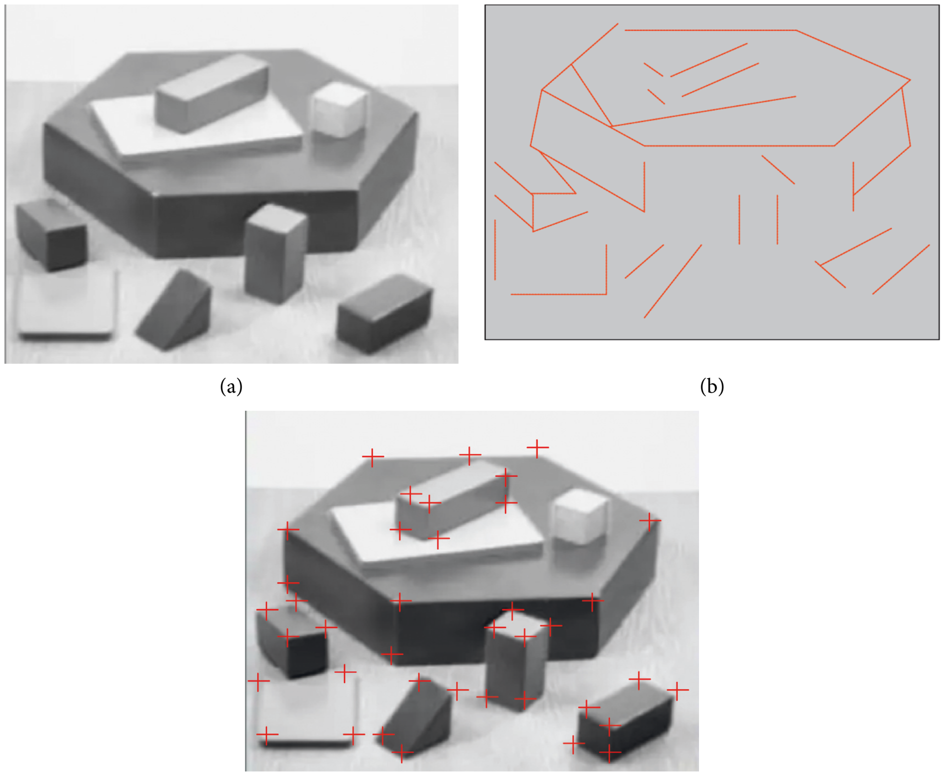

FIGURE 4: Corner detection results. (a) Original image. (b) Curve fitting results. (c) Corner detection results.

Using the above function for curve fitting can reduce the fitting error and improve the accuracy, and its parameter formula is shown in the following formula:

$$M(l) = \sum_{i=0}^{n} h_i N_{i,k}(l), \tag{16}$$

where h_i is the coordinate vector of the control point and $N_{i,k}(l)$ is the harmonic function.

Then, the corner points are detected by the maximum curvature, and the points on the curve are shown in the following formula:

$$Z = h_0(l)O_{i-1} + h_1(l)O_i + h_2(l)O_{i+1} + h_3(l)O_{i+2}. \tag{17}$$

Calculate the derivative separately and substitute it into the curvature formula to calculate the simplified curvature parameter as shown in the following formula:

$$Q(l) = \frac{v_0 l^4 + v_1 l^3 + v_2 l^2 + v_3 l + v_4}{\left[\left(4a_1 l^3 + 3b_1 l^2 + 2c_1 l + d_1\right)^2 + \left(4a_2 l^3 + 3b_2 l^2 + 2c_2 l + d_2\right)^2\right]^{3/2}}. \tag{18}$$

Through the above method, the curve fitting and corner detection experiments are carried out inthe figure, and the specific results are shown in Figure 4

As shown in Figure 4, accurate corner detection results can be obtained through the above methods.

This article uses feature clustering to extract and match features of ethnic sports intangible cultural heritage. The problem of the accuracy of feature point extraction is solved by the feature clustering algorithm. Feature point clustering can accurately extract and classify the feature points of 3D modeling objects scanned by computer nonlinear vision. The object feature points are shown in Figure 5.

In this article, accurate feature extraction is achieved by weighting the K-means algorithm. Its objective function is shown in the following formula:

$$T(L, O, P) = \sum_{t=1}^{k} \sum_{i=1}^{n} l_{it} \sum_{j=1}^{m} q_j^{\partial}\left(x_{ij} - otj\right)^2. \tag{19}$$

Among them, the constraints are shown in the following formula:

$$\sum_{j=1}^{m} q_j = 1. \tag{20}$$

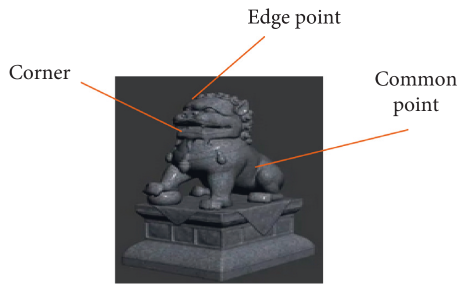

Figure 5: Schematic figure of feature points.

where q_j^{∂} is the added weight parameter. Its function is to calculate the sum of the weighted distances for each dimension while minimizing the distances in the entire cluster. That is, the influence of each dimension on the clustering results is adjusted by different weight values.

By solving the k-means algorithm with added weight parameters, the feature extraction and allocation parameters of the scanned object can be obtained, and then, feature matching can greatly improve the matching accuracy [21].

Through artificial intelligence computer nonlinear vision technology and feature clustering algorithm, the two-dimensional image of multiethnic sports intangible cultural heritage can be modeled in three dimensions. The three-dimensional reconstruction feature matching of ethnic traditional sports cultural heritage is shown in Figure 6.

As shown in Figure 6, the left and right images are obtained by camera calibration. Median filtering and corner detection are performed on the left and right images, respectively, and then, feature point matching is performed. The template images of different orientations of the precise lattice template are drawn, and then, the lattice is detected to calculate the homography matrix. After solving the internal parameters of the camera, the left and right images of the agreed target object are obtained. Then, calculate the essential matrix, obtain the projected matrix according to the internal and external parameters, and then, obtain the three-dimensional coordinates of the feature points. The algorithm matching results are shown in Table 2.

By combining AI computer nonlinear vision with feature clustering and 3D modeling, the problems of low image recognition accuracy and low matching degree in the modeling of national sports intangible cultural heritage can be well solved. The experiments and results are analyzed below.

3. Data Sources for the New Development Path of National Sports Intangible Cultural Heritage

The data sources of this article are mainly divided into two parts: questionnaire survey and experimental test. Through the issuance of questionnaires, information is collected and analyzed for the current development status of ethnic sports intangible cultural heritage and the current people's satisfaction with the development status of ethnic sports intangible cultural heritage as basic data for follow-up experiments. A total of 400 copies were collected, and 386 copies were recovered. The questions in the questionnaire are aimed at two aspects. One is the current understanding of people's traditional national sports culture. The specific content of the questionnaire is shown in Table 3.

This part of the questionnaire survey is aimed at the basic characteristics of the respondents and their understanding of the traditional national sports culture. The information mainly includes the gender, age, and occupation of the respondents, as well as the information about the national traditional sports culture that they do not know, have heard of, know a little about, or know very well about. And collected information on the national traditional sports and cultural activities of the respondents includes content information such as whether they like traditional sports, the number of sports activities, favorite sports, and the level of satisfaction with the current traditional sports culture.

According to the current questionnaire survey, this article developed a scoring table for the development of national sports intangible cultural heritage through collective discussion of the expert group to score and compare the satisfaction before and after the experiment. The content and examples of the scoring table are shown in Table 4.

Among them, the set scoring items are watchability, interactivity, inheritance, dissemination scope, and overall comprehensive evaluation. The scoring scale for the development of national sports intangible cultural heritage adopts a 5-point system; the higher the score, the better the score, the more satisfied, and the lower the score, the more dissatisfied.

The performance data are collected by testing various performance indicators of the 3D modeling method for the intangible cultural heritage of national sports. The specific test content is shown in Table 5.

This article evaluates the method performance by evaluating the scene transfer time, corner recognition efficiency, running time, and object modeling error rate of different 3D modeling methods.

4. Results and Discussion of the New Development Path of National Sports Intangible Cultural Heritage

4.1. Comprehensive Performance of Environmental Transmission and Computing Time in Different Scenarios. In this article, the comprehensive performance of the 3D modeling

Figure 6: Feature matching of 3D modeling of national sports intangible cultural heritage.

Table 2: Partially matched point coordinate values.

Left image coordinates	Right image coordinates	Left image coordinates	Right image coordinates
134,136	145,158	145,136	146,153
234,86	233,85	346,117	351,121
253,76	249,71	185,124	181,127
278,97	263,101	196,28	189,34
314,67	342,63	357,69	359,66
462,175	473,168	237,151	241,148

Table 3: Some examples of the questionnaire survey content.

Project	Person 1	Person 2	Person 3
Gender	Male	Female	Male
Age	34	21	61
Profession	Teacher	Student	Retired worker
Knowledge of traditional sports	Do not know much	Learn some	Know very well
Do you like traditional sports？	Yes	Yes	Yes
Participation in traditional sports	21	14	5
Favorite sports	Tai chi	Lion dance	Folk dance
Are you satisfied with the current spread of traditional sports culture?	Not so satisfied	Pretty satisfied	Not so satisfied

Table 4: Example of satisfaction evaluation form.

Project	Person 1	Person 2	Person 3
Inheritance	2.21	3.27	3.54
Viewability	1.95	3.13	3.53
Interactivity	2.24	3.56	2.76
Propaganda scope	2.33	3.14	3.57
Overview	2.17	3.37	3.68

Table 5: Test part sample situation.

Index	Sample 1	Sample 2	Sample 3
Transmission time	914	1245	1745
Number of corners	1424	7442	10211
Execution time	72.14	123.31	184.26
Match success rate	0.984	0.748	0.826

method for different scene environment transmission and calculation time is tested, and the specific results are shown in Figure 7.

As shown in Figure 7, through the comparison of scene transmission of different scene scales, it can be found that the data transmission amount and the waiting time of a complete scene increase linearly with the scale of the scene. The latency for conceptual scene transfer remains largely unchanged. Because the amount of structured data for conceptualization scenes increases very little as the size of the scene increases, only an increase in its model ID, no order of magnitude difference occurs. But the transfer latency of conceptualized scenarios does not stay the same either. The data volume and transfer time of a conceptualized scene are related to the number of nodes it contains. As can be seen in Figure 7(b), the waiting time

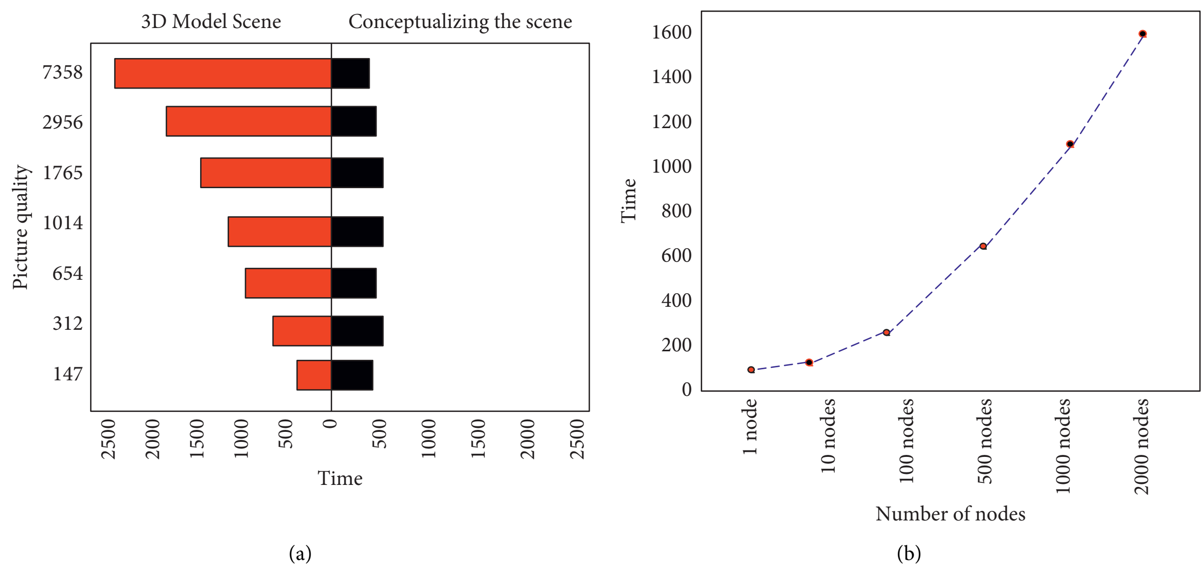

FIGURE 7: Comprehensive performance of scene environment transfer and computation time. (a) Comparison of transmitted 3D overall scene and concept scene. (b) The relationship between the number of nodes and the network delay.

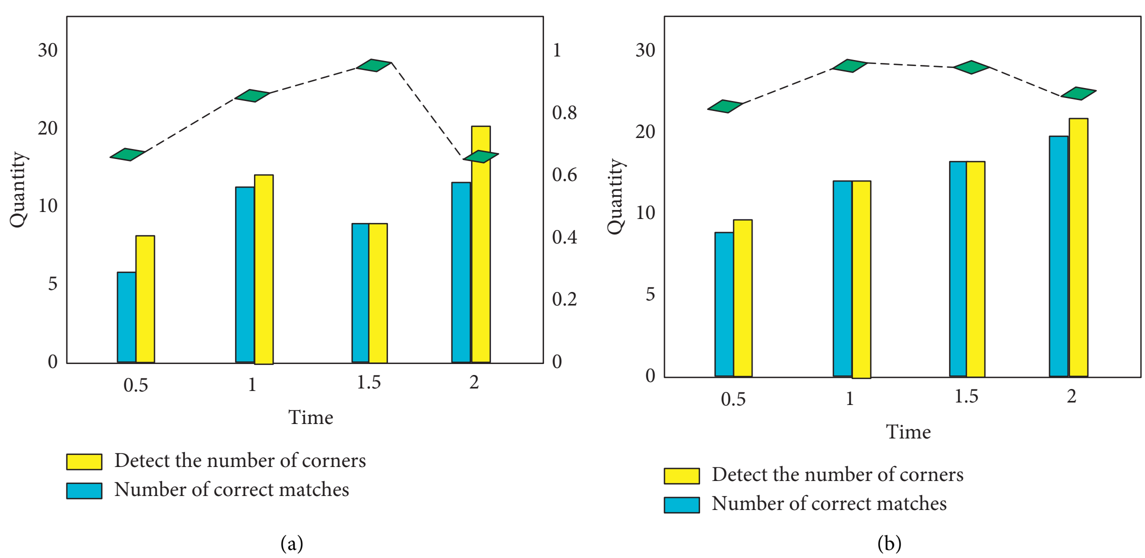

FIGURE 8: Corner detection and matching performance of different methods. (a) Traditional algorithm results. (b) The results of the algorithm in this article.

increases linearly with the number of nodes in the entire conceptualized scene. Of course, even if the number of nodes reaches 2000, the waiting time does not exceed 2 s, and the actual size of the scene at this time is already very large. A node is likely to refer to a model with a scale of 1 m. In addition, the figure also illustrates another result; that is, when the number of nodes increases, the processing time of the system logic algorithm does not increase significantly, which is still consistent with the increase in the amount of data transmission. This convinces people that the system's logic algorithms, including scene synthesis and scene assembly, can provide better processing power for large enough scenes.

4.2. Corner Detection and Matching Performance of Different Methods. This article tests the corner detection and matching results of ethnic sports intangible cultural heritage images using different methods, and the specific content of the results is shown in Figure 8.

As shown in Figure 8, it can be seen that the number of corner points detected and matched by the corner detection method in this article per unit time is higher than that of the traditional algorithm. On the 2 s time node, the traditional algorithm detected 23 corner points, 18 were successfully matched, and the matching was successful, and the rate was 78.3%. While the number of corner detections using this method is 26, 22 are successfully matched, and the matching

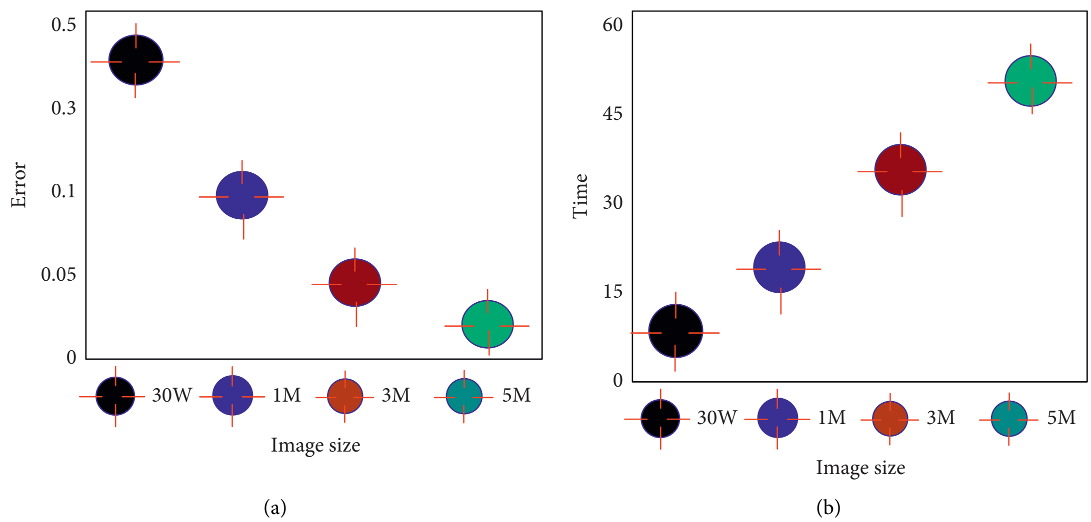

Figure 9: 3D modeling effects of different methods. (a) Errors of figures of different sizes. (b) Running time of images of different sizes.

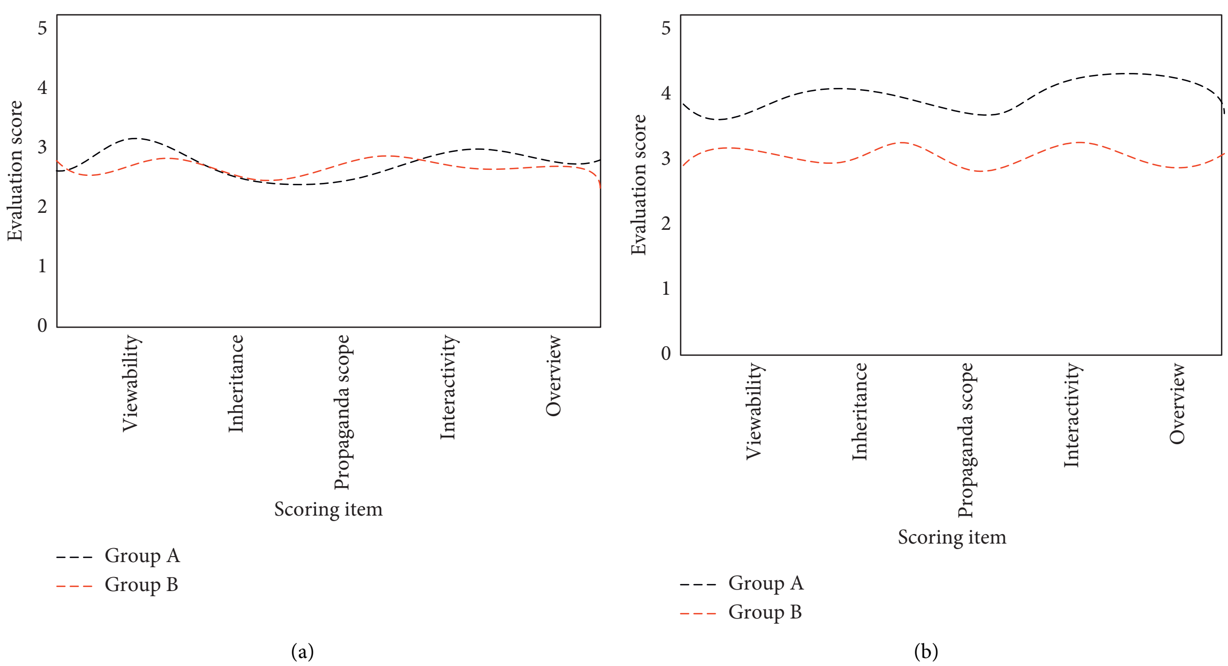

Figure 10: Comparison of satisfaction before and after the experiment. (a) Satisfaction evaluation before the experiment. (b) Post-experiment satisfaction evaluation.

success rate is 84.6%, which is 6.3% higher than the former. It can be seen that the corner detection method in this article not only reduces the time consumption, but also improves the accuracy.

4.3. Comparison Experiment of Different 3D Modeling Methods. This article will compare the modeling error effect of the 3D modeling method in this article and the traditional method through images of different sizes. The specific results are shown in Figure 9.

As shown in Figure 9, the 3D modeling method proposed in this article is better than the traditional method in terms of modeling error. When the pixels of the figure gradually become larger, the modeling error gradually decreases, so that the image becomes clearer visually. However, as the image pixels become larger, the computation time also increases. It can be seen from the comparison that the error rate of the method in this article is reduced by 0.124 compared with the traditional method, and the image modeling effect is relatively good.

4.4. Comparison of Satisfaction before and after the Experiment. In this article, after the performance test of the 3D modeling method is completed, an experimental analysis is carried out on the satisfaction of the development effect of the intangible cultural heritage of national sports. By experiencing different cultural activities in groups A and B, group A carried out the experience education activities of national sports intangible cultural heritage using 3D modeling, and group B carried out traditional speech-style national sports intangible cultural heritage activities. The two groups were carried out at the same time for 1 hour. At the end of the activity, the testers were collected for satisfaction evaluation and a comparative analysis of the satisfaction before and after the experiment was carried out. The specific results are shown in Figure 10.

From Figure 10, it can be seen that the satisfaction of residents who have experienced different activities before and after the experiment has improved. However, the residents who have experienced the activities of 3D modeling have significantly improved their satisfaction with the current development of national sports intangible cultural heritage. Before the experiment, the residents' satisfaction with each index fluctuated around 2.77 points on average. After the experiment, the overall satisfaction of group A increased by 56.7%, and the average score could reach 4.34 points. And the satisfaction items are mainly focused on the interactivity and viewability brought by this form of 3D modeling. It can be seen that the 3D modeling of national sports intangible cultural heritage based on the environmental perspective can well meet people's needs for cultural appreciation and is conducive to its development.

5. Conclusion

Technological innovation drives the innovation of cultural heritage development, and the public's demand for cultural heritage development is getting higher and higher. The development of national sports intangible cultural heritage is inseparable from the contribution of 3D modeling technology. The scene theory has been applied in 3D modeling because of its social publicity advantages. Through comprehensive experimental tests, it can be seen that the 3D reconstruction method based on the scene theory perspective is superior to the traditional method in each performance. Through the analysis of the comprehensive performance of its environment transmission and computing time, the data transmission volume and waiting time of the complete scene can be obtained as a linear growth relationship with the increase of the scene scale, which can provide better processing capacity for large enough scenes. Through the corner detection and matching performance tests of different methods, it is found that the corner detection using this method reduces the time consumption and improves the accuracy. The matching success rate is 84.6%, which is 6.3% higher than the former. Compared with the traditional method, the error rate of the method in this article is reduced by 0.124, and the effect is excellent. Through the comparison of satisfaction before and after the experiment, it was found that the overall satisfaction of group A increased by 56.7.5% after the experiment, and the satisfaction items mainly focused on the interactivity and viewability brought by this form of 3D modeling. This improved 3D modeling method for national sports intangible cultural heritage can meet the needs of promotion and development. Of course, in the process of conducting experiments, there are factors such as unstable use environment, differences in operators, and uncertainties such as use time and frequency. The results of this experiment are not completely accurate and reliable, and there may be some differences.

Data Availability

The data used to support the findings of this study can be obtained from the author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest regarding the publication of this article.

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