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THE APPLICATION OF DIGITAL TECHNOLOGY IN THE PROTECTION OF ANCIENT SPORTS HISTORICAL MATERIALS AND THE INHERITANCE OF SPORTS SPIRIT

Zhencheng Zhao

[1] Northeast Normal University, School of History and Culture, Changchun, Jilin Province, 130024, China.
E-mail: zhaozzc419@126.com

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ABSTRACT

This study explores the crucial role of information technology in the preservation of sports history and the transmission of traditional sports values, using the 3D modeling of an ancient cuju goal as a case study. By leveraging advanced digital tools like 3ds Max and V-Ray, we accurately reconstructed the cuju goal, a significant artifact from the Tang and Song dynasties, based on historical documents and images. The research highlights the process of digitally preserving detailed structural and decorative elements, ensuring the longevity and accessibility of cultural heritage. The model's historical accuracy and usability were rigorously evaluated through expert reviews and user experience assessments. Experts confirmed the model's fidelity to historical sources, while users, including educators and students, recognized its value in educational settings. The study emphasizes how digital modeling not only safeguards historical artifacts but also plays a vital role in conveying the spirit of traditional sports to future generations. The successful integration of user feedback and technological tools in this project demonstrates the potential of information technology to enhance cultural preservation and educational outreach.

KEYWORDS: Information technology, Cultural heritage preservation, Sports history, Digital preservation, Traditional sports values

1. INTRODUCTION

In the modern era of globalization and cultural diversification, the

preservation and promotion of traditional cultures face both unprecedented challenges and opportunities. This is particularly true for China's traditional sports culture, which is a vital component of the nation's rich cultural heritage (Xu, 2006). With the influx of Western sports culture and values, the space for the survival and development of traditional Chinese sports has been significantly compressed (Zheng, 2015). However, these challenges also present unique opportunities for the revitalization and modern development of this heritage. The application of digital technology in the preservation of ancient sports historical records and the transmission of the associated sports spirit is one such opportunity that offers the potential to bridge the gap between tradition and modernity. Traditional Chinese sports culture is deeply rooted in the country's history and social development, with its origins closely linked to the social and geographical conditions of ancient China (Zuo et al., 2023). Developed under the feudal system, traditional sports practices were often influenced by Confucian ethical teachings, which emphasized personal cultivation, moral integrity, and social harmony. These values manifested in sports that prioritized inner balance and holistic health, often reflecting principles of moderation, balance, and the integration of physical and mental well-being. For example, martial arts, Qigong, and Go are all sports that embody these principles. As shown in F1gure 1, unlike modern competitive sports, traditional Chinese sports were not primarily focused on competition but rather on achieving harmony and balance, both internally and with others (Hong & Hua, 2002; Young, 2023).

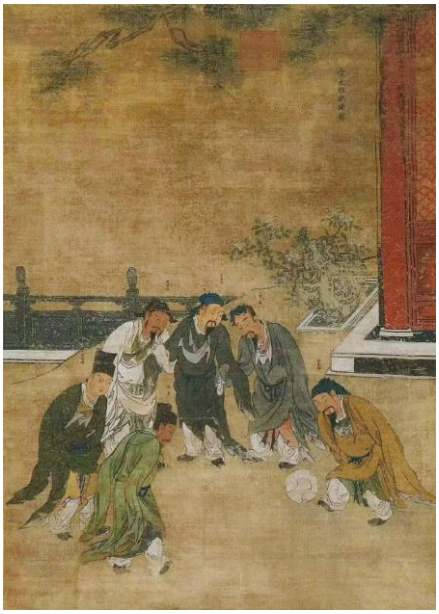

Figure 1: The Emphasis on Harmony and Balance in Traditional Chinese Sports, Exemplified by Cuju

As China advances in the global arena, the preservation and promotion of its traditional sports culture have become critical. The Chinese government

has placed significant emphasis on the revival of Chinese civilization, advocating for the inheritance and development of traditional culture, including sports (Ma & Liu, 2017). However, the modern societal development process, characterized by rapid industrialization and urbanization, has seen a gradual decline in the public's engagement with traditional sports. Western sports, with their emphasis on competitiveness and physical prowess, have become dominant, particularly in educational institutions where they are often prioritized over traditional practices (Beyer & Hannah, 2000). In response to these challenges, it is crucial to explore ways to integrate traditional Chinese sports culture into contemporary society. One effective approach is through the use of digital technology, which offers innovative methods for the preservation, dissemination, and revitalization of traditional sports culture (Ajani et al., 2024). Digital technology not only provides tools for the documentation and protection of ancient sports artifacts but also offers platforms for the transmission of the associated sports spirit to future generations. This integration of technology and tradition can ensure that the essence of traditional Chinese sports culture is preserved while also allowing it to evolve and remain relevant in the modern world. The preservation of ancient sports artifacts and historical records is an area where digital technology can have a profound impact (Stanco et al., 2011). Ancient sports murals, for example, provide valuable insights into the sports practices and cultural values of past civilizations. These murals, found in various locations such as palace walls, tombs, temples, and grottoes, depict a wide range of sports activities, from archery and swimming to ball games and martial arts. However, these artifacts are often vulnerable to deterioration due to environmental factors, human activity, and the passage of time. Digital preservation techniques, such as 3D scanning, digital imaging, and database management, offer a way to protect these invaluable cultural assets from further decay. By creating digital replicas of ancient sports artifacts, we can ensure that they are preserved for future generations, while also making them accessible to a global audience (Hutson, 2024). Furthermore, digital technology can play a crucial role in the transmission of the sports spirit embedded in traditional Chinese culture (Tang, 2024). Virtual reality (VR) and augmented reality (AR) technologies, for example, can be used to recreate ancient sports activities, allowing people to experience them in a more immersive and interactive way. These technologies can bring ancient sports practices to life, making them more engaging and accessible to modern audiences, especially the younger generation. Through digital exhibitions and online platforms, traditional sports culture can be disseminated more widely, reaching audiences that might not have been exposed to it otherwise. The application of digital technology in education also holds significant potential for the transmission of traditional sports culture. Digital tools can be used to develop educational resources that teach the principles and values underlying traditional Chinese sports (Dyson et al., 2022). By integrating these resources into school curriculums and extracurricular activities, students can gain a deeper understanding and

appreciation of their cultural heritage. Moreover, digital platforms can facilitate the creation of virtual communities where people can share their experiences and knowledge of traditional sports, further promoting the transmission of this culture. However, the integration of digital technology into the preservation and promotion of traditional sports culture is not without challenges (Du, 2024). One of the main challenges is the technical and financial resources required for the implementation of digital preservation projects. The digitization of ancient sports artifacts and historical records can be a costly and time-consuming process, requiring specialized equipment and expertise. Additionally, there is the challenge of ensuring that the digital replicas accurately capture the essence and details of the original artifacts, which is crucial for their cultural and historical significance to be preserved (Gems et al., 2022). Another challenge is the need to balance the preservation of traditional culture with its modernization. While digital technology offers many benefits, there is a risk that the commercialization and commodification of traditional culture could lead to a loss of its authenticity and original value. It is important to approach the digitization and dissemination of traditional sports culture with a deep respect for its cultural significance, ensuring that its core values are not compromised in the process (Zhang, 2023). In conclusion, the preservation and transmission of traditional Chinese sports culture in the modern era require a multifaceted approach that combines the strengths of digital technology with a deep understanding of cultural heritage. Digital technology offers innovative solutions for the preservation of ancient sports artifacts and historical records, as well as new ways to engage modern audiences with traditional sports practices and values (Wang & Liu, 2022). However, it is important to approach this integration with a clear understanding of the challenges and potential pitfalls, ensuring that the essence of traditional sports culture is preserved while also allowing it to evolve and remain relevant in the modern world. Through careful planning and collaboration between cultural heritage professionals, technologists, and educators, it is possible to create a sustainable model for the preservation and promotion of traditional Chinese sports culture in the digital age (Mandell, 1984).

2. Methodology

The methodology of this study centers on 3D modeling, using 3ds Max software to construct a three-dimensional model of an ancient cuju goal. The process includes analyzing historical documents and images, followed by model rendering and experimental evaluation. This section provides a detailed description of this process and the tools and techniques employed.

2.1 Collection and Analysis of Research Materials

To accurately recreate the cuju goal from the Tang and Song dynasties, this study first referenced relevant historical documents and images. For instance, the diagram in Figure 2, taken from the Cuju Atlas, clearly illustrates

the design and layout details of the goal used during that period. The diagram includes specific measurements for various parts of the goal, providing crucial reference information for the modeling process. Additionally, historical texts such as Taiping Guangji and Song Shi (History of the Song) offer detailed descriptions of the cuju goal, ensuring the model's design is historically accurate.

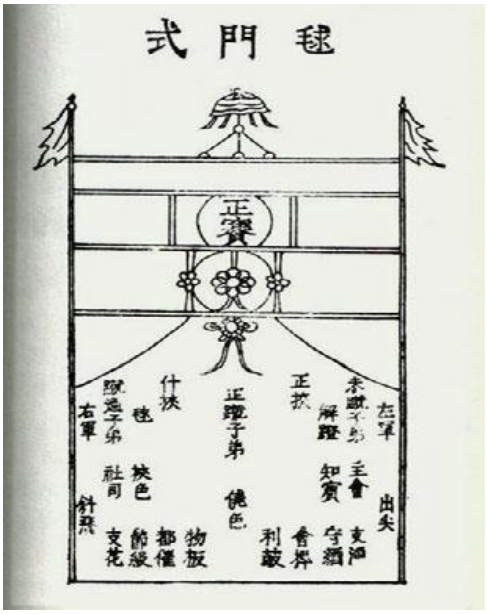

Figure 2: Goal Structure from the Cuju Diagram in the Cuju Atlas

After collecting and analyzing the size details marked in historical images, the researchers cross-referenced these with the descriptions in the literature to accurately calculate the dimensions of the cuju goal. According to the measurements noted in the diagram, the cuju goal typically consisted of two bamboo poles several meters high, with a net strung between them. The upper part of the net featured a hole, known as the "Windy Eye," which served as the goal target area. The diagram specifies the overall height of the goal, the diameter of the net opening, and the distance between the bamboo poles. These precise data points provide a solid foundation for the 3D modeling process, ensuring that the model faithfully replicates the structure and function of the cuju goal from the Tang and Song dynasties. By analyzing and measuring historical documents and image data, detailed dimensions and structural information were obtained, enabling the accurate construction of a model that reflects the authentic appearance of the cuju goal as it existed during the Tang and Song periods.

2.2 Modeling Software

The primary software used for this study is 3ds Max, chosen for its robust capabilities in polygonal modeling, material handling, and rendering. 3ds Max is well-suited for recreating complex architectural structures and intricate

decorative details, making it ideal for the detailed reconstruction required in this project. To enhance the modeling process, several auxiliary tools and plugins were utilized:

Unwrap UVW Tool: This tool is essential for creating accurate UV maps, which allow for precise application of textures across the 3D surfaces. Proper UV mapping ensures that textures are not distorted or stretched when applied to the model.

Material Editor: The built-in Material Editor in 3ds Max was employed to define the material properties of different model components. This tool enables the realistic representation of various materials, such as wood, metal, and lacquer.

V-Ray Renderer: V-Ray was selected for its ability to produce high-quality renders with realistic lighting and material effects. It was particularly useful for achieving the final visual output, enhancing the realism of the model.

2.3 Modeling Process

The cuju goal structure was carefully analyzed and decomposed into its fundamental components to facilitate the modeling process: (1)The main elements, including vertical pillars, horizontal beams, and the base, were identified as the foundational parts of the model. (2) These include the ornate carvings, tassels, and other decorative features found on the goal. Each component was modeled separately to ensure high precision. The basic structure of the cuju goal was constructed using geometric primitives such as Box and Cylinder tools in 3ds Max. The vertical pillars and horizontal beams were created using the Box tool, while the circular elements at the top and bottom of the pillars were modeled using the Cylinder tool. The initial shapes were refined using the Editable Poly function, which allowed for adjustments such as stretching, scaling, and performing Boolean operations to achieve the desired historical accuracy. Boolean operations were particularly useful for subtracting or merging different parts to create complex shapes. The Bezier tool in 3ds Max was used to draw the intricate curves required for the tassels and floral patterns on the goal. Bezier curves are ideal for creating complex, smooth shapes, which are essential for detailed ornamental work. The 2D curves created with the Bezier tool were extruded into 3D forms, allowing for the creation of the detailed carvings that adorn the goal. To ensure symmetry, the Mirror tool was utilized to duplicate the decorations from one side of the goal to the other, maintaining consistency in the design. Different geometric shapes were combined using Boolean operations. For instance, the horizontal beams and vertical pillars were merged to create a cohesive structure, ensuring that all parts of the model were accurately connected. The Attach function was used to combine multiple decorative elements and the structural framework into a

single object, facilitating the application of textures and materials in later stages.

2.4 Detail and Material

The Unwrap UVW tool was employed to create UV maps for the 3D surfaces, which allowed for precise application of textures. Accurate UV mapping is critical to avoid texture stretching or distortion. Adobe Photoshop was used to create custom texture maps, including wood grain patterns, metal engravings, and lacquer finishes. These textures were imported into 3ds Max and applied to the model using the UV maps. In 3ds Max, the Material Editor was used to assign materials to different parts of the model. For instance, a wood material was applied to the structural framework, while metallic and lacquer finishes were used for decorative elements. Parameters such as Reflectivity and Glossiness were adjusted to achieve realistic reflections and highlights. Bump maps were added to enhance the realism of the materials by simulating surface texture irregularities, such as the raised grain of wood or the intricate details of metalwork.

2.5 Lighting and Rendering

Spotlight was used to simulate direct sunlight, casting sharp shadows, while Area Light provided ambient lighting to ensure even illumination across the model. The angles, intensity, and shadow settings were fine-tuned to highlight the model's three-dimensionality and bring out the details in the textures and materials. V-Ray was used as the rendering engine, configured to include global illumination (GI), reflection, and refraction effects, enhancing the realism of the final images. Render resolution and anti-aliasing settings were optimized to ensure high-quality output, with sharp details and smooth gradients. By following this detailed methodology, the study ensured the creation of a 3D model of the cuju goal that is both historically accurate and visually compelling, serving as a valuable tool for cultural preservation and education.

Figure 3: Schematic Diagram of the 3D Model of a Cuju Goal

3. 3D Modeling Evaluation

This section presents a comprehensive evaluation of the 3D modeling process for the ancient cuju goal, including the construction of the model, rendering effects, and the outcomes of expert and user evaluations. The findings are discussed in terms of their alignment with historical documentation, user experience, and potential applications in cultural preservation and education.

3.1 Model Construction Evaluation

The 3D model of the cuju goal was meticulously constructed using 3ds Max, following historical images and textual descriptions. The final model was assessed for its accuracy in reflecting the design and structure of the cuju goal as used during the Tang and Song dynasties. The cuju goal model consists of key components such as two vertical bamboo poles, a horizontal crossbeam, a net with an opening (known as the "Windy Eye"), and various decorative elements like tassels and carvings. These components were carefully modeled to match historical records and images. For example, the vertical poles were modeled with a slight taper towards the top, reflecting the construction techniques of the time. The crossbeam was adorned with intricate carvings created using the Bezier curve and Extrude functions in 3ds Max. The net was modeled using a grid pattern with the "Windy Eye" positioned centrally, as specified in historical diagrams. Particular attention was given to the decorative elements of the cuju goal to ensure historical authenticity. These details include floral patterns, tassels, and other ornamental features typical of the period. The Bezier tool was instrumental in creating these complex shapes, which were then extruded and mirrored to maintain symmetry. The carvings on the crossbeam and vertical poles were based on motifs commonly found in Tang and Song dynasty architecture, ensuring that the model accurately reflects the aesthetic sensibilities of the time. The functional aspects of the cuju goal, such as the net and the "Windy Eye," were also modeled with precision. The net was designed with a texture that mimics the materials historically used, such as hemp or silk. The "Windy Eye" was positioned according to historical specifications, ensuring that the model is both visually accurate and functional in a virtual simulation of the game.

3.2 Rendering Effects Evaluation

After constructing the model, it was rendered using V-Ray in 3ds Max to produce high-quality images that capture the details and textures of the model in a realistic lighting environment. The lighting setup was crucial in highlighting the details of the model. A combination of Spotlight and Area Light was used to simulate natural sunlight and ambient lighting, creating realistic shadows and highlights on the model. The V-Ray renderer was configured to handle global

illumination, reflection, and refraction effects, enhancing the realism of the rendered images. Shadows cast by the vertical poles and crossbeam were sharp and well-defined, adding depth to the overall scene.The materials applied to the model were rendered with high fidelity, showcasing textures in great detail. The wood grain of the vertical poles and crossbeam was particularly well-represented, with bump mapping used to simulate the natural irregularities of the wood surface. The metal and lacquer finish on the decorative elements reflected light in a way that closely mimics real-world materials. The net, with its fine grid pattern, was rendered with transparency and translucency effects, giving it a delicate and realistic appearance. The final rendered images of the cuju goal were produced at high resolution, with careful attention to anti-aliasing and detail preservation. These images not only serve as visual representations of the model but also as educational tools that can illustrate the design and function of historical cuju goals.

3.3 Expert and User Evaluation

Following the construction and rendering of the model, an evaluation was conducted to assess its historical accuracy, visual quality, and user experience. This evaluation involved two groups: experts in cultural heritage and 3D modeling, and general users, including educators and students.

3.3.1 Expert Review

The expert review provided critical insights into the model's fidelity to historical sources and its technical execution, as shown in Table 1.

Table 1: Expert Evaluation Scores (Scale: 1-5)

EVALUATION CRITERIA	EXPERT 1	EXPERT 2	EXPERT 3	EXPERT 4	AVERAGE SCORE
HISTORICAL ACCURACY	5	4.5	5	4.5	4.75
STRUCTURAL AND DECORATIVE DETAILS	4.5	4.5	5	4	4.5
MATERIAL REALISM	4.5	5	4	4.5	4.5
TECHNICAL EXECUTION	5	4	4.5	4.5	4.5

This table presents the average scores given by experts for various evaluation criteria. The scores indicate a high level of satisfaction with the model's historical accuracy and material realism. The average score for Historical Accuracy was 4.75, indicating strong agreement among experts

about the model's fidelity to historical sources. Structural and Decorative Details received an average score of 4.5, with some experts suggesting minor improvements in decorative elements. Material Realism and Technical Execution both received average scores of 4.5, highlighting the model's effective use of textures and efficient polygon management.

3.3.2 User Experience Evaluation

The user experience evaluation focused on how general users interacted with the model and their perceptions of its educational value, as shown in Table 2.

Table 2: User Evaluation Scores (Scale: 1-5)

EVALUATION CRITERIA	USER GROUP A (EDUCATORS)	USER GROUP B (STUDENTS)	AVERAGE SCORE
VISUAL APPEAL	4.8	4.5	4.65
USABILITY AND INTERACTION	4.2	4	4.1
IMMERSION	4.7	4.6	4.65
EDUCATIONAL VALUE	4.9	4.7	4.8

Table 3 summarizes the feedback from two user groups: educators and students. The scores reflect high satisfaction with the visual appeal and educational value of the model. Visual Appeal received an overall average score of 4.65, with educators giving slightly higher scores than students, possibly reflecting their appreciation of the model's historical context. Usability and Interaction scored 4.1 on average, with feedback indicating a need for slight improvements in interaction smoothness, especially in virtual reality settings. The high score of 4.65 for Immersion indicates that users felt deeply engaged with the model, particularly when using VR. Educational Value scored the highest, at 4.8, underscoring the model's effectiveness as a teaching tool.

Table 3: Summary of Qualitative Feedback

FEEDBACK THEME	COMMENTS FROM EXPERTS	COMMENTS FROM USERS
TEXTURE REALISM	"Textures are highly realistic, particularly the wood grain."	"The details on the wood and metal are very lifelike."
STRUCTURAL ACCURACY	"The model accurately reflects historical design."	"The goal's structure is impressive and seems very authentic."
USABILITY IN VIRTUAL REALITY	"Performance in VR is good but could be smoother."	"Interactivity is great, but there were some minor lags."
EDUCATIONAL APPLICATION POTENTIAL	"This model could serve as an excellent educational resource."	"I would love to use this in a classroom setting."

Both experts and users praised the model's texture realism and structural accuracy. Users noted the model's potential as an educational tool, with suggestions to incorporate it into virtual or classroom settings. Feedback on VR usability indicated that while the model was generally well-received, there is room for improvement in interaction smoothness. These tables provide a clear, quantitative overview of the evaluation results, complemented by qualitative insights from both experts and users. This structured approach helps in identifying strengths and areas for further refinement in the 3D modeling process. Quantitative data from user surveys were analyzed to determine overall satisfaction levels and identify areas for improvement. The results showed high satisfaction scores across all categories, with visual appeal and historical accuracy receiving the highest ratings. Qualitative data from interviews and expert feedback were analyzed thematically, with common themes including the importance of texture realism and the model's educational potential.

4. Model Optimization and Adjustments

Based on feedback from the evaluation phase, several adjustments were made to the model to enhance its accuracy and performance. The texture of the net was refined to better represent historical materials. Adjustments were made to the transparency and translucency settings in the Material Editor, and a more detailed texture map was created in Photoshop and applied to the model. The wood grain texture on the vertical poles and crossbeam was also enhanced with additional bump mapping to increase depth and realism. To improve the model’s performance in interactive environments, particularly in virtual reality, the polygon count was optimized without sacrificing detail. This was achieved by reducing the complexity of some decorative elements and simplifying geometry in non-critical areas. The lighting setup was also adjusted to reduce render times and improve frame rates during real-time interaction. After adjustments were made, the model underwent a final round of evaluation with both experts and users. The results indicated that the refinements successfully addressed the initial evaluation concerns. Texture improvements were particularly well-received, with users noting a more realistic and immersive experience. Performance in virtual reality was also significantly improved, with smoother interaction and faster load times.

5. Conclusion

The final 3D model of the cuju goal represents a successful integration of historical research, advanced 3D modeling techniques, and user-centered design. Positive feedback from both experts and users highlights the model’s accuracy and potential as an educational tool. The model’s fidelity to historical sources makes it a valuable asset for cultural preservation. By accurately reconstructing the cuju goal, this project contributes to the documentation and

dissemination of ancient Chinese sports practices. Detailed rendering of the goal's structure and decorations provides a visual reference that can be used in educational materials and exhibitions. The model's high level of detail and realism makes it an effective tool for teaching about ancient Chinese culture. In a classroom setting, the model can be used to engage students in discussions about historical sports, architecture, and societal values during the Tang and Song dynasties. The interactive nature of the model, particularly in a virtual reality environment, allows for a more immersive learning experience, making historical education more accessible and engaging. The use of 3ds Max, combined with tools like the Material Editor, Unwrap UVW, and V-Ray, demonstrates the potential of modern technology to recreate complex historical artifacts. The successful application of these tools in this project showcases how digital modeling can be used to preserve and promote cultural heritage. The iterative process of modeling, evaluation, and refinement highlights the importance of user feedback in developing effective educational tools. While the model was well-received, there are limitations to consider. The model's reliance on historical texts and images means that any inaccuracies in these sources could be reflected in the model. Additionally, while the model was optimized for virtual reality, further improvements could be made to enhance performance on lower-end devices. Future work could explore integrating this model into larger virtual environments, where users can experience a full cuju match in a historically accurate setting. In conclusion, the 3D model of the cuju goal not only serves as a faithful representation of an ancient sports artifact but also as a powerful tool for education and cultural preservation. The successful application of 3ds Max and related tools demonstrates the potential of digital modeling in bridging the gap between history and modern technology, providing new ways to explore and understand cultural heritage.

Reference

Ajani, Y. A., Oladokun, B. D., Olarongbe, S. A., Amaechi, M. N., Rabiu, N., & Bashorun, M. T. (2024). Revitalizing Indigenous Knowledge Systems via Digital Media Technologies for Sustainability of Indigenous Languages. *Preservation, Digital Technology & Culture*, *53*(1), 35-44.

Beyer, J. M., & Hannah, D. R. (2000). The cultural significance of athletics in US higher education. *Journal of Sport Management*, *14*(2), 105-132.

Du, R. (2024). The Protection of Sports Intangible Cultural Heritage in Western China From the Perspective of Information Technology.

Dyson, B., Shen, Y., Xiong, W., & Dang, L. (2022). How cooperative learning is conceptualized and implemented in Chinese physical education: A systematic review of literature. *ECNU Review of Education*, *5*(1), 185-206.

Gems, G. R., Borish, L. J., & Pfister, G. (2022). *Sports in American history: From colonization to globalization*. Human Kinetics.

Hong, F., & Hua, T. (2002). Sport in China: Conflict between tradition and

modernity, 1840s to 1930s. *The International Journal of the History of Sport*, *19*(2-3), 189-212.

Hutson, J. (2024). Digital Cultural Heritage Preservation. In *Art and Culture in the Multiverse of Metaverses: Immersion, Presence, and Interactivity in the Digital Age* (pp. 99-141). Springer.

Ma, H., & Liu, E. (2017). Traditional Chinese Leisure Culture and Economic Development. *A Conflict of Forces. Nueva York: Palgrave Macmillan*.

Mandell, R. D. (1984). *Sport. A cultural history*. Columbia University Press.

Stanco, F., Battiato, S., & Gallo, G. (2011). Digital imaging for cultural heritage preservation. *Analysis, Restoration, and Reconstruction of Ancient Artworks*.

Tang, Y. (2024). The value and implementation path of smart media technology application in the cultural heritage of ethnic traditional sports. *Environment and Social Psychology*, *9*(6), 2498.

Wang, X., & Liu, Z. (2022). Three-Dimensional Reconstruction of National Traditional Sports Cultural Heritage Based on Feature Clustering and Artificial Intelligence. *Computational intelligence and neuroscience*, *2022*(1), 8159045.

Xu, X. (2006). Modernizing China in the Olympic spotlight: China's national identity and the 2008 Beijing Olympiad. *The Sociological Review*, *54*(2_suppl), 90-107.

Young, H. (2023). Evaluating the efficacy of a marine reserve in enhancing the population growth and size of endangered fish species. *FishTaxa*, *27*, 25-35.

Zhang, W. (2023). RURAL REVITALIZATION THROUGH TIBETAN TRADITIONAL SPORTS HERITAGE. *SADI International Journal of Social Science and Humanities*, *10*(4), 15-20.

Zheng, J. (2015). *A comparative analysis of the policy process of elite sport development in China and the UK (in relation to three Olympic sports of artistic gymnastics, swimming and cycling)* Loughborough University].

Zuo, Y., Qiu, Q., Hu, T., & Zhang, J. (2023). How natural environments influence traditional sports and games: A mixed methods study from China. *International review for the sociology of sport*, *58*(2), 328-348.