Digital transmission of cultural heritage.Digital Representation and Reproduction of Pat Chest Dance in Southern Fujian

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Abstract. Faced with the challenges of the digital age, the digital transmission of cultural heritage has become an important issue. This paper takes Pat Chest Dance in Southern Fujian, a Chinese intangible cultural heritage, The objective is to investigate its digital transmission and reproduction, aiming to enhance the efficiency of preserving and disseminating intangible cultural heritage. The study incorporates virtual reality and artificial intelligence to comprehensively examine the process of preserving and disseminating Pat Chest Dance. Theoretical elaboration and empirical research analyze the favorable influence of digital technology on disseminating Pat Chest Dance, while also delving into the challenges and corresponding strategies encountered during the process of digital dissemination. Through experiments and data analysis, the efficacy of deep learning models in video human gesture estimation is demonstrated, which offers an effective approach to precisely capturing and archiving the movement characteristics of Pat Chest Dance. This paper discusses the strategies for safeguarding and storing digitally recorded data by suggesting the utilization of cloud storage and backup services for data protection, while also recommending the use of data compression techniques to minimize storage space requirements and enhance data accessibility speed. The findings reveal the tremendous potential of digital technology in preserving traditional culture, offering novel ideas and methods for digitally transmitting Pat Chest Dance and other forms of cultural heritage.

Keywords: cultural heritage heritage; digital technology; Pat Chest Dance in Southern Fujian; digital presentation

1 Introduction

With the continuous development of society and the rapid changes in technological innovation, intangible cultural heritage protection and inheritance are facing opportunities, and the development of digital technology has opened up a brand new path for the protection and inheritance of intangible cultural heritage. The digital heritage of intangible cultural heritage is to embed the value concept, emotional will and aesthetic interest accumulated in the long history into the cultural digital space, so as to display

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the essential power of human and family sentiment in a multi-dimensional way[1].Pat Chest Dance in Southern Fujian As one of the most representative traditional dance forms in Fujian Province, Pat Chest Dance in Southern Fujian carries profound regional culture and historical connotation, and is of great significance to the inheritance and promotion of Minnan culture. However, Pat Chest Dance in Southern Fujian is facing many challenges, such as the loss of traditional cultural transmission channels due to population mobility and globalization, and the decrease of inherited talents. These difficulties threaten its survival and development and need to be addressed. Digital heritage and presentation provide new ideas for solving this problem.

2 Cultural and historical background of Pat Chest Dance in Southern Fujian

2.1 The origin and development history of Pat Chest Dance in Southern Fujian

Pat Chest Dance is one of the most representative folk dances in Fujian Province, mainly circulating in Quanzhou, Jinjiang, Xiakou, Tong'an and Jinkou, Taiwan in the southern part of Fujian Province[2]. The Pat Chest Dance is one of the most representative folk dances in Fujian Province. It is the first folk dance to be included in the National Intangible Cultural Heritage List. It has distinctive local characteristics and profound cultural connotations, and has been developed through the social practice of generations of southern Minnan people who have been digging, promoting, creating, nurturing and developing it on the basis of the Chinese culture that spread into Fujian during the Jin and Tang Dynasties[3]. Pat Chest Dance not only has a long history of origin and development, but has also gained widespread attention and heritage in contemporary times, becoming an important part of Minnan culture. Over time, it evolved into a more complex dance form. Contemporary Pat Chest Dance in Southern Fujian is no longer limited to male performers, but women and children are also joining this traditional form. At the same time, the content of Pat Chest Dance has been constantly updated and improved with the changing times and social development. In addition to the traditional dances, more dance elements have been added, such as cartwheels and backflips.

2.2 The Regional Cultural Background of Pat Chest Dance in Southern Fujian

Minnan, narrowly understood as the three administrative regions of Quanzhou, Zhangzhou and Xiamen, in a broader sense, refers to the south of Mindi[4]. In a broader sense, it refers to the southern part of Fujian. Minnan culture is an important part of Chinese culture and has distinctive regional characteristics. On the one hand, it pursues the core mainstream Chinese culture, but on the other hand, it stubbornly maintains the variant form of frontier culture with strong regional characteristics[5]. It has strong regional characteristics. The geographical environment and folk culture of the southern Fujian region, with its long history and rich cultural heritage, have also provided an important

influence and foundation for the formation and development of Pat Chest Dance in Southern Fujian. Pat Chest Dance in Southern Fujian, as a traditional cultural performance form of Southern Fujian, presents the cultural connotation and artistic style of Southern Fujian with its unique dance movements, musical rhythms and performance emotions. In addition, the development of Pat Chest Dance in Southern Fujian has been influenced by religious beliefs and the social environment. These religious beliefs and rituals also provide the themes and cultural connotations for Pat Chest Dance in Southern Fujian. In terms of social environment, there are different social groups and lifestyles in Southern Fujian, such as farming culture, maritime culture and trade culture, and these different cultural backgrounds have also influenced the formation and development of Pat Chest Dance in Southern Fujian. In addition, Pat Chest Dance in Southern Fujian has continuously absorbed different artistic elements in its performance forms, such as traditional Chinese music, dance, opera, and other cultural elements, which have enriched the cultural connotation and expression of Pat Chest Dance in Southern Fujian, making it a These elements have enriched the cultural connotation and expression of Pat Chest Dance in Southern Fujian, making it a unique folk culture and art in southern China.

2.3 Expressions of Pat Chest Dance in Southern Fujian

Pat Chest Dance in Southern Fujian has a unique form of dance expression. The Pat Chest Dance has a wide variety of movements, but the basic movement is the "eight taps", and the feet are accompanied by small hopping steps, straight-legged "small hopping steps", "cross steps", "front sucking leg" and "crotch crouching step", The Pat Chest Dance has a wide variety of movements, but it is based on the basic movement of "playing eight taps", and is accompanied by small jumps, straight-legged "small jumps", "cross steps", "front suction leg" jumps and "crouch step" jumps, as well as arbitrary head swings[6]. It is free, lively and varied. This dance style not only shows the rhythmic aesthetics of the dance itself, but also embodies the harmonious integration of group movements, bringing the audience a shocking impact and emotional experience with its strong rhythm and simple movements. As a traditional cultural performance form in Southern Fujian, Pat Chest Dance in Southern Fujian has a strong local flavor, and the dance content is mostly based on the theme of home, garden and life, showing the living habits, folk culture and beautiful emotions of the people in Southern Fujian.

3 The significance of digital transmission of intangible cultural heritage

How to use digital technology to effectively record, preserve, display and disseminate ICH has become an important issue in contemporary ICH preservation. Digital transmission and protection of ICH refers to digitizing information on the content, forms and techniques of ICH in order to better preserve, transmit and promote ICH. This approach not only allows for objective and realistic reproduction and restoration of ICH, but also allows for multi-dimensional and multi-angle interpretation and interpretation,

as well as innovative preservation and utilization to suit the needs of different occasions and different audiences. Digital transmission of cultural heritage plays an important role in the digital age, not only to meet the needs of preserving and disseminating cultural heritage, but also as a natural result of advances in digital technology. Compared to tangible cultural heritage, which relies only on physical forms for preservation, the protection of intangible cultural heritage requires more diverse and innovative approaches. Digital technology has opened up new ways and methods for the digital dissemination of intangible cultural heritage, helping to protect, present and transmit these precious cultural treasures more efficiently, while also enhancing public awareness and understanding of cultural heritage.

Globally, there have been many successful examples of digital heritage practices. In China, the Dunhuang Research Institute's research project on digital conservation technologies for cave art aims to use digital technology to provide comprehensive and accurate conservation and transmission of cave art. The project involves digital photography, three-dimensional scanning, virtual reality technology, and artificial intelligence-based cave image analysis and processing technology; the China Intangible Cultural Heritage Protection Center's virtual reality-based "Cloud" NRM experience hall is an innovative project that uses virtual reality technology to provide new ways and vehicles for NRM preservation and transmission. The project is an innovative project that uses virtual reality technology to provide a new way and carrier for the preservation and transmission of ICH. Through the use of virtual reality technology, the project has established a "cloud" NRM experience hall, which realizes three-dimensional display, interactive experience and innovative dissemination of NRM projects. The project not only breaks through the time and space limitation of traditional NRM display, but also enhances the public's awareness and participation in NRM. The project also promotes the living transmission and creative transformation of ICH through cooperation with multiple parties such as ICH bearers, communities and schools. In foreign countries, practices in the field of digital cultural heritage are also abundant. For example, 3D-ICONS is a pilot project funded by the European Commission in 2012 with the participation of 16 institutions to create 3D models of 4,000 culturally significant buildings, archaeological sites and artifacts in Europe to meet the public's needs for visualizing and browsing cultural heritage based on the Internet[7].The Smithsonian Institution's Digitization Program Office uses digital technology to digitize cultural heritage held in Smithsonian museums, libraries, and research centers. The Smithsonian Institution's Digitization Program Office uses digital technology to digitize cultural heritage collections in Smithsonian museums, libraries, and research centers, including artifacts, animals, plants, and human cultures, so that the public can browse and study these cultural heritage resources online. The above examples of practice show that digital technology provides new means and ways for digital transmission of cultural heritage, and also demonstrate the great potential and development of digital transmission. In the digital heritage of Pat Chest Dance in Southern Fujian, these successful cases of digital heritage can be drawn upon to improve the quality and effectiveness of digital heritage.

4 Problems and challenges in the digital heritage of Pat Chest Dance in Southern Fujian

The digital content innovation is the life source for the digital development of non-heritage, and strengthening data collection and application is the prerequisite for digital protection and development[8]. Strengthening data collection and application is a prerequisite for digital preservation and development. Through digital heritage, more people can understand and appreciate the unique flavor and cultural essence of Pat Chest Dance in Southern Fujian, providing more intuitive, concrete and rich resources and support for cultural research, education, tourism and industrial development. However, the digital heritage of Pat Chest Dance in Southern Fujian still faces a series of problems and challenges.

4.1 Insufficient construction of digital resources

Although some areas in southern Fujian have started to build a digital resource base for Pat Chest Dance, the quantity and quality of resources are not yet sufficient to meet the demand. The digital processing level of some Pat Chest Dance materials is low, which may lead to the loss or misunderstanding of the original information. In addition, the organization and classification of the digitized resources of Pat Chest Dance need to be strengthened urgently in order to facilitate researchers and enthusiasts to use these resources more effectively.

4.2 The level of technology application is limited

The application of VR/AR technology in the Pat Chest Dance heritage is still in its infancy and needs to be further explored and improved.

4.3 Insufficient channels for combining heritage and education

Although there have been cases of disseminating Pat Chest Dance materials and teaching contents to the public through digital means such as websites and cell phone applications, the educational resources and teaching methods of Pat Chest Dance still need to be improved in the field of traditional culture education. Especially, how to combine Pat Chest Dance with modern education system and train more Pat Chest Dance inheritors is still an urgent problem to be solved.

4.4 Publicity and promotion needs to be strengthened

Although new media platforms have been used for dissemination, further promotion efforts are needed to expand the influence of Pat Chest Dance at home and abroad and to attract more young people to participate in the heritage and learning. Joint efforts are

needed from governments at all levels, civic groups and academic institutions to promote the unique cultural value and charm of Pat Chest Dance in Southern Fujian through a variety of ways and channels.

4.5 Insufficient cross-border cooperation and resource sharing

All relevant institutions and groups need to strengthen collaboration to jointly promote the development of the digital heritage of Pat Chest Dance in Southern Fujian. For example, an alliance or cooperation mechanism can be established to share resources in terms of technology, funds, and talents, so as to jointly contribute to the heritage and protection of Pat Chest Dance.

5 Four, Pat Chest Dance in Southern Fujian digital presentation of technical solutions

5.1 Digital recording and storage

Video recording plays a crucial role in capturing and preserving intangible cultural heritage, effectively showcasing its connotations and unique characteristics, including folk art and traditional skills. Pat Chest Dance in Southern Fujian showcases and communicates its essence through body language, voice, expressions, and other artistic mediums. Through video recording, not only can the forms and techniques of these expressions be captured Therefore, digital recording and storage can help preserve this traditional culture and allow it to be passed on and promoted more widely.

Accurately recording and storing the movement characteristics of Pat Chest Dance in Southern Fujian is a challenge.

The Pat Chest Dance of Southern Fujian features numerous subtle movements, characterized with coordinated arm, waist, and head swings, as well as side-to-side body movements. High-quality camera equipment and sensors are utilized to capture these movements, and the captured data is subsequently processed and analyzed using computer vision and machine learning techniques. In order to maintain the distinctive rhythm and precise speed control of the Pat Chest Dance in Southern Fujian, high frame rate camera equipment and accurate timestamps were used to capture each movement. BVH (bio-vision hierarchy), HTR (hierarchical translation rotation), and ASF/AMC (acclaim skeleton file/acclaim motion capture data) are commonly used formats for motion capture data[9]. Solution: Utilize deep learning models to analyze video and sensor data and automatically detect motion features in the Pat Chest Dance of Southern Fujian. Two deep learning models[10],PMAN and FAMI-Pose, that have exhibited exceptional performance on the PoseTrack2017 and PoseTrack2018 datasets, can be cited as references. The PMAN model employs Mean Square Error (MSE) as the cost function, aiming to minimize the L2 distance between the predicted and actual heatmaps for all key points, as demonstrated in equation (1).

$$\mathcal{L}_H = \frac{1}{J}\sum_{j}^{J} v_j \times l_2\left(\mathcal{H}_j, \widehat{\mathcal{H}}_j\right) \tag{1}$$

During the inference stage, the pixel coordinates with the highest value on the heat map are determined by applying a function to the predicted key point heat map, as illustrated in equation (2).

$$\hat{p}_j = \operatorname{argmax}\left(\widehat{\mathcal{H}}_j\right) \tag{2}$$

The FAMI-Pose model conducted ablation experiments to assess feature alignment and auxiliary frame windows, with specific experimental results presented in Tables 1 and 2.

Table 1. Ablation experiments for FAMI-Pose feature alignment

Methods	Global Transformation	Local calibration	Mutual information loss function	Wrist	Ankle	Mean
Baseinen				73.3	68.5	77.3
(i)	✓			78.1	74.3	82.9
(ii)	✓	✓		79.7	76.0	84.0
(iii)	✓	✓	✓	80.0	77.0	84.8

Table 2. FAMI-Pose Auxiliary frame window for ablation experiments

Auxiliary frame window N	Head	Shoulder	Elbow	Wrist	Hip	Knee	Ankle	mAP
N={−1}	88.1	89.2	83.9	78.0	83.5	80.7	73.4	82.8
N={−1, 1}	89.1	89.5	84.8	79.0	84.2	82.3	74.9	83.9
N={−2, −1, 1}	89.3	89.8	85.3	79.8	84.2	82.6	76.2	84.5
N={−2, −1, 1, 2}	89.6	90.1	86.3	80.0	84.6	83.4	77.0	84.8

The above experiments and data analysis demonstrate the effectiveness of deep learning models in video-based human pose estimation, offering an efficient means to accurately capture and archive the movement characteristics of the Pat Chest Dance in Southern Fujian.

Protecting and storing the digitally recorded data is also a challenge.

As the Minnan Chest Pat Dance is a valuable cultural heritage, its digitally recorded data needs to be properly protected and backed up to prevent data loss or corruption. At the same time, due to the large and complex size of the data, efficient data compression and storage technologies are required to reduce storage space requirements and increase data access speed. To address this issue, we propose the use of cloud storage and backup services to protect data and data compression techniques to reduce storage

space. In addition, we propose the use of digital watermarking and encryption technologies to enhance data security. Specifically, a technology called "searchable encryption scheme" is considered, which allows users to securely share data in a cloud storage environment, while also allowing for search of encrypted indexes. In addition, the use of distributed file systems such as Google File System (GFS) and Hadoop Distributed File System (HDFS) was considered to provide cloud storage services. To demonstrate the effectiveness of this approach, experimental data and models from the paper "A study of searchable encryption schemes supporting complete validation in cloud storage"[11] were used. The study experimentally verifies the correctness and security of the searchable encryption scheme. In addition, the study provides a functional comparison table (Table 3) comparing the functionality of the various schemes, which helps us to understand why searchable encryption schemes are chosen.

Table 3. Function comparison table of each scheme

Programme	Correctness	Integrity	Empty set	Dynamic updates	Update validation	Timeliness
Literature [12]	✓					
Literature [13]	✓			✓	✓	✓
Literature [14]	✓	✓		✓		
Literature [15]	✓	✓	✓			
Literature [16]	✓	✓	✓	✓		
Literature[11]	✓	✓	✓	✓	✓	✓

5.2 Virtual reality technology

Virtual Reality (VR), also known as Reality Technology, first originated in the United States in the 1950s, is a computer advanced human-computer interface with the basic characteristics of multi-sensory, immersive, interactive and conceptual[17] . As a new form of media, virtual technology enables users to "link" with the virtual world through perceptual colors, sounds, shapes, images and other media symbols to complete the communication and dissemination of meaning and information[18]. It is a new form of media. Through the application of virtual reality technology, intangible cultural heritage such as Pat Chest Dance in Southern Fujian can be presented as a virtual 3D scene or environment, so that users can experience and learn intangible cultural heritage in the virtual world.

The accuracy of restored dance movements.

To accurately capture and restore the movements of Pat Chest Dance in Southern Fujian, virtual reality technology must faithfully represent its distinctive characteristics. Solution: Utilizing high-precision sensors and cameras, multi-dimensional data can be collected during dance performances. Advanced algorithms are then employed to accurately capture and present the dancers' movements. Enhancing the utilization of virtual reality (VR) technology, the implementation of six-degree-of-freedom (6DoF) tracking technology, demonstrated in Figure 1, enables the capture of the dancer's position and

orientation in 3D space. Additionally, skeletal animation technology can generate animations based on the dancer's skeletal structure, resulting in a more realistic reproduction of their movements. By applying these techniques, the challenge of restoring dance movements can be addressed, providing effective technical support for the preservation of the digital heritage of Pat Chest Dance in Southern Fujian.

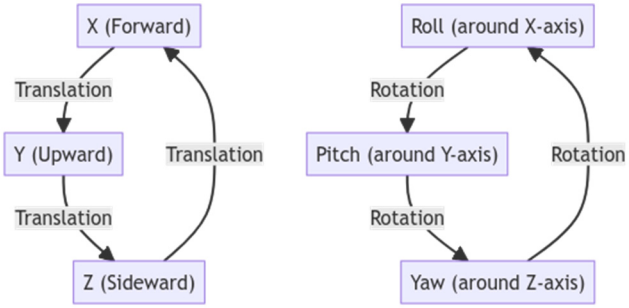

Fig. 1. Six degrees of freedom (6DoF) example diagram

Realize natural and smooth movements.

Pat Chest Dance in Southern Fujian is known for its rhythmic coordination and natural and smooth movements. Achieving this natural effect poses a significant technical challenge. A solution to achieving the natural and smooth dance effect is through the use of physics engine technology, which simulates the dancers' movements by calculating their movement trajectory, speed, strength, and other relevant factors in real-time. Additionally, machine learning technology can analyze and learn dance data to simulate the dancer's movements with greater accuracy. Utilizing a deep learning approach, we trained a neural network model to accurately simulate the dancer's movements. Comparison of different machine learning algorithms revealed that the most favorable results were obtained with AdaBoostRegressor, LinearRegression/SGDRegressor, neural networks (with multiple inputs), and neural networks (with one input) within the range of $3 \leq Q \leq 7$. AdaBoostRegressor demonstrates a maximum deviation of no more than 0.25 m and an average deviation of no more than 0.10 m .

Realize an immersive experience.

Virtual reality technology is needed to achieve an immersive dance experience in order to make the audience more immersive and feel the features of Pat Chest Dance in Southern Fujian. Solution: High-definition virtual reality equipment and sound technology, as well as special set design and lighting effects, can be used to create a realistic, vivid and rich dance experience for the audience. In addition, interactive technology can also be used so that the audience can participate in the dance and enhance the immersive experience.

5.3 artificial intelligence technology

Today's technology has evolved to the stage of intelligence, and artificial intelligence is gradually becoming a new way of art practice and production, as well as allowing intelligent elements in contemporary art to dominate[19] . Using artificial intelligence technology, the digitally recorded intangible cultural heritage can be automatically classified, labeled and analyzed to improve the utilization value and research of the digitized content. In the digital heritage of Pat Chest Dance in Southern Fujian, we need to focus on how to accurately capture its unique rhythmic and movement characteristics, as well as efficiently and reliably store and manage digital materials to ensure data security and privacy. Artificial intelligence technologies can provide some solutions to these technical challenges.

Challenges in action recognition and pose estimation can be effectively addressed with the help of deep learning models.

One example includes employing convolutional neural networks (CNN) to extract features and classify image data. Recurrent neural networks (RNN) are also used to model and predict the temporal data, as shown in Figure 2. To collect and label a large amount of training data, we can use remote collaboration tools, such as cloud platforms, remote video and communication tools, to coordinate data collection and labeling in different regions.

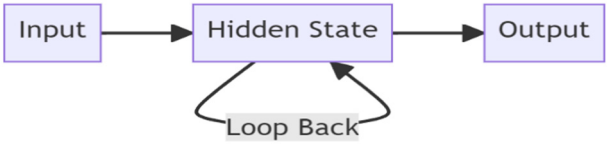

Fig. 2. Recurrent Neural Network (RNN) structure

In order to improve the generalization ability of machine learning models, we need to include diversity samples in the training data.

To cope with the possible differences between performers in Pat Chest Dance in Southern Fujian, we can apply data augmentation methods to enrich the diversity of the data by rotating, flipping, scaling and adding noise as technical means. At the same time, a migration learning strategy is used to apply the pre-trained model to the new dataset, thus further optimizing the generalization performance of the model and providing more efficient and accurate technical support for the digital transmission of Pat Chest Dance.

5.4 big data analysis technology

Big data analytics technology is a branch of computer science that attempts to understand the essence of intelligence and produce a new one that can respond in a similar way to human intelligence[20]. Using big data analytics, we can quantify and analyze the digitally recorded intangible cultural heritage in order to discover the patterns and characteristics of it and provide strong support for research. The application of big data is inseparable from the promotion of technology, and data analysis using big data technology is necessary to discover the potential value of data[21]. In the heritage of Pat Chest Dance in Southern Fujian, the use of big data technology for data analysis is crucial to discover the potential value of the data. The challenges faced are mainly in digitizing the movement information and performing large-scale data analysis. To address these challenges, we can adopt the following solution: using advanced sensors and data acquisition technologies, combined with machine learning algorithms, to achieve accurate and efficient acquisition and processing of dancers' movement data. This will help capture the unique rhythm and movement characteristics of Pat Chest Dance in Southern Fujian for further analysis; with the help of techniques such as deep learning, we can train and analyze a large amount of dance data to extract key features and patterns, as shown in Table 4, which shows the dancers performing Pat Chest Dance with each sensor locations (e.g., left foot, right foot, left hand, right hand, and head) at different timestamps with X, Y, and Z axis data, and the corresponding movement labels. This data can be acquired through advanced sensor and data acquisition technologies, and then processed and analyzed through machine learning algorithms. This will help assist dancers to make movement corrections and improve dance performance, thus better transmitting and promoting Pat Chest Dance in Southern Fujian, an intangible cultural heritage; using cloud computing and distributed computing technologies, we can achieve efficient processing and analysis of large-scale dance data. By making full use of distributed computing resources, we can improve the efficiency of data analysis and thus better explore the artistic characteristics and features of Pat Chest Dance in Southern Fujian.

Table 4. Example of data acquisition and processing

Timestamp	Sensor Position	X-axis Data	Y-axis Data	Z-axis Data	Action Label
0.01s	Left Foot	0.12	0.15	0.11	Initial Pose
0.02s	Right Foot	0.14	0.13	0.10	Initial Pose
0.03s	Left Hand	0.15	0.12	0.14	Initial Pose
0.04s	Right Hand	0.13	0.14	0.15	Initial Pose
0.05s	Head	0.12	0.13	0.11	Initial Pose

5.5 open data interface

Combined with the artistic characteristics and features of Pat Chest Dance in Southern Fujian, open data interface technology can provide a platform for users to easily access, utilize, and share digital intangible cultural heritage. In developing an application on Pat Chest Dance in Southern Fujian, we needed to face a complex set of technical challenges.

Data labeling.

For the training of machine learning algorithms, a large amount of labeled data is required. Collecting and labeling Pat Chest Dance in Southern Fujian data is a daunting task. Solution: Crowdsourcing or collaborative labeling can be used to distribute the data to multiple people for labeling to speed up the labeling.

Data Access.

How to effectively access the large amount of Pat Chest Dance in Southern Fujian data needs to take into account the size of the data and storage methods. Solution: Use technologies such as cloud computing and distributed storage to optimize data access.

Data privacy and security.

How to protect the privacy and security of Pat Chest Dance in Southern Fujian data to avoid data leakage and misuse is critical. Solution: Develop appropriate data privacy policies and data security measures to ensure that user data is properly protected.

6 Conclusion

Digital heritage is of great value in preserving and transmitting folk art performance forms with regional characteristics, such as Pat Chest Dance in Southern Fujian, providing new ways for the preservation and dissemination of intangible cultural heritage. With the development of technology, the role of digital heritage in the field of intangible cultural heritage preservation and transmission will continue to grow. Digital technologies, such as digital recording and storage, virtual reality, artificial intelligence, and big data analysis, help preserve the unique rhythmic and movement characteristics of Pat Chest Dance in Southern Fujian. These technologies enable efficient and reliable data storage and management, ensuring data security and privacy. At the same time, digital technology provides an immersive dance experience for the audience, promoting the heritage and development of Pat Chest Dance in Southern Fujian. Although it still faces a series of technical challenges, through continuous innovation and exploration, it can realize the sustainable development of digital heritage technology in the field of intangible cultural heritage protection and transmission, and contribute to the protection and transmission of intangible cultural heritage.

In future research, continued attention needs to be paid to the advancement of digital technology and its integration with other modes of preservation and transmission to

create a diversified system of intangible cultural heritage preservation and transmission. The government, academia and the community should pay more attention and support, and increase investment to promote the development of digital transmission technology in the field of intangible cultural heritage protection and transmission. We should actively carry out international exchange and cooperation, learn from the successful experiences of other countries in the field of intangible cultural heritage protection and transmission, and jointly promote the cause of global intangible cultural heritage protection and transmission through cooperation and exchange.

Reference

1. HAN Mei-qun,ZHOU Xiao-qin.Digitization of Inheritance and Development of Intangible Cultural Heritage since the New Century: Visualized Analysis with VOS Viewer[J].Journal of South-Central University for Nationalities(Humanities and Social Scie,2022,42(01):65-74+184.DOI:10.19898/j.cnki.42-1704/C.2022.0109.
2. Huang Dong-yi. Research on the History and Contemporary Development of the Breast-Clapping Dance——Taking the Dance of "You School" as an Example[D].Chinese Master's Theses Full-text Database,2015.
3. Wu Huilian,Ding Conghui.Influence of Regional Culture in Teaching of Minnan Folk Dance from "Chest-patting" Dance[J]. Journal of Beijing Dance Academy 2010(04): 77-80.
4. Yong Z .On the Unique Features of Minnan Culture and its Ecological Conservation[J].Journal of Fujian Normal University(Philosophy and Social Sciences Edition), 2010.
5. Liu Xiaohong. The development strategy of tourist souvenirs with regional cultural characteristics of southern Fujian[J]. Journal of Fuzhou University (Philosophy and Social Science Edition), 2009,23(06):105-107.
6. Chinese Folk Dance Integration Editorial Committee. Chinese Folk Dance Integration-Fujian Volume [M]. Beijing: China ISBN Center Publishing, 1996.
7. Liu F, Wu Z-X. Practice of Three-Dimensional Digital Resources in the Field of Cultural Heritage [J/OL]. Library Tribune:1-9 [2023-03-22]. http://kns.cnki.net/kcms/detail/44.1306.g2.20221128.0947.002.html.
8. YAO Guo-zhang, LIU Zeng-yan. Foreign Experiences in Applying Digital Measures to Intangible Heritage Preservation and Promotion [J]. Southeast Culture,2022,No.290(06):179-185.
9. Li Ting. Research on Human Motion Editing Based on Motion Capture Data[D]. Huazhong University of Science and Technology, 2008.
10. Chen, Haoming. Research on video human pose estimation based on deep learning [D]. Zhejiang University of Technology and Industry, 2022. DOI:10.27462/d.cnki.ghzhc.2022.001002.
11. Long Tao. Research on searchable encryption schemes supporting complete authentication in cloud storage [D]. Jiangxi University of Finance and Economics, 2022. doi:10.27175/d.cnki.gjxcu.2022.001674.
12. Miao Y, Weng J, Liu X, et al. Enabling verifiable multiple keywords search over encrypted cloud data[J]. Information Sciences, 2018, 465: 21-37.
13. Tian Youliang,Luo Qin.Verifiable multi-keyword search scheme based on improved Merkle-Tree authentication method[J]. Journal of Communication,2020,41(09):118-129.
14. Ge X, Yu J, Hu C, et al. Enabling efficient verifiable fuzzy keyword search over encrypted data in cloud computing[J]. IEEE Access, 2018, 6: 45725-45739.

15. Wang J, Chen X, Huang X, et al. Verifiable auditing for outsourced database in cloud computing[J]. IEEE transactions on computers, 2015, 64(11): 3293-3303.
16. Wang J, Chen X, Li J, et al. Towards achieving flexible and verifiable search for outsourced database in cloud computing[J]. Future Generation Computer Systems, 2017, 67: 266-275.
17. Hu Yaxi. The application of virtual reality technology in intangible cultural heritage protection[J]. Jiangxi Social Science,2012,32(08):196-200.
18. SHAO Yan-mei.The Affective Incorporation Model of Technology and Body——Take the Virtual Reality Technology As an Example[J].Studies in Dialectics of Nature,2022,38(11):117-122.DOI:10.19484/j.cnki.1000-8934.2022.11.017.
19. LI Shuo,WEN Cheng-wei.On the Enabling Art of Intelligent Technology[J].Studies in Dialectics of Nature,2023,39(01):97-103.DOI:10.19484/j.cnki.1000-8934.2023.01.013.
20. ZHANG Chune,ZHAO Xiaodong,YANG Lijuan.Research on large scale laser image classification based on Artificial Intelligence[J].Laser Journal,2018,39(05):66-69. DOI:10.14016/j.cnki.jgzz.2018.05.066.
21. Gao Shan,Tan Guoxin.Research on the Transformation of Intangible Cultural Heritage Management Paradigm Driven by Big Data[J].Library,2020(11):76-82.