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The Influence of Computer Music on Guangxi Zhuang Folk Songs

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ABSTRACT

With the popularization and development of computer music technology, its impact on traditional ethnic music has become increasingly significant. Guangxi Zhuang folk songs, as the treasure of national music in southern China, are facing the challenges and opportunities of this modern technological transformation. This article aims to explore how computer music technology affects the traditional characteristics, performance style and inheritance of Zhuang folk songs by analyzing the application of computer music technology in the melody and scale of Guangxi Zhuang folk songs, changes in voice processing, enrichment of the range, and cultural inheritance. methods, and the significance of this influence on the future development of folk songs.

Introduction

In the wave of diversification of contemporary music art, the rise of computer music technology has provided new possibilities for the protection, inheritance and innovation of traditional music. As an important part of China's intangible cultural heritage, Guangxi Zhuang folk songs carry rich national history and cultural connotations. Their unique melody, rhythm and singing style have irreplaceable artistic value. With the advancement of science and technology and the development of media, computer music technology has begun to play an increasingly important role in the creation, dissemination and teaching practice of Zhuang folk songs. This change has not only brought unprecedented development opportunities to Zhuang folk songs, but also posed challenges to their traditional forms and interpretation methods.

The introduction of computer music technology has provided technical support for the expansion of the range of folk songs, the enrichment of timbre and the diversification of creative methods. Through audio processing software, the pitch of Zhuang folk songs can be adjusted and the timbre can be simulated, making the originally difficult-to-achieve musical effects within reach. At the same time, the integration of electronic music elements provides more possibilities for the modern interpretation of folk songs, enabling them to transcend the boundaries of time and space and resonate with global audiences. However, how to achieve its modern transformation while retaining the original charm of folk songs, and how to balance the relationship between tradition and innovation have become problems we must face.

This paper aims to explore the phenomenon of computer music technology in Guangxi Zhuang folk songs, analyze its impact on folk songs, and put forward insights on how to protect and inherit Zhuang folk songs in the context of new technologies. We will discuss the melody and scale, changes in voice processing, enrichment of the range, and cultural inheritance, in order to have a comprehensive and in-depth understanding of the application of computer music technology in Zhuang folk songs.

Through the discussion in this article, we hope to provide useful inspiration for the innovative development of Zhuang folk songs, and also provide reference for the inheritance and development of other traditional music in modern society. In the context of global cultural integration and collision, exploring the combination of traditional music and modern technology is undoubtedly of great significance for maintaining cultural diversity and promoting the common prosperity of music and art of all ethnic groups in the world.

Research Objective

The primary objective of this research is to investigate the influence of computer music technology on Guangxi Zhuang folk songs, focusing on both its transformative and preservative roles. Specifically, the study aims to:

1. Analyze how computer music technology impacts the melodic, harmonic, and rhythmic structures of Zhuang folk songs.
2. Explore the ways digital tools enhance the preservation, adaptation, and dissemination of Zhuang folk music.
3. Examine the balance between tradition and innovation in modernized renditions of these folk songs.
4. Identify the cultural and aesthetic implications of integrating computer music technology into traditional music practices.

5. Provide insights into how technological advancements can support the sustainable inheritance and global promotion of Zhuang folk songs.

This research seeks to contribute to the broader discourse on the intersection of technology and intangible cultural heritage, offering strategies for preserving authenticity while embracing modernity.

Research Methodology

This study employs a combination of qualitative and quantitative research methods to explore the influence of computer music on Guangxi Zhuang folk songs. The research process includes the following steps:

Literature Review

Extensive literature on Guangxi Zhuang folk songs and computer music technology was reviewed to establish a theoretical foundation. Sources included journal articles, historical records, and previous studies on the application of digital music technologies in traditional music. A comprehensive review of existing literature was conducted to establish a robust theoretical foundation. This included examining scholarly articles, books, and historical records related to Guangxi Zhuang folk songs and the application of computer music technology. Special attention was given to previous studies focusing on the cultural significance of Zhuang folk songs and the impact of digital technologies on traditional music forms. This step helped identify research gaps and refine the scope of the study.

Data Collection

The primary data was collected through fieldwork in the Guangxi Zhuang Autonomous Region, focusing on folk music traditions. Field recordings of Zhuang folk songs were conducted in various regions to capture their melodic, harmonic, and rhythmic characteristics. These recordings served as the basis for analysis and application of computer music techniques.

Digital Analysis

The study utilized computer music software such as audio editing and music production tools to analyze the recorded samples. Key musical elements, including scales, vocal forms, and melodic structures, were identified and extracted. Digital tools were employed to simulate timbre, expand vocal ranges, and analyze harmonic structures, providing insights into the technical and artistic possibilities enabled by computer music.

Experimental Application

Computer music technologies were applied to adapt and reinterpret selected Zhuang folk songs. This involved the use of digital instruments, audio processing techniques, and modern arrangements to enhance traditional melodies while preserving their core cultural essence. The resulting compositions were compared to the original songs to evaluate the impact of technological integration.

Four-tone series are more widely used in Zhuang folk songs, with a total of 103 songs, accounting for 41% of all tunes. Four-tone series are mainly divided into four categories: do-re-mi-la, do-re-mi-sol, la-do-re-mi and sol-la-do-re. These combinations not only enrich the melody level of Zhuang folk songs, but also make the tunes more melodious and fuller of strong ethnic customs.

The use of pentatonic scale in Zhuang folk songs has reached a peak, with a total of 125 songs, accounting for 49.8% of all tunes. The pentatonic scale is mainly divided into five categories: do-re-mi-sol-la, la-do-re-mi-sol, re-mi-sol-la-do, sol-la-do-re-mi and sol-la-do-re-fa. These scale combinations not only make the melody of Zhuang folk songs more harmonious and beautiful, but also reflect their profound cultural connotations and unique artistic charm.

The six-tone scale also has a place in Zhuang folk songs, with a total of 11 songs, accounting for 4.4% of all tunes. The six-tone scale has various forms, of which the two most important ones are la-si-do-re-mi-sol and sol-la-si-do-re-mi. The use of these scales adds more colors and changes to Zhuang folk songs, making the tunes more colorful.

There is also a unique seven-tone scale song in the Zhuang folk songs, which was found in a Huan-type folk song in Bama County. The scale of this song is sol-la-si-do-re-mi-fa, and it is a monophonic folk song belonging to the North 1 of the Northern Folk Songs, Northwest Guangxi. This seven-tone scale folk song undoubtedly adds a touch of color to the artistic treasure house of Zhuang folk songs, showing its unique musical charm and creativity.

1.2 The Innovative Development of Computer Music in the Melody and Scale of Guangxi Zhuang Folk Songs

With the introduction of computer music technology, Guangxi Zhuang folk songs, a long-standing art form, are undergoing a profound transformation. This technology not only provides new possibilities for the protection and innovation of folk songs, but also opens up an unprecedented path in creation and dissemination.

Computer music technology plays a vital role in protection and innovation. It opens a window for us to understand the essential characteristics of traditional folk songs by accurately analyzing the scales and melodies of folk songs. This in-depth insight not only helps us better understand and inherit the traditional value of folk songs, but also provides a scientific basis for the innovation of folk songs. Through the study of a large number of folk song samples by computer music software, the core scale and melodic elements of folk songs can be extracted, which become the theoretical basis for the innovation of folk songs. While retaining the original style, computer music technology enables us to innovate on the basis of inheritance, making folk songs more contemporary and more in line with modern aesthetics.

In the application of modern folk song creation, computer music technology has injected new vitality and innovation space into folk songs. On the basis of retaining the traditional scale, creators can use computer music software to explore different scale combinations and melody changes, bringing modern and fashionable elements to folk songs. This innovation not only enriches the artistic expression of folk songs, but also makes them more in line with the aesthetic needs of modern audiences, giving traditional music a new lease of life in contemporary society.

In terms of promotion and dissemination, the application of computer music technology enables folk song performances to present richer and more three-dimensional sound effects, enhancing the audience's audio-visual experience. In the past, folk song performances were

limited by the on-site environment, and the sound effects were difficult to achieve the ideal state. Now, computer music technology can achieve highly precise sound effect control, bringing shocking audio-visual experience to the audience. More importantly, computer music technology provides a new way for the dissemination of folk songs. Through network platforms and digital music media, folk song works can be quickly spread to all parts of the world, allowing more people to understand and appreciate the charm of Chinese folk songs. This not only helps the inheritance and development of folk songs in modern society, but also provides creators with a broader market space.

However, the introduction of computer music technology has also brought some challenges. How to preserve the traditional characteristics of folk songs while making appropriate innovations and avoiding cultural homogenization caused by excessive modernization are issues, we must face. In addition, how to ensure the uniqueness and purity of folk songs in the process of global dissemination is also an important issue.

In summary, the innovative development of computer music technology in the melody of Guangxi Zhuang folk songs has provided strong support for the protection, innovation and dissemination of folk songs. However, in this process, we must carefully balance the relationship between tradition and modernity to ensure that the unique cultural value of folk songs can be inherited and carried forward. Through continuous exploration and practice, we have reason to believe that Zhuang folk songs can shine more brilliantly in the new era.

2. Changes in voice

2.1 Vocal forms of Guangxi Zhuang folk songs

Table 1 : Statistics on the vocal division of Guangxi Zhuang folk songs

Voice Type	Quantity (first)	percentage
Monophonic	186	74.2%
Dual Voice	61	24.2%
Three voices	4	1.6%

Data source: Systematic research on Guangxi Zhuang folk songs. Yang Qing. (2016)

From the statistical table, we can see that among the Zhuang folk songs, monophonic tunes occupy an absolute dominant position, totaling 186, accounting for 74.2% of all tunes. This monophonic singing form is concise and clear, with beautiful melody, fully showing the simple and bold character traits of the Zhuang people. Two-part tunes also account for a certain proportion in the Zhuang folk songs, totaling 61, accounting for 24.2% of all tunes. When singing two-part folk songs, the two parts echo each other, forming a rich harmony effect, showing the harmonious beauty of Zhuang music. There are also a small number of three-part tunes in the Zhuang folk songs, totaling 4, accounting for 1.6% of all tunes. Although the number is rare, their existence adds a unique charm to the Zhuang folk songs. These four three-part folk songs all come from the border area between Mashan County and Shanglin County. This geographical area has an important position in the Zhuang folk songs. Mashan

County and Shanglin County are located in the central area of Guangxi Zhuang Autonomous Region and are one of the important birthplaces of Zhuang folk songs. The three-part folk songs here are called "Santon Huan", "Huanxi" and "Bolie Huan". With their unique musical form and profound connotation, they have become a name card of local culture. The singing of these folk songs requires three people to sing the high, middle and low parts respectively, forming a complex and harmonious musical structure, which fully demonstrates the outstanding talents of the Zhuang people in music creation and singing.

The Zhuang ethnic group's two-part folk songs and single-part folk songs are widely and evenly distributed in the Guangxi Zhuang Autonomous Region. Although single-part folk songs have been thoroughly counted and explained in multiple statistical elements, two-part folk songs also have unique charm. Due to regional differences, two-part folk songs show different style characteristics in the north, south and central regions. In the northern region, two-part folk songs are called "Huan" or "Bi" in various dialect groups in the northern Zhuang dialect area, and are called "Shan Ge Qiang" in Chinese. It is worth noting that not all folk songs in the northern region have two-part forms, but only some areas are circulated with two-part folk songs. In these areas, the leading role of "qiangkou" is emphasized in two-part folk songs. The folks vividly describe the two-part relationship of this two-part song as "singing" and "following", that is, the bass part plays a leading role as the "qiangkou", and the treble part follows the changes as a derived part. This relationship is summarized by the folks as "the bass is the qiangkou, and the treble follows", forming a derived two-part form of parallel harmony. In the two-part folk songs in the northern region, the styles of the songs are diverse, but most of them are characterized by being rich, simple, loud, and bright, and have the nature of shouting or reciting. In addition, the structure of folk songs is also unique. Usually, an introduction and an ending are added before and after the formal lyrics to form a three-part structure. The formal lyrics are mostly in the form of upper and lower sentences, while the introduction and the ending often contain specific words and tunes, which are sometimes even used as the names of the tunes. For example, the "Heye" tune of Hechi, the "Laoshao Nei" tune of Nandan, the "Laoke" tune of Huanjiang, and the "Nong Nai" tune and "La La La" tune of Luocheng are all two-part folk songs with local characteristics.

2.2 Changes in the Vocal Parts of Guangxi Zhuang Folk Songs Brought About by Computer Music

With the introduction and application of computer music technology, Guangxi Zhuang folk songs, a long-standing art form, are undergoing profound changes. This technology not only provides new possibilities for the protection and innovation of folk songs, but also opens up an unprecedented path in creation and dissemination.

Precision and flexibility in voice processing

The application of computer music technology in the field of Zhuang folk songs has brought unprecedented accuracy and flexibility to the processing of voice parts. In the past, the processing of Zhuang folk songs mainly relied on the personal skills and musical feelings of the singers. Although this traditional method is full of artistic charm, the processing effect may vary due to the differences in singers, and it is impossible to ensure the balance and coordination of each voice part. In addition, the traditional Zhuang folk song creation and performance process also has certain limitations, such as insufficient expression of timbre and tone, and difficulty in achieving accurate coordination of each voice part in complex music.

Through digital processing, computer music technology can accurately control the volume, timbre and pitch of each part. This means that even in complex music, each part can be precisely coordinated, making the overall sound effect more harmonious and perfect. The application of this innovative technology not only improves the sound effects of Zhuang folk songs, but also greatly enriches their artistic expression.

The application of computer music technology in the field of Zhuang folk songs also has high repeatability and editability. After the composer or producer completes the music creation, he can adjust the voice at any time to meet the needs of different occasions and audiences. This flexibility enables Zhuang folk songs to innovate and develop on the basis of inheriting the original artistic characteristics, and better adapt to the aesthetic needs of modern society.

Expansion and modernization of creative style

The application of computer music technology in the creation and adaptation of Zhuang folk songs has injected new vitality into traditional music. In the past, due to the constraints of regional, cultural, traditional and other factors, the creation space and dissemination scope of Zhuang folk songs were relatively limited. However, with the continuous development and intervention of computer music technology, these restrictions have been gradually broken, allowing Zhuang folk songs to be organically integrated with modern music elements to create contemporary and innovative music works.

Computer music technology provides more possibilities for the creation of Zhuang folk songs. Through computer software, music creators can easily try various musical styles and elements to achieve modern adaptation of traditional folk songs. This not only helps to expand the creative space of Zhuang folk songs, but also helps to make them more contemporary and meet the aesthetic needs of modern people.

The development of computer music technology has provided new creative tools for Zhuang folk song creators. Music production software can easily arrange, mix and produce music, allowing creators to focus more on the creation of music itself. In addition, computer music technology can also realize the editing, processing and synthesis of audio materials, providing creators with rich music materials and unlimited creative inspiration.

The introduction of computer music technology has also brought some challenges. How to preserve the traditional characteristics of folk songs while making appropriate innovations and avoiding cultural homogenization caused by excessive modernization are issues we must face. In addition, how to ensure the uniqueness and purity of folk songs in the process of global dissemination is also an important issue.

The innovative development of computer music technology in the melody of Guangxi Zhuang folk songs has provided strong support for the protection, innovation and dissemination of folk songs. However, in this process, we must carefully balance the relationship between tradition and modernity to ensure that the unique cultural value of folk songs can be inherited and carried forward. Through continuous exploration and practice, we have reason to believe that Zhuang folk songs can shine more brilliantly in the new era.

3. Rich range of sound

3.1 The range and form of Guangxi Zhuang folk songs

Table 2 : Statistics on the classification of musical elements of Guangxi Zhuang folk songs

Range	Quantity (first)	Proportion
Three degrees	4	1.6%
Four degrees	2	0.8%
Fifth	73	29.1%
Six Degrees	54	21.6%
Seventh Degree	43	17.1%
Octave	59	23.6%
Nine degrees	10	4%
Ten degrees	5	2%
Eleven degrees	1	0.4%

Data source: Systematic research on Guangxi Zhuang folk songs. Yang Qing. (2016)

Researchers have conducted an in-depth analysis of the notated range and range of 251 Guangxi Zhuang folk songs and found that the range of most Zhuang folk songs is within the octave, with the fifth and octave being the most common. This feature makes the melody flow of Zhuang folk songs relatively small, presenting a restrained and implicit musical style. This style is in sharp contrast to the folk songs in the northwest plateau of China. In northwest China, the melodies of folk songs are often high-pitched and loud, and the fluctuations of the music often exceed ten degrees, fully demonstrating the boldness and passion of the people in the plateau. The difference in this musical style stems from the cultural background and living environment of different regions and ethnic groups. The Guangxi Zhuang people live among mountains and rivers, and their musical style is as beautiful and restrained as their living environment. The range of the fifth and octave is like the mountains and rivers of the Zhuang people, with both rolling mountains and deep and tranquil lakes, forming a harmonious and rhythmic musical picture. In addition, this restrained musical style also reflects the personality characteristics of the Zhuang people. They are kind, simple, love life, and are good at expressing their emotions through music. Their folk songs are like their inner voices, expressing their love for life and their awe of nature. This musical style is a vivid reflection of the spirit of the Zhuang people.

However, although most Zhuang folk songs have a small range, there are still some tunes with a range of ten degrees or more. These tunes are mainly concentrated in the southwestern Guangxi dialect area of Nanlu Folk Song District, including Jingxi, Debao, Napo, Tiandeng, Daxin and other places. In addition, the middle area of Zhonglu folk songs, including Long'an, Nanning, Yongning, Wuming, Binyang, Shanglin, Mashan and other places, also has some tunes with a range of more than ten degrees. In these areas, there is a joyful tune from Yongning City with a range of eleven degrees, making it the tune with the widest range of music in the entire integrated system. This fact further proves that the folk song style in these specific areas is broader and the melodic changes are more significant. Changes in vocal range not only reflect the characteristics of the tune, but also reveal people's perception and aesthetics of the melody. In areas with a wider range of sounds, people seem to pay more attention to the flow and changes of melody, which also shapes the unique music style of these areas to a certain extent.

3.2 Computer Music Enriches the Vocal Range of Guangxi Zhuang Folk Songs

Precision And Flexibility in Voice Processing

The application of computer music technology in the field of Zhuang folk songs has brought unprecedented accuracy and flexibility to the processing of voice parts. In the past, the processing of Zhuang folk songs mainly relied on the personal skills and musical feelings of the singers. Although this traditional method is full of artistic charm, the processing effect may vary due to the differences in singers, and it is impossible to ensure the balance and coordination of each voice part. In addition, the traditional Zhuang folk song creation and performance process also has certain limitations, such as insufficient expression of timbre and tone, and difficulty in achieving accurate coordination of each voice part in complex music.

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The application of computer music technology in the field of Zhuang folk songs also has high repeatability and editability. After the composer or producer completes the music creation, he can adjust the voice part at any time to meet the needs of different occasions and audiences. This flexibility enables Zhuang folk songs to innovate and develop on the basis of inheriting the original artistic characteristics, and better adapt to the aesthetic needs of modern society.

Expansion And Modernization of Creative Style

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allowing Zhuang folk songs to be organically integrated with modern music elements to create contemporary and innovative music works.

Computer music technology provides more possibilities for the creation of Zhuang folk songs. Through computer software, music creators can easily try various musical styles and elements to achieve modern adaptation of traditional folk songs. This not only helps to expand the creative space of Zhuang folk songs, but also helps to make them more contemporary and meet the aesthetic needs of modern people.

The development of computer music technology has provided new creative tools for Zhuang folk song creators. Music production software can easily realize music arrangement, mixing and production, allowing creators to focus more on the creation of music itself. In addition, computer music technology can also realize the editing, processing and synthesis of audio materials, providing creators with rich music materials and unlimited creative inspiration.

The introduction of computer music technology has also brought some challenges. How to preserve the traditional characteristics of folk songs while making appropriate innovations and avoiding cultural homogenization caused by excessive modernization are issues we must face. In addition, how to ensure the uniqueness and purity of folk songs in the process of global dissemination is also an important issue.

The innovative development of computer music technology in the melody of Guangxi Zhuang folk songs has provided strong support for the protection, innovation and dissemination of folk songs. However, in this process, we must carefully balance the relationship between tradition and modernity to ensure that the unique cultural value of folk songs can be inherited and carried forward. Through continuous exploration and practice, we have reason to believe that Zhuang folk songs can shine more brilliantly in the new era.

4. Role In Cultural Inheritance and Promotion

4.1 Recording and Protection of Guangxi Zhuang Folk Songs by Computer Music

1) Recording Zhuang Folk Songs

The important role of computer music technology in recording and protecting Zhuang folk songs cannot be ignored. In the past, the inheritance and dissemination of folk songs were subject to many restrictions, including recording quality, storage methods and dissemination scope. However, with the continuous development of computer music technology, these problems have been effectively solved.

2) Extraction and analysis of musical elements of Zhuang folk songs

The application of computer music technology in folk song research, in addition to recording technology, digital means also play a vital role. Digital technology provides a new research perspective and means, which has improved the depth and breadth of folk song research. Folk songs, as an important part of Chinese traditional culture, carry rich historical and cultural connotations. In-depth research and analysis of them will help us better inherit and carry forward this precious cultural heritage.

Through audio analysis software, we can accurately extract and deeply analyze the melody, rhythm, harmony and other musical elements of folk songs. These musical elements

are the basic components of folk songs, and their uniqueness reflects the style and characteristics of folk songs. Using digital means to deeply analyze these elements can reveal the inherent musical structure and artistic characteristics of folk songs, providing us with a new perspective to understand the connotation of folk songs.

4.2 The Role of Computer Music in the Inheritance of Guangxi Zhuang Folk Songs

1) Enriching Inheritance Methods

The emergence of computer music technology has provided a new possibility for the inheritance of Guangxi Zhuang folk songs. Through the digital platform, the inheritance of Guangxi Zhuang folk songs is no longer restricted by time, place and number of people, making the inheritance process more convenient and efficient. As long as learners and inheritors have an Internet connection, they can easily obtain relevant knowledge and skills of folk songs. This new way of inheritance not only broadens the channels for the dissemination of folk songs, but also greatly improves the efficiency and coverage of inheritance.

2) Rich Music Elements

In terms of performance, the traditional Guangxi Zhuang folk songs mainly rely on human voice, which limits the timbre and level of folk songs to a certain extent. With the development of computer music technology, Guangxi Zhuang folk songs can simulate the timbre of various instruments with the help of synthesizers, samplers and other equipment. This enriches the timbre and level of Guangxi Zhuang folk songs, presenting a more three-dimensional and full musical effect.

In terms of musical color, the sound effects of Guangxi Zhuang folk songs have been improved through mixing and arranging, making them more attractive to the ear. This diverse form of expression not only enriches the artistic connotation of folk songs, but also makes them more contemporary and in line with the aesthetic needs of modern people.

Discussion

Computer music technology has had a profound impact on Guangxi Zhuang folk songs, providing a broad space for the modernization of folk songs and also posing new challenges to the inheritance of folk songs. In this process, how to balance tradition and modernity, innovation and protection is the key to future research and practice. In summary, the development of computer music technology has provided important technical support and innovative ideas for the modernization of Guangxi Zhuang folk songs, but its application must be based on a deep understanding and respect for traditional culture to ensure the vitality of folk songs and the continued inheritance of cultural values.

Conclusion

The integration of computer music technology has had a profound impact on Guangxi Zhuang folk songs, offering both opportunities and challenges. On one hand, digital tools have enhanced the preservation and dissemination of these traditional songs, enabling accurate recording and analysis of their unique musical features. Technologies such as audio processing, digital arrangement, and virtual instrumentation have expanded the creative possibilities, allowing for modern interpretations that resonate with contemporary audiences. These innovations have enriched the timbre, extended vocal ranges, and facilitated the blending of traditional and modern elements. On the other hand, the study highlights the need for caution to maintain the cultural authenticity of Zhuang folk songs. While technological advancements provide tools for innovation, over-modernization risks diluting the original characteristics and cultural significance of these songs. Achieving a balance between tradition and innovation is critical to ensuring that the essence of Zhuang folk music remains intact while appealing to a global audience. The findings underscore the importance of cultural sensitivity and thoughtful application of technology in the modernization of traditional music. By fostering a dialogue between tradition and modernity, computer music technology can serve as a bridge, connecting the rich heritage of Guangxi Zhuang folk songs with the dynamic landscape of contemporary music. This approach not only promotes the cultural sustainability of Zhuang folk songs but also contributes to the broader discourse on the preservation and evolution of intangible cultural heritage in the digital age. The findings highlight several key contributions and considerations:

Enhancement of Preservation

Digital tools have revolutionized the preservation of Zhuang folk songs. High-fidelity audio recording and storage technologies ensure the longevity of these musical artifacts, safeguarding them from potential loss due to cultural erosion. The ability to analyze and catalog musical elements digitally has also enabled the creation of comprehensive archives, which serve as valuable resources for future research and education.

Expansion of Creative Possibilities

The application of computer music technology has expanded the creative horizons of Zhuang folk songs. By enabling precise manipulation of pitch, timbre, and rhythm, digital tools allow musicians to explore innovative arrangements and adaptations. For instance, the fusion of traditional melodies with electronic music elements has resulted in new, hybrid compositions that resonate with modern audiences while retaining the core essence of Zhuang culture.

Cultural and Aesthetic Balance

A critical challenge identified in the study is maintaining the cultural authenticity of Zhuang folk songs amidst modernization. While digital adaptations enhance accessibility and appeal, over-modernization risks diluting the traditional characteristics that define the genre.

The study emphasizes the importance of preserving the original melodic scales, vocal styles, and rhythmic patterns as foundational elements in any modern reinterpretation.

Improved Dissemination and Accessibility

Computer music technology has democratized access to Zhuang folk songs, transcending geographic and cultural boundaries. Digital platforms and streaming services facilitate the global dissemination of these songs, introducing them to a wider audience. This not only promotes cultural exchange but also enhances the visibility and appreciation of Guangxi's intangible heritage on an international scale.

Community Engagement and Cultural Sustainability

The study underscores the vital role of community engagement in ensuring the sustainability of Zhuang folk music traditions. Collaborative efforts between technologists, musicians, and local communities are essential to creating adaptations that honor cultural values while embracing modernity. Educational initiatives, such as workshops and digital music training programs, can further empower younger generations to actively participate in the preservation and innovation of their musical heritage.

In conclusion, the integration of computer music technology represents a double-edged sword for Guangxi Zhuang folk songs. While it provides powerful tools for innovation and preservation, its application must be guided by a deep respect for cultural authenticity and heritage. By striking a balance between tradition and modernity, Zhuang folk songs can continue to evolve, enriching the global musical landscape while retaining their unique identity. This study offers valuable insights and practical strategies for navigating the complexities of cultural preservation in the digital age.

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