Research Article

The Inheritance and Future Development Direction Prediction of Opera Culture Based on Cloud Communication under the Background of Big Data

Yufeng Yang¹ and Ting Lei²

¹School of Humanities and Education, Xijing University, Xi’an, Shaanxi 710123, China
²College of International Cooperation, Xi’an International University, Xi’an, Shaanxi 710077, China

Correspondence should be addressed to Ting Lei; leiting@xaiu.edu.cn

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In the digital economy era, digital technologies such as cloud computing, big data, artificial intelligence, mobile Internet, and Internet of Things are becoming the new foundation of social operation and industry innovation. In order to achieve creative transformation and innovative development of traditional opera culture and art, there is a need to actively embrace the new digital technologies of the Internet. From the perspective of big data, according to the development status of Chinese opera art, this paper examines the limitations of traditional means to protect and develop opera art and puts forward the inheritance of opera culture and the prediction of future development direction based on cloud communication. This paper demonstrates the matrix system and inheritance development direction of Kunqu Opera culture to realize cloud communication. The main conclusions of this paper are as follows: firstly, promoting the overall digitalization of Kunqu Opera culture is the inevitable choice to realize the inheritance and development of Kunqu Opera; secondly, it is scientific and feasible to promote the overall digitalization and inheritance of Kunqu Opera culture. Thirdly, promoting the research and planning of cloud-spread opera should be promoted to become a national cultural strategy.

1. Introduction

Opera art is a combination of Chinese excellent music, dance, poetry, and other artistic elements. It is the cultural symbol and life memory of a nation and a region and the cultural root of people’s homesickness. As a unique Chinese excellent traditional culture, it adds confidence and pride to the hearts of the Chinese people and the Chinese nation and is also the foundation and source of national cultural strength and cultural industry development [1]. Print media, mainly represented by newspapers and magazines, expanded the exhibition space of opera performances to thousands of households, and three-dimensional media such as radio, film, and television also joined in, attracting new and old audiences to the stage of opera performances from thousands of households. Internet, big data [2], cloud computing [3], artificial intelligence, and other new technologies and new applications are rapidly influencing and changing our society [4], changing our way of life, work, and study. However, at present, the operation of real society and the cognition and research of virtual space boundaries of the Internet are becoming increasingly vague.

Promoting cloud dissemination of opera is an inevitable choice for China’s traditional culture and opera industry to meet the challenges of the Internet age. At present, the Internet has not only brought about the great development of productivity but also caused great changes in industrial structure and cultural inheritance methods and paths. How to deal with and integrate the Internet in culture and opera determines the foundation, framework, and rules of inheritance and operation of culture and opera. With the continuous progress of the times, the development of traditional culture cannot be limited to theatres. Audiences need operas, and operas need audiences even more. Nowadays,
marketability is a prominent feature of the cultural industry, and the theme of the market is the audience. If the opera wants to develop, it must be reformed to face the market [5, 6]. The era of electronic media is an era surrounded by all kinds of information such as words, images, audio, and videos, and it is also the home of new media. People can pick up mobile new media such as mobile phones and tablets at hand at any time to look at information around the world. Its timeliness, interactivity, mobility, cloud storage, and integration of multimedia push information dissemination to a new stage [7]. In the current society and information age, the traditional opera art has been impacted by itself and the outside world, and people's aesthetic style has changed. Under the environment that the opera has not fully adapted to the rapid development of media, its spread has shown obvious decline. However, as an important part of Chinese traditional culture and an important carrier of communication, the inheritance and development of opera cannot be ignored. The research on the communication of opera culture in the current audio-visual media environment will highlight its significance and value [8, 9].

In the era of digital economy, people cannot refuse the convenience brought by smart phones, and opera culture and art have naturally entered the era of digital communication. Cloud communication of opera is an inevitable move for opera culture and art to actively embrace the new digital technology of the Internet [10]. In the era of big data, data has penetrated into every industry and business function, which has led to earth-shaking changes in all walks of life. However, the research and exploration on the field of opera art are still in its infancy. In view of the current development situation of traditional Chinese opera, this paper analyzes from the perspective of communication and studies the exploration of communication content, media, and audience in the process of communication. Relying on the current audio-visual media, this paper innovates communication content, unblocks communication channels, and broadens audience groups, so as to achieve effective and extensive communication of traditional Chinese opera. Take Kunqu Opera, the representative work of national intangible cultural heritage, as an example to carry out the research of this topic.

2. Related Work

Opera art is the unique “cultural heritage” and “civilized memory” of the Chinese nation, with a long historical tradition, a profound realistic foundation, and a sustainable future [11]. Document [12] puts forward the status and protection of opera as an intangible cultural heritage, and document [13] describes the current situation of opera in the process of urbanization and makes an in-depth analysis. Literature [14] summarizes and discusses the survival dilemma and internal and external reasons of traditional Chinese operas and puts forward new ideas and paths. However, more research focuses on the transmission of performing arts, the popularization of award-winning plays and representative plays, the inheritance of talents, the publicity of news media, etc. Literature [15] adapts Sichuan Opera from the similarities of action and dialogue design between Sichuan Opera and animation to realize the organic integration of opera and animation. Literature [16] said: “Facing the world of economic globalization, communication globalization and cultural diversity and diversity, the way to maintain traditional cultural genes is to look at the world and keep pace with the times.” Literature [17] points out that the regulation and modeling design of Sichuan Opera Theater has a strong era, and the concept of Sichuan Opera’s inheritance and development in each era also determines the choice of acoustic and optical technologies that should be considered in theater performance design in this era, and these performance field designs can also promote the innovation and development of Sichuan Opera. Literature [18] uses mobile terminal animation to subtly spread and inherit traditional culture and to make colorful description and nuanced penetration.

Literature [19] also integrates traditional culture into Internet products, forming a picture of the existence of traditional culture in the new era. Literature [20] puts forward the research direction of “organic integration of traditional culture and digital media,” and France has in-depth practical and related theoretical research on promoting the traditional cultural communication of digital media. Literature [21] holds that “the new media represented by TV and Internet have destroyed the traditional aesthetic sense of opera, such as the aesthetic rules of virtual assumption stylization of opera. He believes that opera can only be shaped and developed if it returns to the countryside.” Literature [22] holds that the spread of traditional culture needs not only the traditional media but also the assistance of new media platforms, which is of great significance to the spread of traditional culture and the realization of the Chinese dream. In literature [23], after an empirical analysis of the opera websites, it is found that “Opera websites are mostly independent survival types, with outstanding personalized characteristics and distinctive public welfare color.” It needs to be clearly recognized that although the XiQU website has its own space for rapid development, it is not the mainstream of website development. From the perspective of drama, this paper sorts out the concept, characteristics, and communication period of drama films. In literature [24], from the perspective of communication, this paper expounds the influence of electronic media on opera communication and puts forward constructive communication ideas from the aspects of basic ways of communication, etc.

3. Research Method

3.1. Cloud Communication of Traditional Opera Cultural Heritage. Based on the cloud communication supported by big data technology, artificial intelligence technology, mobile Internet technology, and cloud computing technology, through the multidimensional and multistate fusion organization of these communication forms, the borderless and borderless communication under the information society ecology can be realized.

With the gradual maturity of big data technology, its great value in scientific research, economy, society, and
other aspects has become increasingly apparent. Therefore, it has attracted great attention from the government, academia, business circles, and literary and art circles. All parties are scrambling to seize the strategic high point in this field and apply it to different industries and departments. However, the research on opera art by big data has just started.

Although the exhibition space of opera culture and art is stage-centered, it is not the only display carrier of opera culture and art. Modern media integration is to make full use of media carriers to comprehensively integrate different media, such as radio, television, and newspapers, which have something in common but are complementary, in terms of manpower, content, and publicity. With the help of the Internet-based mode of media communication platform and driven by the power of the masses, traditional opera culture and art can quickly attract attention and quickly understand the opinions and suggestions of the audience. Providing a better shooting experience and a lower use threshold can enable users to reinterpret and spread traditional opera culture easily and easily and can promote the audience’s perception of the fragmentation of opera culture and art to further explore the whole.

Opera breeds in the soil of new media, which is bound to shape a new paradigm suitable for opera according to the survival rules of new media and form a virtuous circle of opera. Make full use of mobile terminal applications to spread opera, and combine many advantages of WeChat official account, such as multimedia presentation, instant interactive communication, and longer service arrival time, with traditional opera culture. Unlike the previous theater linear communication, it changes the single linear social network in which opera culture only stays in the personal carrier but cannot spread, and pays more attention to the feedback of the audience.

Compared with traditional theater stage performances, cloud communication has its unique advantages. First, the network communication mode determines its wide audience and fast speed, far exceeding the narrow theater capacity and interpersonal communication mode of word of mouth. Secondly, it can meet people’s demand for opera appreciation anytime, anywhere. It can be based on any platform, any terminal, any time, any place, any way, any node, and other limitations, breaking the shackles of time, space, and place of traditional theater opera dissemination.

Although the network teaching of Kunqu Opera is different from the general school network course, under the top-level design strategy of promoting digital data inheritance, the network and platform system of network teaching of Kunqu Opera has become a strong support for the government to support this cultural cause, because the platform support and resource support needed by network teaching of Kunqu Opera need more powerful information means and network technology. In order to build a simulation and synchronous teaching experience platform, support the participatory interactive teaching of virtual and realistic technologies, support the specific expression language and artistic image of Kunqu Opera to communicate with learners in spirit, and support and meet the needs of learners with different cognitive levels (see Figure 1).

![Image](Figure 1: Topology diagram suitable for network teaching platform architecture of Kunqu Opera.)

Innovating the new network teaching mode of Kunqu Opera, starting from the infrastructure of network teaching, carry out the popularization activities of traditional opera education in primary and secondary schools, bring the popularization teaching of traditional opera into the category of characteristic education in primary and secondary schools, and establish a number of demonstration bases for traditional opera teaching. Develop traditional opera teaching materials of various operas; explore new modes of digital, remote, and networked teaching; and form a reserve of traditional opera teaching materials with various styles and characteristics.

From the form of drama communication, drama communication is a present and nonreplicable form of acceptance, while network communication is nonpresent and replicable. This change not only did not weaken the original characteristics of opera but also enhanced the communication effect of opera because of the marriage with digitalization. While the Internet has changed the traditional concept of drama watching, on the one hand, it is necessary to guide the audience reasonably and actively expand the drama watching space outside the Internet on the other. Use the Internet as a front to promote opera and national quintessence, not only to capture the hearts of young people but also to promote opera and national quintessence for foreign friends.

What cannot be underestimated is that the extended dissemination of opera has become the main way of communication nowadays, and it has effectively changed the audience’s viewing habits, which has brought about a new situation in the amount of information spread, the spread surface, the interaction between communication and audience, etc. Cloud classroom solves the problem that traditional learning and training are limited in places, hardware, software, teachers, distance, resources, etc. Any person or
institution can incite and promote an educational revolution by renting space and technical services. Any educator who has expertise in learning and teaching can preach and dispel doubts to audiences distributed in various regions, ethnic groups, and cultures through the cloud classroom, with thousands of students at the same time.

3.2. Prediction of the Development Direction of Opera Culture under the Background of Big Data. In the Internet age, the “enabling organization” supported by digital technology refers to a platform that can endow social production elements with stronger production and communication capabilities. The core of “Internet Plus” is empowerment; that is, with the help of digital platform, the relatively independent production elements are optimized and integrated, and a new production system and communication chain are formed in the interrelated and interactive scene. The core value of big data lies in the analysis of data. Through big data analysis technologies such as cloud computing, the multidimensional, scientific, and reasonable integration and induction of opera-related data scattered on the network, new media, and other platforms can fully tap the huge value contained in the data. Big data analysis technology can quickly realize data processing. In the traditional ranking statistics system of opera publications and box office, research institutions or literary and art units may spend several weeks sorting out, counting, and analyzing.

Using big data analysis and judgment may be the solution for the troupe to explore, create, and select scripts [9]. In the protection of traditional opera cultural heritage, protecting its “original ecology” is often emphasized repeatedly. When creating new plays, on the one hand, strive to maintain the true character and essence of traditional opera, such as aria, tunes, and operas. On the other hand, according to the results of audience feedback value analysis, audience hobby analysis, and communication behavior analysis based on big data platform, the model is established by using various parameters, and then, the rational data conclusion is obtained by careful data analysis. With the help of people’s favorite modern art elements and traditional art elements, the opera is packaged and transformed, and the aesthetic principles of tradition and modernity are effectively reconciled, so as to successfully realize the promotion and inheritance of opera in contemporary society.

Developing creative products of opera culture is a new way to protect and develop traditional opera art. Traditional opera costumes, props, and various decorative patterns are treasures of Chinese traditional art. Excavate the artistic resources of opera; collect various opera props, masks, and decorative patterns; excavate various artistic symbols in the patterns; and sort them out to create the library of opera patterns, basic elements, and common symbols. Apply the decorative patterns seen in various traditional operas to different characters, and apply them to contemporary art forms such as TV, movies, animation, publishing, games, and cartoons. Through cultural and creative products, the information of opera culture is actively integrated into people’s daily life, which arouses people’s concern and love for opera art.

Consider that a recommendation system includes several users and commodities, and each user has purchased some commodities. The value of element \( a_{ij} \) in the user-commodity relationship matrix is shown in the following formula:

\[
a_{ij} = \begin{cases} 
1 & u_i \text{ has chosen product } o_j, \\
0 & u_i \text{ commodity } o_j \text{ has not been selected.} 
\end{cases}
\]

If user \( u_i \) selects commodity \( o_j \), the commodity obtains an initial resource of one unit, otherwise the initial resource of the commodity \( o_j \) is zero. Compared with different users, the initial resources of the same commodity have different values.

The weight \( s_{kj} \) represents the similarity between the user \( u_i \) and the target user \( u_j \) with respect to the commodity \( o_k \), and its calculation formula is as follows:

\[
s_{kj} = \frac{a_{kj} \text{sim}(u_i, u_j)}{\sum_{m=1}^{m} a_{kj} \text{sim}(u_i, u_j)},
\]

in which \( \text{sim}(u_i, u_j) \) represents the similarity of user \( u_i, u_j \); \( m \) represents the number of users in the system; \( a_{kj} \) represents the selection relationship between commodity \( o_k \) and user \( u_j \); and \( \sum_{m=1}^{m} a_{kj} \text{sim}(u_i, u_j) \) represents the sum of the similarity between all users who have selected the product \( o_k \) and the target user \( u_j \) in the system.

\( s_{kj} \) also satisfies the following equation:

\[
\sum_{i=1}^{m} s_{kj} = 1.
\]

That is, the sum of the relative similarities between all users who have selected product \( o_j \) and the target users is 0, which can ensure that the total amount of resources in the bipartite graph remains unchanged.

The initial resources of commodity nodes in the commodity set flow to each user node in the user set. At this time, the calculation formula of resources owned by user node \( u_i \) is

\[
f(u_i) = \sum_{i=1}^{n} \frac{a_{ij} f(o_j)}{k(o_j)},
\]

The resources on the user \( u_i \) come from \( n \) nodes in the commodity collection.

\( w_{ij} \) integrates the contribution rate of the initial resources of node \( o_j \) to the final resources of node \( o_i \) in these two rounds of resource flows. Let the matrix \( W = \{w_{ij}\}_{n \times n} \); then, the resource flow process of the above two rounds can be expressed as

\[
f' = Wf,
\]
where $f$ corresponds to the $n$-dimensional initial resource vectors of $n$ commodities in commodity set $o$ and $f'$ is the final resource vector of these $n$ commodities. Set the final resource value of the commodities that the target user has already purchased in vector $f'$ to zero, and then, select $L$ commodities with the largest resource value as the recommendation list made by the system for the target user.

User similarity can be calculated by cosine similarity formula:

$$\text{Sim}_{\text{user} 1, \text{user} 2} = \frac{|\text{items of user}_1 \cap \text{items of user}_2|}{\sqrt{|\text{items of user}_1|} \times |\text{items of user}_2|}$$

(6)

The information recommendation process is to find the product information to be recommended through the established correlation matrix Sim. The formula for calculating user $u_1$ interest in information resource $i_1$ is

$$\text{interest}(u_1, i_2) = \sum_{u_j \in \text{reluser}(u_1, N) \cap \text{itemsuser}(i_1)} \text{Sim}(u_1, u_j) \times (u_j, i_1).$$

(7)

Among them, reluser$(u_1, N)$ represents the set of $N$ other users related to user $u_1$, and such filtering can reduce the scale of calculation. itemsuser$(i_1)$ refers to the set of users interested in $i_1$ resources, which can be obtained through the inverted list.

The core of big data engine lies in the implementation of recommendation algorithm, and the user-based collaborative filtering recommendation algorithm is written by using Scala language to call Spark RDD-related interfaces. The flow is shown in Figure 2.

The implementation process of big data engine takes the user information recommendation function as an example, and its overall process includes the following four stages: preparation stage (resource loading and data acquisition), user relevance calculation, user information recommendation calculation, and ending stage (data collection and writing into database).

### 4. Result Analysis and Discussion

What are the attitudes and demands of audiences of opera and new media? In order to illustrate the problem with data, this paper uses questionnaires to prove it. Refine the data, collect 5~10 people from each group, and then, convert the results into percentages (Figure 3).

As can be seen from Figure 3, most of the new media are used by young people, but a considerable number of middle-aged people are using it. Secondly, on the issue of the inheritance of Kunqu Opera, people at all stages have reached a consensus. Young people think that the combination of Kunqu Opera and new media is a promising thing.

Building a three-dimensional communication channel of opera culture based on new media can attract the wide attention of the audience. The new media communication of Kunqu cultural heritage needs to attach importance to and link the Internet platform of Kunqu culture at all levels, which provides a good opportunity for the communication of Kunqu cultural heritage through various intelligent terminals such as smart phones and tablets.

With the maturity and continuous innovation of Internet technology, the presentation and application of new media are becoming more and more diversified. Under the background that the policy environment and entrepreneurial environment encouraging the development of Internet content are becoming more and more perfect, the evolution of new media forms and contents, on the one hand, the video community applications with small videos and short videos as the main bearing forms are increasing obviously; on the other hand, the video live broadcast industry is also developing extremely rapidly, and various live broadcast platforms, live broadcast communities, and other nonmedia
platforms are growing into new self-media carriers. Figure 4 shows the statistics of short video user value research.

Figure 4 shows that the growth trend of short video users in China is obvious and the demand is clear. The new spread of Chinese traditional culture is also attracting more attention from young people with its own innovations and attempts.

Opera WeChat official account is loved by opera lovers because it pays attention to the standardization of content and the diversity of communication modes in the push process. To a great extent, the WeChat account of opera meets the aesthetic needs of the audience. While spreading opera knowledge, it conveys cultural positive energy and caters to the audience’s emotions in terms of text expression. Through investigation, the authors found that 89% of subscribers said that opera stories, celebrity anecdotes, and so on can attract and mobilize emotions, arouse inner excitement and waves, and greatly stimulate interest in WeChat official account (Figure 5).

In the era of new media, relying on the spread of WeChat official account, it injects fresh blood into the opera culture, makes it integrate with the times, and glows with new and stronger vitality. For today’s opera circles and media workers, they should not only create operas and interpret the essence of operas but also learn to make full use of the thinking of new media to expand the influence and communication power of operas, so that operas can meet the aesthetic needs of audiences to the maximum extent and promote excellent national culture.

63.2% people think that the development of the Internet has led to the decrease of the audience of opera, 46.55% people think that the opera itself is too old, and 35.71% people know that the opera is too mild, lacking in freshness and excitement. As for the reasons why teenagers do not like opera, 64.33% of the respondents said they are really not interested, because they are too procrastinating and old, 49.32% of the respondents said they could not understand it, and 23.28% of the respondents felt that they did not have time to enjoy it (Figure 6).

The integration of big data engine and digital platform adopts the way of database integration. The platform database is used, and the actual research and comparison are made on the selection of data engine. Select the most commonly used centralized database storage engine in MySQL 5.6.17 for research and testing. The final statistics are as follows in Figure 7.

The full application of online new media is manifested not only in the full sharing of online resources but also on the basis that resources can be found at any time. It is also manifested in the drama taking the initiative to find its own position in online new media, making full use of the platform to publicize itself, publishing the latest drama information, making it convenient for everyone to know the performance information of the drama, publishing advertisements, letting everyone know the existence of the

**Figure 3:** Questionnaire on the inheritance and promotion of Kunqu Opera in the new media era.

**Figure 4:** The scale and forecast of short video users in China.
online drama platform, and letting everyone pay attention to this information, thus forming influence.

The simulation experiments of UB_CF (user-based collaborative filtering algorithm), WB_R (WB_R, web-based recommendation algorithm) and UB_NR (user-based network recommendation algorithm) proposed in this paper are carried out, respectively. Figure 8 is the result chart of prediction accuracy of recommendation algorithm.

It can be seen from the figure that the average absolute error of UB_CF is the smallest. Although the prediction accuracy of UB_NR improved in this paper is higher than UB_CF, it is lower than that of the traditional recommendation algorithm based on network structure. It can be seen that UB_NR has greatly improved the prediction accuracy compared with the recommendation algorithm based on network structure and narrowed the gap between the recommendation algorithm based on network structure and collaborative filtering algorithm in prediction accuracy index.

Figure 9 is an experimental result diagram of the ranking accuracy of the recommendation algorithm.

It can be seen from the figure that UB_NR has the highest promotion index value among the three algorithms, which indicates that compared with the original recommendation algorithm based on network structure, the improved UB_NR in this paper has increased the ranking accuracy by 8.66%.

Chinese traditional culture is the outstanding artistic creation achievement created and precipitated by the Chinese nation in the long historical development process for thousands of years. Opera culture is not an exhibit in a museum, but a movable work of art. To inherit opera culture, fundamentally innovate the concept of opera in the

Figure 5: Investigation on the audience motivation of the opera WeChat official account.

Figure 6: What aspects of opera are respondents interested in?

Figure 7: Time-consuming situation of MySQL storage engine continuously inserting ten thousand pieces of data.
current media environment. The development and inheritance of opera cannot just stay on the glory of the past but should actively carry out independent innovation to meet the aesthetic needs of people under the current popular culture and reflect the current aesthetic tendency of young people on the basis of retaining the basic creative concept of opera.

Today, with the development of the information age, the sudden rise of new media has to be paid close attention to by us. Its effective and rapid communication mode is an opportunity that cannot be ignored in the process of opera communication. In the face of the current media opportunities, opera should be fully prepared and boldly innovated to meet the aesthetic needs of young people, and at the same time, the classic traditional plays should be retained. Let the audience have more choices in the new media environment.

5. Conclusion
The protection and inheritance of opera art based on big data technology are an active protection. Through the deep integration of opera art and science and technology, the opera culture will be full of vigor and vitality. Under the background of digital economy, traditional opera culture and art need to adapt to new development and changes, improve innovation ability, replace context and reconstruct scenes on the premise of maintaining excellent tradition, and realize the innovative development of cloud-based opera. The use of new media communication technology and communication methods, with rapid and massive information dissemination, will further meet people’s spiritual and cultural needs and enhance people’s cultural quality and cultural connotation, and at the same time, it is also the actual needs and strong wishes of the general public. Because of the comprehensive implantation of information technology and cloud communication means, the Kunqu Opera culture will make the inheritance elements and development means of Kunqu show a young state, which will help to rejuvenate the youth of Kunqu Opera and promote the healthy realization of digital inheritance of Kunqu Opera culture.

Data Availability
The labeled dataset used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest
The authors declare no competing interests.

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