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Research article

A novel architecture design for artificial intelligence-assisted culture conservation management system

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Abstract: Native culture construction has been a prevalent issue in many countries, and its integration with intelligent technologies seems promising. In this work, we take the Chinese opera as the primary research object and propose a novel architecture design for an artificial intelligence-assisted culture conservation management system. This aims to address simple process flow and monotonous management functions provided by Java Business Process Management (JBPM). This aims to address simple process flow and monotonous management functions. On this basis, the dynamic nature of process design, management, and operation is also explored. We offer process solutions that align with cloud resource management through automated process map generation and dynamic audit management mechanisms. Several software performance testing works are conducted to evaluate the performance of the proposed culture management system. The testing results show that the design of such an artificial intelligence-based management system can work well for multiple scenarios of culture conservation affairs. This design has a robust system architecture for the protection and management platform building of non-heritage local operas, which has specific theoretical significance and practical reference value for promoting the protection and management platform building of non-heritage local operas and promoting the transmission and dissemination of traditional culture profoundly and effectively.

Keywords: artificial intelligence; culture conservation; management system; architecture design

1. Introduction

With the rapid advancement of innovative technology, artificial intelligence technology is entering our daily life and learning work. From a broader perspective, the fourth industrial revolution, based on artificial intelligence, quantum technology, clean energy, and biotechnology, is reshaping our way of life and communication mode. Especially under the new concepts of "Internet+" and "Smart+", artificial intelligence technology is gradually impacting the traditional production mode [1]. Extensive data analysis, cloud computing, intelligent logistics, innovative products, and other fields are expanding, forming a picture of the Internet of everything. Technological innovation drives the development of human business activities, production life, self-needs, and way of thinking [2]. The rational use of artificial intelligence technology in conserving non-heritage local opera is the motivation for this research [3]. Non-heritage local opera conservation is essentially a new communication orientation, which breaks the one-way communication path in the traditional sense and enriches the expression of non-heritage local opera conservation through intelligent processing technology and human-computer interactivity as a guide, and expands the interaction trend of the management platform building [4]. It realizes the accessibility of display content and the diversity of visual experience. It aims to effectively disseminate information culture and enhance visual communication from the human spirit as much as possible [5].

Promoting "Internet+opera" is an inevitable choice for traditional culture and opera to meet the challenges of the Internet era. The Internet has significantly developed productivity and triggered a massive change in the industrial structure and the methods and paths of cultural inheritance [6]. The Internet has changed how people and society communicate regarding information, information dissemination, Cultural Heritage, and culture [7]. It has promoted a massive change in people's values and behavioral awareness [8]. It can be said that the Internet has become the new "operating system" of the whole society [9]. All industries must comply with its development logic and rules, especially the traditional cultural business, only to take the initiative to integrate and embed to achieve their transformation and upgrading, to promote the development of traditional culture, and to spread the excellent cultural heritage [10]. The ability to protect, pass on, and innovate traditional opera based on and integrated into the Internet is lagging. This is an era of rapid progress in information technology, unprecedented cognitive and learning abilities, and a period of universal media in which everyone can pursue the right to speak and have simultaneous communication platforms and means [11]. The application of new technologies to organize, protect and excavate traditional culture and opera, inherit and develop traditional culture and opera, and innovate traditional culture and opera on the Internet has become a whole new issue that all practitioners, researchers, disseminators, and producers of traditional culture and opera must face [12].

Some museums and exhibition projects have cooperated with digital information and media teams, using various digital information technologies to display and protect intangible cultural Heritage [13]. However, there are still some problems in the current implementation process. It can be said that the digital construction of intangible cultural Heritage is still in the exploration and exploration stage [14]. However, there are still some problems in the implementation process, and it can be said that the digitalization of Intangible Cultural Heritage (ICH) is still in the location of exploration and exploration [15]. Therefore, this paper will explore the advantages, values, and feasibility of the digital display of ICH under the concept and thinking of experience design through the combination of theoretical research and practical cases [16]. By grasping the current regional characteristics of culture,

fully excavating and developing them, and spreading these valuable cultures, we can promote the dissemination of local culture and the economic benefits of residents and inherit and develop the local cultures of ethnic minorities [17]. The Internet has been a fast-growing industry in recent years, spreading silently throughout everyone's lives. The use of new media to enhance the development of Yunnan's local opera culture is based on its unique cultural resources and modern digital media technology to create innovative displays of the intangible cultural Heritage of Yunnan opera culture [18]. The results can be used in museum tours, theater promotions, cultural exhibition halls, or on the Internet for opera lovers and researchers, thus adding new energy and luster to disseminating intangible cultural opera art. The form of building a platform for the protection and management of non-heritage local operas is optimized. This paper proposes to introduce ontology into the field of ICH local opera conservation and commitment, which provides a new way of knowledge organization for ICH local opera conservation and makes up for the defects of the existing single-cue knowledge organization method and constructs an ICH project management platform with ICH local opera conservation as an example, which has specific exploration and pioneering significance for the standardization and standardization of ICH local opera conservation project knowledge. It improves the efficiency of ICH knowledge dissemination. In this paper, we apply the constructed non-heritage local opera conservation to personalized recommendation technology and design a recommendation algorithm based on non-heritage local opera conservation, which can actively push non-heritage items to users who are interested in them to improve the efficiency of knowledge dissemination of non-heritage.

The remainder of this paper is organized as follows. In Section 2, the related works will be shown in detail. In Section 3, the system of AI technology-assisted preservation and management platform for NRM local operas is designed. Subsequently, the system of ICH local opera protection and management platform is implemented in Section 4. Finally, some conclusions are drawn in Section 5.

2. Related work

As the research on Intangible Cultural Heritage (ICH) archives continues to intensify, many scholars have proposed the idea of archival protection for ICH. The concept of "archiving" was first proposed in the archival field in the 20th century during the practice of science and technology archives, when the term "archiving" referred to the establishment of science and technology archives, including the formation, accumulation, organization, and filing of science and technology documents and materials [19]. Compared with the traditional concept of "archiving", the active and dynamic nature of the idea of "archiving" is more prominent, which requires archivists not only to sit in the archives to receive and organize archives passively but also to go out of the archives and actively carry out the collection and organization of archives. It requires archivists to not only sit in the archive and passively receive and organize archives but also to go out of the archive and actively collect and organize them [20]. Building archives is identifying, expanding, and creating new archival resources. This is a legal affirmation of the importance of archiving for the protection of ICH, and it can be said that archiving is the foundation and pre-requisite for the protection of ICH. In the author's view, archival protection of ICH means establishing archives for ICH and using the established ICH archives as the basis and premise of ICH protection and inheritance work [21]. The business work includes archival collection, arrangement, storage, development, utilization, etc.

The protection of intangible cultural Heritage has been in place for a long time and has more mature practices and rich theoretical research. The definition of intangible cultural Heritage has been

changing and evolving; the policies are well-developed and implemented from the study of supernatural cultural heritage protection [22]. The policy of giving priority to opera over other cultural development has been actively developed. Unlimited support is given to the development of theater companies, which are actively encouraged to push the boundaries and support the re-invention of classics [23]. The cultural story combines modern commerce to introduce opera performances that can bring economic revenue. Because of the support of various policies, opera performance in the UK has a high status of culture and art, and all kinds of opera can be developed long and prosperously [24]. Currently, the protection of opera in the UK has a complete system; the collection of various social groups and outstanding professionals, the preservation of intangible cultural Heritage, the division of labor, and the creation of a steady stream of economic income protect the integrity of traditional culture. Various policies guarantee and give full play to social forces, which is an important reason for the successful development of the protection of opera. Li points out that the preservation of intangible cultural Heritage should be actively combined with the latest means of communication, which can be combined with film and television culture to increase the visibility of traditional opera through the latest communication channels, thus creating more significant economic benefits [25].

The art of Beijing opera has likewise embarked on a path of digital communication development. In the olden days, the cultural transmission was not advanced, so there were certain limitations in communication. There was no two-way flow of information, and there was little design for interactivity. New media, however, as a comprehensive, timely, interactive feature, provides ample space for the public to communicate and discuss, and people are no longer single individuals [26]. People are no longer single individuals; the public exchanges ideas and attitudes on the Internet. In communication, resources are shared, providing a good platform for communication nowadays [27]. In opera culture, we can't forget the traditional media because of the new communication media; after all, opera targets a slightly bigger older group of users. With the changing times, traditional operas have been treated with digital preservation and development. There are opera genres included in the intangible cultural heritage list, but their Heritage and protection are not optimistic [28]. Therefore, it is urgent to use digital communication to promote traditional local operas. Currently, no literature on the culture of Yunnan opera can comprehensively organize and summarize the art of Yunnan opera, and the available reference materials are minimal. In this paper, the research is carried out in two directions: one is to organize and summarize the historical origin and development of Dianju through the direction of intangible cultural Heritage; the other is to explore the digital communication design for the display of local opera [29]. Theoretical studies on intangible cultural Heritage are also rich in research content. At the same time, scholars have given positive suggestions for the protection of intangible cultural Heritage from several dimensions. Wenshan researches what is worth learning in preserving opera as a traditional opera and suggests that new communication channels can better promote opera and protect its long-term development [30]. Through his research, Correia et al. point out that the preservation of traditional opera is not only about preserving the classic repertoire of the past but also about creating new works based on the original ones, considering the background of the times and the current trends [31]. This way, tradition, and modernity can be combined better, and traditional opera can be revitalized.

3. Artificial intelligence technology-assisted non-heritage local opera conservation and management platform system Design

The continuous improvement and development of artificial intelligence technology have injected core strength into the development of non-heritage local opera conservation. Through the intelligent creation of non-heritage local opera protection live, an efficient management platform is realized to reach the ultimate goal of non-heritage local opera protection. To reach this goal, the non-heritage local opera conservation also puts forward new requirements for the development of non-heritage local opera conservation in terms of intelligent features of environmental features, technical features, process features, and data processing features. In this section, a model for the conservation of nonheritage local operas with the assistance of artificial intelligence technology is constructed, and then a system for the conservation and management platform of non-heritage local operas is designed in detail.

3.1. Construction of a model for the conservation of non-heritage local operas with the assistance of artificial intelligence technology

As a technical science, artificial intelligence is the study of the characteristics and laws of human intelligence activities and then using these characteristics and laws as the basis to imitate the construction of artificial systems with a certain degree of intelligence and try to let the computer use the intelligent artificial system to complete the work and tasks that previously required human intelligence to perform. In short, artificial intelligence mainly studies the basic theory, method, and technology of applying computer hardware and software to simulate intelligent human behavior, and forge, extend, and expand human intelligence through smart algorithms, platforms, or machines [32]. However, due to the limitation of technical means and the vital artificial intelligence that devices have, the ability of independent creative thinking, as envisioned in some movie works, is not yet attainable. Presently, research on AI is still at the stage of weak AI, focusing on solving problems in some specific areas. With rapid development in the last three decades, AI has been widely used and achieved fruitful results in disciplines such as language recognition, image recognition, natural language processing, and expert systems. Suppose AI-generated content is not well protected or regulated by law. In that case, human creators can generate content uncontrolled, crowding the market of human works, squeezing the economic value of human pieces, and making it impossible for them to be in the market. For human creators, there is a risk that artificial intelligence-generated content will overwhelm the need for human work, squeeze the economic value of human pieces, and make it impossible for them to stand in the market. AI-generated content's original purpose is to create and integrate human works. If AI-generated content can be well protected by law, the value of the original published works can also be improved by the correct guidance of legal protection. Therefore, the legal protection of AI-generated content can promote the prosperity of the cultural market and enrich people's spiritual world. The flow of artificial intelligence technology in art creation is shown in Figure 1.

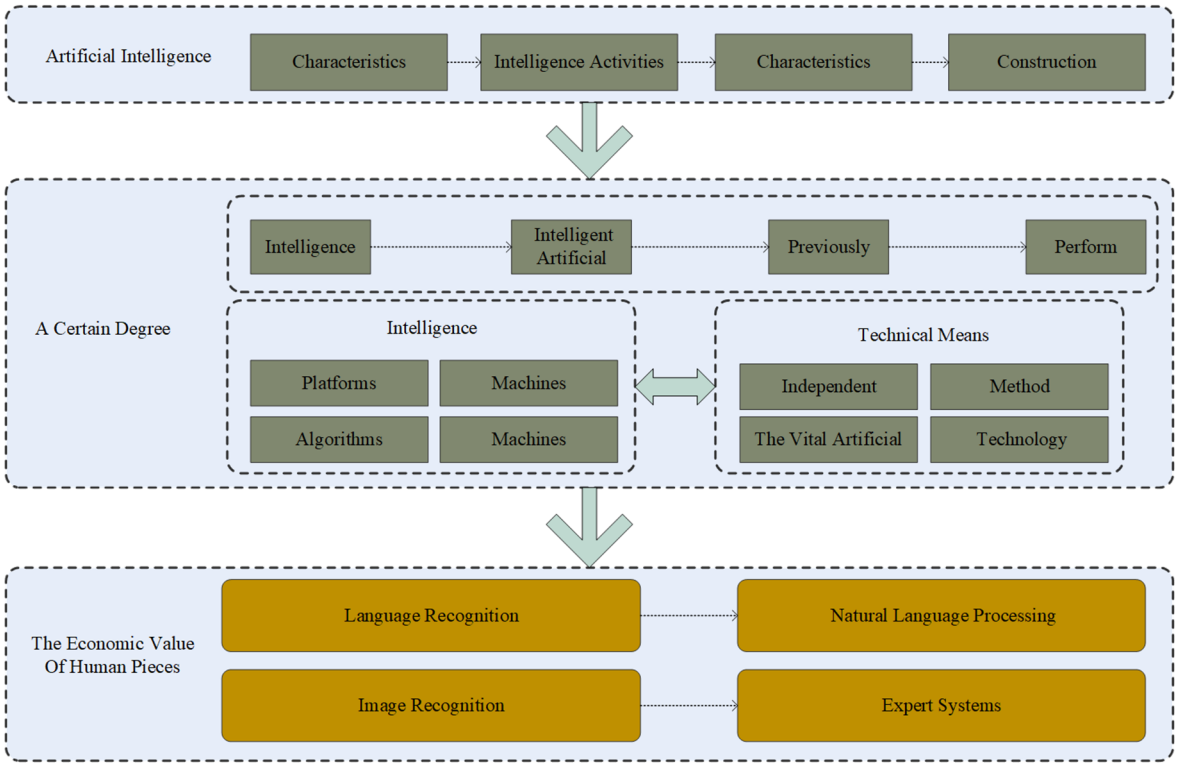

Figure 1. Artificial intelligence technology is involved in the art creation process.

Deep learning is an algorithm that effectively implements a machine learning method that uses neural networks that mimic the human brain to learn and build networks that mimic the mechanisms of the human brain to parse data with association storage functions. This association is possible with the feedback network of artificial neural networks. Ability to find optimal solutions at high speed. Finding an optimal solution to a complex problem often requires much computation. Using a feedback-type artificial neural network designed for a problem, it is possible to find the optimal solution quickly by using the high-speed computing power of a computer. In machine learning, incredibly complex deep neural networks, "ablation studies", have been used to describe removing certain parts of the network to understand the web's behavior better. By understanding the intrinsic laws and representation levels of sample data, the goal is to enable machines to have similar analytical learning capabilities as humans. Deep learning algorithms mimic the multilayer neural networks of the human brain, allowing the device to learn more complex features from lower to higher levels, thus enabling it to solve more complex and challenging problems in a more targeted manner. To train and generate effective models, large-scale data is needed to prepare the network through supervised or unsupervised learning methods. Thanks to the rapid development of technology, the Internet, and social media in modern society, the scale of data is exploding, providing a constant source of fuel for the development of artificial intelligence. With massive data support, deep learning needs to use massive data to train complex neural network models and mighty computing power to parse these huge data materials.

However, the traditional CPU is used for model training, which has the problem of the long time spent. With the development of technology and the application of GPU, the efficiency of deep learning has increased hundreds of times. FPGA and various custom chips are also widely used to accelerate the speed and efficiency of deep understanding, which also vigorously promotes the rapid development

of artificial intelligence. Existing multi-view spectral clustering methods do not jointly utilize the graph and embedding matrix information, degrading the final clustering results. To address these issues, we propose a unified one-step multi-view spectral clustering method that integrates spectral embedding and k-means into a unified framework to obtain discrete clustering labels in a one-step strategy. Under the observation that the inner product of the embedding matrix is a low-rank approximation of the graph, we combine the graphs of different views and the embedding matrix to obtain a unified graph. The basic process of the spectral clustering algorithm consists of the following four main steps:

(1) Similarity matrix construction and scarification: First, read the input data, calculate the similarity between two samples, and construct the similarity matrix W. Then, the similarity matrix is certified W.

(2) Laplacian matrix construction and regularization: The diagonal matrix D is calculated as in Eq (3.1). The value on the diagonal of the matrix D is the sum of the elements of the corresponding row in the similarity matrix W.

$$D_i = \sum_{j=1} W(i-j) \times (N-1) \tag{3.1}$$

The Laplacian matrix is calculated as in Eq (3.2):

$$L = \sum \frac{(D-1)\times W}{\sqrt{D+W}} \tag{3.2}$$

The calculation procedure of the regularized Laplacian matrix is in Eq (3.3):

$$L_1 = \sum \frac{D+L^{\frac{1}{2}}\times D}{D-L} \tag{3.3}$$

(3) Eigenvector calculation: Calculate the first k minimum eigenvectors of the regularized Laplacian matrix, and construct the eigenvector matrix.

(4) k-means clustering: the k-means algorithm is used to cluster each row of the feature vector matrix.

The traditional spectral clustering algorithm requires solving the first k minimum eigenvectors of the Laplacian matrix so that the sample pairs with high similarity are as close as possible in the reduced dimensional space. The objective optimization function of the spectral clustering algorithm is:

$$W = \sum_{ij=1} min\left[y_i + y_j\right] \times \left[y_i - y_j\right] \tag{3.4}$$

From the maximum divisibility, the minimization problem in Eq (3.4) can be converted into an optimization problem in Eq (3.5) to maximize the variance of the sample points after projection.

$$W_{ij} = \sum max \frac{(y_i+y_j)^2}{(y_i-y_j)^2} \tag{3.5}$$

As in Eqs (3.6) and (3.7), this objective function can be described in a simplified matrix-vector form.

$$Y = \sum max(T-L) \times tr \frac{D}{s-t} \tag{3.6}$$

$$L = \sum(\lambda - y) * (y - D) \tag{3.7}$$

where (-L) is the matrix of the corresponding position elements of the matrix L after inversion and is

denoted as the eigenvector corresponding to the first k largest eigenvalues of the matrix L_{Inv}, which is the optimal solution to the original problem. According to the idea of PIC and the theory of iterative convergence, solving the first k most significant eigenvectors L_{Inv} can be transformed into the following iterative problem:

$$V = \sum L_{Inv} (v^i - i) \times (v^i + i) \tag{3.8}$$

Local operas are protected: 1) Static protection: Local operas that exist only by name can only exist in written form or the language of an older generation and have disappeared from the stage and must be subjected to static defenses. First, faded operas are meaningless; they simply do their best to exclude themselves from society and are rejected and reborn by the masses. Secondly, despite the disappearance of some operas, their essence has been absorbed by other operas; in other words, they survive differently. Therefore, in such operas, it is necessary to intensify research and excavation of ancient and historical sites and to take static conservation measures to transform intangible cultural Heritage into various forms of tangible creatures, such as photographs and texts. Different modern methods are used to preserve, collect, store, and classify the data of these local operas. 2) Dynamic conservation: Local operas with strong artistic vitality, a good mass base, and a good market should be protected dynamically. These operas do not have survival problems, at least for a short time, and do not need emergency rescue. Dynamic conservation is mainly for the protection of survival space. Local departments need to adapt to the local situation, provide an external environment for the prosperity of local operas, create a good and orderly market, and require further development of market competition. 3) Rescue protection: The protection rescue model is applied to those opera works that have lost their markets in development and are on the verge of extinction, leaving only the only works in the world. Traditional performance techniques, operatic features, and standard repertoire must be preserved before opera disappears. This requires the perseverance of contemporary artists as well as full support.

3.2. System design of non-heritage local opera protection and management platform

With the development of technology, people's quality of life has been dramatically improved, and human beings have stepped into the world of virtual reality and semi-virtual reality. For a long time, the protection of intangible cultural Heritage has been taken employing paper media, audio, and video products interacting with film and television media. The opera culture is not well preserved because of its living and fluid nature. For this opera culture, the traditional means of preservation will make this valuable intangible Heritage suffer from different degrees of paper damage or disc loss [33]. The mobile digital communication APP born under new media background is more diversified in storing contents and will not miss many valuable audio-visual paper materials with the changing times. At the same time, it is also more user-friendly in terms of searching on the page to quickly find the information needed, which significantly saves people's time. The digital collation can summarize the local opera culture more comprehensively and perfectly. A complex network is a unique network structure, which is a network structure model that abstracts the elements of complex systems as nodes and the relationships between elements as edges. Not all networks belong to complex networks, and it needs to meet the following three characteristics: small world, that is, the network between the points of the characteristic path length value is small, close to the random network, but the aggregation coefficient of the network is high, close to the regular network. Scale-free, that is, the degree of a few nodes in

the web will be significant, the degree distribution of nodes follows the power distribution law. Association structure characteristics, the nodes in complex networks tend to show clustering characteristics; that is, the connection between the nodes inside the association area is solid, while the relationship between the nodes inside the association and the nodes outside the association is weakened.

The data source layer provides primary data for the service management system, including service attribute data, service-specific content, and data required to calculate the service. The service attribute data and specific content are mainly obtained through the service file submitted by the user. In contrast, the data necessary for calculating the service is extracted from the user's external database. The service data acquisition layer implements writing the data in the external database, log files, user-submitted service files, and monitoring data to the service data storage layer through different processing methods. The data from the relational database will be extracted to HDFS and Hive in the Hadoop platform using Sqoop. Log files are then processed through the nurse file processing tool. Since there are multiple formats of data files submitted by users, different files must be processed by various file-processing means. The service data storage layer uses HDFS in the Hadoop platform for the underlying data file storage, Hive for the data management of the computing service, Hbase for the data maintenance of the computing service, and MySQL database for the storage of scheduling policy information, service base attribute information, and monitoring data information. The computation service layer uses a MapReduce-based offline computing framework to compute MapReduce service and a Spark computing engine to add Spark service. The computation service layer and the data storage layer have the relationship of passing data to each other, and the computation layer will give the result data to the storage layer for storage after deriving the computation results of the service. The logical architecture of the system is shown in Figure 2.

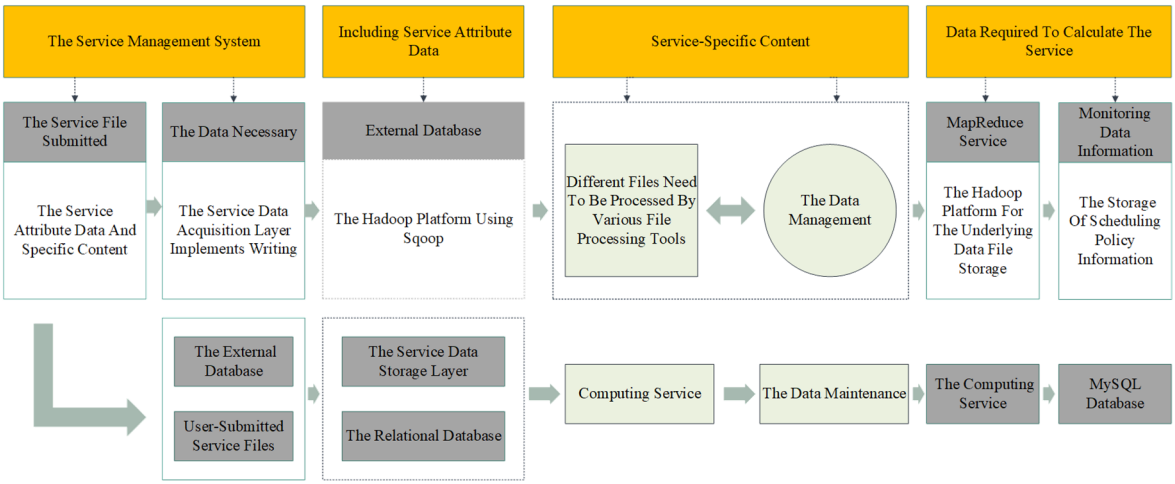

Figure 2. System logical architecture.

The primary function of this system is to efficiently manage and schedule extensive data services, visually monitor server resources, platform resources, and service execution status, provide real-time warning of abnormal conditions and accurately predict the remaining available resources in the future so that service providers can save labor costs, increase service revenue, and improve the resource utilization of big data platforms. The system mainly includes four modules: service management and maintenance module, service scheduling and optimization module, service timing execution module,

and service visualization and monitoring module.

Cloud or online storage is commonly known as uploading and storing data to a web server. Users can view and download applications from these virtual servers in any way, from anywhere in the network. Through the theory of network interconnection without boundaries, the primary and application resources are stored in a centralized and decentralized manner, based on the principle and support of cloud computing, which can meet the user at any time in any place with any device and the resources stored on the cloud associated with the storage and trade-off application relationship. The advantages of a cloud storage system are perfect system-level functions; easy expansion; reliable security; simple and convenient maintenance and management; controllability of resources; submission of resource utilization; data storage and backup; efficient file sharing; all-around data security; and cost saving [34]. In layperson's terms, we study and consider the relationship between the record and storage of opera cultural heritage resources and the cloud to advocate those opera professionals engage in the cause of opera heritage; after understanding and absorbing the concept of cloud record and storage, can feel free to leave the record and storage to IT professionals, or can train opera professionals to learn and manage IT applications, instead of doing a tricky thing personally. You can even say that in the opera industry, people only care about the items within the opera profession and need to explain your needs, values, and core. You do not have to consider the equipment, security, database, space, encryption, etc. As for how to record, upload, secure, and access, everything will become WYSIWYG due to modern technology and your open-mindedness, which is the convenience and value of the information society brought to us by cloud storage. The architecture design of cloud storage is shown in Figure 3.

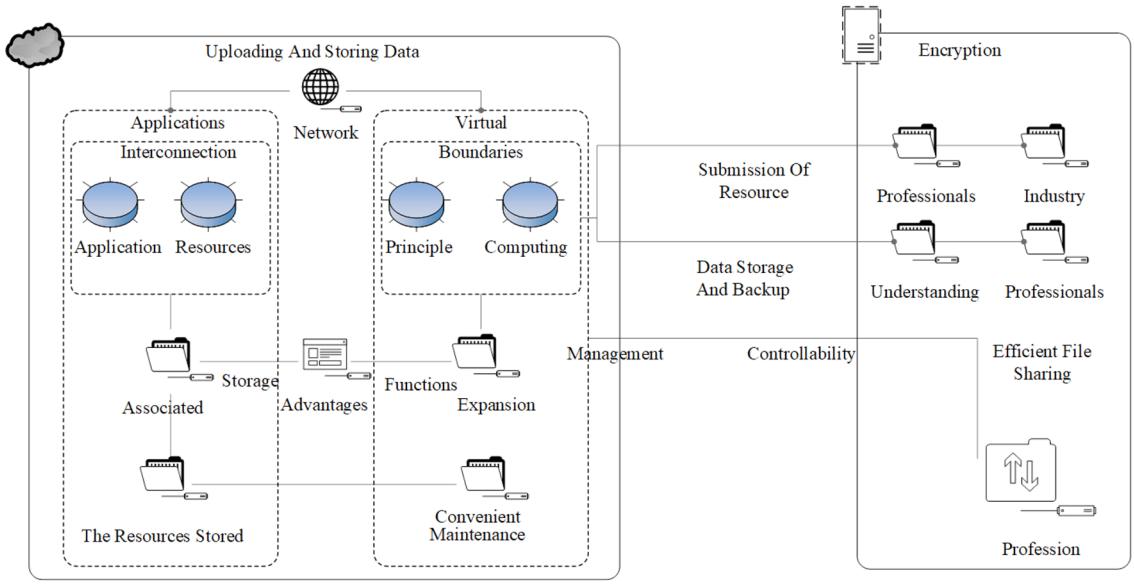

Figure 3. Architecture design of cloud storage.

The results can be obtained with a relatively simple model. With this critical benchmark value, it is possible to evaluate whether a complex model is performing well and to remove the torn between accuracy and complexity. Fast training: the ability to get performance feedback quickly. Easier to study: This means that most errors encountered can be more easily pinpointed as a model flaw or data error. Rapid inference: Deploying a baseline model does not require many architecture-level modifications

and does not lead to potential risks. The construction of data centers has gone through a cycle of centralization, decentralization, and centralization. We all know that most experts and consulting firms are predicting that the subsequent development direction of the data storage center will be distributed; the exact term should be physically decentralized and logically centralized. In the construction process of the opera cloud, the need to integrate the existing data center and the migration of all kinds of current has been developed and applied to the opera application system resources. The opera cloud can be logical by pooling resources and service portal technology, forming a virtual data center, and allocating to various application systems [35]. For each application system and the original user, both as before, independent allocation and use of computing, storage, and network resources, but also do not have to pay attention to the existence of hardware facilities at the lower level and the operation and maintenance of the server room, so that the application efficiency is greatly improved.

4. Reference style, citation, and cross-reference

Through the research on the recommendation algorithm based on the conservation of non-heritage local opera, the problem of knowledge dissemination discourse level has been solved. This section will design a non-heritage local opera conservation system as a management platform for non-heritage projects based on the previous research content from the perspective of the technical level of management platform construction. This section firstly analyzes the requirements of the non-heritage local opera protection system and secondly realizes the construction of the non-heritage local opera protection and management platform under the assistance of artificial intelligence technology from the aspects of system architecture design, functional module design, and database design according to the requirements analysis.

4.1. System testing of ICH local opera protection and management platform

The scientific management and adequate protection of local opera can bring the subsidiary benefits of cultural development and improve local cultural and economic strength. Therefore, only scientific and cultural management can better protect the development of local opera, whether it is financial or political management. But we can see from the reality of cultural management that many places on the protection of local opera lack a scientific and perfect management system. The main reason is that in the process of local opera protection, there are old-fashioned ideas and practices of the traditional management system. The places themselves do not know enough about the soft power of culture, only link culture with the economy, and only care about how much the protection of culture can bring economic benefits [36]. Localities focus their work only on the promotion of economic benefits, taking the speed of development of the local economy as the benchmark for the next step of local employment. Or some places may pay attention to the conservation and scientific management of culture but only around the income generated by culture as a commodity. A study was conducted to analyze the big Internet data for the top ten operas and the two mainstream western local operas, opera, and Qin cantata. By mining the data of the famous professional opera website “Ten Products Opera Network”, we found that there is a strong positive correlation between the relevance of each opera genre on the Internet and its popularity and that the film and TV commercialization of opera performances has a good effect on the popularity of the repertoire. The relationship between the overall relevance of the song genres and their broadcasting popularity is shown in Figure 4.

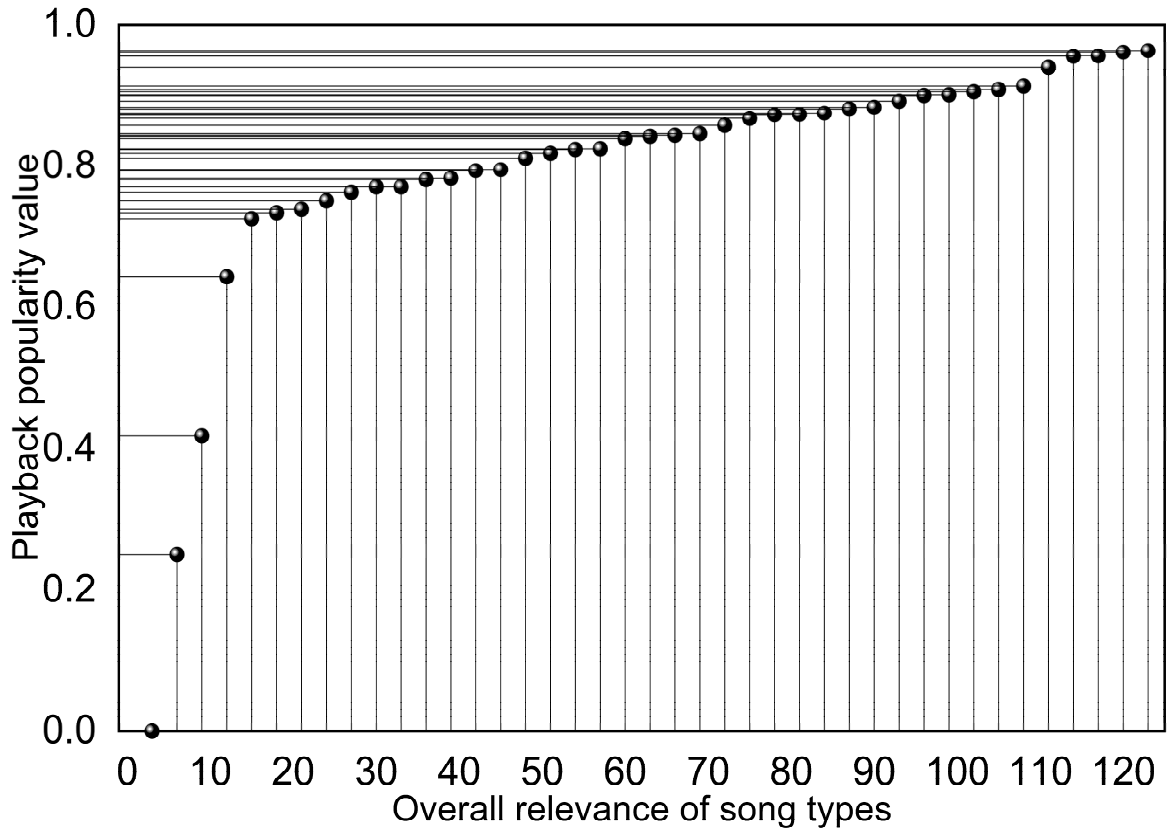

Figure 4. Relationship between the overall relevance of the song genre and the playing popularity.

Based on the data of the Ten Products Opera Network, we calculate the proportion of film and television productions in each interval. It can be seen that, except for the Qin cadence, which is relatively rare, the film and television works of the other eleven genres have the following distribution pattern: the proportion of the film and television works in the top ten plays is higher than the proportion of the film and television works in the top one hundred plays, and the balance of the film and television works in the top one hundred plays is higher than the proportion of the film and television works in the genre as a whole. This indicates that the higher the number of spaces, the greater the probability of film and television productions appearing in the repertoire. The filmization of opera promotes the increase of opera broadcasting fever. The protection value test of non-heritage local operas is shown in Figure 5.

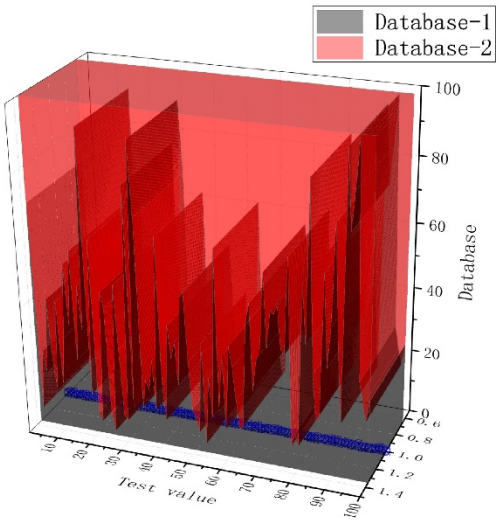

Figure 5. Non-heritage local opera protection value test.

There is a strong positive correlation between the communication efficiency of opera and the connectivity between cultures. Specifically, the weak position of opera in Internet communication is linked to its weaker connectivity with other genres, which leads to the geographical limitation of opera culture in Internet communication. Attempts can be made to improve the Internet's influence on opera by increasing the connectivity between opera and other genres. For example, they are introducing well-known repertoire from different genres for operatic adaptation or exporting outstanding opera repertoire through cooperation and adapting it locally at the destination to enhance the compatibility between opera and other genres and art forms. In addition, appropriate re-creations of traditional opera forms that fit the context of the times can also vastly enhance the appeal of conventional opera to the general public, especially the younger generation. At the same time, in recent years, film and television production in opera has been poor, and the proportion of film and television production is low. As an art form with local characteristics, opera comedy can be used as a breakthrough to try to create relevant films and television. The integration of traditional opera and modern pop culture is also a direction for the inheritance and development of opera.

4.2. Implementation of a platform system for the protection and management of non-heritage local operas with the assistance of artificial intelligence technology

The experiments evaluate the data scalability of SCoS from different sample sizes and feature/cluster sizes, respectively, and each set of data scalability experiments is run five times. The results are averaged over the running time. As shown in Figure 6, the data scalability evaluation results for sample size are offered, and the data scalability evaluation results for different feature vector/cluster sizes. The score, ASCoS, Spark k-means, and Spark PIC algorithms exhibit good data scalability. A-mong them, the ASCoS and Spark PIC algorithms have a longer running time. When the number of clusters is fixed, the main computational overhead of the Sparkk-means algorithm is the distance

between the sample and the cluster center. When the number of groups is small, Sparkk-means has good data scalability, and the SCoS algorithm also has data scalability when the size of the data increases. However, as the data size increases, the computation overhead of the similarity matrix increases, so SCos takes longer than k-means. The similarity computation is the primary time-consuming aspect of SCoS, ASCoS, and SparkPIC algorithms. In contrast, the k-means algorithm does not need to compute the similarity between samples but only the distance between models and cluster centers.

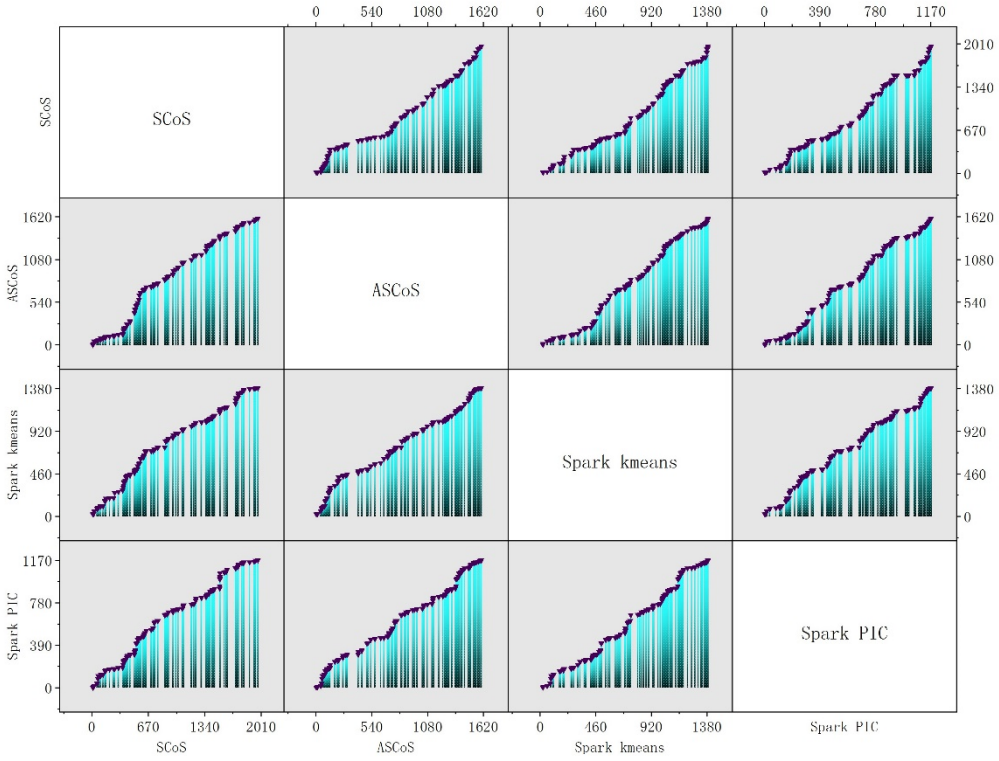

Figure 6. A total algorithm is running time when the sampling size increases.

The experiments took KDD-20 dataset with a feature vector size of 500 and several clusters of 23. The size of computational nodes increased from 2 to 8 nodes. With the increase in the number of nodes, the SCoS algorithm and ASCoS algorithm have a more obvious linear decreasing trend. With the rise in the number of nodes, similarity computation's running time linearly decreased movement. It then gradually slows down, mainly because the communication overhead between nodes gradually increases. Four computational steps of similarity matrix construction, construction of regularized Laplacian matrix, eigenvector computation, and k-means clustering in the SCoS algorithm better node scalability. The test of the management platform before and after the improvement is shown in Figure 7. The digital museum of opera is another window of the cultural landscape of opera open to society. Its web-based genes can significantly promote the communication and connection between opera culture and the public and strengthen the public's understanding of opera in a broad sense. The digital museum of opera can effectively enhance the public's experience of browsing at the physical museum. The construction of a digital museum of opera cultural heritage not only realizes the preservation of opera cultural heritage but also satisfies the need for people to dialogue with opera culture through inter-

networking anytime, anywhere, on-demand, and in all directions, regardless of time and space constraints. This dialogue and participation can transcend race and culture, reach and transcend the on-site perception and proximity to the opera cultural heritage, and realize the all-around three-dimensional multi-dimensional human-computer integrated time-travel role-playing and other extreme sensory experiences. This digital technology implementation and application can break through the inherent closed cultural inheritance state, thus promoting opera's cultural Heritage beyond the regional and ethnic cultural inheritance and development.

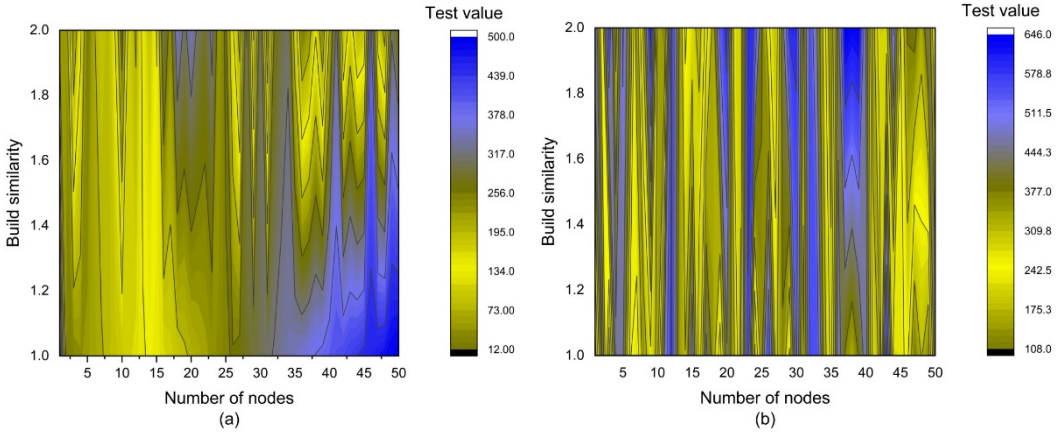

Figure 7. Changes in test data of management platform before and after improvement.

There are various types of local opera, and the kinds of theater companies are divided into state-owned and folk troupes, so they need to be managed separately in a targeted manner. For the corps to give financial and policy protection, to provide the company with the space to develop itself, to let go of the initiative to allow the state-owned troupe to adapt to the market's needs, actively review their problems, and timely rectification. The state-owned theater companies should be supervised as necessary, and the use of special funds should be understood. Folk troupes should be guided to create positive works, encouraged to promote the essence of local opera vigorously, and given the necessary support. It is essential to have a localized approach, adopt different management models, and support the development of local opera with an inclusive attitude. It is also necessary to use modern financing channels by creating special foundations so that more people can participate in the preservation of local opera through financial support. Questionnaires can be made with the help of platforms such as WeChat and Weibo to mobilize people's enthusiasm so that they can actively and positively contribute their ideas and participate in the work of preserving local operas, gathering the strength and wisdom of all people so that local operas can better understand their shortcomings and constantly correct them. Only by making more people understand local operas can they flourish.

5. Conclusions

This paper designs a platform system for conserving and managing non-heritage local operas, which effectively solves this challenge. The platform is to provide a more convenient and feasible method path for the contextual construction of non-heritage local opera conservation, and it is the basis for the preservation of non-heritage local opera and its wide application in it. The management

platform creates the contextual environment to realize the purpose of the non-heritage local opera conservation and management platform system. The digital management platform in this design can solve many realistic bottlenecks in the current protection of non-heritage local operas, provide more ways and means for management subjects and teaching subjects to organize and implement activities, and provide a more engaging and realistic learning and experiencing environment for the audience. With the continuous development of AR technology and artificial intelligence technology, the integration of virtual and reality will be more prominent in the interactive experience mode, providing a more realistic interactive experience platform for the experiencers.

Under the background of artificial intelligence technology, traditional culture is being impacted by foreign culture, while Chinese opera, which has a history of four hundred years, is declining. By combing the birth and development of local opera culture, investigating the current problems faced by local opera culture, summarizing the value of local opera as a non-heritage culture, analyzing the methods of digital cultural preservation of local opera, and carrying out design practice under the guidance of regional, cultural, and visual characteristics of opera, this paper argues for combining, a local opera, with digital technology, establishing an independent local opera. The report demonstrates the possibility of digitally storing and promoting information about local opera on a portal platform and using the advantages of digitization to attract audiences and form a virtuous circle to preserve local opera digitally. This paper adopts the process management service Java Business Process Management (JBPM), Cloud Resource Management Open Stack open-source system, as the primary service component to realize the cloud resource business process management platform. The system's scalability, flexibility, and efficiency are improven by servicing the process management component and the process designer. Each module is managed separately as a service, enhancing the service's availability, fault tolerance, and system stability. New media communication gives traditional opera a new reformation and transformation; its inclusiveness and timeliness, as well as sharing, allows the dissemination of opera art with the change of times through the development of traditional language, paper, audio-visual, printing, electronic media, and network media, spreading faster, sharing resource platform, removing the shortcomings of space and geographical development boundaries, and adding color to the inheritance and protection of local non-heritage cultural treasures.

This paper has conducted some exploratory research on the application of digital technology of ICH in the transmission and dissemination of knowledge of ICH items and has made some progress, but the work done is still very limited, and there are still many improvements needs The recommendation algorithm can only consider the semantic vector of ICH for the similarity of ICH when recommending ICH because the data set of historical user behaviors related to ICH is relatively small and it is difficult to obtain user ratings. This has a certain impact on the effectiveness of the non-heritage recommendation, and because of the small amount of data, the accuracy of the recommendation algorithm is not compared, but only the evaluation index is used to reflect the advantages and disadvantages of the algorithm with different parameters.

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