International Journal of Information Systems and Supply Chain Management
Volume 17 • Issue 1

Influence of the Development of Internet Big Data on College Students' Music Education

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ABSTRACT

Under the background of globalisation and diversification, how to construct a music culture with national characteristics and develop music education with both diversity and localisation is a major issue that music education theory and research in China must face up to. This study begins with a theoretical overview and uses big data analysis to construct a framework for teaching localisation. Then the localisation methods of educational concepts and practical operations are sorted out, and the construction of the localised teaching model of Orff music pedagogy is introduced. Finally, this paper describes the big data analysis of the localised teaching model in terms of cluster trend analysis and determining the number of clusters analysis. The results show that the Chinese music pedagogy of Orff is realised on the basis of improving students' music knowledge and achieving their all-round development. The experimental data effectively improved the speed and accuracy of the big data analysis algorithm. This study is significant for the localised music education system in China.

KEYWORDS

Big Data Analysis, Cluster Analysis, Globalization, Internet Technology, Localization Teaching Mode, Orff Music Teaching Method

INTRODUCTION

With the continuous development of globalization, internationalization, and diversification trends, the localization of educational theories has increasingly attracted the attention of countries around the world, especially developing countries (C. Zhang, 2019). In China, the Orff music education system, as one of the most widely distributed music education systems in the world, has had a significant impact on music education and has gradually developed into a comprehensive and systematic educational direction in the field of music education in China. With its unique teaching methods and diversified teaching contents, which focus on cultivating students' musical expression, creativity, and cooperation ability, Orff music education is well recognized and respected by the Chinese education sector (Rui, 2021).

DOI: 10.4018/IJISSCM.343260 *Corresponding Author

Despite its achievements in China, Orff music education is currently facing challenges, such as integrating Orff music education with Chinese cultural traditions and localizing educational theories. (Lai, 2022). As a country with a long history and rich culture, China has unique musical traditions and aesthetic concepts. Therefore, to localize Orff music education it needs to be combined with Chinese music culture to make it more in line with the needs and characteristics of Chinese students. This requires not only localizing and improving Orff music education, but also strengthening teacher training and developing teaching materials to adapt to the reality of Chinese music education (Huang & Yu, 2021).

On the other hand, with the rapid development of big data analytics technology, the education field has gradually begun to explore how to use big data analytics to improve the education model and teaching methods (Hong & Luo, 2021). Big data analytics can help educators better understand students' learning situations, interests, and learning styles so as to carry out personalized teaching design and guidance. In Orff music education, big data analytics can help educators better understand students' music literacy levels, music interests, and development potential, and they can provide them with targeted music teaching programs. By using big data analysis technology (Adjepong, 2021), Orff music education can better meet the needs of Chinese students' individualized development and improve the effectiveness and quality of music education.

However, there are some challenges and dilemmas in promoting the localization of Orff music education and the application of big data analytics technology in music education (Maronna, 2018). The balance between globalization and localization is a key issue, and how to inherit the core concepts and methods of Orff music education while integrating Chinese music culture and educational practices needs to be explored and solved by educators and researchers working together (Sun, 2021). In addition, the application of big data analytics technology also needs to consider issues such as data privacy and security to ensure the protection and legitimate use of student information.

To overcome these challenges, the following strategies can be adopted. First, practitioners can strengthen teacher training to improve teachers' understanding and knowledge of Chinese music culture, so that they can combine Orff music education with Chinese music traditions and flexibly apply them in their teaching practice. Secondly, they can develop localized teaching materials and teaching resources that meet the needs of Chinese students, integrate Chinese music elements into Orff music education, enrich the content of teaching materials, and stimulate students' interest and creativity (Y. Zhang & Yi, 2021). At the same time, with the help of big data analysis technology, they can collect students' learning data and feedback information, provide teachers with personalized teaching guidance, and promote students' comprehensive development. In addition, it is also necessary to strengthen exchanges and cooperation with other countries and regions in music education, learn from their successful experiences, and promote the localized development of Orff music education in China.

This paper aims to explore how to localize the Orff music education system based on the method of big data analysis to meet the music education needs of Chinese students and provide a personalized teaching mode. It also emphasizes the combination of big data technology and local culture in order to develop a music education system suitable for Chinese soil.

The innovations of this paper are as follows:

1. The topic of this paper is relatively novel. It integrates big data analysis with a localized teaching mode and analyzes and expounds upon the emerging new mode of music teaching.
2. From a new disciplinary perspective, combined with the national cutting-edge concept of music education, this paper interprets Orff's localization theory and practice, hoping to help China's Orff music education out of the previous dependent development model.

The research framework of this paper consists of five parts, which are arranged as follows.

The first part of this paper introduces the research background and significance and then introduces the main work of this paper. The second part introduces the work related to the localization of Orff's music teaching method and the framework of teaching localization under big data analysis. The third part combs the localization methods of educational ideas and practical operations so that the readers of this paper can have a more comprehensive understanding of the construction of the localization teaching mode of the Orff music teaching method under the analysis of big data. The fourth part is the core of the paper, which describes the big data analysis of localized teaching modes from two aspects: estimating cluster trend analysis and determining cluster number analysis. The last part of the paper is the work summary of the full text.

RELATED WORKS

Globalized Music Education (GME) refers to the process of introducing worldwide musical elements, teaching methods, and cultural backgrounds into music education. Globalized Music Education emphasizes cross-cultural communication and integration and provides students with a broader musical perspective through the introduction of diverse musical styles, techniques, and theories. Globalized music education can promote students' understanding and appreciation of music from different cultures and cultivate their cross-cultural awareness and open-mindedness.

Localized Music Education (LME) refers to the process of integrating the musical traditions, cultural characteristics, and teaching methods of a specific region into music education. Localized Music Education emphasizes respecting and passing on the local music culture and helps students establish an identity and connection to local music by teaching local music styles, instrumental techniques, and traditional repertoire. Localized music education also fosters students' pride and identity in their local culture and promotes cultural inheritance and preservation.

In order to better adapt to the development of the times, Shi need to improve the ideological and political education system of colleges and universities. Based on this, Shi should explore the challenges of the traditional college instrumental music teaching modes in the Internet era, expound upon the advantages of the combination of internet technology and college instrumental music teaching, and further put forward practical and feasible reform measures of instrumental music teaching modes in internet colleges and universities in the internet era. This paper analyzes the innovation of classroom teaching modes of instrumental music (Shi, 2020). With the development of 5G mobile Internet, cloud computing, Internet of Things, and other cutting-edge technologies, the era of big data has quietly arrived. The contribution of Cao (2021) was to explore the feasibility of the application of new technologies for music teaching in the era of big data in the context of the rapid development of science and technology in the information society. Cao (2021) also enlightened and led music teachers to apply the spontaneous and conscious awareness of new media and fully apply the new achievements of science and technology in the information society for future music classroom teaching and analyzed the mode, method, trend, characteristics, advantages, and disadvantages of music teaching in the new media environment. The new information age has come; network, big data, information technology, and mobile Internet have become its basic features. Zhao (2021) studied the construction of big data student management platforms in the information age by means of a literature survey and questionnaire survey. Hu et al. (2021) studied the impact of big data technology on the diversity of physical education teaching methods. Hu et al. (2021) analyzed the impact of big data on the development of physical education from these five aspects: education decision-making, education teaching, student learning, education evaluation, and education research. At the same time, VR, AR, AI, big data, and other technologies based on a wireless network have also been optimized and applied to the field of music education, which will further promote the development of intelligent music education. Focusing on music education, in a study by Jiang (2022), the applications of artificial intelligence in music education are listed and a music education framework based on artificial intelligence algorithms and wireless networks is proposed. Guo and Xu (2022) predicted the students' musical performance based

on the gray theoretical model and the big data platform. The single-line education management model among them has an average score of 83.3 points, and the credit system education management model has an evaluation score of 86.1 points (Guo & Xu, 2022). The Orff music teaching method is one of the most famous and widely used music education systems in the world and is named after Karl Orff, a famous German musician. During the process of Chinese folk music teaching in primary and secondary schools. C. Zhang (2019) drew on the advantages of Orff's music teaching philosophy and promoted the national characteristics of Chinese music teaching. Tabuena (2021) employed a descriptive method to gather information about present conditions through a library method and literature review. The various music teaching strategies act as a guide to help teachers and students effectively achieve their educational goals (Tabuena, 2021).

The current field of music education has been positively affected by emerging technologies such as big data, the Internet, and artificial intelligence under the trend of globalization and informatization. However, there are some gaps in the research, including the organic integration between globalized music education and localized music education, privacy and information security issues, as well as the practice cases and effect studies of the localization of the Orff music education system in China, which need to be further explored in depth. This study aims to fill these gaps by exploring how to integrate the Orff music education system with Chinese music traditions and provide personalized instruction with the help of big data analytics to meet the music education needs of Chinese students. By strengthening teacher training, developing localized teaching resources, and promoting international exchanges and cooperation, this study provides new ideas and practical paths for future sustainable development and innovation in the field of music education.

CONSTRUCTION OF LOCALIZATION TEACHING MODE OF ORFF MUSIC TEACHING METHOD BASED ON BIG DATA ANALYSIS

Localization Method of Educational Idea

Orff's music teaching method is an educational system that combines language, music, dance, and corresponding education and performance behavior (J. Xu, 2023). If there is no theoretical premise behind any educational system, there will be no corresponding teaching methods and teaching practice activities in line with its educational thought (Liu, 2021). The overall goal of the localized teaching model based on big data technology is to achieve the student-centered teaching goal and help teachers and students complete the teaching process efficiently and intelligently. The traditional method is to use the measure of proximity, which is expressed by the sum of square errors (SSE) in most cases. SSE is defined as follows: $SSE = \sum_{i=1}^{k} \sum_{\lambda \in c_i} dis\left(v_i, x\right)$

$$C_i = \frac{1}{m_i} \sum_{\lambda \in c_i} x \tag{1}$$

k--Number of clusters
c_i--Class
m_i--Number of samples
v_i--Center point
x--Cluster sample

First and foremost, originality lies at the core of Orff's music education philosophy, reflecting its humanistic essence. This concept originates from Orff's personal evolution and is not merely based on musical form or technical proficiency, but rather on a fundamental understanding of its

originality (Eccles et al., 2021). This understanding is further supported by initial statistical analyses of the extensive teaching data generated by the new educational model. A big data online learning platform was constructed to record learning behaviors, learning outcomes, and language, physical, and other characteristics, and the data were used to study the relationship between student behavior and learning outcomes. The centroid block of the first data was randomly selected, and the rest of the centroids were selected on the principle that a normal distribution is the relative probability of a point satisfying the following equation:

$$P = \frac{D\left(X_I\right)^2}{\sum_{x \in N} D\left(X_I\right)^2} \tag{2}$$

That is, when x_h satisfies:

$$\sum_{i=1}^{h} D\left(X_I\right)^2 > R > \sum_{i=1}^{h-1} D\left(X_I\right)^2 \tag{3}$$

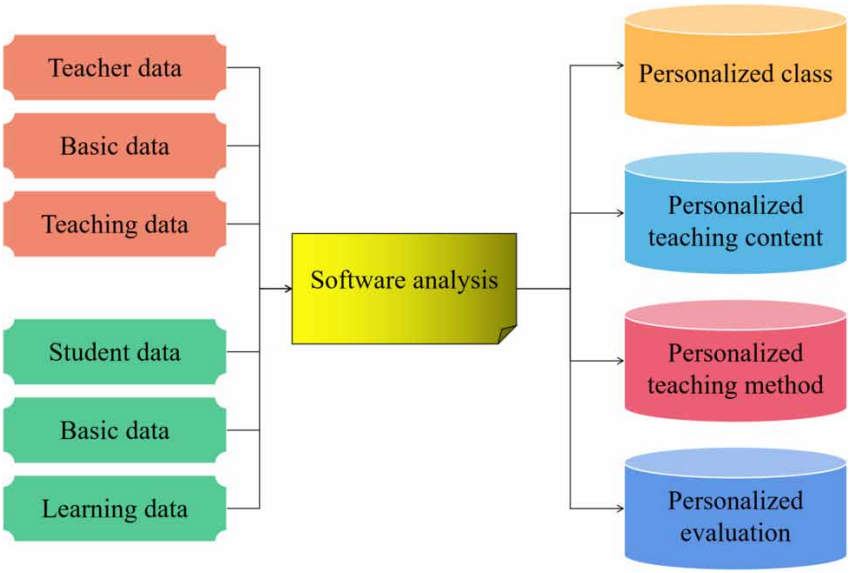
x_h--Selected center point
x_i--Current data point
D=(x_i)--Distance between current data point and nearest center point
R--Random real number

Secondly, the traditional teaching method focuses on technical education, while the new curriculum standard focuses on music aesthetics, which emphasizes facing all students, cultivating students' interest in music teaching and music creation, and advocating the integration of music and other art courses. The integration of non art courses is the embodiment of Orff's concept of music education. By extracting essential data elements necessary for the learning process, a fundamental learning model is developed by integrating big data analysis and machine learning algorithms. This model assesses students' foundational knowledge structure through their learning history and performance in knowledge tests before undertaking advanced courses. For instance, mastering data structures entails proficiency in discrete mathematics, programming languages, and computational concepts:

$$H = \frac{\sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} x_i + \sum_{i=1}^{n} y_i} \tag{4}$$

In conclusion, researchers should embrace a "dive in first, then emerge" approach to understand and implement "original music" in accordance with local conditions. This is crucial for catering to the unique characteristics of education in China and advancing the new curriculum reform in music education within the country. The basic learning process model is fed back to the teaching process, the data elements required for data analysis are improved, the learning process model is perfected, and the learning process model and personalized knowledge recommendation model are finally established to form different data warehouses based on the previously formed database and related subject informion. The formation process of the personalized teaching model is shown in Figure 1.

Figure 1. Personalized Teaching Mode



Generally speaking, for the classification and mining of information in large data sets, data warehouse is a key element within the acceptable accuracy range (Eren & Gül, 2017). Data warehouse is integrated to extract, filter, clean, and integrate different source data according to the requirements of decision analysis (Cheng et al., 2022). Next, identify a representative point and conduct global clustering around this point. As the general points are representative, the volume of data is significantly reduced after each clustering, thereby shortening the execution time of subsequent clustering processes (Wei et al., 2020). And AA is q_i, the distance between y_i and its nearest neighbor in D-{qi}; that is:

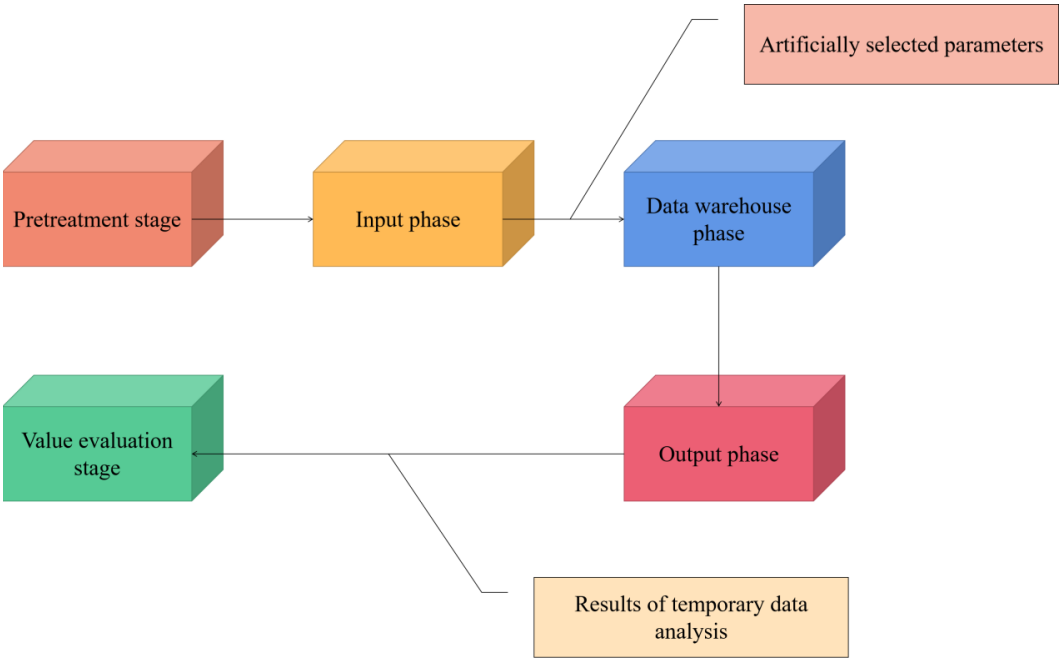
$$y_i = \min\left\{dist\left(q_i, v\right)\right\} \tag{5}$$

Therefore, the localization of educational ideas should be emphasized, because the best reward for children is their experience in making music. This has important reference value for establishing empirical Orff music teaching models. Only by studying the local music culture of this country and region can researchers establish a truly suitable music education system from the local culture of this country and the actual situation of students (Hou et al., 2019).

Localization Method of Practice

The Orff method of music pedagogy has always had practical activities at its core and aims to promote the cognitive, aesthetic, and humanistic qualities of students through their hands-on participation (Marquez-Garcia et al., 2021). By splitting big data into subsets and processing them simultaneously, the entire data set can be analyzed more efficiently, and this approach employs a divide-and-conquer parallel processing strategy. In the localized Orff music education environment, students are fully engaged in musical exploration by engaging in activities such as improvisation, which leads to a rich musical experience and effectively enhances their musical perception. The process of big data analysis usually involves five main stages: data preprocessing, data input, data warehouse establishment, data output, and data value assessment. The application of this coherent analysis and processing process to

Figure 2. Analytical Process of Big Data



the teaching and learning process is illustrated by Figure 2, which shows how big data technologies can be used to optimize and improve music education practices.

To begin with, let's delve into the concept of Orff's music teaching method. His approach to music education focuses not on what teachers impart to students, but rather on awakening students' innate musical sensibilities. By engaging children in hands-on activities, this method combines music with physical sensations to encourage practice and improvisation. The learning process is analyzed and evaluated by using big data analysis technology: big data analysis algorithms such as classification, clustering, regression analysis, and correlation analysis, as well as conditional random field, support vector machine and deep learning technology in machine learning technology. For each object $o \in D$, calculate the average distance $a(o)$ between o and other objects in the cluster to which it belongs. Assuming $o \in C_i$, then:

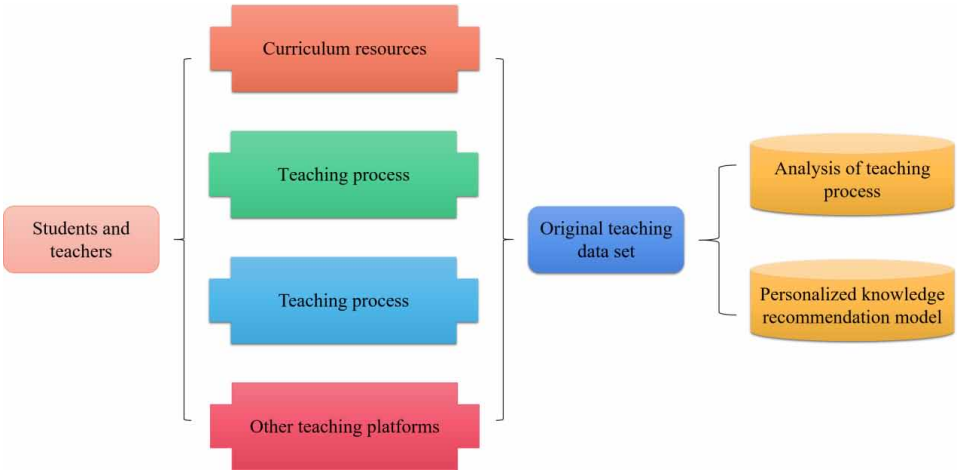
$$a\left(o\right) = \frac{\sum_{oeC_i} dist\left(o, o'\right)}{\left|C_i - 1\right|} \tag{6}$$

However:

$$b\left(o\right) = \frac{\sum_{oeC_i} dist\left(o, o'\right)}{\left|C_i\right|} \tag{7}$$

The profile factor is defined as:

Figure 3. Implementation Plan of Localization Teaching Mode



$$s\left(o\right)=\min\frac{b\left(o\right)-a\left(o\right)}{\max\left\{a\left(o\right),b\left(o\right)\right\}} \tag{8}$$

The layer-based approach is also a classical clustering method with two design methods: "bottom-up" and "top-down." The former uses the hierarchical aggregation method, while the latter uses the hierarchical decomposition method. Both methods are hierarchical until a specific set of conditions is met, at which point the result is the final clustering result. Logically, the so-called specific setting conditions correspond to the specific analysis associated with the educational process. The pedagogical model is implemented, as shown in Figure 3.

Secondly, while learning from the excellent foreign education system and learning from the excellent achievements of others, implementers' basic music education must also clearly recognize their own strengths and truly learn from others, which is the ultimate goal and task of establishing a truly Chinese music education system. Obtain the data of teachers and students, and carry out data cleaning, data conversion, and data loading to form regular data. According to the analysis and evaluation results of learning behavior, combined with the domain knowledge model, establish a personalized knowledge recommendation model to provide students with personalized knowledge recommendation. For each sample i, calculate the category it should belong to:

$$c^{(i)}=x_{i}-\mu_{j} \tag{9}$$

Finally, the software generated on the data server analyzes and processes the data based on standardized data from students and instructors. For example, web access log file data consists of repeated access logs. The processing of these sequential data point records is also typically a sequential scan process, where the center of mass is recalculated for each cluster.

$$u_{j}=\frac{\sum_{i=1}^{n}sign\left(c^{(i)}=j\right)x_{i}}{\sum_{i=1}^{n}sign\left(c^{(i)}=j\right)} \tag{10}$$

Using various software education platforms as personal preferences, learning preferences and student user models are obtained based on the data recorded by students. Select the mean of the model as a representative point so that the point is more representative and can be used as the center of clusters for clustering. In this way, researchers can "transform" as much data as possible, thus minimizing the original data set. Simple behaviors are not regular, but when the data accumulates to a certain level, the learning behavior pattern of the group is mined, and the data is analyzed, counted, and summarized to derive the learning pattern and generate the necessary knowledge points to emphasize and teach according to the learners' abilities.

BIG DATA ANALYSIS OF LOCALIZATION TEACHING MODE

In music localization education, clustering methods can be used in a variety of applications. Through clustering analysis of students' interests, majors, and other variables, students can be classified into different groups, so as to understand students' characteristics and needs and provide teachers with personalized teaching strategies and resources. Meanwhile, by clustering and analyzing music teaching resources (e.g., textbooks, music scores, etc.), it is possible to select teaching resources suitable for a certain group of students based on different clustering results. In addition, the clustering method can help teachers understand the common needs of students, so that they can design music teaching contents that are more in line with students' characteristics and needs and improve students' learning effects and interests. Finally, by analyzing the clustering trend of students, the learning situation and development trend of students can be assessed, providing teachers with guidance and feedback in order to better support students' learning and development. In summary, clustering methods play an important role in music localization education, which can help teachers better understand the characteristics and needs of student groups and improve the effectiveness and adaptability of music education.

Estimated Clustering Trend Analysis

It is a common phenomenon that the distribution of data in low-dimensional space is sparse in high-dimensional space and the distance between data is almost the same. Orff music education allows students to directly participate in musical activities and complete their own musical designs, and such improvisation and participation is very helpful in developing students' practical skills. The dataset is randomly divided into equal parts, and each equal part is brought into the test set in turn to obtain the predicted strength of each, and the average of this number of clusters is taken as the predicted strength. Clustering trend assessment determines whether a given data set has a random structure that can lead to meaningful clustering. Figures 4 and 5 below show the curves of predictive strength according to the number of variables and clusters.

To ensure the meaningfulness of clustering results, it is important to preprocess the collected massive data before applying clustering algorithms. Typically, massive data are naturally sparse, ultra-high dimensional, unstructured, and noisy. Therefore, filtering algorithms and denoising techniques are applied to obtain a set of instructional data, which is then stored using Hadoop distributed storage technology.

During the clustering process, the Mapper plays a vital role in parsing values and recording the frequency of matching address spaces. The dimensions correspond to numbers, and this string is displayed as a key output. To maintain the timeliness of the personalized education system, the clustering model must be updated regularly with the increasing number of new users and database expansion.

Once the raw data is preprocessed and the clustering model is updated, the k-means clustering method can be applied to cluster the data. It is worth noting that clustering algorithms cannot return meaningful clusters for data sets with no non-random decomposition, such as uniformly distributed points in the data space. In such cases, clustering results would be random and meaningless.

Figure 4. Variation of Prediction Intensity With Cluster Number and Subset of Cluster Variables

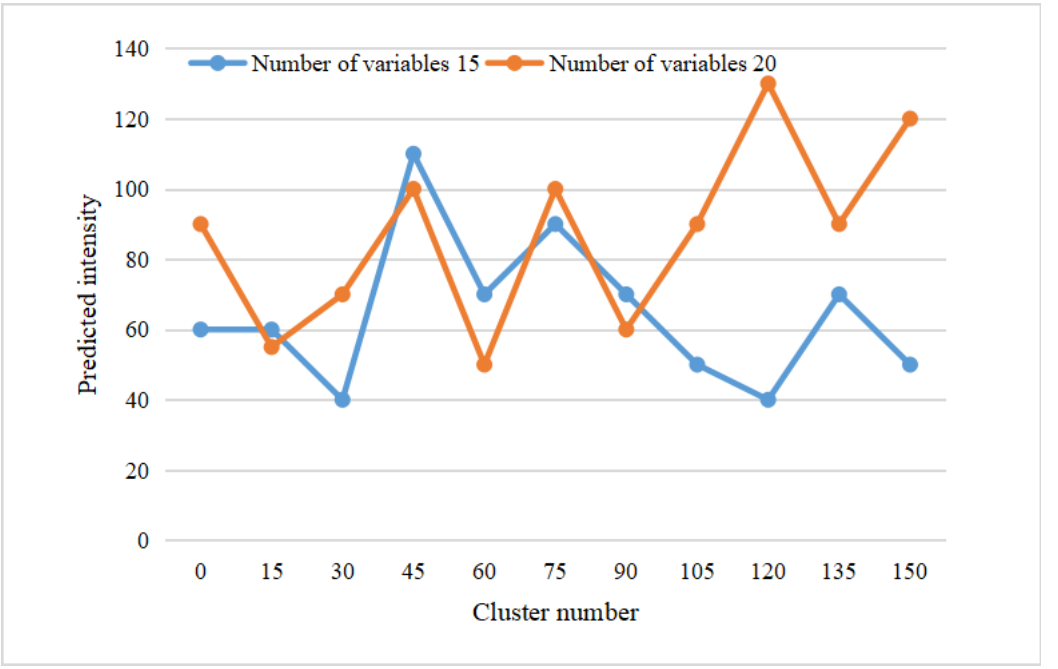


Figure 5. Variation of Prediction Intensity With Cluster Number and Subset of Cluster Variables

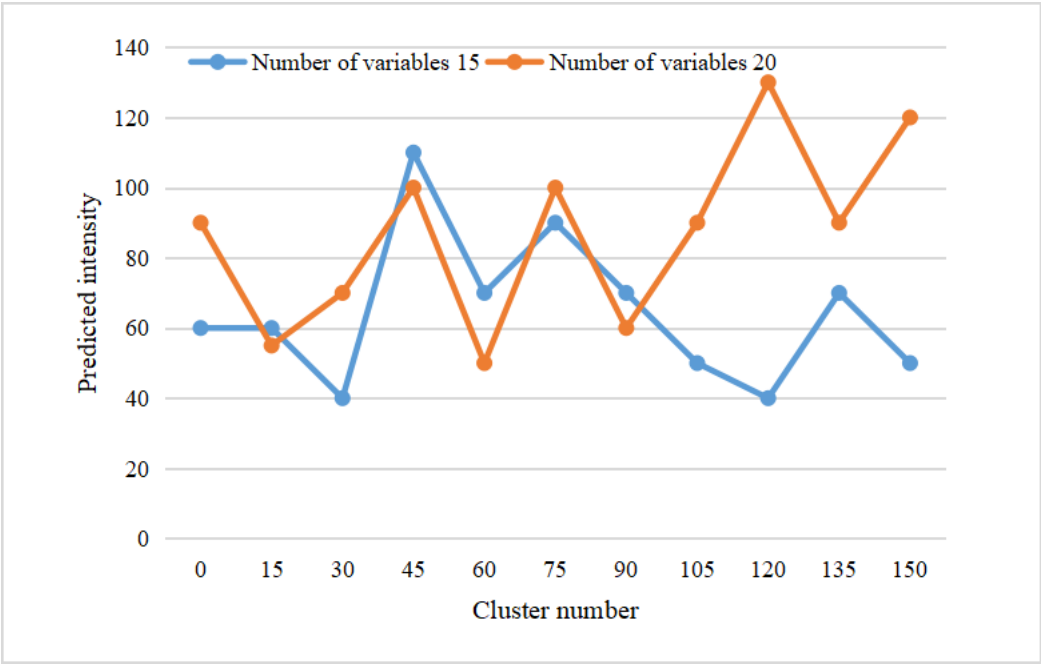
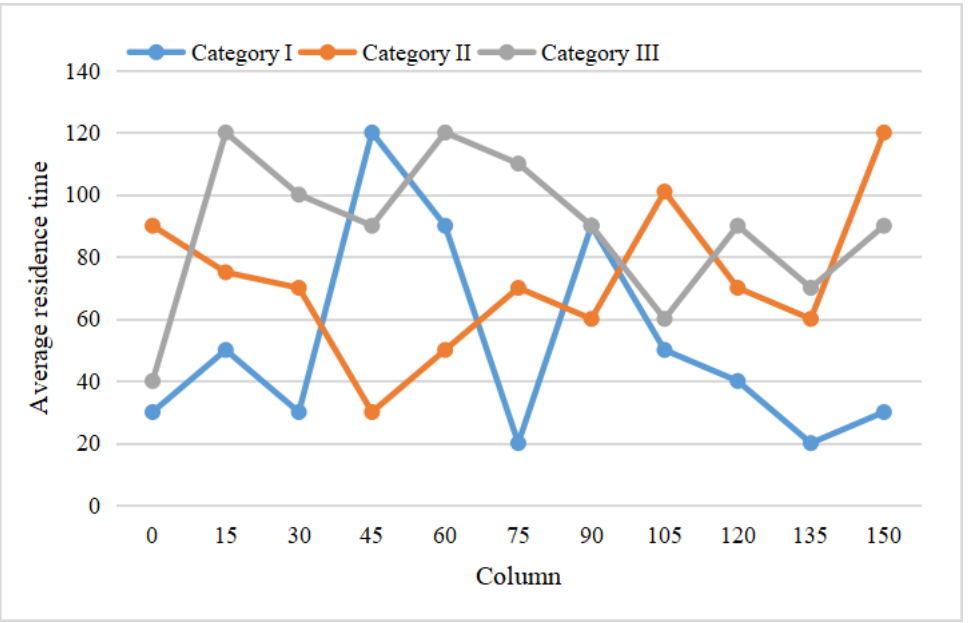


Figure 6. Average Stay Time of All Kinds of Visitors in All Columns



Finally, the results of clustering can be visualized in a line graph showing the average length of stay of the three types of visitors in each column, as illustrated in Figure 6.

Secondly, by evaluating the clustering trend of data sets, the authors can intuitively evaluate the probability of a uniform distribution of the data sets. For a data set, firstly, randomly select a sample A from it, then judge whether sample A is a typical sample. If it is a typical sample, calculate the typical point; otherwise, continue to judge until a typical sample is found. The partition function partitions the data so that it can be transferred to a different reducer, and the reducer function calculates the initial clustering centers. By modifying the matching strategy, the optimal configuration of the strategy is realized, and a new matching model is adopted according to the specific matching application; and the matching strategy is requested or the matching engine is started.

Finally, for an arbitrary data set D, which can be considered as a sample of random variables o, the Hopkins statistic needs to be calculated in order to determine the degree of dissimilarity of o from the uniform distribution in the data space.

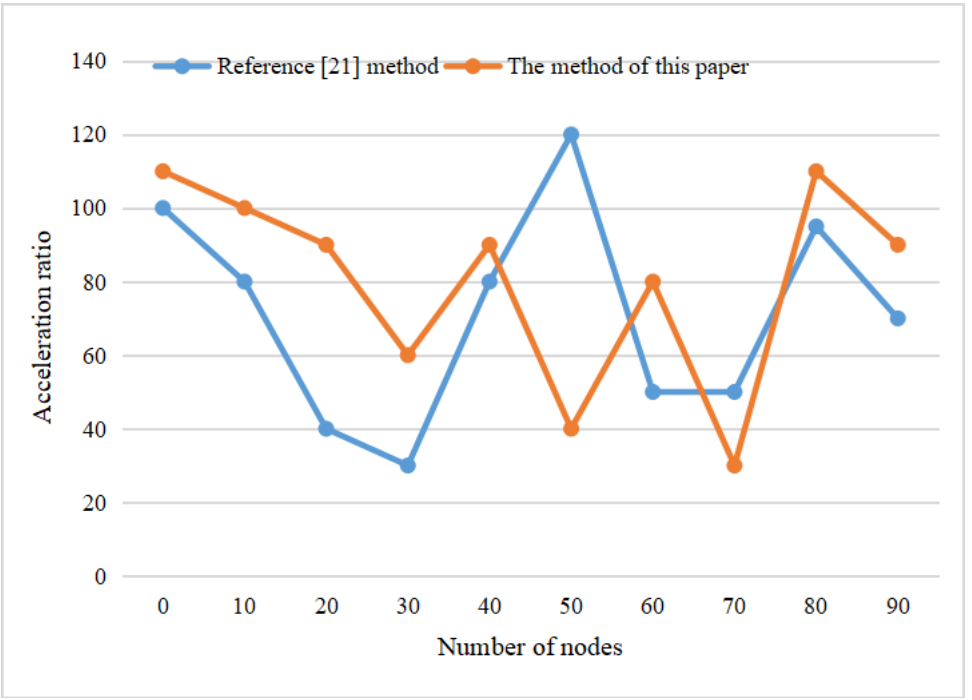
This makes it easier and faster to find representative samples and representative points and avoids the disadvantage of having to count multiple times because representative points are calculated only once. This section primarily offers matching engine prompts to student users based on their interests, majors, and analysis of student-teacher interactions. It involves accessing the application server to match service interfaces and subsequently configuring customized lists of professors and personalized matching systems. Given a matching strategy, the matching engine of the system uses the matching strategy to form an appropriate matching result.

Therefore, in the specific music education and teaching practice, the authors must not copy the Orff music method but simply "bring it"; but the authors should combine its experience with the actual characteristics of Chinese music education.

Determination of Cluster Number Analysis

In a sense, any musical education idea must originate in a particular country, state, or region and must be a unity of universals and particulars. Orff's pedagogy is a highly integrated educational model

Figure 7. Comparison of Acceleration Ratios of Different Methods



of music education for children, not only in musical performance but also in highly related artistic activities such as song and dance. Simple music is conceived from the elements of human music, and it is important to determine the "correct" number of clusters in the data set. This parameter is needed for clustering algorithms such as k-means, but it is also needed because the right number of clusters controls the appropriate granularity of the cluster analysis. The total execution time and the total number of executions of each algorithm were measured separately, and the algorithms of the literature (23) for different nodes were compared with the algorithms based on big data analysis. The following is a detailed analysis of these two experiments, as seen in Figure 7.

Therefore, the results show that the execution time of the method in this paper is shorter than that in the literature (21), except that the number of nodes is 50 and 70, and the total time analysis can effectively provide algorithm efficiency with the increase of the number of nodes. In testing the clustering accuracy, the data were expanded to 2 GB, and the results of 20 runs comparing the algorithms of literature (21) and literature (22) are shown in Table 1.

First, reducing the sum of within-cluster variance of each cluster will decrease as the number of clusters increases. Based on the distributed storage data combined with the MapReduce distributed computing model, the training process analysis model is obtained by modeling the data analysis using classification, regression, and correlation analysis algorithms of big data analysis algorithms. Benchmark tests show that if two objects belong to the same class, they should be assigned to the same cluster. Using deep learning techniques of machine learning, the model is analyzed based on the teaching process and teaching dataset to construct a personalized knowledge recommendation model. To measure the fit of the clustering clusters, the authors can calculate the average of the profile coefficients of all objects in the clusters. At the same time, the classification process eliminates the classified data in time to further reduce the complexity of the dataset. Each dataset is run twice to better reflect the effectiveness and stability of the algorithm, and the average precision of the runs

Table 1. Algorithm Accuracy Comparison

Data Set	Synthetic Control	Could	Wine Quality
The algorithm of this paper	65	73	71
Reference (21) algorithm	45	58	68
Reference (22) algorithm	56	55	65

is obtained to better reflect the variability of the results of the second run, the results of which are shown in Figure 8.

Secondly, if too many clusters are formed, the boundary effect of intra cluster variance can be reduced. Therefore, the heuristic method to select the correct number of clusters is to use the intra cluster variance and the inflection point of the curve. The experimental data is sourced from the UCI repository, which includes commonly used datasets such as iris, can, and others. The individual elements of the dataset collected in this paper are listed in Table 2.

Since the remaining data are all "bad" points, the processing method has little influence on the classification results. For the remaining data, many methods can be adopted, such as analyzing what the outliers are and deleting the outliers directly, because the outliers generally do not affect the final classification effect. Researchers can also compare the remaining data with k classes again and use the nearest principle to allocate them.

Finally, the authors can use the sum of squares of the distances between each point in the test set and its nearest neighbor to measure how well the clustering model fits the clusters. The role of the combiner is to interpret the fitness and aggregation by matching each dimensional attribute of the data and producing new values that encompass the cumulative values of each dimensional attribute. If there is no available benchmark for the dataset, one should use one's own method to evaluate the clustering quality. Since the fusion determines the weighting of the class masses in such a way that the weights are determined as a proportion of the total class mass, the class masses are more general and the clustering is more representative; this thus ensures a better dataset. The maximum possible reduction allows for faster operations and shorter execution times.

Figure 8. Size of Data Set and Accuracy of Results

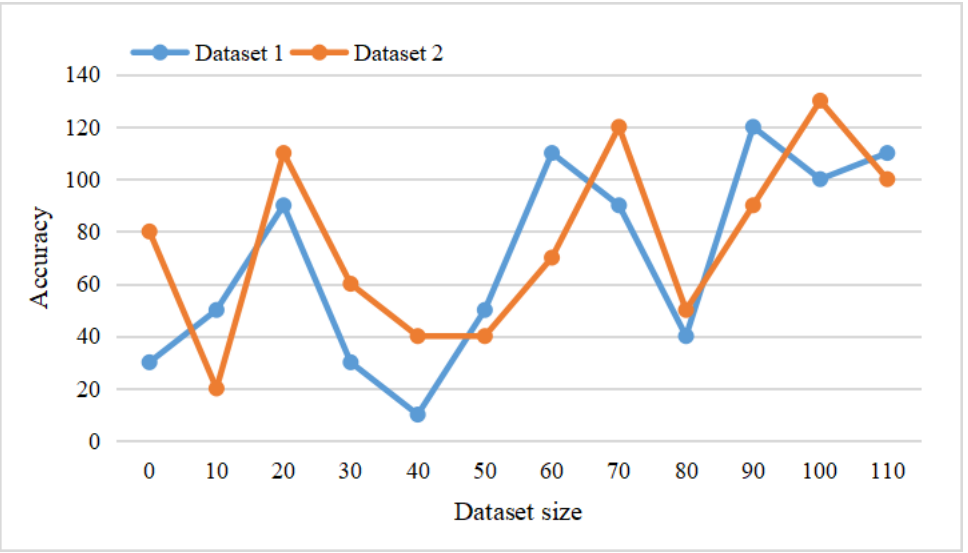


Table 2. Experimental Data Set

Attribute Type	Wine Quality	Could	Synthetic Control
Number of categories	Numerical value	Numerical value	Numerical value
Dimension	20	45	32
Number of samples	300	340	450
Data set	4	5	5

Clustering algorithms play an important role in the localization of music education. By evaluating the clustering trend and determining the optimal number of clusters for music student datasets, the authors can better meet the individual needs of students and improve the effectiveness of music education. To measure the degree of fit of the clustering model to the clusters, the quality of clustering can be assessed using the sum of squares of the distances between each point in the test set and its nearest neighbor. In the implementation of the clustering algorithm, the combiner's role is to interpret the fitness and aggregation for each dimensional attribute of the data. It then generates new values that encompass the cumulative values of each dimensional attribute. This approach helps to determine the weights of the class qualities and ensures that the clusters are more representative, thus better meeting the needs of music education localization. Moreover, by minimizing clustering algorithms to enable quicker operations and shorter execution times, it becomes possible to enhance the efficiency and accuracy of music education.

Therefore, clustering algorithms are an effective tool to help researchers better understand music student data, optimize the process of music education localization, and improve the effectiveness and efficiency of music education.

CONCLUSION

Within the realm of diverse music cultures, the interaction and collision of various musical cultures and trends in music education have emerged as crucial trends in the advancement of global music education. This has become a pressing issue for educational researchers. Meanwhile, clustering analysis is one of the key issues in big data analysis and a powerful tool for exploring hidden patterns in big data. The introduction and application of the Orff music education system is not just for participating in foreign music education research, but is also for rediscovering the development of local musical, linguistic, and cultural strengths; it is also meant to further localize the concepts and methods of Orff education. Therefore, this paper proposes a localization scheme for the teaching model of Orff music education based on big data analysis. By integrating big data analytics with the music education system, the suitable number of categories can be determined based on the data distribution itself, eliminating the necessity for domain-specific knowledge of the data. Therefore, educational research can produce a music education system that is truly suited to Chinese soil only if it accurately grasps the core concepts and connotations and combines them with the connotations of traditional Chinese music culture.

ACKNOWLEDGMENT

The authors would like to show sincere thanks to those whose techniques have contributed to this research.

DATA AVAILABILITY

The figures and tables used to support the findings of this study are included in the article.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

FUNDING STATEMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. Funding for this research was covered by the authors of the article.

PROCESS DATES

Received: 1/11/2024, Revision: 2/7/2024, Accepted: 2/7/2024

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