Ann. For. Res. 65(1): 9393-9405, 2022
ISSN: 18448135, 20652445

ANNALS OF FOREST RESEARCH
https://www.e-afr.org/

SIMULATION TRAINING METHOD OF FOLK MUSIC CONDUCTOR BASED ON DYNAMIC EVOLUTIONARY CLUSTERING ALGORITHM

Jiajia Li
Music and Dance Academy,Guizhou Minzu University,Guiyang,550000,China
Email: pipaljj@163.com

Abstract: The existing folk music conductor simulation training methods have the problem of imperfect data stream storage structure, resulting in low clustering accuracy. A folk music conductor simulation training method based on dynamic evolutionary clustering algorithm is designed. Divide the curriculum level, identify the value orientation of talent training curriculum, obtain the command characteristics of folk music, regulate the sound facilities, take the attributes of sample points as the judgment standard, use the dynamic evolutionary clustering algorithm to build the data stream storage structure, calculate the sample similarity, and design the simulation training mode of folk music talents. Experimental results: the average clustering accuracy of the folk music conductor simulation training method and the other two folk music conductor simulation training methods is 59.542%, 51.759% and 51.291%, which proves that the training method integrating dynamic evolutionary clustering algorithm has better performance.

Keywords: dynamic evolutionary clustering algorithm; folk music conductor; training courses; training methods; data flow; storage structure;

0 Introduction

The conductor shall convey the style and ideological connotation of the work to each band member or chorus member through gestures [1-2]. The gestures and actions used by the conductor in the performance of music are the command skills, that is, the command method. It is the basic skill that the conductor must master skillfully and the necessary means for the conductor to reflect the music and instruct the performer to perform. The basic command methods include "command schema", "shooting", "speed change", "rhythm type", "strength change" and "division of labor with both hands". In addition to learning the basic part of the command method, beginners still need to master the ability to read the general score, the so-called "seeing its type", Hearing its sound "means that the plane information in the music score is expressed stereoscopically through the carrier of band or chorus through the conductor method. Generally, the command specialty is divided into three sub categories, which generally follows the Western Command teaching system, and is relatively consistent in the basis and simple application of command technology [3-4]. However, in the face of more advanced learning, the three sub areas focus in different directions. At present, the research on the command techniques and teaching of orchestra and chorus conductor is more common at home and abroad, and the research on the direction of folk music conductor is less. Through their own learning and practical experience, combined with the common points of the three majors in command law, this paper tries to discuss the similarities and differences of command learning“ "Orchestra conductor" is also called "orchestra conductor" or "symphony conductor". Since the establishment of the command department of the Conservatory

of music, this major has been opened. At the initial stage, it was preached and taught by experts of the older generation, such as Soviet Union and Chinese scholars, and then the teaching content of conductor has been continued to this day. In fact, the teaching content of the orchestra conductor major basically follows the western traditional teaching mode. Before learning works, we should first understand the basic content of command learning, which is also the basis of command works. Such as prediction and starting, basic conductor schema, orchestra seating table, etc. After entering the works, the learning difficulty is gradual, and the style of the works follows the development context of western music, from Haydn, Mozart and Beethoven in the classical period, Tchaikovsky and Brahms in the romantic period to Stravinsky and Shostakovich in the 20th century.“The progressive learning difficulty of "orchestra conductor" is also reflected in the number of conductor voices, starting with String Quartet and gradually entering more voice works such as symphony. Compared with the other two majors, the establishment of folk music command specialty started late. The symphonic instrumental ensemble mode of "string pulling", "plucking", "pipe blowing" and "percussion" of national orchestral music was gradually formed at the end of the 20th century [5]. The teaching mode of folk music conductor is also constantly exploring and gradually forming a system [6-8]. Although national orchestras are different from symphony orchestras, because the sound generation mode of instrumental music is similar, and a large number of national orchestral works are written in symphonic logical vocabulary. Therefore, in the initial stage of directing learners, they still have to learn a large number of Western works to pave the way for learning large-scale national orchestral works in the future.

1 Simulation training method of folk music conductor based on dynamic evolutionary clustering algorithm

1.1 Identifying the value orientation of talent training curriculum

Curriculum is the core of education, and the modernization of curriculum is the core of educational modernization. The modernization of curriculum means to guide the curriculum preparation with modern values, ideas and ideas, make each element in the curriculum system interrelated, give play to the overall effect, and better solve the relationship between "individual development", "social needs" and "knowledge system". Under the guidance of this curriculum "holistic view", this section discusses the value orientation, basic principles and mutual cooperation of various curriculum types of folk music talent training curriculum in Colleges and universities in a general sense. Curriculum value orientation is the value tendency of curriculum subjects when making value choices according to their own needs in curriculum activities. Curriculum value orientation is the soul and direction of curriculum operation. It plays a guiding role in curriculum objectives, curriculum development, curriculum setting, curriculum implementation, curriculum evaluation and other aspects. It affects the implementation of the whole curriculum activities. Therefore, when discussing the curriculum of folk music talent training in colleges and universities, the primary consideration is also the value orientation of the curriculum. Only on the premise of clarifying "what the value orientation of contemporary folk music talent training curriculum should be and what its connotation is", can we formulate curriculum objectives, select curriculum contents, arrange implementation ways and determine

evaluation forms. In curriculum theory, people often discuss the basis of curriculum from three aspects: subject knowledge factor, social factor and student factor. The three aspects reflect three different attributes of the logical starting point of curriculum: cultural attribute - taking subject knowledge logic as the starting point of curriculum. Social attribute - taking social factors as the starting point of curriculum, humanistic attribute - taking student factors as the logical starting point of curriculum. If we examine these three attributes from the perspective of value orientation, they are: knowledge-based, social based and individual based value orientation. Like the value orientation of the folk music talent training curriculum in colleges and universities, whether it is knowledge ability standard, social standard or personal standard, they all have their own characteristics and shortcomings. They can not completely replace each other, nor are they primary and secondary and parallel. The three reflect the dialectical unity of giving consideration to each other. Therefore, the realization of multiple integration is bound to become the development trend of folk music talent training. Accordingly, it puts forward a new "comprehensive" value orientation of folk music talent training curriculum in Colleges and universities. Structure is an important feature of orderly things, and structured talent training courses must also be orderly. The specific training structure is shown in Figure 1:

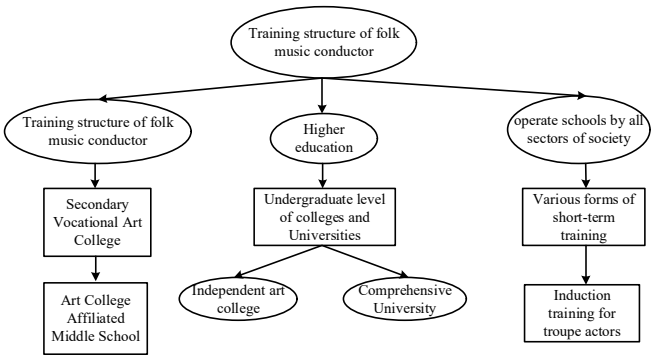

Fig. 1 Structure of music talent training in China

From Figure 1, we can clearly see that China's folk music talent training mode is mainly composed of three talent training modes: secondary education, higher education and social school running. The talent training mode of secondary education is mainly composed of folk music classes in Secondary Vocational Art Colleges and secondary schools affiliated to higher art colleges. This kind of talent training is mainly to provide blood for the cultivation of folk music talents at the undergraduate stage of higher professional art colleges in China, or provide comprehensive performing talents who can sing and dance for local song and dance troupes. The training mode of higher education talents is the most popular training mode in China, which is mainly composed of undergraduate stage and graduate stage. Under the guidance of this principle, the core of the structure construction of the folk music talent training curriculum system is how to effectively and creatively transform the learned professional knowledge and subject knowledge into practical and effective folk music subject teaching knowledge, folk music performance ability, editing and creation ability, folk music guidance and planning ability, and folk music management ability. Therefore, the structure of the folk music curriculum is not to divide the curriculum categories according to the disciplines of folk music as we used to, but to classify the curriculum based on

"the improvement of students' comprehensive quality and professional quality". Because of the cultivation of folk music professionals, the purpose of curriculum is to improve the professional and comprehensive quality of future folk music professionals, rather than develop disciplines [9-11]. In this way, only by following the principle of structured curriculum construction can we cultivate practical senior folk music performance, teaching, editing, directing or management talents. The order of curriculum structure lies not only in the structure of the curriculum system, but also in its hierarchy, that is, the curriculum structure can also be divided into different levels. These levels are interrelated and interact with each other to serve the curriculum structure. For the cultivation of folk music professionals, the principle of hierarchy is to divide each major category of courses into three levels according to the different roles of courses in improving students' quality. For example, professional courses can be divided into professional basic courses (or professional core courses), professional characteristic courses and professional elective courses. Professional basic courses provide students with the most basic and important theoretical knowledge in the discipline of folk music. They play a basic role in shaping students' professional quality and forging professional ability. Professional characteristic courses are the courses that embody the unique characteristics of folk music. Elective courses are mainly used to meet students' further needs for professional learning and provide a wide range of possibilities for students' personality and interest development. Based on the general goal of improving the comprehensive quality of folk music talents, we should distinguish each component structure of the curriculum and different levels of each component structure, so that the whole curriculum system can not only meet the common needs of most students of folk music, but also meet the individual needs of different students, so as to make the limited curriculum resources give full play to the educational effect as much as possible. Based on the above description, complete the steps of identifying the value orientation of talent training courses.

1.2 Getting the characteristics of folk music conductor

In terms of basic technology and theory, the conductor of folk music is basically the same as that of Western symphony, but there must be great differences between them because the objects of his command are very different. Folk music is the unified abbreviation of national orchestral music in the mainland. The new band combination of national orchestral music has gradually been recognized and accepted by the music industry in recent 30 years. So far, the band composition is still in the process of continuous improvement and standardization. The compilation is not finalized, and the general score style is "diverse". Generally, there is a relatively unified arrangement format of musical instruments, but it still needs to be further standardized, because there are still differences in the details of notation and the setting of musical instruments, which is difficult to be unified. After hundreds of years of evolution and improvement, symphony has already formed international band specifications and norms. Therefore, compared with symphony, folk music has few classic works that have been retained for many years and widely spread, and a large number of new tracks are relatively unfamiliar. The symphony is different. It has a considerable number of classic repertoires used all over the world, and the orchestra can perform skillfully. Therefore, folk music command is a new subject, an unprecedented art major without

reference and any systematic teaching materials. For the conductor of folk music, rehearsal is very important. It is the core of the conductor's work. The rehearsal of a folk music conductor is a difficult process. It is more difficult and complex to deal with folk music works than symphony conductor. The most critical way of cooperation between the conductor and the team is to run in through rehearsal, while the folk music conductor and the team need to double the running in. Therefore, the folk music conductor needs to have a stronger sense of running during rehearsal. The scale and main musical instruments of the folk band are shown in Figure 2:

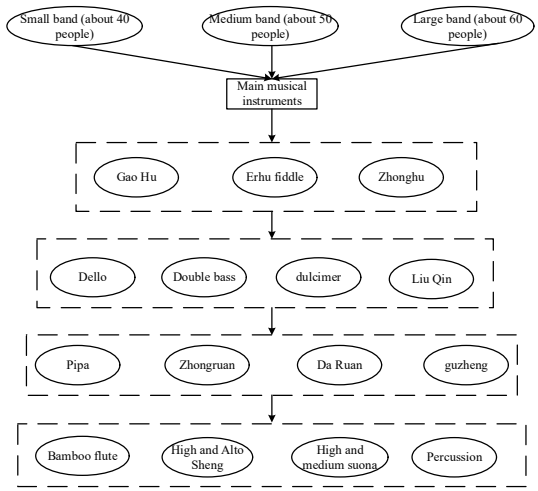

Fig. 2 Scale of folk band and main musical instruments

According to figure 2, as a folk music conductor, you need to be familiar with the performance and playing methods of various national musical instruments. The conductor of folk music should know the actual performance sound effect of each instrument, understand the advantages, limitations and potential of each instrument, and always pay attention to the development trend of performance techniques of common instruments. It is best to learn one or two instruments, and then understand other instruments by analogy. The conductor of folk music cannot imitate the working mode of guest conductor of symphony. A concert will be performed in a few working days of rehearsal. For new works, the conductor of folk music must go through voice practice to refine the sound combination. The style and rhythm of folk music can be accurately expressed only after the conductor and the band have enough time to run in. According to the actual use status of national orchestras, a more general arrangement method of national orchestras is obtained, as shown in Figure 3:

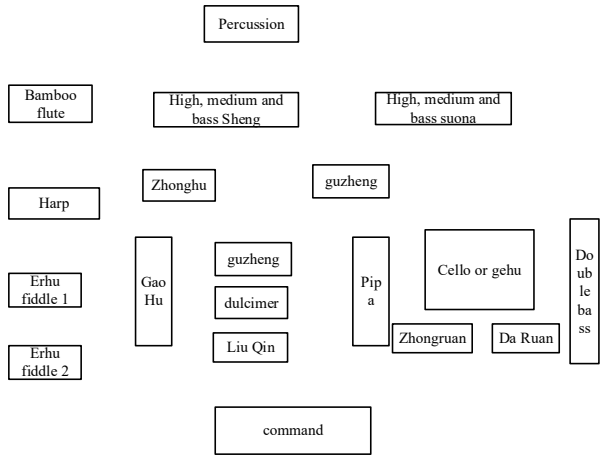

Fig. 3 Arrangement of folk bands

As can be seen from Figure 3, in the National Orchestra, there are many kinds of national musical instruments, diverse pronunciation principles, and highly personalized timbre and sound quality. In addition, different playing methods of each instrument or different schools of teachers may make the overall sound difficult to be pure. At this time, our folk music conductor needs to integrate and regulate the sound of the band. This is a high-level and high standard requirement, and this high standard problem is difficult to quantify and endless. Its difficulty is much higher than the integration of Symphony timbre. Music rhythm is one of the important symbols of the characteristics of national music. Chinese national music culture has a profound accumulation, and the music styles of each region are different, which can be described as a variety of forms. Among the new folk music works, there are not a few repertoires created with folk songs and opera music of various nationalities as materials. As a folk music conductor, we need to grasp and deal with these works with regional style and unique rhythm characteristics, grasp the key paragraphs for guidance in rehearsal, and cooperate with band members to accurately interpret the works and obtain recognition. Based on this, the steps of obtaining the characteristics of folk music conductor are completed.

1.3 Construction of data stream storage structure by dynamic evolutionary clustering algorithm

As an effective data processing tool, dynamic evolutionary clustering algorithm has been widely used in many fields such as high-performance computing, pattern recognition, image processing and data visualization [12-14]. It is an unsupervised learning process, does not rely on any prior knowledge, and takes the characteristics or attributes of sample points as the only criterion. Its essence is to identify the internal relationship between sample points, and then find out the characteristics of data distribution. Time series is an important part of dynamic clustering evolutionary algorithm. It is widely used in many fields, such as finance, industry, meteorology and computer network. A large number of data in the database exist in the form of time series. In the field of data mining, time series has attracted more and more attention and become a hot spot in the field of data mining. At present, the work of time series mining mainly focuses on classification, indexing, clustering and segmentation. Complete data stream mining tasks usually

include tasks such as clustering, classification, regression and anomaly detection. Clustering is a key step in data mining [15-16]. Clustering is an important method for data acquisition to find the information contained in the data set without labels. It is also a key part of data preprocessing. Cluster analysis is based on similarity, and data in one cluster has higher similarity than data not in the same cluster [17-19]. Data flow clustering defines the clustering of continuous incoming data. This puts forward higher requirements and challenges to the traditional clustering methods. It is necessary to use new data to update or recreate the clustering model, and forget the outdated data. Clustering data stream is a process of processing continuous data within memory and time constraints [20-21]. Therefore, the data stream clustering algorithm must meet the following requirements: 1. It can quickly and incrementally process continuous data objects in order to generate clustering results in time; 2. It can quickly adapt to the dynamic changes of data, which means that the algorithm should detect the emergence and disappearance of clusters in time; 3. Provide a memory efficient storage model, which can not only meet the rapid and incremental update, but also represent the current distribution of data flow. Feature vector is the most commonly used storage method, and its expression formula is as follows:

$$L = \frac{W}{Q} - \left(\frac{1}{\alpha}\right)^2 \quad (1)$$

In formula (1), W represents the number of data it represents, Q represents the linear sum of these data objects, and α represents the square sum of these data objects. The object-based clustering algorithm usually adopts the two-stage clustering mode: Micro cluster clustering online and macro cluster clustering offline. The data flow clustering framework is shown in Figure 4:

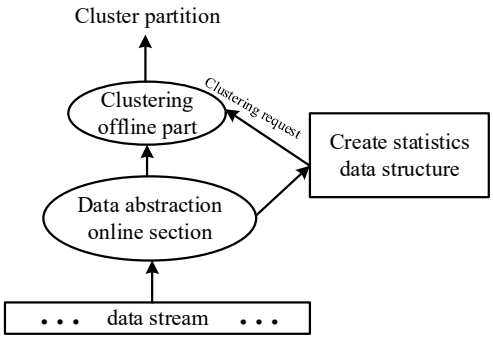

Fig. 4 Stage framework of data flow clustering

As can be seen from Figure 4, the online part counts the data flow with the help of a specific data structure to meet the time and space constraints of the data flow. These data structures (micro clusters) count the data flow to retain the meaning of the original objects without actually storing them. In the off-line stage, when the user has a clustering request or the data flow changes and needs to be reclustered, the standard static clustering algorithms can be applied to micro clusters to obtain the clustering division. For a dataset containing multiple data objects, build a data matrix:

$$P=\begin{bmatrix} p_{11} & p_{1\beta} & \cdots & p_{1n} \\ p_{22} & p_{2\beta} & \cdots & p_{2n} \\ p_{n1} & p_{n2} & \cdots & p_{n\beta} \end{bmatrix} (2)$$

In formula (2), p represents the data set, n represents the sample points in the data set, and β represents the cluster center. Get the historical, current and upcoming data sets in the dynamic data source. The data obtained from the historical data set or the current data set can be extracted at one time, but the data that has not been generated or is being generated can only be obtained step by step. Combined with the mathematical meaning of binary variables, the expression formula of simple matching coefficient of data is obtained:

$$l=\frac{u+s}{G} (3)$$

In formula (3), u represents the vector dimension, s represents the similarity of feature vectors, and G represents the difference of feature vectors. For nominal, ordinal and proportional scale variables, the difference calculation formula is:

$$g=\frac{h-\delta^{-1}}{q} (4)$$

In formula (4), h represents the number of sample matches, δ represents the total number of features, and q represents the data attribute value. Clustering criterion function is an essential part of clustering algorithm. As the basis to judge whether the algorithm is terminated, it directly affects the complexity of clustering algorithm and the accuracy of final clustering results. The specific operation is to define the threshold of similarity measure based on experience, and then classify the sample objects into the corresponding categories. Distance is the most commonly used measure to measure the similarity (or difference) between sample points. The criterion function based on distance is defined as follows:

$$F(\lambda)=\sum_{d=1}^{e} H^{d}(\lambda) (5)$$

In formula (5), λ represents the center point of the e-th cluster, H represents the intra class difference, and d represents the degree of membership. Through the study of flows in different time windows, users can better understand the dynamic behavior of clusters. Therefore, the data stream clustering algorithm must provide users with a method to check the clusters that occur at different granularity times (e.g., daily, monthly, annual), or even at any time. Some statistical structures, such as micro clusters, are effective tools for mining data streams because of their incremental and additive advantages. In addition, the clustering results on the data of many practical applications will be affected by the change of underlying data over time. Although many research was devoted to adapting the clustering results to the evolving data flow, the key problem is to track and understand the clustering evolution itself, so as to gain insight into the data and support strategic decision-making. Based on this, complete the steps of building the data stream storage structure.

1.4 Design the simulation training mode of folk music talents

The emergence and development of folk music conductor 'talents are accompanied by the needs of the society. Therefore, compared with other professional higher education, the cultivation of musical talents reflects more obvious social needs - that is, to meet the needs of the society and the development of the industry. Based on this, the evaluation of musical talent training course should take the combination and cooperation of people's "all-round development" and "social needs" as the basic goal and general principle of evaluation. If the playing instrument is regarded as the sample of folk music talent simulation training, the sample similarity calculation formula is:

$$Sim = \frac{1}{\sqrt{\sum_{v=1}^{z}\left(w_z - w_v\right)^2 + 1}} \quad (6)$$

In formula (6), w represents the number of sample features, v represents the sample dimension features, and z represents the radius of the cluster. Clustering is regarded as dividing the data set into different groups. The definition of clustering may be more detailed in the metric space, so that the topology can be used to specify the proximity of objects, in order to collect data at any time and model and track the cluster structure obtained by clustering. In the process of clustering evolution of samples, the clustering results in different time periods will evolve to varying degrees, so the calculation formula for calculating the overlap of two samples is as follows:

$$J\left(A,B\right) = \frac{\sum_{A\cap B} age\left(\varepsilon\right)}{\sum \varepsilon} \quad (7)$$

In formula (7), A,B represents any two samples within the cluster radius, and ε represents the metric space. If the degree of overlap is greater than 1, the best matching cluster will be selected. This characterization will not bring loss of information, and each observation can be monitored over time, which is conducive to more reliable and accurate evolution results. However, in the data stream, due to the limitation of memory, it is impossible to save all data objects. Therefore, a cluster is often represented by the summarized data. If statistical information is used to summarize its internal structure, the weight between any two clusters is estimated according to the conditional probability:

$$M = \frac{r\Delta_{t+1}}{\sum y_{(t)}} \quad (8)$$

In formula (8), r represents the distance between centers, y represents the sum of cluster radii, and t represents evolution data. Combined with computer technology, set up the simulation training mode of folk music talents. From the perspective of instrumental performance, the sound production methods of musical instruments in Western orchestras and national orchestras are very close. The performance methods of stringed instruments, wind instruments and percussion instruments are of the same origin. Only "plucked instrument" is a conventional and different from Western orchestras in national orchestral music, such as sanxian, pipa, Ruan, etc. The playing methods are usually playing, picking, sweeping, wheel, etc. Due to the special shape of this kind of musical instrument, the conductor learners need to study the internal principle of its sound

production and use reasonable command actions to better lead the orchestra members to play and make them more reasonable and comfortable to express music. Apart from plucked instruments, other musical instrument groups can correspond to each other under the establishment of "Chinese" and "western" bands. For example, huqin instruments can be compared with the playing method of violin instruments, and Chinese flute can be compared with the sounding method of Western flute. Then, when learning these two majors, it is easier to master the ways and methods of conducting instrumental music with references. The creation of national music has shown a prosperous scene in just a few decades, and a large number of works of different styles have emerged, which stems from the fact that composers invariably use national and folk music materials to create works with Chinese traditional style. When facing folk music works, command learners should distinguish the learning methods of "music" and "combination" majors, jump out of the thinking mode of studying a certain style period, read works as much as possible, widely learn and understand local traditional folk music, first understand more music materials and accumulate enough works, so as to better learn folk music command. This shows that in command learning, in addition to learning the specified command actions, it also needs a lot of theoretical knowledge to support practice. Only after in-depth research and learning can the command work be more handy. Make use of the current advanced technology to train all-round folk music conductor talents. Based on this, the steps of designing the simulation training mode of folk music talents are completed.

2 Experimental analysis

2.1 Select experimental data set

The experiment is programmed by MATLAB. Firstly, Wine data set is selected: it is composed of 178 data, which is 71 and C3 is 48. The UCI standard data set wine was used for the experiment. Each data has 13 attributes, including three categories: 59 for C1, 71 for C2 and 48 for C3. KAIDA algorithm is used to experiment with wine data set. The characteristic dimension and classification number of the data set are shown in Table 1:

Table 1 Dataset information

Name / Characteristics	Iris	Wine	Glass	Seeds
Number of sample points	152	176	216	212
Data dimension	4	11	9	7
Classification number	3	3	7	3

Because the threshold needs to be set in advance during the experimental test, and the set threshold affects the number of clusters, thus affecting the final clustering results, the thresholds are set to 1.1, 90, 0.7 and 1.8 for iris, wine, glass and seeds data sets respectively. On the basis of the above experimental preparation, an experimental test was carried out.

2.2 Experimental result

Select the folk music conductor talent simulation training method based on K-means algorithm and the folk music conductor talent simulation training method based on FCM algorithm for experimental comparison with the folk music conductor talent simulation training method in this paper, and test the clustering accuracy of the three folk music conductor talent simulation training methods under different running time conditions. The experimental results are shown in table 2-4:

Table 2 Clustering accuracy with running time of 150s(%)

Number of experiments	Simulation training method of folk music conductor based on K-means algorithm	Simulation training method of folk music conductor based on FCM algorithm	The simulation training method of folk music conductor talents in this paper
1	66.541	65.418	72.005
2	62.314	64.203	71.654
3	60.182	63.879	69.845
4	62.554	62.151	71.050

Table 3 Clustering accuracy with running time of 250s(%)

Number of experiments	Simulation training method of folk music conductor based on K-means algorithm	Simulation training method of folk music conductor based on FCM algorithm	The simulation training method of folk music conductor talents in this paper
1	55.021	54.116	63.874
2	54.216	53.609	61.206
3	56.849	52.171	65.445
4	53.022	54.886	67.210

Table 4 Clustering accuracy with running time of 350s(%)

Number of experiments	Simulation training method of folk music conductor based on K-means algorithm	Simulation training method of folk music conductor based on FCM algorithm	The simulation training method of folk music conductor talents in this paper
1	36.787	34.588	42.316
2	37.842	36.210	43.219
3	39.564	37.414	42.505
4	36.221	36.852	44.177

According to table 2, the average clustering accuracy of the folk music conductor talent simulation training method in this paper and the other two folk music conductor talent simulation training methods is 71.139%, 62.898% and 63.913%; According to table 3, the average clustering accuracy of the folk music conductor talent simulation training method in this paper and the other

two folk music conductor talent simulation training methods is 64.434%, 54.777% and 53.696%; According to table 4, the average clustering accuracy of the folk music conductor talent simulation training method in this paper and the other two folk music conductor talent simulation training methods is 37.604%, 36.266% and 43.054%, which proves that the folk music conductor talent simulation training method in has a wider application space.

3 Conclusion

On the current background, the simulation training method of folk music conductor talents in this paper can basically meet the current social needs for folk music conductor talents, be in line with the future development of folk music as much as possible, and ensure the curriculum and implementation strategy of folk music conductor talents training that is really conducive to students' learning and survival. Of course, the implementation of any theory with new ideas is not easy. Due to the comprehensiveness and complexity of curriculum research and musical drama discipline, and this research still belongs to the blank field of research, this research process is quite arduous and difficult, coupled with my limited ability, The analysis and explanation of some problems in the curriculum setting and implementation of folk music conductor training in Colleges and universities are inevitably shallow. In the future, we will continue to focus on relevant topics and achieve corresponding results.

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