

Intelligent Control System Algorithm Based on Cooperation in Singing Method of Soloist

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Keywords: Song Singing, Solo Singer, Intelligent Control System Algorithm, Synergistic cooperation

Abstract: With the continuous improvement of people's material living standards, music has become popular with the public, and plays an important role in modern society. Most people use their favorite and popular songs to express their love, sincere feelings, yearning for memories and other aspects of emotional and life experiences. In the vocal music competition, the thoughts expressed by the singer are very rich, diverse and complex and have a certain difficulty. And there's a high degree of consistency between these different things. Solo singing is an important vocal music art, but also the singer and the audience between the emotional communication and the collision of ideas the most direct, the most infectious way. In this paper, the algorithm of cooperative intelligent control system is applied to the singing method of soloist, and the algorithm of cooperative intelligent control system and the different training methods of soloist singing method are analyzed. Through the experimental test of different soloists, it is found that the application of intelligent control system algorithm in the singing method of soloists makes the performance achieve the best effect, and the audience's satisfaction is improved, and the satisfaction score is increased by 12.3%.

1. Introduction

With the rapid development of modern society, people are demanding higher and higher quality of life, and art is one of them. An actor is a career that combines acting and singing. Performing a good work on stage can not only make the audience feel pleasant, relaxed and happy. It can also sublimate and deepen the performance effect. At the same time, it can also enhance the presentation of strong emotional conflicts, contradictions and contradictions between the plot content and the

characters, so as to better convey feelings and promote the development of the story plot. Therefore, it is of great significance to study the singing method of actors' solo songs.

Many researchers have studied the singing of collaborative soloists. Molchanova Violetta S discussed the singing lesson system of educational institutions in the Russian Empire, focusing on the history and educational significance of school music and chorus training, teaching difficulties and methods [1]. DaiJiajie studied the interactivity of singing by analyzing the factors affecting the intonation of an unaccompanied duet, calculated the pitch error and interval error, and tested the influencing factors using one-way analysis of variance and linear mixed effects model [2]. Yehia Enas Fares offers a comprehensive overview of the etiquette, customs and rules of courtesy in ancient and modern Egyptian female solo vocations from a comparative perspective. A detailed sequential survey has been carried out on all the collected data, as well as a detailed sequential survey and analysis of all the collected data on this topic and the topic of female soloists [3]. D'Orazio Dario has shown what he can do, and what he can do, when he focuses on recording from the Italian melodrama period. The themes chosen are from scores by Donizetti, Verdi and Puccini [4]. Palmer Tim stresses the importance of higher education, the link between a wide range of creative and cultural interests and musical excellence, and the important role of conservations in diverse training and easy transitions into professional careers [5]. The results are good, but there are still some problems.

With the continuous improvement of people's pursuit and appreciation of beauty and the rapid development of science and technology, the progress of performing arts is promoted. As an important part of vocal music works, solo songs have been widely valued and achieved good results. This paper will combine the intelligent control algorithm; take the actor's solo song as an example to analyze how to make it achieve the best combination of songs, the best sound effect and the optimal singing method.

2. Application of Intelligent Control System Algorithm in Singing Method of Soloist

2.1. Collaborative Cooperation

Collaborative cooperation means that two or more different people form a whole to accomplish common tasks through cooperation and obtain corresponding benefits. In the field of music, the concepts of "cooperation" and "defense" are the most common and basic ones. When a certain band has a certain situation, it is impossible to coordinate with each other and take certain measures to solve the problem. Or there may be a situation in which the band is unable to deal with the adverse effects of the situation or problem in a timely manner, making it impossible for the other members to continue working together and resume their work. In this case, the contractual nature is particularly important. Collaboration can improve the overall cooperation ability of the band. This paper discusses how to use the collaborative mechanism to improve the singer's musical effect and control when the two actors with the same characteristics are closely related to each other and mutual restriction relationship are trained intensively, and analyzes its feasibility, scope of application and limitations combined with specific case studies. At last, a solution of adding more than two different roles to the intelligent control system to achieve the best balance state under the combination mode is proposed and verified by experiments. Collaboration can effectively solve certain conditions or problems of a band. In today's society, music has become an essential part of people's life. Vocal music, as a singing art, is one of the Musical Instruments with a complete and systematic structure, a certain complexity, and relatively high organizational ability. It can convey sound and feelings to the audience, and achieve the purpose by expressing emotions in different forms, playing an important role in modern society.

2.2. Collaborative Intelligent Control System Algorithm

The feature of the collaborative recognition algorithm is that it classifies and recognizes images based on general information of different images. Compared with the classical classification recognition method based on operation parameters, it provides better recognition performance in terms of image noise or error. Sometimes crystal - clear images are captured during crystal rotation, and some images are blurred [6]. Therefore, a collaborative algorithm is used to classify and recognize the crystal images.

Intelligent control algorithm is a kind of adaptive search [7-8] for simple, stable and high-precision objects in complex systems by imitating and using multiple or unstructured automatic controllers. Currently commonly used to this type of programming methods are: Based on the classical neural network method (BP), genetic algorithm as the basis of programming, and get the results of multi-number logic for solving linear problems, the most used is the feedforward control theory, and fuzzy reasoning, support vector machine, artificial potential field and other intelligent technology combined to realize the processing process of data in the complex system.

The basic idea of pattern recognition collaborative method is to identify the experimental state q , enter the standard state V_k closest to q (0) through the intermediate state q (t), and construct a dynamic process. The dynamic equation of image recognition at this time is described as follows:

$$p = \sum_k \lambda_k V_k (V_k^+ q) - \sum_{l \neq k} \sum_{k \neq l} B_{kl} (V_l^+ q)^2 (V_k^+ q) V_k - c(q^+ q) q + B(t) \quad (1)$$

Formula: λ_k is the attention parameter, V_k is the original operation vector, V_k^+ is the adjacent vector of V_k , B_{kl} and c are constants, the expression containing B_{kl} is used to identify the expression between various operation modes, the expression containing c is used to limit the exponential growth of experimental mode q , $B(t)$ is the negligible wave force. Let the number of modes of operation be M , the state vector N and the dimension M of $M \leq N$ are necessary to satisfy the condition of linear independence between the original mode vectors. q and V_k meet the condition of zero average and normalization:

$$\|V_k\| = \sum_{l=1}^N V_{kl}^2 = 1 \quad (2)$$

V_k^+ and V_k meet:

$$(V_k^+ V_l) = \delta_{kl} = \begin{cases} 1 & k = l \\ 0 & k \neq l \end{cases} \quad (3)$$

In the intelligent control algorithm, the general processing process is:

1) Preprocess the original data.

Contains information such as numbers, letters, symbols, etc. The information can be stored directly in the database through the memory;

2) Input the obtained values and values into the computer system within the corresponding time,

It is calculated that there is a certain relationship between the time value and the output and then returned to the user. If there is a certain relationship, it needs to automatically execute the operation under the preset program: (1) The preprocessing process is to sort the original data and determine its order. (2) The pre-processing process is to sort the tasks that have been assigned in a certain order, and output the results to the program. Including the data and algorithm analysis, calculation and program operation; Finally, select the appropriate operation method according to the actual situation.

2.3. Singing Methods of Soloists

The training steps for soloist singing are shown in Figure 1.

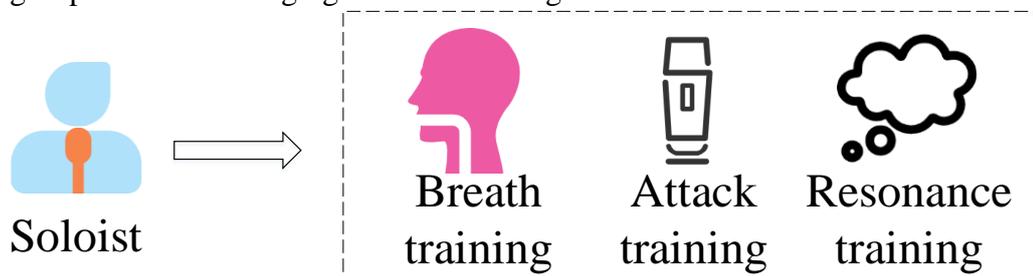


Figure 1. Soloist singer singing song

2.3.1. Breath Training

Once soloists have a deeper understanding of breathing in vocal training, they will find that good voice and singing skills are based on deep breathing work [9-10]. This is the singer's ability to maintain a deep, full breath for a long time after each inhalation and exchange of air, thus making the singing of musical phrases more coherent and even. Full breath allows singers to sing longer songs, so it is very important to be a good soloist in terms of breath control and practice. However, there is a misconception that the more fully you breathe, the better you sing, but this is inaccurate, as too much inhaling can cause excessive muscle tension and negatively affect singing. The amount of inspiration varies from person to person, but it's important to keep it at the right amount and level and to be able to sustain the duration of each line you sing. In a solo performance, the amount and speed of breathing should be controlled according to the length and rhythm of the song being sung, as well as the intensity of the high and low notes, in order to make the singing more relaxed and natural. The inhaling process should be combined with the partial exhalation, taking the breath deep so that it gathers strength for the rest of the song.

2.3.2. Pitch Training

The training of a solo singer is mainly in weak intonation. Weak intonation occurs in songs with a relaxed rhythm, requiring the singer to be ready to breathe at the beginning, but to flow out slowly, similar to the breaking sensation in folk songs. When singing, it is important to put your breath in front of your voice, so that the breath is released first and the voice comes later. It is also important to pay attention to breathing exercises in daily singing practice, it is easy to feel the air flowing through the microphone if you inhale first and then simply let the sound out. By doing so, not only breaks the continuity of the song, but also breaks the mood of the song itself, so practicing soft breathing is an important part of the vocal music and the foundation of the song. Soft breathing allows the singer to change the breath more scientifically, making the song more cohesive and aesthetic.

2.3.3. Resonance Training

Coordination in solo singing mainly includes three aspects: chest resonance, head cavity resonance and oral resonance [11-12]. The sound resonance of a soloist singing a piece has nothing to do with pronunciation and can be solved according to the soloist's knowledge of the piece. It can be seen from music programs that different singers singing the same song can produce different resonating effects, because soloists can control the size and intensity of resonating cavity arbitrarily

according to their own understanding of the song, and perform very well in different songs [13]. Thoracic resonance is the basis of vocal chord resonance in singing and plays a fundamental role in supporting the pitch of the singing voice. Simply put, if the vocal cords vibrate, then the pneumothorax should vibrate with them, which is the most direct manifestation and sensation of chest resonance. When it comes to singing, sopranos and tenors tend to have more power and impress the audience, mainly because the high range is more penetrating, louder, and more dynamic. However, even higher treble notes use cavity resonance to enhance the artistic effect, because the head cavity resonance can effectively express emotion and set artistic mood, and use the head cavity resonance more effectively, resulting in optimal sound quality and less damage to the vocal cords. Although oral resonance is not as important in vocal singing as the head cavity and chest cavity resonance, it is also a reflection of the basic quality of the singer's speech. If a singer uses too much oral resonance in her singing, she will end up with a flat voice, which goes against the essence of Bel canto and thus cannot bring out the beauty of her voice[14]. Therefore, the singer must make better use of the three resonating cavities in order to sing better and keep the most beautiful voice [15].

3. Influence of Algorithm of Intelligent Control System on Singing Style of Soloist

3.1. Experimental Process

Ten soloists were randomly selected for the experimental test. The 10 soloists were divided into two groups: a and b. Among them, soloists in group a performed with traditional singing method, while soloists in group b performed with collaborative intelligent control system algorithm singing method. After the two groups of soloists finished playing, audience satisfaction rating test was conducted, and experimental results were recorded and analyzed.

3.2. Experimental Data

The specific data of 10 soloists are shown in Table 1.

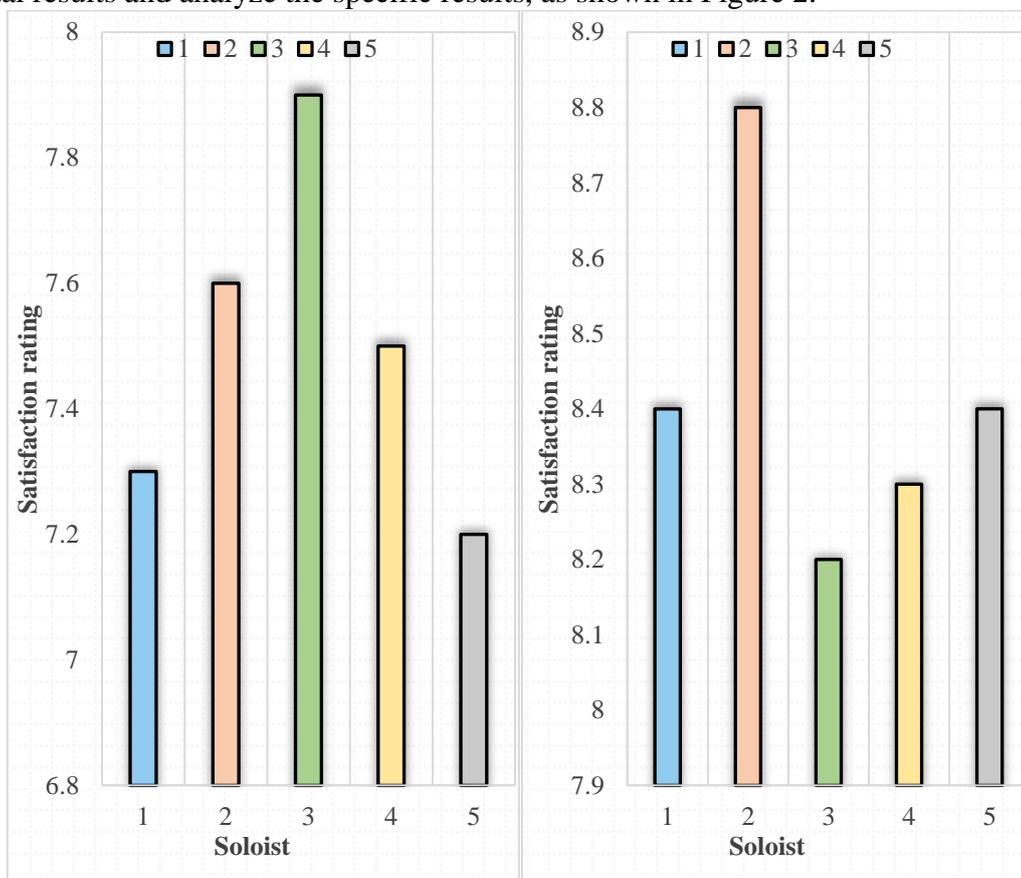
Table 1. Specific data for the 10 soloists

Group	Serialnumber	Age	Gender
Agroup	1	31	female
	2	32	female
	3	29	female
	4	28	female
	5	34	female
Bgroup	1	32	female
	2	35	female
	3	31	female
	4	27	female
	5	28	female

3.3. Experimental Results

The higher the audience satisfaction rating, the better the soloist's performance. To test the influence of the collaborative intelligent control system algorithm on the singing style of the soloist, the two groups of soloist performed the soloist in this way, and the audience was asked to score the

satisfaction of the soloist, observe the difference between the two groups of test results, record the experimental results and analyze the specific results, as shown in Figure 2.



a. Group soloists satisfaction rating b. Group soloists satisfaction rating

Figure 2. Audience satisfaction rating test

As can be seen from Figure 2, Figure a is the audience satisfaction score of soloists in Group a, and Figure b is the audience satisfaction score of soloists in Group b. Soloists in Group a scored between 7.0 and 8.0, while soloists in Group b scored between 8.0 and 9.0. Soloists of Group a who performed with traditional singing method scored an average audience satisfaction of 7.5, while soloists of Group b who performed with collaborative intelligent control system algorithm singing method scored an average audience satisfaction of 8.42. To sum up, the application of the intelligent control system algorithm in the singing method of the soloist achieved the best performance effect, and the audience's satisfaction was improved, with the satisfaction score increased by 12.3%.

4. Conclusion

With the rapid development of economy, people's living standards have also been significantly improved, and music art is playing a more and more important role in People's Daily life. And the singer's accurate and reasonable singing treatment of the song is the realization of vocal music learning and creation and to a higher level of interpretation of the work is essential and key factors. In this paper, the algorithm of cooperative intelligent control system is applied to the singing of soloist, and its application is studied. It is found that the algorithm of intelligent control system can improve the satisfaction of audience through the test of audience satisfaction of soloist.

Funding

If any, should be placed before the references section without numbering.

Data Availability

The datasets used during the current study are available from the corresponding author on reasonable request.

Conflict of Interest

The author states that this article has no conflict of interest.

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