

Retraction

Retracted: Feasibility of Music Composition Using Deep Learning-Based Quality Classification Models

Wireless Communications and Mobile Computing

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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- [1] S. Zhang, "Feasibility of Music Composition Using Deep Learning-Based Quality Classification Models," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 8123671, 9 pages, 2022.

Research Article

Feasibility of Music Composition Using Deep Learning-Based Quality Classification Models

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Polyphonic music technique is the foundation of students' understanding of musical works. The mastery of polyphonic music techniques enables students to better understand the meaning of musical works and get in touch with the soul of music. Hence, teaching polyphonic music is a compulsory course for composition theory. In the past, all the concepts taught in the composition theory class included the use of the main key, and the minimal amount of polyphonic music works was covered. Also, even if students encountered polyphonic music, a brief inclusion of the same would be included in teaching, creating difficulties for the students to understand polyphonic music well. Intelligent music composition, however, refers to a formalized process that allows the composer to create music with the help of a computer, ensuring minimal human intervention. With the popularity of the Internet and the rapid development of multimedia technology, the majority of the users now use online music applications. Therefore, the need to automatically organize and manage the huge amount of music data effectively has evolved. Studying intelligent music composition helps to understand and simulate the way of thinking of composers in making compositions. It also helps to assist composers in making music, in addition to entertaining people. Considering the aforementioned, the present paper uses a deep learning-based quality classification model for music composition feasibility. The experimental results show that the algorithm has the advantages of fast detection speed and high quality. It helps composers to compose music, greatly reduces the workload, and also ensures certain promotion value.

1. Introduction

With the development of the economy and society, people have put forward higher requirements for spiritual life. In today's society, people's entertainment life is more rich and diverse. Music is a special kind of social ideology, which can not only cultivate sentiment and regulate emotion but also develop thinking and emotion, and has strong infectious power [1]. The streets and alleys, shopping malls, and supermarkets are full of music rendering, giving people passion and enjoyment. With the popularity of the Internet and the rapid development of multimedia technology, the amount of music on the Internet has exploded, and music searching, auditioning, and downloading have become very popular applications among Internet end users [2]. For music service providers, the huge amount of music data and the increasing number of users bring opportunities as well as great challenges. Faced with the massive amount of

music data, it is obvious that the manual-based music organization and management methods can no longer adapt [3]. At the same time, the huge number of users brings a variety of different music information needs, which also makes the original single music service approach seem backward. Therefore, how to automatically organize and manage music data effectively, as well as provide diversified services to meet different users' needs, becomes an important issue [4]. It is in this context that research on music composition quality detection began to develop and become popular.

Music has always been loved and welcomed by people, and since ancient times, composers have been trying new techniques and skills to meet new needs. With the development of the mobile internet, the amount of multimedia short video users continues to increase. Numerous short videos, games, and animations need a large number of original compositions to support them, while professional music production is costly and cannot meet users' personalized needs for

background music [5]. With the development of machine learning, automatic computer composition will greatly improve music creation power, while assisting composers to develop new creative ideas. Of course, as the amount of music continues to increase, it is also important to manage the generated music in a categorized manner [6]. Artificial intelligence is a strategically important science and technology that humans need to focus on in the future. Music is an important form of human emotion expression. The corresponding music emotion is also a kind of human emotion that cannot be quantified. In case of a change in music melody, the corresponding emotion will also encounter a rich change in trend. Considering the strengths of artificial technology in the rapid recognition of musical sounds or optical music scores in association with the reasoning and optimization of the musical emotion model, it can directly make the machine obtain a mode of expressing human musical emotion and finally realize the goal of carrying out musical cocreation with users. It can also provide services related to artificial intelligence composition, which has significant research prospects and real-time applicability in promoting the development of artificial intelligence and the commercialization of the music industry [7]. The basic elements of music composition are shown in Figure 1.

In conclusion, considering the increasing demand for AI composition at present, it is necessary to conduct in-depth research on AI composition. However, in order to better promote the development of AI composition, it is necessary to base on the current situation of AI composition development and need to clarify the future development direction. Specific focus can be placed on the development direction of multialgorithm combination optimization, identification, and optimization of multisource music emotion, and the combination of robotics and AI composition to ensure that the development of AI composition can be effectively promoted [8]. Based on these, this paper uses a deep learning-based quality classification model for music composition feasibility. The experimental results show that the algorithm has the advantages of fast detection speed and high quality.

2. Related Work

This chapter focuses on research-related work, starting with the current state of research in music composition, followed by the current state of research in composition recognition, and finally the current state of research in deep learning.

2.1. Current State of Research in Music Composition. Looking at the development of artificial intelligence composition, we can see that its earliest manifestation is mainly algorithmic composition, and only after that, it developed to the stage of artificial intelligence composition [9]. In the mid-1950s, algorithmic computer composition was born, and the concept of artificial intelligence was introduced at the same time, but it was many years before algorithmic composition started to change to artificial intelligence composition because computers were very expensive at that time, and the operation rate was slow and complicated [10].

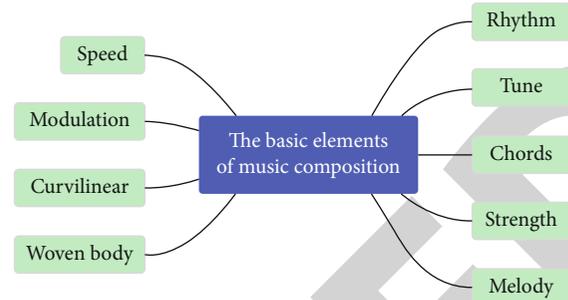


FIGURE 1: The basic elements of music composition.

The earliest computer algorithm composition was mainly the “iliac suite.” Then later, Alpern developed the EMI composition system in 1995, which allows the creation of works by composers who have passed away in a patchwork fashion [11]. For example, applications based on this system have enabled the reproduction of musical works of deceased composers like Mozart and Bach. Subsequently, GeorgBoenn et al. developed the Anton composition system in 2010, which employs answer set programming for composition, an algorithm that has produced a relatively large innovation in the field of composition, allowing for automatic recognition of human composition errors [12]. After entering the 21st century, academics began to pay great attention to algorithmic composition and studied it comprehensively and deeply. Fernandes proposed in 2013 that the development of algorithmic composition systems could drive human music composition into a new era, which indicates that AI composition research has stepped into a brand-new stage [13]. Many foreign AI research companies have started to study AI composting systems in-depth, and the music works created by them can even reach the point of “faking.” These AI compositions are basically consistent with those composed by humans. At present, the field of AI composition in China is still in the primary exploration stage, and some domestic companies have developed AI composition systems or corresponding music works one after another [14]. However, the research results of these AI compositions cannot form a systematic system yet, and the listenability of the corresponding AI works also needs to be improved. The integration between AI composition and deep learning is getting closer and closer today and is starting to move in a diversified direction [15]. There have been numerous attempts to combine stochastic processes with other algorithms, such as the combination of two algorithms, genetic algorithms, and artificial neural networks, to improve the effectiveness of artificial intelligence composition creation. The general steps of AI composition are shown in Figure 2.

Through the above analysis of the algorithms involved in the current development of AI composition, it can be seen that there are more kinds of methods for AI composition computation today. Their advantages and shortcomings have different manifestations [16]. Therefore, in order to better promote the development of artificial intelligence composition, attention should be paid to prompt the development of intelligent composition algorithms in the

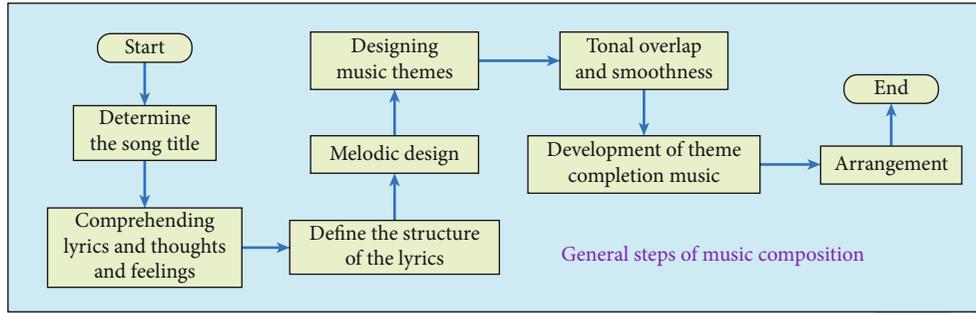


FIGURE 2: The general steps of AI composition.

direction of diversified hybrid algorithms, considering that the system and style of musical works born in the context of AI composition at present are rather single and not very listenable [17]. Therefore, in order to better promote the development of AI composition in the coming period, it is necessary to focus on the development of a multialgorithm combination optimization direction. Specifically, during the mixed application of multiple intelligent composing algorithms, the advantages and shortcomings of each algorithm are analyzed in-depth. It is possible to use them in combination in a way that gives full play to their respective strengths and avoids their weaknesses. This has the potential to further enrich the genre and styles of musical works composed by artificial intelligence thereby enhancing their listenability. In recent years, with the development of AI technology, it has been widely used in music composition, which can improve the efficiency of music composition and increase the novelty characteristics of music effects on the basis of saving labor costs [18]. This will have a positive impact on promoting the commercialization of China's music industry. However, in order to ensure the smooth penetration of AI technology, its active role in identifying and optimizing the emotions of multisource music needs to be strengthened.

2.2. Current Status of Research on Composition Recognition.

Music originates from life and reflects the emotions of its creators. With the rapid development of digital music production technology, the number of music genres continues to increase. Text-based music retrieval is no longer applicable, and new classification retrieval methods have been explored to facilitate the retrieval of target music from massive data [19]. Currently, commonly used music retrieval is based on content-based retrieval methods, such as classification based on the name of the music piece, the specified composer, and the era of the piece. Music as a carrier of emotion, retrieval research based on music emotion classification has a very important objective significance.

The study of musical emotions dates back to the end of the 20th century. The MuscleFish method was proposed to classify music emotion by extracting the pitch, width, and brightness features in the frequency domain of music [20]. In 1997, the first mathematical-statistical model was used to describe the music emotion problem. In the same year, they extracted the MFCC coefficients and short-time energy features of music and classified them using the minimum

distance algorithm. In 2004, they extracted the spectral features of music and classified the emotions using the SVM classification algorithm. Subsequently, research scholars have also successively used SVM for music emotion classification [21]. Music sentiment recognition is similar to speech sentiment recognition. Research scholars have explored and studied the effectiveness of the random forest classification algorithm in speech emotion recognition, which has greater advantages in generalization and antinoise robustness compared with the SVM classification algorithm and is well suited in classification tasks about audio. In recent years, neural network-based classification methods have also been investigated. 2005 researchers used neural networks for speech emotion recognition, and the same method can be used for emotion analysis of music [22, 23]. 2014 researchers extracted the underlying features of music and performed music emotion recognition based on recurrent neural networks. Since then, new emotion classification methods have been explored. The evaluation index of music quality is shown in Figure 3.

Today, with the rapid development of information technology, the concept of artificial intelligence is no longer so sci-fi and mysterious and has been deeply applied in the field of music. By effectively combining music composition and artificial intelligence, the goal of artificial intelligence composition can be achieved, which is of great significance in promoting the commercialization of the music industry [24]. During the development of AI composition, it is inseparable from the necessary robotics as an important carrier of the system application. Along with the rapid development of robotics, the music robot is the best carrier in the process of developing AI composition. Based on the research results of music robots at home and abroad, it is possible to realize intelligent composition of music robots under emotional computing or collaborative performance of robots and humans supported by emotional computing technology, which are both important paths for research in this field in the future [25]. In this way, by effectively combining robotics and artificial intelligence composition, new methods and ideas of active service mode and emotional computing can be injected into the human interaction system, which can promote the development of music robots in the direction of emotionality and intelligence. This will enable them to recognize and perceive musical emotions while taking the initiative to perform collaboratively or compose intelligently

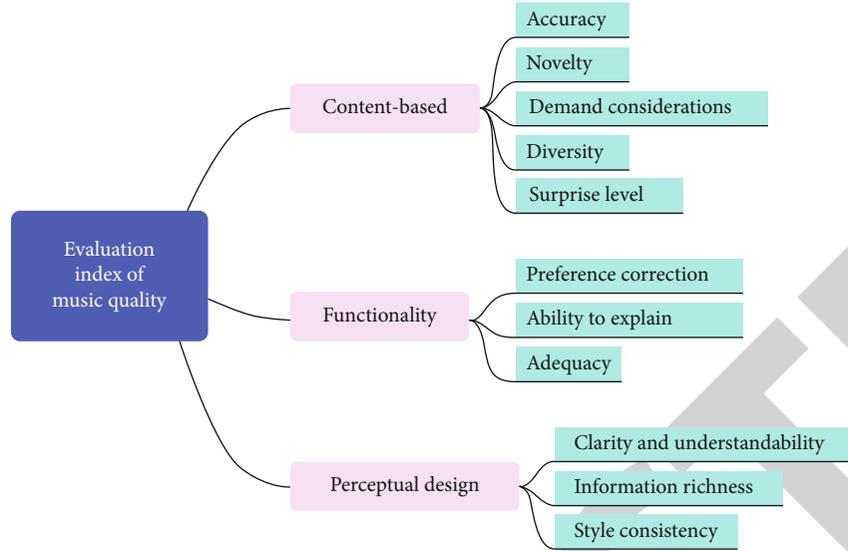


FIGURE 3: The evaluation index of music quality.

[26]. In this way, the interaction barriers between robots and humans can be further eliminated, thus promoting the development of artificial intelligence composition to a whole new level.

2.3. The Current State of Development of Deep Learning. In recent years, deep neural networks have been continuously applied to AI fields such as computer vision, speech recognition, and natural language processing with great success. Thanks to the deeper and larger network structure, the performance of DNNs is rapidly improving. However, along with the increase in network performance, the network has become deeper and deeper, greatly increasing the computational overhead required by the network [27]. The design of larger and deeper network structures in pursuit of performance makes the models require more and more storage overhead as well. This severely limits the application of deep neural networks in embedded devices. Although models can leverage the powerful parallel computing power of GPUs to accelerate model inference time, it is difficult to meet real-time requirements in some embedded devices with limited resources [28, 29].

In general, there is a large amount of redundant information inside the very large deep networks. When the training data is limited, the excessive number of parameters leads to a decrease in the generalization ability of the network. Removing half or even more than half of the weights from a deep neural network has little impact on the performance of the network and can even improve the generalization ability of the network in some cases [30]. However, it is difficult for a lightweight neural network to achieve the performance of a complex neural network. Therefore, how to design efficient deep neural networks with fewer parameters and less computation required for the model is one of the current research hotspots in the field of deep neural networks. In general, designing efficient deep neural networks involves two goals: model compression and speedup. The two are

both distinct and closely related. For example, the most common convolutional neural networks today contain two different types of computational layers: convolutional layers and fully connected layers. The convolutional layer requires a very large amount of computation, and by abstracting layer by layer to obtain high-level semantic information, the number of parameters can be reduced by sharing weights [31]. Compared to the convolutional layer, the fully connected layer requires less computation but is connected by dense weights and thus requires a large number of parameters. The former can reduce the memory requirement and reduce the resident memory. The latter can reduce the inference latency of the network and improve the response speed.

Parameter pruning reduces the number of parameters in the network mainly by removing unimportant parameters from the neural network. Low-rank decomposition reduces the number of parameters by performing matrix decomposition on the convolutional kernel or fully connected layers. It should be noted that both parameter pruning and low-rank decomposition require some changes to the structure of the existing network [32]. Knowledge distillation does not require any changes to the network but rather improves the performance of the smaller network by guiding the training of the smaller network through the larger network with higher performance. Relying on manual efforts to design neural networks requires strong expertise and training and validation of models on specific datasets, which leads to the high cost of using and implementing neural networks [33]. Network architecture search methods can effectively solve this problem.

3. Design of the Model

This chapter mainly elaborates on the music quality evaluation model based on a deep neural network, introducing the relevant methods of music feature extraction for the first time, followed by the music quality evaluation model based on a

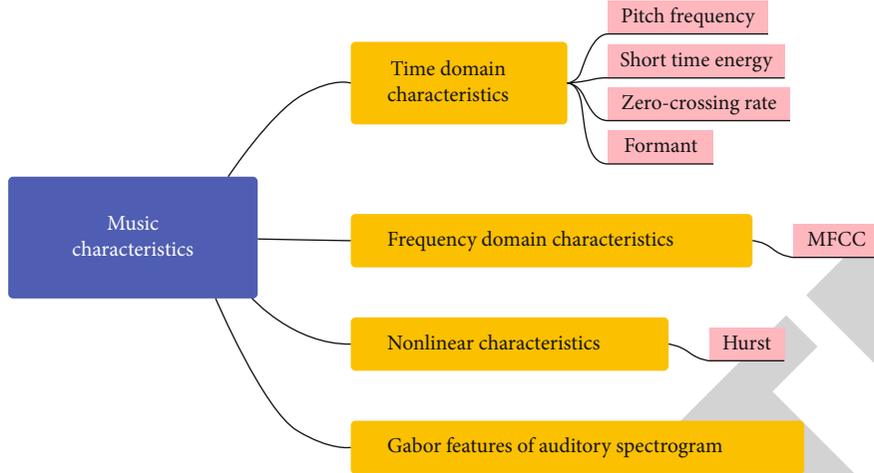


FIGURE 4: Music quality characteristics.

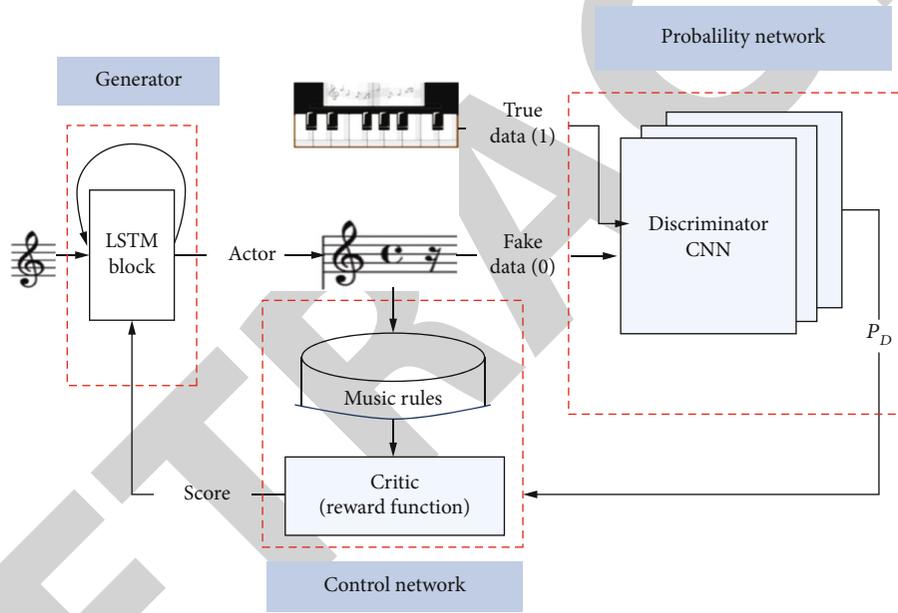


FIGURE 5: The overall flow chart of the model.

deep neural network, and finally introducing the optimization method of neural network weights in the process of music quality evaluation.

3.1. Music Feature Extraction. For the classification problem of audio quality, the first thing to do is feature extraction. Extracting effective and suitable features is crucial to the quality classification of audio. Speech and music are two important forms of audio, and it has been shown by scholars that music and speech have the same underlying features. In this paper, feature extraction is performed in four aspects, as shown in Figure 4.

In Mandarin, words or phrases with the same pinyin byte but different tones may contain very different meanings. There are four tones in Chinese, and different tones and pronunciations correspond to different fundamental frequency trajectories. The fundamental frequency is an

important characteristic parameter in acoustics, which conveys the excitation information of the sound source and is expressed as the reciprocal of the sound vibration period. Because the fundamental frequency has an important role in the analysis of audio signals for identification, it is often used for speech recognition, audio analysis, etc.

Short-time energy can be used to distinguish between clear and turbid tones. In the calculation, the short-time energy is obtained by setting the window function, as shown in the following.

$$x_n(m) = \omega(m)x(n+m) \quad 0 \leq m \leq N-1. \quad (1)$$

The number of times the audio waveform signal crosses the time horizontal axis is called the short-time over-zero rates. It can also be used to distinguish between clear tones and muddy tones. Clear tones generally appear in the

high-frequency band, the over-zero rate tends to be larger, and conversely, the over-zero rate of turbid tones is smaller. The formula for calculating the short-time over-zero rates is as follows.

$$Z_n = \frac{1}{2} \sum_{m=1}^{N-1} |\text{sgn}(x_n(m)) - \text{sgn}(x_n(m-1))|. \quad (2)$$

The vocal tract can be seen as a nonuniform sound pipe, and there will be resonance phenomena when the vocal cords vibrate, producing resonant frequencies. The resonance peak is the resonance frequency, which is an important characteristic of the audio signal. The resonance peak frequency is often used to distinguish the rhymes, and the resonance peak frequency will be different for different rhymes. The resonance peak is often estimated based on the maximum value in the spectral envelope of the audio signal. In practical scenarios, under certain emotions, human nerves and muscles will be tense, and the vocal tract will contract and change to different degrees, corresponding to differences in resonance peaks.

Mel filter banks are equivalent to the human cochlea and are capable of responding to various frequency signals. In a real environment, the hearing ability of the human ear is different in different frequency ranges. When the frequency is less than 1000 HZ, the human ear perceives the frequency in a linear relationship, and when the frequency is greater than 1000 HZ, the relationship is logarithmic, as shown in the following.

$$\text{Mel}(f) = 2595 \lg \left(1 + \frac{f}{700} \right). \quad (3)$$

Hurst is a nonlinear parameter that is mainly used to describe the temporal correlation of sound signals. It has been shown that this parameter implies the emotional information of the sound, and the Hurst parameter can vary significantly for different emotional information. Finally, the Gabor texture features of the speech spectrogram are extracted, and dimensionality reduction is performed by the PCA algorithm.

3.2. Improved CNN-LSTM Model for Music Quality Evaluation. CNN has a powerful adaptive feature extraction capability. Moreover, the LSTM has a memory structure that can tap the implied temporal relationship between the before and after data, which is consistent with the strong time-varying characteristics of the wide-band oscillation signal. Therefore, in this paper, we introduce the CNN-LSTM recurrent neural network and improve it for music quality recognition. The overall flow chart of the model is shown in Figure 5.

To solve the fixed-order problem of CNN modal parameters, unsupervised optimization is required. The mathematical expression of the output value after superposition of n sets of single-modal signal time-domain waveforms is as follows.

$$g(t) = \sum_{i=1}^n A_i \sin(2\pi f_i t + \varphi_i) e^{-\lambda_i t}. \quad (4)$$

TABLE 1: Sound level coding table.

| Sound level | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------|----|----|----|----|----|----|----|
| Encoding | 12 | 22 | 32 | 42 | 52 | 62 | 72 |
| Chromatic offset | 0 | 2 | 4 | 5 | 7 | 9 | 11 |

The mathematical expression of the loss function E is as follows.

$$E = -\frac{1}{n} \sum_{i=1}^n [y(t_i) \ln g(t_i) + ((1-y(t_i)) \ln (1-g(t_i))]. \quad (5)$$

The loss function E is used as the loss function of the output layer of the model, the network weights and bias are continuously adjusted, and the expression is as follows.

$$\begin{aligned} \omega' &= \omega - \alpha \frac{\partial E}{\partial \omega} \\ \gamma' &= \gamma - \alpha \frac{\partial E}{\partial \gamma}. \end{aligned} \quad (6)$$

The choice of optimization method plays a significant role in the selection of hyperparameters during model training. Stochastic gradient descent does not introduce the concept of momentum in the process of model optimization, which leads to its slow convergence rate and is prone to local optima. Therefore, the concepts of first-order momentum and second-order momentum are introduced in the adaptive momentum estimation. Their mathematical expressions are as follows.

$$g_t = \nabla J \left(\omega_t - \frac{\alpha}{\sqrt{v_{t-1}}} \times m_{t-1} \right). \quad (7)$$

NAG makes use of the second-order derivative information of the objective function to make the hyperparameters continuously updated with time, which ensures the stable update of the learning rate. Therefore, the Nadam obtained by combining NAG and Adam is chosen in this paper to have stronger constraints on the learning rate and achieve more accurate identification. The traditional CNN-LSTM model for connection processing is to unfold the feature matrix of the CNN output by newly generating the matrix dimensions in a way that conforms to the format of the LSTM input. Although this unfolding method is validated by experimental simulations to be effective, it still inevitably changes the number of features outputted to the CNN model. Unsupervised construction of the CNN is performed to omit the label amount setting. The input training data is compressed by convolutional and pooling layers to compress the amount of data, extract oscillating features, and reduce overfitting. The fully connected layer can aggregate and output the feature dataset. The dataset is classified by mapping the Sigmoid function, and the number of modes is determined to achieve a fixed order for the LSTM.

3.3. Optimization of Weights for Neural Networks in the Evaluation Process. To ensure the variability between modules, there are two randomization processes in the

TABLE 2: Interregional contrast of different methods.

| Types of music | GA | ANN | PSO | Our model |
|----------------|-------|-------|-------|-----------|
| National music | 0.883 | 0.672 | 0.595 | 0.495 |
| Jazz | 0.845 | 0.766 | 0.776 | 0.694 |

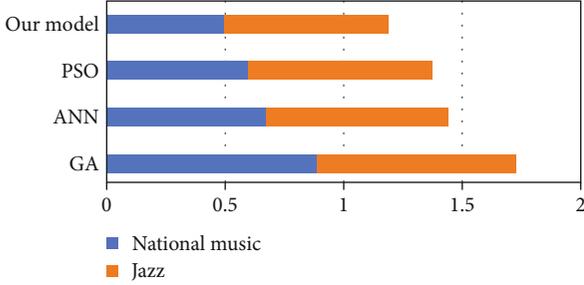


FIGURE 6: Interregional contrast of different methods.

TABLE 3: Uniformity measure of different methods.

| Types of music | GA | ANN | PSO | Our model |
|----------------|-------|-------|-------|-----------|
| National music | 0.227 | 0.418 | 0.385 | 0.909 |
| Jazz | 0.254 | 0.416 | 0.374 | 0.896 |

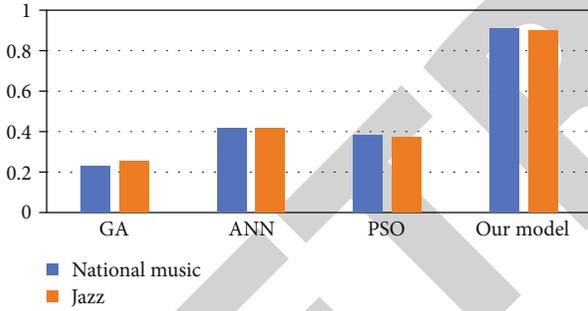


FIGURE 7: Uniformity measure of different methods.

construction of the model. The selection of samples is random, and the selection of sample attributes is also random. The mathematical expression of weight optimization is shown in the following.

$$f_{WRF}(a) = \arg \max_{i=1,2,\dots,c} \left\{ \sum_{k=1}^K [(f_k(a) = i)w_k] \right\}. \quad (8)$$

The reasonable selection of the weights is of great significance. Differential evolution algorithm is an intelligent method to simulate the evolution of species in the biological world, using the principle of survival of the fittest and survival of the fittest to guide the evolutionary direction of species as well as individuals through the collaboration and competition among individuals in the species to get better populations and individuals. The mathematical expression is shown in the following.

$$\begin{aligned} V_i(t) &= (v_{1i}(t), v_{2i}(t), \dots, v_{2i}(t))v_{ji}(t) \\ &= x_{jr_1}(t) + F(x_{jr_2}(t) - x_{jr_3}(t)), j = 1, 2, \dots, D. \end{aligned} \quad (9)$$

For many problems encountered in practical engineering, researchers usually use the above-mentioned differential evolution approach to optimize the weights.

4. Experiments and Results

Usually, music information is recorded in WAVE and MIDI formats. The WAVE format is mainly used for real-time playback of music signal samples and digital encoding, as well as recording the actual performance of the music, while the MIDI format is the standard for music signal transmission, and this format is mainly used for the performance of music and the recording of the entire process of the score. Most intelligent composers use the MIDI format, so this paper uses the MIDI format for intelligent composing. The tone level mainly includes the basic tone level and the changing tone level, which is called the tone level of the music tone system. In the musical system, the seven independent tones are called basic levels. The tones that are achieved by raising or lowering the fundamental level are called change levels. In order to better and objectively evaluate the effect of intelligent music composition, this paper uses three indexes, including intraregional uniformity measure, interregional contrast measure, and comprehensive measure, to evaluate the effect of intelligent music composition. The coding of sound level is shown in Table 1.

To verify the effectiveness of the music features and classification algorithm in the paper, a music emotion database was constructed. The samples of this database are derived from the network and classified into four features totaling 300 samples by the judgment of five professionals, 160 of which are used for training and 140 for testing. The audio features extracted in the experiment have a total of 198 dimensions. The interregional contrast results are shown in Table 2 and Figure 6.

Subsequently, experimental tests of the uniformity measures of different methods were conducted, and the experimental results are shown in Table 3 and Figure 7.

This chapter focuses on the quality assessment of the generated music. Firstly, the emotional characteristics of the music signal in four aspects are as follows: time domain, frequency domain, time-frequency domain, and nonlinear parameters are introduced, followed by the integrated learning model and the construction principle around the algorithm of this paper. And according to the problems and shortcomings of the algorithm, the weight optimization model of the convolutional neural network is proposed by using the global search ability of the differential evolution algorithm. The superiority of the algorithm is verified through experiments, and the quality of the generated music is also evaluated. The algorithm in this paper helps composers to compose music, greatly reduces the workload, and provides a better foundation for subsequent research work.

5. Conclusion

Music is an important spiritual culture that can enrich people's lives and inspire their aesthetics. With the rapid development of new media technology and with the diversified development of society, people's demand for music tends to be more and more diverse. The low output and high cost of music creation by professionals make it difficult to meet the large demand of society. At present, with the maturity of artificial intelligence technology, the study of an efficient music quality evaluation algorithm has become a research hotspot. In this paper, we first introduce the current research status of algorithmic composition, discuss and analyze the commonly used methods, and finally choose the deep neural network to implement algorithmic composition. The experimental results show that the algorithm has the advantages of fast detection speed and high quality. It helps composers to compose music, greatly reduces the workload, and has a certain promotion value.

The research on algorithmic composition is still in the exploration stage. From the experimental results, although the algorithmic music composition based on the CNN network can basically ensure the integrity of the tune, it is still a long way from the practical application requirements. There are various styles of music, and people have various needs for music types. How to build a multistyle music generation network has great practical research value. In the paper, preliminary research is conducted mainly from the perspective of classical music, and the next step can follow the pace of popular music to study the generation algorithm of popular music. The rational categorization of generated music facilitates the retrieval and finding of music. Music emotion classification is an important classification method. For the classification problem, it is also particularly important to continuously study suitable classification algorithms.

Data Availability

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

Conflicts of Interest

The author declares that he has no conflict of interest.

Acknowledgments

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