Research on Computer Generation Technology of Fractal Music

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Abstract. Fractal technology is an important project, which can not only form art image, but also compress image. Therefore, fractal technology is widely used in computer field and chemical industry. Therefore, the scope of music creation will have fractal characteristics, which requires computer fractal technology. Through fractal technology, we can automatically generate music, which will achieve high-quality, high-definition music effect. In the aspect of computer, fractal science and technology are mainly applied to the generation and compression of fractal art image. In the field of music composition, musicologists have an important ability to analyze classical music, which can be used for fractal analysis. Music is fractal, which can be produced automatically. Therefore, we must study the technology of computer fractal music. Firstly, this paper analyzes the related concepts. Then, this paper analyzes the basic elements of music. Finally, this paper analyzes the situation of music generation.

Keywords: Fractal Music, Computer, Generation Technology

1. Introduction

With the rapid development of society, computer information technology has developed rapidly, which has been applied to many fields, including music production [1]. At the same time, the traditional pure sound natural music is no longer suitable for the development of modernization, which requires us to constantly enrich and colorful pictures [2]. Through the integration of clear pictures and sound effects, video, audio and other effects, we can further strengthen the music generation technology, which requires the integration of modern information technology applications. Through computer fractal technology, we can make full use of and refine music fractal. By analyzing musical notes and scales, we can change with time fluctuation, which will achieve better fractal technology [3]. Therefore, we have to carry out multiple iterations, which can achieve vivid simulation on the macro and micro level. Through fractal technology, we can adjust the relationship between the whole and the local, which will achieve spatial symmetry. Through image simulation, we can create a scene of the screen, which will present a rich artistic realm [4-7]. Through the analysis technology, we can form the
koch curve, which is a mathematical curve. We can replace equilateral triangles and so on by dividing three equal segments, which will repeat the result of replacement [8].

2. Fractal music generation technology

2.1. Fractal music

Fractal geometry was put forward by Mandelbrot in 1973. Its original meaning is irregular and fragmented. It is a kind of geometry studied by irregular geometry. Through the establishment of fractal geometry, we can attract the attention of many disciplines, which is an important value in economy, chemical engineering, computer and other fields. Musicologists are from the perspective of music science, which can better analyze the fractal nature of music [9]. Therefore, we should analyze music from the perspective of natural science, which will fluctuate with the change of musical scale. This paper analyzes the relationship between music and noise. Noise can be divided into three types: 1 / m white noise, t, F2 noise, l, f noise and so on. Therefore, we must carry out fractal wave, which will give people a pleasant feeling. Fractal music is a branch of fractal art, which is generated by multiple iterations of algorithm. Self similarity is the essence of fractal geometry, which can be used to construct synthetic music. So we have to keep repeating it in the loop, which will imitate the real music [10].

2.2. Computer algorithm composition

Algorithmic composition is a method of automatic composition, which can control the generation of music by some logical process. People play the role of "legislator" in algorithmic composition. When the logical process is set, we will intervene as little as possible in the generation of music, which can control the completion of music works [11]. Computer algorithm is a process rule, which will generate the artistic interest of music works. Through computer algorithm composition, we can create "music module", which can be used for imagination and control when making rules. We can use specific algorithms to control the process of sound generation and change, which will directly produce sound results [12]. Through a specific algorithm, we can control the generation and change of notes, which will automatically generate music scores. Through MIDI equipment, players can play to get the sound results [13].

3. Basic elements of music

3.1. Pitch

Pitch is a variety of different levels of sound, which is determined by the pitch. Physically, pitch is determined by vibration frequency, which will be positively correlated. In psychological sense, pitch is affected by the loudness of the sound. Simplified notation refers to a simple notation, which is mainly divided into two kinds: alphabetic notation and digital notation. We can use notes to record the height and length of the recording, which can be expressed by the notes on the score. Notes are closely related to pitches, which represent different pitches, as shown in Figure 1.
3.2. Sound value

The magnitude of the sound value is expressed as the duration of the sound. In music score, the sound value is used to express the relative duration of each note. Therefore, the sound value is also called the note time value. A perfect note is equal to two bisquavers, or Four Quartets, or eight eighthes, or sixteen sixteenth, or thirty-two thirty-two. Therefore, we should take a quarter note as a beat, which can complete some common notes and time values.

4. Gan generation technology based on Algorithm

4.1. The challenge of Gan music generation

It is a significant task in artificial intelligence to produce works with realistic and aesthetic sense. Through computer technology, we can create music. In the 1950s, people began to use computers to compose music. Based on the deep neural network, we have gradually generated a variety of big data centralized learning ability. Through neural network, we can generate music. In recent years, scholars have proposed some confrontation network models for music generation, such as c-rnn-gan, midinet, musegan, etc., which enrich the research on music generation in Gan field. C-rnn-gan is a recurrent neural model with continuous data, which can be used for confrontation training. By simulating the whole joint probability of the sequence, we can generate the data sequence. In the implementation of c-rnn-gan, the author uses real valued continuous quadruples of frequency, length, intensity and time to represent tones. By inputting random noise, we will produce different melodies, which will follow the conditional mechanism of starting melody or chord sequence to produce music.

4.2. Mct-gan model

According to the multi track correlation model, time structure model and discrete processing method, we can get the complete mct-gan network model, as shown in Figure 2.
5. Experimental results and analysis

5.1. Experimental result

Through mct-gan model, we generate a large number of music clips. After listening, the generated music is smooth and has a certain artistic aesthetic effect. Therefore, we can randomly select the music clips generated, which will be displayed as the results. First of all, we can present the generated multi track music in the form of score, which will use Python library to generate music files, which can convert npz format into mid file format. Through Cubase software, we can expand the mid file in the form of score, which will clearly show the score. In this paper, we choose a four bar music score, as shown in Figure 3.
Figure 3. The experimental results are as follows.

5.2. Comparative analysis and evaluation

According to the experimental results, this paper will use met-gan experimental results and musegan experimental results are compared as follows. In this paper, we get the training loss of the discriminator at different training iteration points, which can get the convergence curve of the discriminator loss. By comparing with the convergence curve of musegan, we can get the comparison chart of convergence curve, as shown in Figure 4.
6. Conclusion

Music is the combination of modern art and science, which has become an important embodiment of fractal technology. Through fractal technology, we can fully understand the creation process of the two. Through an example, this paper analyzes the corresponding data image, which will better verify the analysis. Through computer fractal technology, we can enrich the modern music art production, which will produce real music effect.

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