Make Sense ! Face the Music

Employing Interaction Technology to Implement an Automatic Creation Mechanism of Audio/Visual Digital Artworks

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ABSTRACT

In this project, Max/MSP and Processing programming are used to realize the interactive art on Android system. When users play the instrumental interface on Android devices, system will trigger two feedbacks. First of all, auditory part of the system will automatically retrieve the appropriate melody which becomes background rhythm and broadcast. Sound may turn out to be a harmonious chord rhythm. On the other hand, visual part of the system will be based on the melody played by users, a rhythm visual feedback of the network projected on the screen. On the whole, visual may turn into lines of visual artistic.

The project is made by the following step: instrumental pass by value to Max/MSP and Processing which received value, edge detection on the computer; creating melodies network by the rhythm value, Max/MSP retrieved rhythm, compose rhythm and so forth. In this essay will give a brief introduction.

Keywords : Max/MSP, Processing, Android, Interactive arts, Numerical analysis of rhythm.

1. INTRODUCTION

In modern society, people usually live under the pressure of public opinion. They oppress us so tight that people can hardly breathe! So, people like to hold a party to relax themselves. In the party, people can't help to swaying themselves when the light show and music go on. That's the reason why party is so charmed to us.

Thought the party atmosphere always keeps in a high point, but this is created by people. If people want to hold a party, they must pay a lot of expenses. Based on these reasons, this project intends to adopt modern interactive technologies, building a self-generated system of visual and sound effect.

Besides, the project wants to let users to be the system controller. It means that the entire people surround the party can control visual effect and sound effect, building a harmonious atmosphere in the environment. In this condition, when people are more excited, the higher effect is. The atmosphere can take advantage of this feedback to bring the environment an unpredictable and random interaction of vision and harmonious sound. Correspondingly, this specialty can give users a surprise. In this project, interpersonal relationship can also be built up progressively.

The project will use the Max/MSP and Processing programming language to execute the system development, and also to approach the result of interactive digital art.

2. LITERATURE REVIEWS

2.1. Digital Art

According to the definition by National Taiwan Arts Education Center (2005)[1], they classify that "All the Art composition which contains digital technologies ", can be referred to as Digital Art. Therefore, digital art finally turned out to be an aggregation with different composition, and have at least one definite substance belongs to Digital Technology. Because of the mainstream of digital technology, it offers art domain a brand new composing environment, making the art spirit of twenty century more plentiful and more multivariant.

From the 1980s to the present, the popularization of computer and the rapid development of digital technology promote the growth of development of interactive art and interactive technology. With the advance of science and technology, digital art is seems to be extended to the most of art compositions in the human society. It can be used to explain the development of digital art for the future.

2.2. Interactive Art

Interactive technologies is popular and prosperity technique in nowadays, so that the way of exhibition changed a lot. Hence, many young generations liked to use interactive technology. Much software, such as Max/MSP, Processing, Puredata, Kinect, Arduino, and so on, make us an easy way to approach the effect of interaction.

3. RESEARCH FRAMEWORKS

3.1. System Framework

The framework can be split into three part of development. There are respectively the user interface, the sound feedback and the interactive visual appearance. And the research uses the Android OS, Max/MSP, Processing to accord with the system demands, building system framework. The diagram of system framework is shown in Fig. 1.

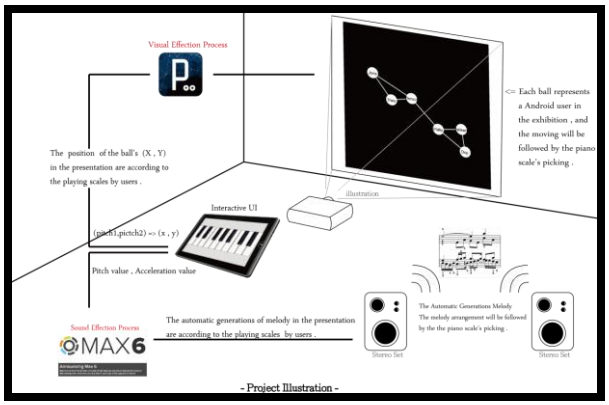

Figure 1 System framework

3.2. Research Process

The system interactive can be separated into visualization, audition and Android system. First of all, this research will talk about the aspect of Android UI design. Then, the process will go deep into the research procedure of Max/MSP and Processing. At the end of discussion, it will talk about the system integration. This is shown in Fig.2.

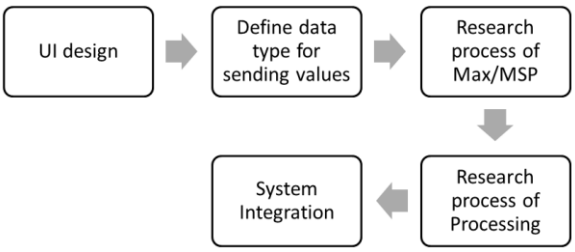

Figure 2 Research Process

3.3. User Interface Design

Consider the universality which instrument may have, the research decides to make user interface on Android looks like a piano. In order to build up the user interface, the method is to use Processing programming to sketch out the piano interface. For the purpose of running the piano interface on the Android device, the program must be saving as an apk file.

Also, the interface needs to set the boundary value for every pitch, making every key correspond with themselves own pitch value. Therefore, these pitch values which the visitors have pressed can be sent to Processing and Max/MSP. The piano interface which is designed by Processing is shown in Fig.3.

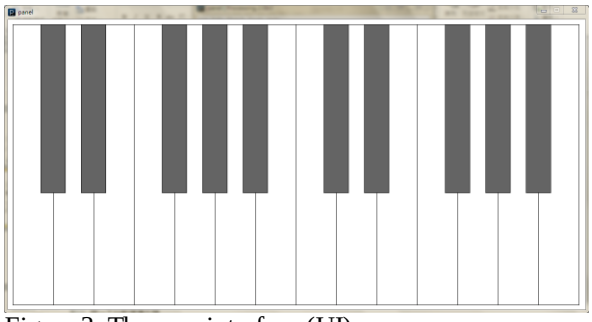

Figure 3 The user interface (UI)

3.4. Research Process of Max/MSP Programming

The above-mentioned pitch value is according to the definition in western culture. In west, pitch definition have a lot of different ways. But in the present study is based on the common definition, which is widely used in MIDI standard. It defined that a linear pitch space in which octaves have size 12, semitones (the distance between adjacent keys on the piano keyboard) have size 1. So, the key C(4) can be represented by the numeral value 60 ; the key C(4)# can be represented by the numeral value 61. The data types and the pitch values are based on the above definition, so that tablet device can pass by value to system.

In recent years, the way of composition the digital art introduces the concept of object-oriented. The Max/MSP, which was developed by Miller Puckette, is the most important technique in the field of digital art. The integrated program is made up of draggable objects, and also completed by dragging the relation between objects. Each object has its function clip, and each segment represents a data flow.

In order to build connection between Max/MSP and user interface, the method also uses the CNMAT library to construct UDP connection to send pitch value. CNMAT library is developed on the basis of UDP technology, building a seamless and fast value connection between two software environment (Jesse Kriss，2006)[2].

The pitch values sent from the Android device are the numbers between 36 and 83. They will be sent to the Max/MSP system to analyze the fitness of the chords by the note weights of chords. Finally, automatic sound of the chord progression will be triggered immediately.

The further mechanism of the process is triggered when users pressed the piano interface, then pitch values will be sent to the Max/MSP, each value will be also transformed into the normalized pitch notes. Once the pitch values are normalized, they will be weighted to the different chords. In the output of chords, set a mechanism of accumulation to give chords a threshold to trigger a chord sound. Finally, the pitch sound triggered by visitors will be in perfect harmony with the chord sound progression. Main program is shown in Fig.4, the weight mechanism is shown in Fig.5, the accumulation mechanism is shown in Fig.6.

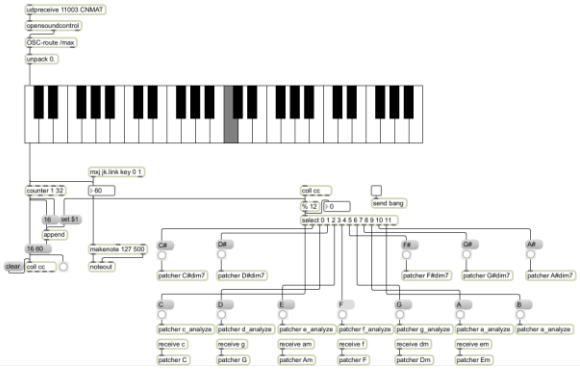

Figure 4 The main program of Max/MSP

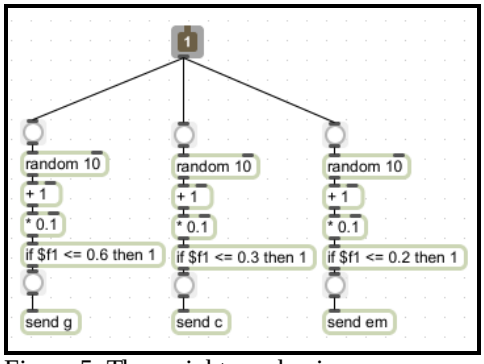

Figure 5 The weight mechanism

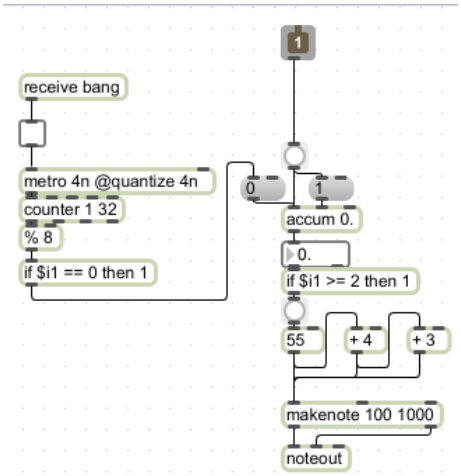

Figure 6 Mechanism of accumulation

3.5. Research Process of Processing Programming

The process of Processing programming is set on the computer. In present research attends to build a visual effect of internet grid interaction, and projected it on projection screen. Users can play on the piano interface as they please. When system gets the pitch values from users via UDP (CNMAT library), each user will have their identical ball object.

In the meantime, the Processing will also transform the following two pitch values into a coordinate in two dimensional. The position of the ball will be according to above–mentioned coordinate. When users pressed every two keys on the piano interface will trigger their identical balls to move interactively, and also create a gradual color interaction of grid. All the identical balls can move respectively with each other. Make the visual effect considerably colorful. The visual effect is shown in Fig.6.

Figure 7 The visual effect

3.6. System Integration

In this partition, the emphasis is on integration of the interaction. And also, the research want to point out that this research can use the Android interface to obtain the feedback of automatic chord sound and the visual contraposition appearance. This specialty can let the viewers absorb in research's concept of interactive art. Viewers can also interact with their subjective knowledge, and carry out the feedback of their own feelings.

To construct the integration of the system, it only needs to make sure that the exhibition must have audio equipment and wireless network environment to establish the interactive atmosphere. The sound volume, colors of the vision, restriction on the number of viewers, the tuning of the note weights will also produce a large effect on the appearance of this project.

4. RESULT

The research of the interactive concept uses innovative framework of interactive application successfully, using the interaction with Android device interface achieves the process of interactive environment between visual and sound interaction, and based on the keys pressed by the viewers to achieve interactive detection on feedback. Also, the visual effect of pitches is associated with the objects which represent personal independence. In generally, when viewers see a piano interface, they will press the keyboard with their own intuition, and also they will take corresponding sound feedback for granted. In the framework of the interactive art, however, is more emphasis on the scale that can bring out the interactive significance. Auditory presentation by the changes between the chords and the melody allow the viewers to realize that the source of the music is performed by the player's linear instruments playing and the rhythmic counterpoint. The framework of interaction established group's instrumental interaction, let groups of viewers organize the chords and melody sound interactive experience through the instrumental interaction. And the visual appearance shows

experiences the viewers have played with the user interface. When viewers play on the piano interface, the keys viewers have played must be a successive process. Therefore, by the early and late pitch values will accords with the visual coordinate with the positions of the objects. The technique also put this mechanism on recursion to detect a before and after scale to produce a two-dimensional interaction on the personal object.

In this study, successfully use the integrative technique to build an interaction between the edit software of digital art and Android device. The effect also let viewers to feel about the experience of group's interaction by means of acoustics view. On the other hand, the multiple frameworks indicate that the interaction keeps abreast of the science technology.

5. CONCLUSIONS

The innovation in this research is to achieve interactive art emotional detection and emotional feedback by using Android device, so that the viewer can immerse themselves in the concept of interactive sound art, and understand the meaning of digital art indirectly. With these interactive experiences, this research provides an innovative concept of interactive architecture and process for digital art and interactive art. Another contribution is break through pitch values process in Max/MSP. The pitch values played by viewers can generate a harmonious chord with the melody sound. In the future, the research will be take emotional detection as the development goal.

With the rapid development and convenience of network and information sharing, many domestic and foreign developers of free software also developed many libraries for digital artists can build a complex environment using some simple ways. To build bridges between different types of software and somatosensory technology, for instance: Kinect, Arduino, Wii…and so forth. The research can merge more and different aspects of emotion detection, for example: viewer's position and height detection, facial detection, acceleration on android device and so on. System of interactive feedback can correspond to viewer's emotions. To endow the creation of interactive elements more implications, this is the most important values.

The basis of the research can provide the concept of interaction with many other ideas. Especially, the framework of network interaction has been realized in this research. With the Android device, the framework establishes a simple way to generate an identical interaction in the global visual effect. In the future, it could be added more experience of interaction, such as social network, record experience, history message interaction and Generative Art, etc. It could increase the multi-level dimension which interaction had. On the other hand, the feedback can combine installation art, adding lighting effect to augment the reality. Therefore, more possibility of interaction will be added to the digital art.

6. REFERENCES

[1] National Taiwan Arts Education Center http://www.arte.gov.tw/

[2] Maxlink.http://jklabs.net/maxlink/