An Automatic Mechanism to Recognize and Generate Emotional MIDI Sound Arts Based on Affective Computing Techniques

Hao-Chiang Koong Lin, National University of Tainan, Tainan, Taiwan
Cong Jie Sun, National Taiwan Normal University, Taipei, Taiwan
Bei Ni Su, National University of Tainan, Tainan, Taiwan
Zu An Lin, National University of Tainan, Tainan, Taiwan

ABSTRACT

All kinds of arts have the chance to be represented in digital forms, and one of them is the sound art, including ballads by word of mouth, classical music, religious music, popular music and emerging computer music. Recently, affective computing has drowned a lot of attention in the academic field, and it has two parts: physiology and psychology. Through a variety of sensing devices, the authors can get behaviors which are represented by feelings and emotions. Therefore, the authors may not only identify but also understand human emotions. This work focuses on exploring and producing the MAX/MSP computer program which can generate the emotional music automatically. It can also recognize the emotion identified when users play MIDI instruments and create visual effects. The authors hope to achieve two major goals: (1) Producing the performance of art combined with dynamic vision and auditory tune. (2) Making computers understand human emotions and interact with music by affective computing. The results of this study are as follows: (1) The authors design a corresponding mechanism of music tone and human emotion recognition. (2) The authors develop a combination of affective computing and the auto music generator. (3) The authors design a music system which can be used with MIDI instrument and also be incorporated with other music effects to add the Musicality. (4) The authors Assess and complete the emotion discrimination mechanism of how mood music can feedback accurately. The authors make computers simulate (even have) human emotion, and obtain relevant basis for more accurate sound feedback. The authors use System Usability Scale to analyze and discuss about the usability of the system. Also, the average score of each item is obviously higher than the simple score (four points) for the overall response and the performance of music when we use “auto mood music generator”. There are average performance which is more than five points in each part of Interaction and Satisfaction Scale. Subjects are willing to accept this interactive work, so it proves that the work has the usability and the potential which the authors can keep developing on.

Keywords: Affective Computing, Automatic Music Generation, Interactive Art, Performance, Sound Art

DOI: 10.4018/ijopcd.2013070104
INTRODUCTION

Music is a form of sound, which is related to our life from ancient periods to nowadays. Some melodies may send messages as a media, while others may cheer up soldiers in the war, still others may express sensibility of human beings. It plays an important role on showing happy and sorrow purifying emotions. Music is combined with pitch, loudness, tone, tempo, and harmony, which can be used to express sensibility, atmosphere, thoughts and inspirations by users. Each piece of music is unique. For instance, some shows pleasant while others are weird. Some are inspirational while others perform crazy.

As time went by, listening to music is no longer limited by the public stage, CD and MP3. Music may influence human’s emotion, and human’s emotion may be expressed by playing instruments or singing. There is a strong connection between them. Recently, we pay more attention on the cognition of emotion, so we are curious about the impact on sensibility.

CONCEPTS OF THE ARTWORK

Human’s emotions are really complicated. We hope that there is a better and special explanation of affective computing. The type of emerging performance makes us to think: When users played MIDI instruments, the data produced by affective computing may touch the automatic music mechanism and then to play the corresponding music as the computer owed feelings, in order to show human’s inner world and strengthen the sense of imagination.

The random real-time effects produced by affective computing are incredible and amazing. You can also use the corresponding music to release your pressure if there is a need. “The meaning of music is the vivid and imaginary affection, the mode of tempo and the structure of harmony. A simple melody or an exquisite topic is the model of sensibility, which is formed and given features to achieve the goal of art affects. Music is the fusion of affection, reason, content, and style.” “Music work is designed to convey feelings and emotions” (Fang, 1997).

RESEARCH QUESTIONS

Music, we want to use as a symbol, is the expression of sensibility. “Sound” is the way that user unleashed. It would be good music if we combine the sound and the emotion correctly. Through the art creation mechanism with random real-time effects, we want the audience to join the scene, to feel something, and then to own the entirely different exhibition form. Music gets along with us in a specific manner; we expect to make use of its power and function, to echo with audiences as well:

1. How do we use Max/MSP/Jitter and music theory to manufacture the automatic music mechanism?
2. Which parameter does Max/MSP/Jitter need, when the sensor receive a variety of tunes?
3. How do the MIDI instrument and Max/MSP/Jitter match up? How to get the parameter during the play?
4. How do we express the feelings and make sure the interaction between audiences and our mechanism?
5. Can we sum up the melodies in different emotion, bring a whole new creative way for the emerging computer music as well?

LITERATURE REVIEW

Affective Computing

“Affective computing is that using varied sensors, to get the facial and psychological signals with emotions then to identify those signals, in
Related Content

Student-Driven Learning within a Technology-Enhanced Learning Environment
www.irma-international.org/chapter/student-driven-learning-within-a-technology-enhanced-learning-environment/171572/

Mathematics Acquisition and Immigrant Children
Judi Simmons Estes and Dong Hwa Choi (2014). Cross-Cultural Considerations in the Education of Young Immigrant Learners (pp. 103-128).
www.irma-international.org/chapter/mathematics-acquisition-and-immigrant-children/91848/

Evaluating Social Interaction and Support Methods Over Time
www.irma-international.org/article/evaluating-social-interaction-and-support-methods-over-time/117453/

Expectations, Challenges and Suggestions for Faculty Teaching Online Courses in Higher Education
www.irma-international.org/article/expectations-challenges-and-suggestions-for-faculty-teaching-online-courses-in-higher-education/216932/