Chapter 18

Using Emotion Map System to Implement the Generative Chinese Style Music with Wu Xing Theory

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ABSTRACT

Wu Xing is an ancient mysterious Chinese philosophy applied to many fields. The Music Emotion Classification (MEC) refers to the music cognition of mind with the categorized emotion result mapping to music parameters. Many researchers focused the topic on the MEC with theory and experiment development in the past decades. This chapter mainly discusses the possibility to synthesize the meta-level algorithmic music based on the analysis result from the previous research, with the proposed Emotion Map System (EMS) mapped into the innovated Wu Xing Emotion Map System (WXEMS), which indicates the emotion situation based on the X-Y coordinate movement in the WXEMS plane. The MEC result shown in the EMS/WXEMS trajectory controls the algorithmic music variation with the proposed mapping rules. In addition, the generative music varies smoothly according to the correspondent WXEMS data changed with any emotion transition, which can apply the technology into the generative background music in Chinese style using the proposed Wu Xing Automated Music System (WXAMS).

INTRODUCTION

There are lots of research literatures show the relationship between music and emotion. Chinese Wu Xing (Fung, 1983; Wolfram, 1965) which means five elements, including metal, wood, water, fire, and earth, respectively, provides an abstract and mysterious philosophy applied for various fields including Chinese medicine, Cosmology or so-called Feng Shui, military strategy, and music, to pursue the harmony in human and nature. In this chapter the music emotion classification (MEC)
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will be discussed, and correlated to Wu Xing theory, in order to generate background music in Chinese style automatically.

Some of the music emotion researches retrieved the data from the speech, facial expression, and physiological signal (Healey, 2000; Picard, Vyzas & Healey, 2001; Haag, Goronzy, Schaich & Williams, 2004; Nasoz, Alvarez, Lisetti & Finkelstein, 2003), which are not sufficiently acceptable for the realistic application. The research by Johannes Wagner, Jonghwa Kim, Elisabeth André (Chen, 1996) shows a successful emotion recognition system including data analysis and classification for collecting physiological signals indifferent affective states for music and emotion with biosensors. Therefore we adopt and categorize the four emotions including “joy”, “anger”, “sadness”, and “pleasure” to the well-know 2-D emotion model into the 4-quadrature plane, according to Johannes Wagner’s expression. The horizontal axis (X-axis) with position and negative directions represents the “positive emotion” and “negative emotion” respectively, while the vertical axis (Y-axis) in positive and negative directions represents the “high arousal / energetic” and “low arousal / calm” emotions respectively. Figure 1 shows our proposed 2-D Emotional Model for the generative music with the “Emotion Trajectory” controlled by user, with proper emotion-music features mapping into our proposed “emotion map system” (EMS) to generate music automatically (Huang, 2011).

WU XING MUSIC THEORY

The proposed Wu Xing generative music is based on the fundamental Chinese Wu Xing philosophy (Fung, 1983; Wolfram, 1965; Rossi, Caretto & Scheid, 2007), and the properties metal, wood, water, fire, and earth construct this system as a universe. Chinese pentatonic scale will be discussed to map the Wu Xing emotion data correlated to the MEC system.

Wu Xing Cycles

There are five phases as the interactions between two of the Wu Xing elements. There are two main Wu Xing cycles including Generating Cycle to represent the constructive process, and Overcoming Cycle to present the deconstructive process (Rossi, Caretto & Scheid, 2007) as shown in Figure 2.

Furthermore many related literatures show the result based on the similar system to perform the MEC with more detailed analysis to obtain the four difference music emotion styles with the characteristics of all of the music parameters. Among all research papers, Livingstone and Brown’s “Dynamic Response: Real-Time Adaptation for Music Emotion” divides the quadrature form into a more detailed octal form, with a 2DES –2 Dimensional Emotion Space (Wagner, Kim & André, 2005). As shown in Figure 3, our proposed Wu Xing Emotion Map System (WXEMS) is based on the mapping according to the octal rules and the Wu Xing emotion theory (Rossi, Caretto & Scheid, 2007) which summarizes every music parameter data with its priority of the importance mapped from the Wu Xing emotion state located in the correspondent coordinate area, according to the related literatures. The (X, Y) mapping data can be retrieved based on the EMS, to realize the music synthesis in real time with the Wu Xing emotional data change.

This research is mainly based on the classified result in (Haag, Goronzy, Schaich & Williams, 2004) to extract the most important mapping relationships between music parameters and emotion states, to implement the EMS / WXEMS with our selected mapping data, in order to find the possibility to compose emotion-based music in real time with smooth change.

MUSIC PARAMETER DISCUSSION

Based on (Haag, Goronzy, Schaich & Williams, 2004) we summarize and extract all of the music