Emotion-driven Creative Music Composition in brAInMelody®

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Abstract

The purpose of music creation is to cause impression to listeners. Based on this way of thinking, while watching the reaction of the listener, we will describe the artificial intelligence to perform creation. In this method, based on the reaction of the listener, that is, the measurement result of the emotion, AI predicts the feeling to the new song being made. In this way, having discussed automatic composition, we discuss AI approaches to activation of a human being (brain) by songs. This system demonstrates our emotion-driven creative music composition, which composes a piece of music on the fly based on physiological sensing, such as brain waves, heart rate and skin conductance, of the user.

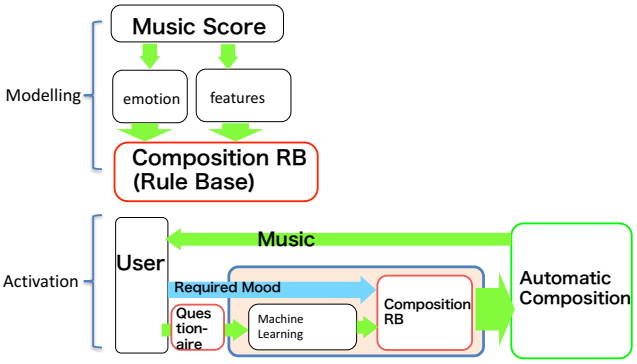

Figure 1: Contents creation based on feelings

Introduction

What is considered as a frontier of artificial intelligence is creative acts, such as novels, music, or the art of hospitality. Although authoring novel by artificial intelligence and automatic composition by Google are hot topics, people have to give their seeds of creation. In this extended abstract, from the viewpoint of entertaining people, we discuss on the flexibility in artificial intelligence to raise autonomy. That is, instead of the seeds of creation that a person gives to artificial intelligence, we detect the feelings of recipient to reduce the given seeds.

The purpose of creation is to inspire a recipient (in the case of music, a listener). To make it happen based on this concept, listener's reaction is detected while listening the created contents. Reaction of the listener, i.e., feelings is measured. In addition, the system predicts the response of the listener in order to avoid making queries many times.

Emotional measurement techniques targeting music is discussed for prediction technology and automatic composition based on them. By listening to music, we are in a healthy and comfortable state. It is trying to automate the music selection for that in music recommendation systems. Our aim is to extend it to implement automatic composition for this purpose.

Music is a flow of information among its composer, player and audience. A composer writes a score that players play to create a sound to be listened by its audience. Since a score, a performance or MIDI data denotes a section of the flow; we can know a feeling caused by a piece of score or performance. A feeling consists of very complex elements, which depend on each person, and are affected by a historical situation. Therefore, rather than clarifying what a human feeling is, we would like to clarify only musical structures that cause a specific feeling. Based on such structures, the authors constructed an automatic arrangement and composition system producing a piece causing a specified feeling on a person.

The system first collects feelings of a person for some pieces, based on which it extracts a common musical structure causing a specific feeling. It arranges an existing song or composes a new piece to fit such a structure causing a specified feeling. Figure 1 is a diagram for the creation based on queries to the user.

It has three levels of composition process: (a) chord-progression and motif level (Figure 2)(Numao, Takagi, and Nakamura 2002; Otani, Kurihara, and Numao 2012), (b) rhythm level (Otani et al. 2013), and (c) melody level (Otani, Okabe, and Numao 2018).

Figure 3 is a diagram for the creation based on physiological sensors.

Demonstration

As such, we address the problem of determining the extent by which emotion-inducing music can be modeled and generated using creative music compositional AI. Our approach involves inducing an affects-music relations model that describes musical events related to the listener's affec-

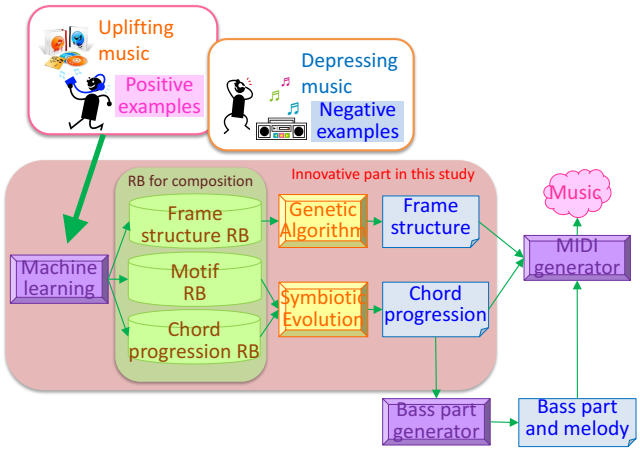

Figure 2: Music-composition flow at the chord-progression and motif level

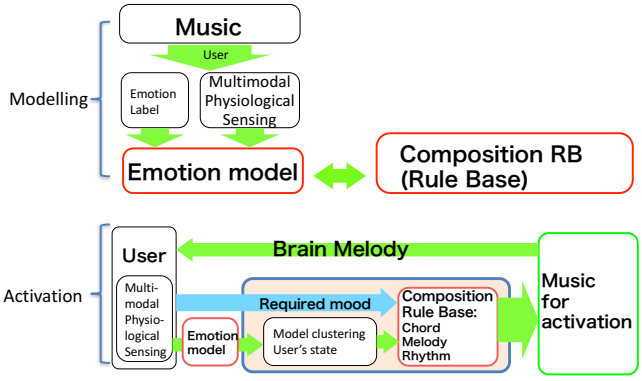

Figure 3: Sensor-based creation

tive reactions and then using the predictive knowledge and character of the model to automatically control the music generation task. We have embodied our solution in a Constructive Adaptive User Interface (CAUI) that re-arranges or composes a musical piece based on one's affect.

This demonstration shows brAInMelody® system constructed based on these series of research(Numao, Takagi, and Nakamura 2002; Numao, Kobayashi, and Sakaniwa 1997; Numao, Takagi, and Nakamura 2002; Sugimoto et al. 2008; Otani, Okabe, and Numao 2018; Otani et al. 2013; Otani, Kurihara, and Numao 2012; Cabredo et al. 2013; Thammasan et al. 2016; 2017b; 2017a).

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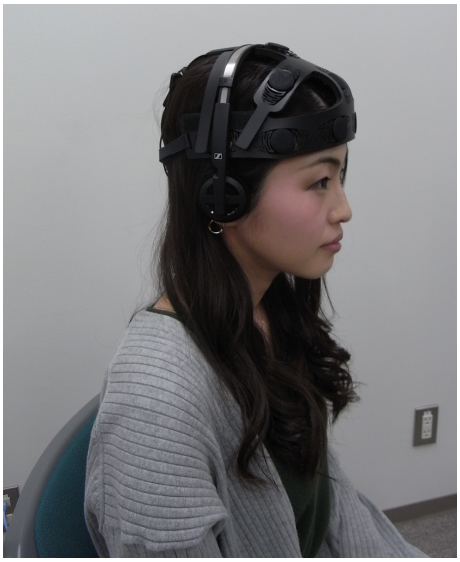

Figure 4: The brain-wave headset with a headphone