Automatic Composition System Based on Melodic Outlines and Music Theory

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ABSTRACT

The purpose of this article is to compose music clips satisfying selected ambience on an intended melody easily, and to get the satisfaction of self-making. The targets are beginners of music theory. To achieve those purposes, this article proposes the automatic composing system that takes impression words and outlines, which represent the melody’s profile lines, as inputs. This system makes several arrangements and modifications to the initial melody based on the music theory. It is experimentally clarified that the music clips composed by the system are satisfactory, and their moods fit the specified impression words.

KEYWORDS
Automatic Composition, Chord, Consonance, Dissonance, Impression Words, Melodic Outlines, Mood, Melody, Music Theory

INTRODUCTION

Recently, the Internet environment is generally expanding. It is easy to make self-making musical pieces public. Along with that, there is an increasing demand for self-making music for posting and presenting to the music/video community. Extensive music theory and knowledge are needed in composing music. It takes much time to acquire them. So it is required for the people without skills of music theory to obtain music pieces by an automatic composition system with easy inputs.

Automatic composition refers to the generation of the main melody by inputting non-music data (lyrics, impression words, etc.) (Kitahara & Miyama, 2015). For the composer, the main purpose is to create a novel melody, and for the non-composer, the main objective is to obtain music that meets the purpose or the preferences of the request. As means for inputting the non-music data, there are methods such as probability model, common point extraction of past music, evolution calculation, music theory, etc. (Sumita & Hayashi, 2008; Imai & Nagao, 1998; Kobayashi & Ogata, 2002). Also, there are technologies such as automatic arrangement and automatic harmonization in arranging parts (Otani, Uemura, Kurihara & Numao, 2013; Tokumaru, Humimuro, Nakamura & Imanishi, 1997).

This paper proposes the automatic composing system in order for users to compose music satisfying selected ambience on intended melody easily, and to get satisfaction of self-making. This system takes impression words and outlines, which represent melody’s profile lines, as inputs.

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Beginners of music theory are the target of this system. This system uses music theory to make several 
arranges, and to modify the initial melody. It is experimentally evaluated to show that the music 
clips composed by the system are satisfactory, and their moods fit to the impression words specified.

The structure of the rest of this paper is as follows. Section 2 describes some related works. 
Section 3 describes some preliminaries including music theory related to this paper. Section 4 proposes 
the automatic composing system. It is experimentally evaluated in Section 5. Section 6 gives some 
considerations. Finally, Section 7 concludes the paper.

RELATED WORKS

Automatic Composition

Many automatic composition methods have been proposed (Kitahara & Miyama, 2015). A method 
used music knowledge (Kobayashi & Ogata, 2002). Some methods used genetic algorithm (Imai & 
Otani et al. (2013) used Harmony Search in creating the rhythm of melody. Tokumaru et al. (1997) 
used fuzzy reasoning.

Although automatic composition is possible, there is a drawback that melody depends on training 
data sets or music knowledge. Improving the composition strategy requires more learning or more 
knowledge. Moreover, the melody generated may not agree with the user’s intention and/or taste. 
We need the method that the user’s intention and/or taste can directly be reflected in the music piece 
generated. The method proposed in this paper enables it by using a melodic outline described later.

Usage of Affective Information

Some methods use the affective information of users. Otani et al. (2013) aimed at the automatic 
composition according to the user’s sensitivity. Nakamura and Onisawa (2007) proposed the automatic 
composition based on the user’s impression.

Music pieces give us some impression. Affective information should be used. We use impression 
words as affective information.

Melodic Outline

Tsuchiya et al. (2013) have tried that users who cannot use the MIDI sequencer make trial and error 
correction on the melody generated by the automatic composition system and changing it to satisfying 
melodies by themselves.

They convert a melody to a single curve called a melodic outline, edit it, and change it to an 
ideal melody by converting it back into a melody. Melody is converted to a melodic outline by using 
Fourier transformation. In addition, the inverse Fourier transformation is used for the conversion 
from a melodic outline to melody. For the part with distortion, the sequence of notes matched to the 
scale is estimated by hidden Markov transformation.

The melodic outline is used in changing the melody. It is assumed that the melody is generated 
by other composition systems. The melodic outline is not used in generating a melody. The method 
proposed in this paper uses the melodic outline as a sketch of a melody line.

PRELIMINARY

Impression Words Used in Music Retrieval System

Sugihara et al. (2005) considered lyrics that can image music to be an indispensable term for searching 
music. They investigated for the purpose of picking out sensitivity words necessary for a music 
sensation retrieval system targeting young people from these words.
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