Music Composition with Recommendation

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ABSTRACT
Creating a piece of music requires deep knowledge of composition, and is time-consuming even for experts. Algorithmic composition systems can generate pieces in an existing style. However, these systems are not interactive. Therefore, it is difficult for them to express the user's intention. We propose a system that recommends a continuation melody in accordance with a melody expressed by the user. Recommendation uses the style of the piece of the composer, thus users give the system a piece of the style in which they want to compose. With this system, users can compose pieces tailored to their needs, and composers can get assistance with composition.

Author Keywords
Music; music composition; recommendation; interaction;

ACM Classification Keywords
H.5.2. Information Interfaces and Presentation: User Interfaces.

INTRODUCTION
In music composition, composers face the following two difficulties: 1) Keeping within the constraints imposed by the multiple layers of structure, such as the style and form of the piece. 2) While keeping within those constraints, continuing to create new material until the piece is completed. Pachet [5] has categorized musical systems to solve each problem into 1) interactive music systems and 2) music imitation systems. 1) Interactive music systems propose ways of transforming musical input into musical output. Korg Kaossilator [3] and Yamaha TENORI-ON [6] convert the pitch entered by the user to a pitch of specific tone. Using these systems, melody can be expressed even by users who do not have composition skills. However, for such users it is difficult to express a particular style or to create all the melodies that constitute the piece. 2) Music imitation systems represent stylistic information to generate pieces in various styles. These systems represent the musical styles of existing composers [1, 2, 4]. Therefore, music imitation systems enable anyone to generate pieces. However, since these are not interactive, it is difficult for users to intervene in composition. We propose a system to recommend how to create melodies, in order to allow anyone with intention to compose. Before beginning composition, users provide a piece of the style that they are aiming to recreate and our system proposes a continuation melody in accordance with this. (Figure 1) With this system, users can compose pieces tailored to their needs, and composers can get assistance with composition.

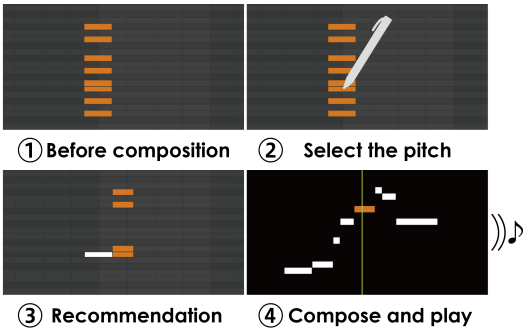

Figure 1. Example of music composition with recommendation. Our system proposes a continuation melody in accordance with the melody entered by the user.

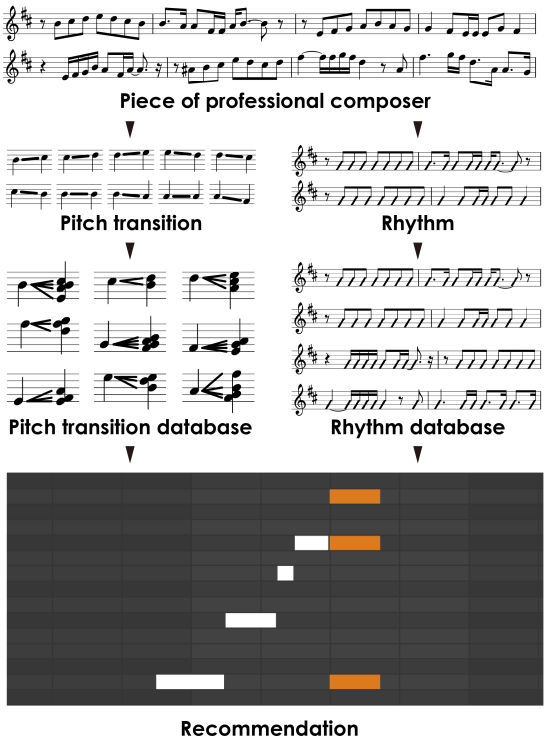

Figure 2. Overall picture of music composition with recommendation.

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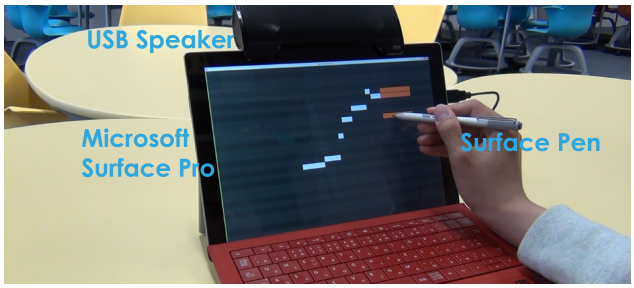

Figure 3. Composition Interface. This is built on a Microsoft Surface Pro 3, and is operated by the Surface Pen. Composed pieces are output from the USB Speaker.

RECOMMENDATION METHOD

Figure 2 shows our pipeline for music composition with recommendation. A user begins by providing a piece of music. Our system then divides the melody of the piece into pitch transition and rhythm. After the division is complete, these data are entered into their respective databases. When a user enters a note on the composition interface, our system searches the pitch transition database for pitches to which is it possible to transition from the pitch entered by the user, and recommends a list of these pitches. The length of the note presented by our system is determined by the rhythm of the piece provided by the user. In the case of the first notes only, the user starts from the notes presented by our system. Only some notes to which it is possible to transition from these notes are displayed. A video of our system and interactions can be seen at `https://youtu.be/SSlzdlO_v0Y`.

IMPLEMENTATION

Our system was built on a Microsoft Surface Pro 3, and is operated using the Surface Pen. Composed pieces are output from a USB Speaker. (Figure 3) The user interface is displayed by embedding JavaScript in Cycling '74 Max and calling OpenGL. The pitch transition database and rhythm database were built by SQLite, and melody recommendation is processed by calling data from each database from JavaScript. Music data uses MIDI format data that is sold in the YAMAHA music data shop (`https://yamahamusicdata.jp/`). MIDI data is expanded by JavaScript, and recorded in each of the databases. Melodies in the process of composition are stored in the computer memory by JavaScript, and are played in bach. Bach is an external object of Max. Our system uses the Roland SOUND Canvas for iOS as a sound source.

EXPERIMENT AND RESULTS

An easy comparison was carried out between a piece created with our system and a piece created with the conventional piano-roll type of composition system. The piano-roll composition system used was Domino. Figure 4 shows a pair of pieces that were composed in accordance with the same accompaniment. Our system was provided with the melody of this accompaniment piece. The song used was "Hana no Nioi" by Mr.Children (2008). Mr.Children is one of the most popular rock band in Japan. The composer of the pieces shown in Figure 4 is a 21-year-old student who is inexperienced at composition. Comparing these pieces, the piece

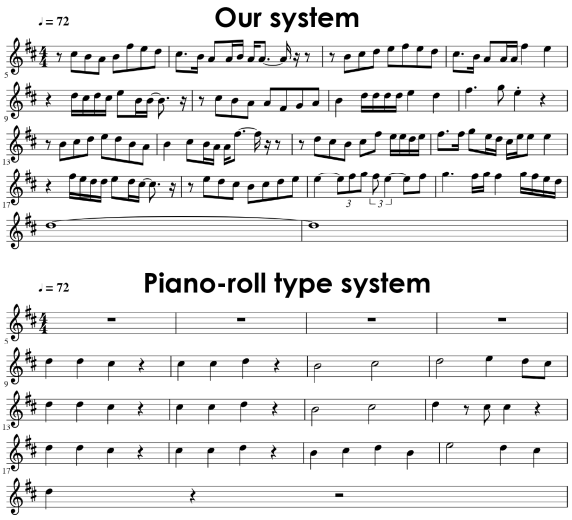

Figure 4. Comparison of a piece created with our system (above) and with the conventional piano roll type system (bottom). These were both created by a 21 year-old student who is inexperienced at composition.

composed on our system used a broad range of pitches and a many variations of rhythm compared with the piano-roll type system. This is thought to be due to the fact that an increased number of options is available to the user because a variety of notes is recommended.

CONCLUSION AND FUTURE WORK

We proposed a system to recommend how to make melodies, in order to allow anyone with intention to create compositions. Our system recommends a melody to match the style of the piece that has been provided, using pitch transition and rhythm. Compared to the piano-roll system, the piece composed with this system used a wide pitch range and a many variations of rhythm. In the future, we intend to use our system to compose pieces of different styles, then investigate the differences between these pieces, and whether it is possible for listeners to distinguish them from pieces created by professional composers.

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