DISCO: Disk-based Interface for Semantic Composition

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Abstract: When moving the activity of composing music to the desktop, one of the common issues is that the interface doesn't suggest an appropriate workflow, which would lead the user to structure up the work systematically. In conventional interfaces, musical elements are scattered over the sequencers and are thus visually unperceivable by the user. The semantics of music can be employed to put the elements in a coherent order, which would better assist the user at maintaining the intricate materials. Stepping further into the rhythmic part of music, this thesis will demonstrate a disk-based interface that helps the user create patterns easier.

1 Introduction

According to [Bl99], a piece of music can be split into individual segments (conventionally entitled as Chorus, Verse, Intro... etc.), which in turn are composed of several phrases. Similar to language, the musical structure can be described by a formal grammar that is constructed in three levels: the phrase, the syntactic elements, and the chords. Furthermore, rhythms are described in patterns; patterns are highly repetitive and made up of multiple instruments that run in parallel. To express rich emotions, variations at all levels (song segment / pattern) are necessary.

Conventional music software does not support semantic structuring of songs. Instead, it is based on the timeline and track metaphor: each instrument is represented by a single track, which generalizes the content according to the instrument being performed. However, the interrelationships between different parts of instruments are overlooked by such methods. The composer has to conform to the linear timeline to layout the materials, which is different from how the composer would structure the music. Reviewing and improving the result is also difficult because the materials to be altered are scattered over the entire interface.

To create rhythms, conventional music software emulates the step sequencer commonly used in hardware solutions. This metaphor does not capture the repetitive nature of music well: it groups patterns into fixed-length beats and distributes the components (instruments) across different parts of the interface. This organization makes variations especially hard, because the user has to repeatedly look at different parts of the interface and duplicate and modify the original at many ends.

The semantic composer intends to address these issues by allowing the composer to interact with the piece in a semantically coherent framework.

2. Related Work

A circular metaphor for music creation has appeared in many different areas: Jam-O-Drum [BP00] employs a tabletop and drum pads to enable people of different backgrounds to improvise drum patterns at a round table. Its visual feedback provides an immersive collaboration experience. In DaisyPhone [Bn04] a circular step-sequencer is used for remote musical collaboration. Aiming at examining the social aspect of using a circular metaphor, it is designed for the casual interaction in a shared space and expects contingent outcome. ReacTable [Js07] takes multiple discs on a tabletop as symbols to represent different controls of the sound. It mainly addresses sound manipulation and group collaboration. Buchla Arbitrary Function Generation 250e is known as the pioneer of applying a circular concept to the design of a drum machine, which inspired the software emulation Atomic. Nonetheless, it is still clumsy to integrate them into music composition, in that they are designed solely for making sequences of drum loops. Our work integrates neatly into a composing framework and supports the user in their task of composing and structuring rhythmic patterns.

The issue of semantic composition has been addressed by commercial software, such as Steinberg's Cubase, where the user can group and order music in sub segments. While this reduces the complexity of the representation, there is no way of using this visual ordering to structure the song itself. The Semantic Composer, on the other hand, is built around the structure of the music and allows the user to not only define but also use it when manipulating the song structure.

3. Proposed Design

We want to design and evaluate a system that represents the semantic structure of the song similar to how the composer thinks of it. Our design is influenced by two general principles: to represent the music in a semantically coherent way and to use metaphors close to the human thinking of music.

As a first prototype, we have restricted our focus to rhythmic composition on the pattern level. To better present the concept of a loop, we utilize a circular layout for each material. Similar to the clock, time presented on the disk can be easily divided into equal portions, and the continual nature of looping is also clearly shown. Multiple disks represent different instruments. The user can specify the length of a loop by changing the number of steps in each disk, which also changes its size. The user can also combine disks into groups to compare them. Figure 1 shows an example screen of our prototype.

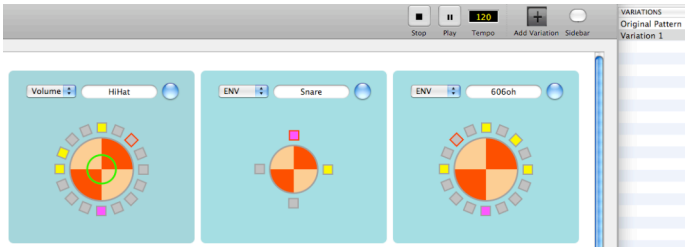

Fig. 3.1. The original pattern

We also support creating variations of patterns. These variations keep visual reference to their originals and treat changes as incremental, meaning that only changes are recorded. This way, a change of the original can be propagated to all variations. Variations are stored alongside the original, allowing for easy switching in the song arrangement. Figure 2 shows the first variation of the previous example.

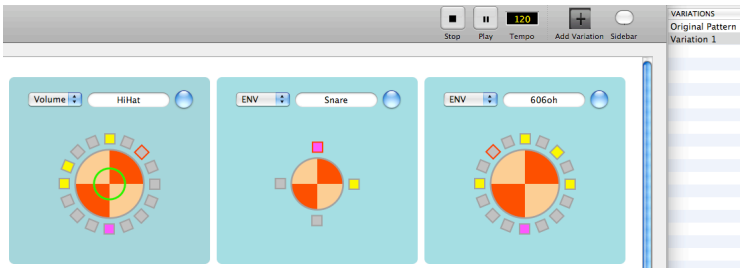

Fig. 3.2. The red frames indicate its differences from the original

In a subsequent prototype, we want to create a complete composing environment, which allows managing the semantic context of a song. The interrelated materials from different sources are created in segments, and then arranged in a timeline. Details are hidden by the user ‘s high-level definition of each segment and retrieved in groups.

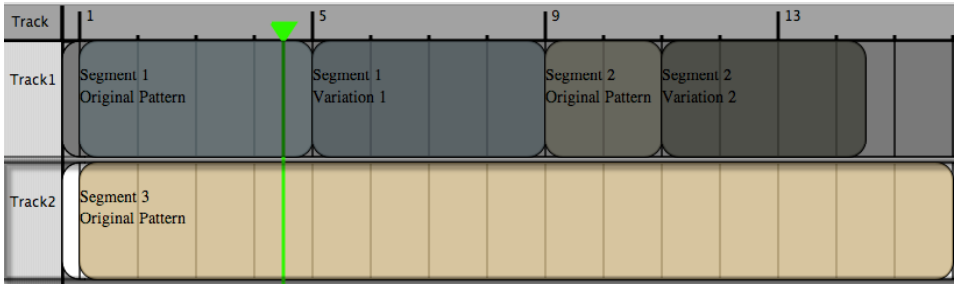

Fig. 3.3. High-level representation of materials

3. Goals

Our main goal is to reduce the unnecessary effort of composing music. We believe the two underlying principles of our design are a major step into achieving this goal. Making music in a semantic manner suggests a different workflow than is common: the user creates the base elements and uses them to create variations in a dynamic fashion, which is analogous to how generally music evolves.

Open questions we need to consider include:

[1] Do all humans think in the same semantics for the same song? Can all music be structured semantically?

[2] Are there better ways to display melody than notes?

[3] Where else does it make sense to apply the variations metaphor?

[4] Where else can semantic metaphors be applied?

We believe a fruitful discussion of this topic could lead to a publication at a major conference or journal, which we would be very interested in proceeding together with the workshop team.

References

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