MusAssist: A Domain Specific Language for Music Notation

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ABSTRACT

MusAssist is an external DSL devised as a compositional aid for music notation. Users can change key signatures, start a new measure, and describe musical structures such as notes, rests, and custom chords in MusAssist's straightforward syntax much in the same way they would when composing. MusAssist is unique in that users can also describe complex musical templates for triads and seventh chords, cadences, and the four primary harmonic sequences with desired length. The level of abstraction of a MusAssist template MusAssist matches that of the theoretical musical structure it describes (e.g. users can describe a harmonic sequence without lowering the abstraction level to chords and notes). This allows users to write out specifications precisely at the conceptual levels of the musical structures they would organically conceive when composing by hand. The musical expressions described by the specifications are expanded out (i.e. the level of abstraction is fully lowered) by the Haskell-based MusAssist compiler and are translated to MusicXML, a language accepted by most major notation software, allowing for further manual editing.

1. INTRODUCTION

MusAssist is an external domain specific language devised as a compositional aid for music notation. It organically models a composer's flow of thought by framing its syntax around the musical expressions a composer conceives when writing. Users describe musical structures in MusAssist's simple and straightforward syntax just as they would when composing. In other words, users describe a composition in MusAssist, and MusAssist writes out the music via these instructions. Fundamentally, MusAssist supports notes (including rests) and custom chords (i.e. any desired collection of notes) in the octave and key of choice, as well as change the key signature or start a new measure at any point. MusAssist is unique in that users can also describe complex musical templates; specifically, templates for chords (all types of triads and seventh chords in any inversion), cadences (perfect authentic, imperfect authentic, plagal, half, deceptive), and harmonic sequences (ascending fifths, descending fifths, ascending 5-6, descending 5-6) of a desired length. The level of abstraction of a template in MusAssist matches that of the musical structure it describes (e.g. users can define a high-level harmonic sequence without needing to lower the level of abstraction to chords and notes). This allows users to write out a specification precisely at the conceptual level of the structure. The musical expression described by this specification will then be completely expanded out (i.e. the level of abstraction will be fully lowered) by the Haskell-based MusAssist compiler.

The target language of the MusAssist compiler is MusicXML, itself a DSL that is an extension of XML (Extensible Markup Language). MusicXML is accepted by most major notation software programs (such as MuseScore). Thus, once a user has described a composition in MusAssist, they can open the resulting MusicXML file in MuseScore or another program for further customization and editing, thus bypassing the need to write out complex musical templates by hand at a note- and chord-level of abstraction. Beyond a professional music compositional aid, MusAssist may be particularly helpful to music students as an educational tool, enabling them to visualize the relationship between a theortical musical structure and its expanded form, such as a cadence and the chords resulting from its expansion.

A MusAssist user need not have any computing background, though they should understand music theory through chord and cadence types, as well as harmonic sequences.

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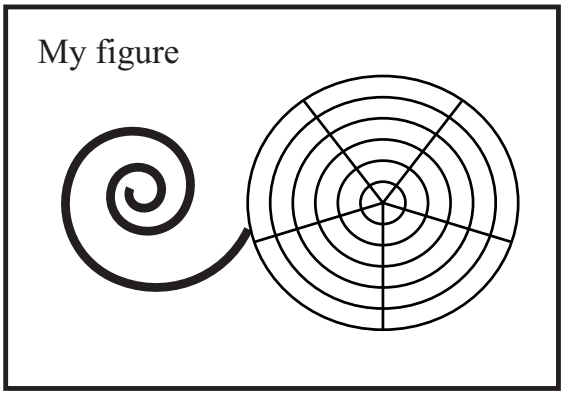

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Acknowledgments

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8. REFERENCES

[1] A. Someone, B. Someone, and C. Someone, "The Title of the Journal Paper," *J. New Music Research*, vol. 12, no. 2, pp. 111–222, 2009.

[2] X. Someone and Y. Someone, *The Title of the Book*. Springer-Verlag, 2004.

[3] A. Someone, B. Someone, and C. Someone, "The Title of the Conference Paper," in *Proceedings of the 2005 International Computer Music Conference*, Barcelona, 2005, pp. 213–218.