Reducing Dissonance with Dynamic Tuning Algorithms for MIDI Synthesis

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ABSTRACT

This dissertation investigates a software based tuning method as an alternative to the standard western, one-size-fits-all approach of tuning music pitches in the form of twelve-tone equal temperament (12-TET). It is based on the belief that software synthesized music does not have to follow the constraints of traditional instruments which cannot be tuned, with precision, in a practical timeframe. The aim is to provide a custom tuning system, that considers the melody of a song.

Four popular songs read from standard MIDI files were parsed and represented in a program. This representation was analysed for its structure, dissonance between notes, and run through a gradient descent algorithm. This algorithm optimizes the frequency of notes to reduce calculated dissonance between simultaneous notes, or chords. Results were then compared to standard tuning methods and the algorithm fine-tuned to maximize the reduction in dissonance.

The algorithm shows up to 12% reduction in total calculated dissonance. Successful dissonance reduction occurs in 3 out of 4 MIDI tunes of varying complexity. It can be concluded that reducing dissonance in comparison to 12-TET is possible using the methods outlined in this project. Possible adaptations to improve usability and widen the tuning parameters are discussed in later sections of the dissertation.