MADSA: Musical Accuracy Development Using Spectral Analysis

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With the increasing amount of cognitive benefits found to help musicians, it has become increasingly imperative to begin playing music. However, aspiring musicians often have trouble pinpointing and correcting mistakes, particularly in longer and more technical musical scores. Furthermore, tiny differences in notation (e.g., a different direction in a turn, or the absence of a slash in a grace note) can misguide a musician from learning the correct way to play a song. These two factors can lead the musician astray from correctly identifying and improving on the sections the musicians struggle upon, inhibiting their rate of improvement. To help musicians identify miscues in their performance, a software solution and its various algorithms were developed. A Java program was written to implement a Discrete Fourier Transform that visualizes the data from a .wav sound file by its frequency and amplitude. Real-time data is collected from a musician playing a specific song which is laid over the spectrogram and compared to see if the frequencies match a known “perfect” performance of the same song. The effectiveness of the program was tested with students who played various pieces different instruments and were asked to describe where they played incorrectly. The resulting responses wee then compared to the data from the program. This project helps train musicians to play more accurately and provides an alternative to a music teacher if the student either cannot afford lessons or is not able to meet the teacher in person.

Awards Won:

Oracle Academy: Award of $5,000 for outstanding project in the systems software category.