

CORNELL UNIVERSITY

CS 4621 PRACTICUM PROJECT PROPOSAL

A[#] – Music Visualizer

Shane MOORE
swm85

Zachary ZIMMERMAN
ztz3

Emre FNDK
ef343

Joseph VINEGRAD
jav86

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1 Summary

Our group proposes to create a music visualizer called A♯ (A Sharp) which goes beyond the interpretive scope of current visualization software. We find that the typical music visualization does fine at looking good alongside the music, but fails to go beyond and provide actual interpretation or insight into the song.

As Edward Tufte said in his book *The Visual Display of Quantitative Information*, “At their best, graphics are instruments for reasoning about quantitative information” (Introduction). The job of a music visualizer, therefore, is to provide the user with enough relevant and useful and visual information that they may interpret, on a higher level, the characteristics of the sound which is being visualized. If possible, the visualization could be considered a summary of the song, and even a rudimentary alternative.

We plan to work towards this standard in our music visualizer, A♯.

2 Software description

- Application that takes a song file and outputs a video file to accompany it
- We should think about this, maybe we want to input a song, have it do preprocessing, and then immediately play the video?
- Perhaps also take midi input as a warmup (this is a good idea)

3 Application in Graphics

Two areas that we'll cover and graphics techniques that we'll use (video rendering)

4 Software Architecture

Code in python Modules Sound file analysis Model for representing different parts of sound Timbre, key/“emotion”, amplitude Controller acts as abstraction layer between model and view View (graphical representation) Software representation of the visualizer Renderer Actually render (and play?) the video of the visualization

Also breakdown of work

4.1 Properties of Music for Quantification

- Song genre
- Amplitude at a given frequency
- Sound location (stereo)

- Sound quality (Hilbert scope)
- Tremolo
- Centroid, spread, skewness and kurtosis (of an amplitude envelope)
- Mel-frequency cepstrum
- Rhythm complexity
- Distinguish accompaniment from melody
- Melody: pitch, volume, position in chord

5 Milestone

By the milestone, our group hopes to have the following as part of a proof of concept:

- Warmup: midi support, later on, wav support
- Working interfaces for each of the sound libraries we choose to use
- Integration of data from all of the libraries into one format
- A rudimentary visual representing every meaningful piece of insight we can glean from the music