

Final Project Proposal

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Background and Motivation

With the development of technology, music instruments change a lot, especially in the improvisation field. Unlike composition, improvisation places additional demands on instruments. More and more instruments are being made to satisfy more novel improvisations. Nowadays, the use of computers for improvisation has developed to a whole new level, and it is also one of the future trends. In this project, I propose a new and interesting way of creation: improvisation using Rubik's cube and computer.

There are two reasons I chose to use Rubik's cube: 1) I'm a professional player of Rubik's cube and there are a lot of wonderful patterns which can produce music. I hope that I can take advantage of this and set up an interesting instrument prototype. 2) There are more than 4×10^{19} states of Rubik's cube combination, so we will never have to worry about the repetition of music. Making music with a Rubik's Cube is a tempting thing to try.

Software Introduction

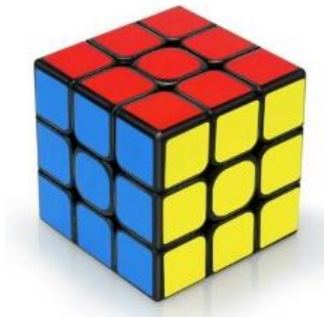


Fig 1: Rubik's Cube

A 3x3x3 Rubik's cube is shown in Fig 1. Every time a user rotates the layers, the movements will be input into the computer software and produce musical sounds.

Software Implementation (Technical Methods)

This software will be programmed in Python and wrapped to be an execution file. There will be a designed GUI when running the program.

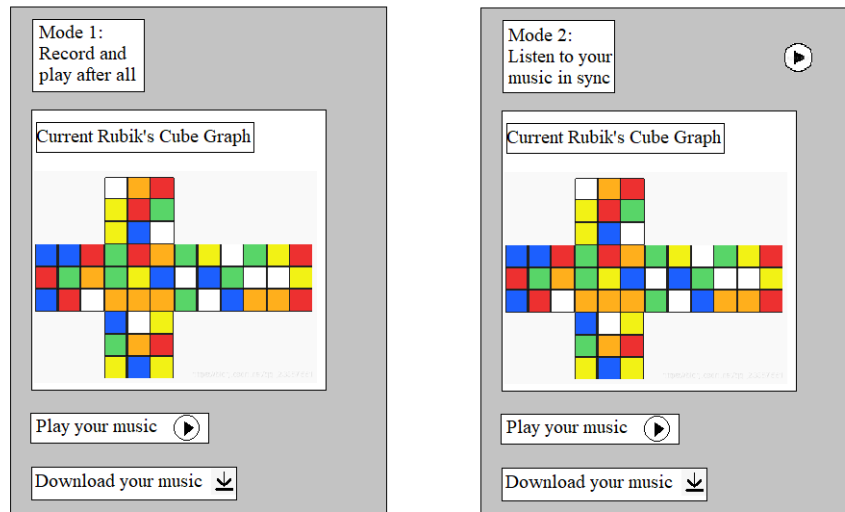


Fig 2: GUI Design

Every rotation of the Rubik's cube will lead to the position and color changes. To make the final music sound better, I used a pentatonic scale.

From top to bottom, each layer of the cube represents a different frequency range. The bottom layer has the lowest pitches, and the top layer has the highest pitch. The Rubik's Cube has six colors, each color will be converted into a musical note.

There are two modes of this software: 1) people can choose to record and play their improvisation music after they complete all the movements, or 2) they can rotate and listen to the musical sounds simultaneously. If people are satisfied with their implementation, they can click the download button to download their music. The music made by this is no longer than 10 minutes.

Milestone and Timeline

- ◆ Feb 23: Submit Final Project Proposal
- ◆ Mar 15: Finish Rubik's Cube Programming
- ◆ Mar 25: Combine Rubik's Cube Programming and Music generation
- ◆ Apr 1: Finish GUI design
- ◆ Apr 12: Package all the programming files
- ◆ Apr 13: Submit Final Project Prototype
- ◆ Apr 25: Submit Final Project Paper