

ABSTRACT

Harmonic dictation in music is the process of being able identify and transcribe the relation of a set of chords played successively. This is an aural skill that can only be developed through practice. As of today, no set of tools exist for musicians to develop this skill independently. In order to develop this skill, the process requires a person to physically play the progression through the use of an instrument and have the user attempt to identify the progression. This project attempts to provide a solution by automating the process through the use of computer software.

BACKGROUND

Music theory is in part a collection of rules, guides, and methodologies describing how composers create music acquired by studying hundreds of composers across different periods in time. The rules of music theory in reference to the production of chord progressions that will be used by this project produce a chart that when followed properly produce a proper chord progression.

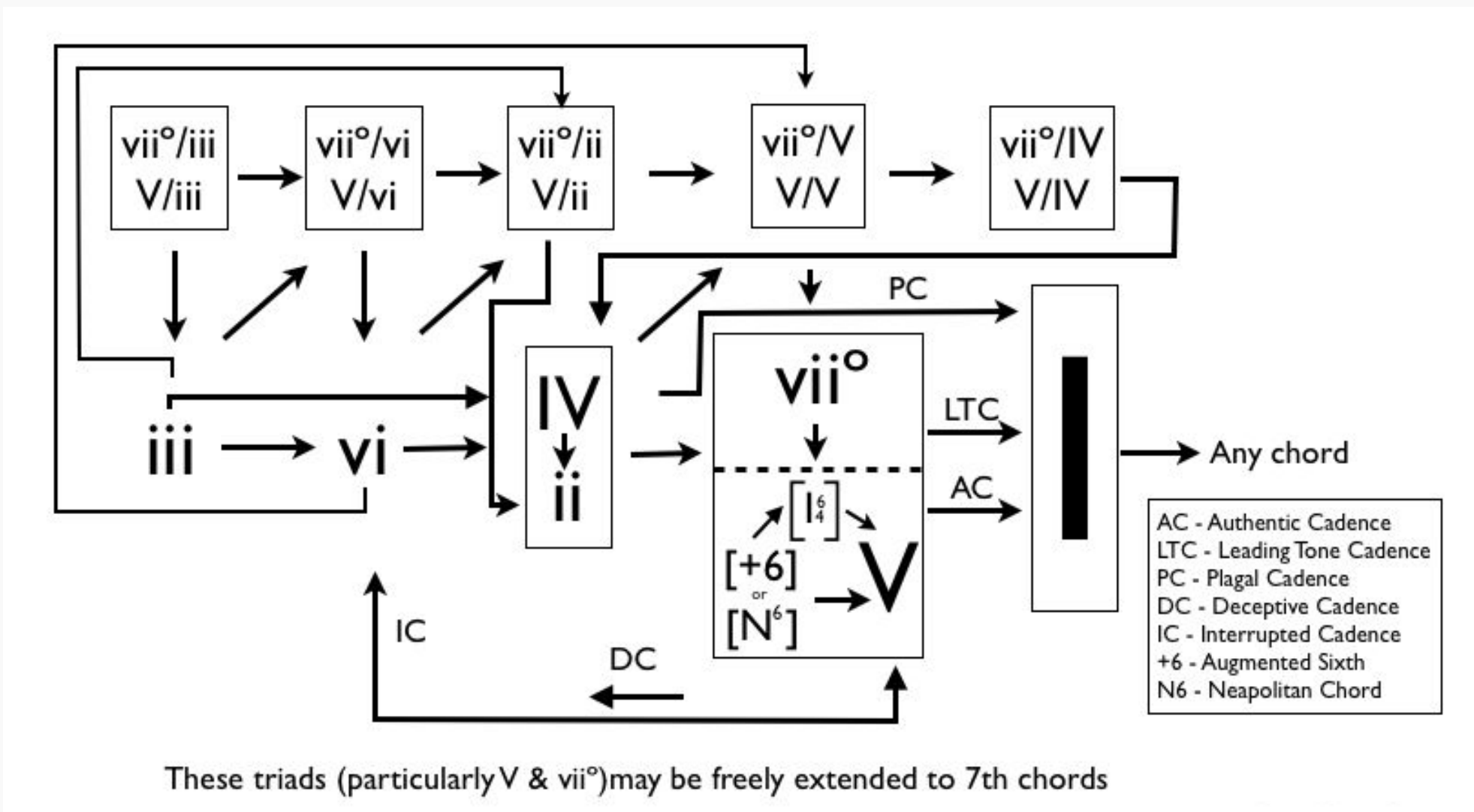
DEVELOPMENT

- Java was used to develop the core of the application. This includes the core music model such as notes, chords, keys, and the progression.
- Google Web Toolkit was then used to compile the Java program entirely into to Javascript. This was done in order to allow the program to run natively across all browser supported devices.
- JasmineMidi Library was used to play the audio of the chord progression using MIDI.
- Laravel PHP was used to create the backend server that would allow user to register, login, and communicate with the MySQL database.

OBJECTIVES

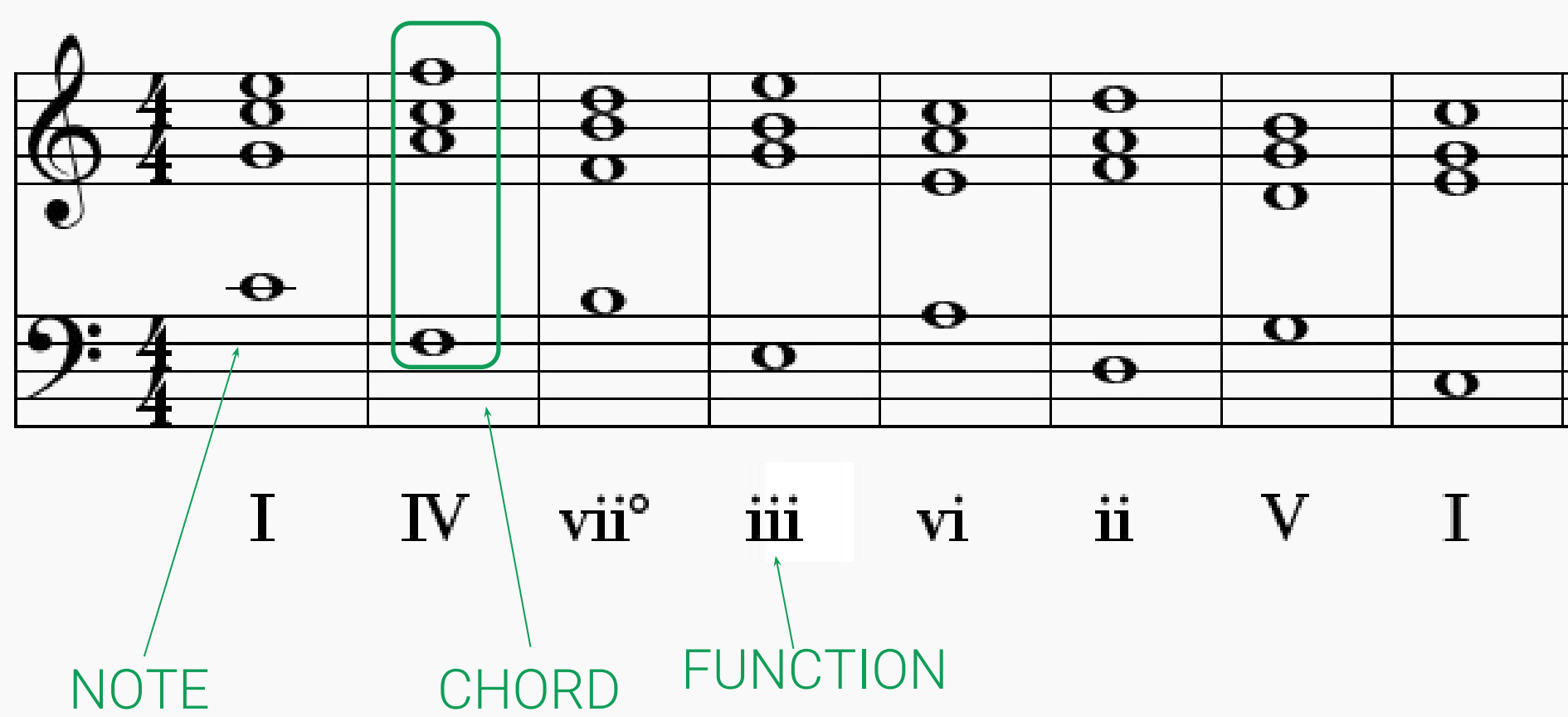
- Develop a web application that is able to generate harmonic chord progressions based on the rules of music theory.
- Allow users to select number of chords in progression.
- Allow users to select the mode of the progression.
- Play the chord progression back to users.
- Allow users to input their answers based on the audio played.
- Allow users to submit and display the correct answers.
- Create a login and registration system so that users can track their progress.
- Generate progressions based on a user's prior incorrect entries.

PROGRESSION CHART



- A I chord can go to any chord
- A progression must start and end with a I chord
- The semi last chord before must be a IV, vii°, or a V chord

CHORD PROGRESSION



- Chord Progression - A set of Chords or Functions
- Note - A frequency identified by alphabet letters A – G
- Chord - A stack of 3 or more notes
- Function - Roman numerals used to represent a chord and its relationship to other chords in a given progression.

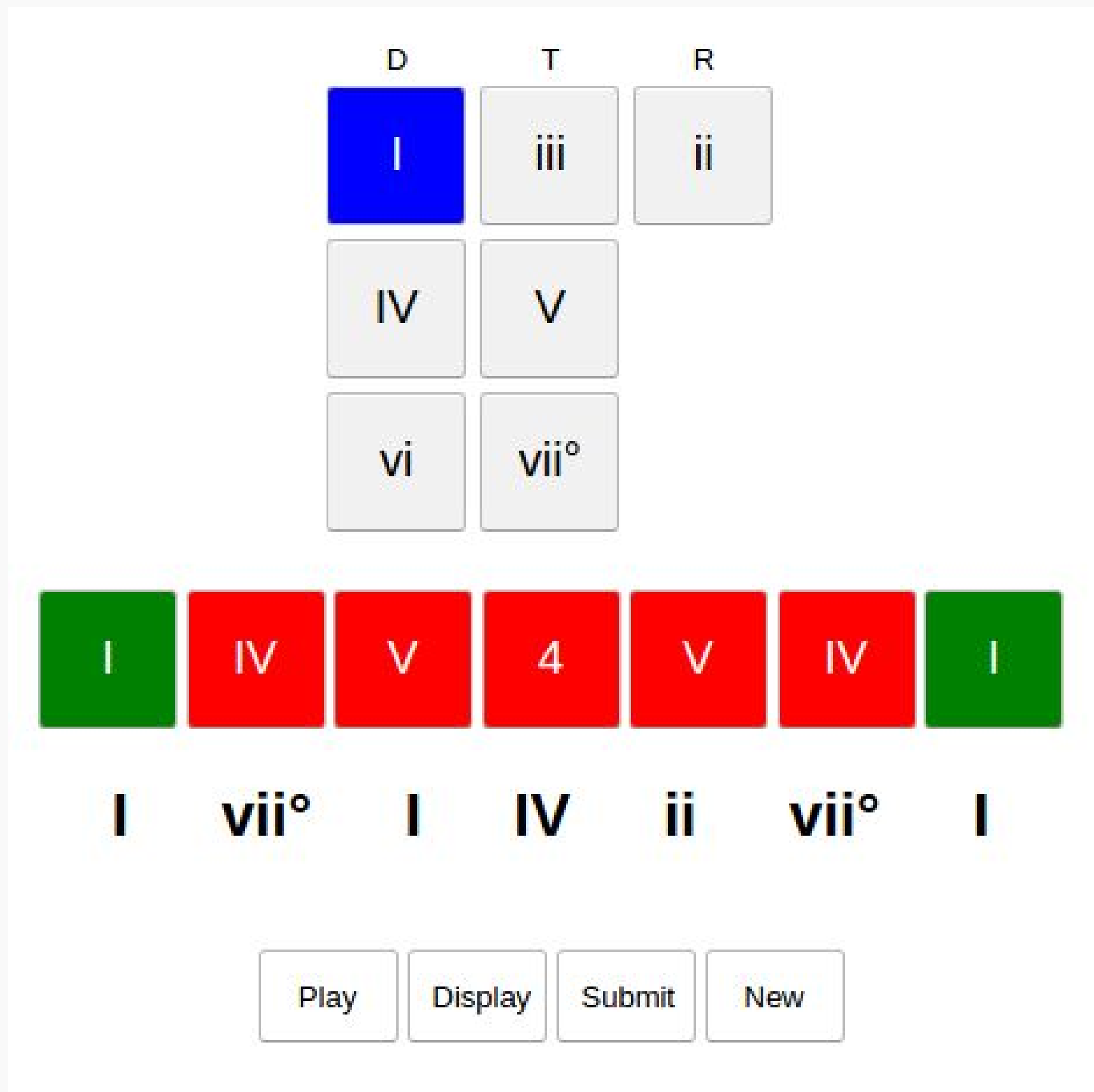
IMPLEMENTATION OF THE PROGRESSION

If the progression gets created as it would get played from start to end, a problem would arise towards the end of the progression. Since the number of chords is unknown it would be possible for the program to not be able to resolve the semi last chord to a I chord within the given number of chords. This would force to program to run a Backtrack algorithm until and if it is able to resolve the chords appropriately. Through careful observation, it was discovered that if one were to instead run the algorithm from the end to the start with a reversed progression chart, one would be able to avoid this problem since the first chord can go to any other chord and no other rule exists other than the first chord must be a I. The implementation can be seen below.

```
Select number of chords
Select Mode
Select Key
Set 1st chord and N chord to a I chord
FOR EACH N from N-1 to 1:
    GenerateChordFrom (N+1)
```

GUI

The application's graphical user interface features a grid of buttons that represent all the possible answer choices a user can enter for a given progression. A row of buttons exist right below that allow the user to input the chord the user thinks corresponds to what was played by selecting one of buttons from the grid above. A user can press play to hear the entire progression. A user can press submit in order to show the answer and accuracy of the user.



REFERENCES

Kostka, Stefan M., Dorothy Payne, and Byron Almén. *Tonal harmony: with an introduction to post-tonal music*. New York, NY: McGraw-Hill Education, 2018. Print.

ADVISORS

- Professor David Egle
- Dr. Carol McNabb-Goodwin