CS Capstone Technology Review

NOVEMBER 14, 2017

Music Theory Application

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Abstract

This document is a technology review for the Music Theory Application that Team TriTone will be creating for Lukas Hein. This document contains Aidan's review of his three pieces. These pieces are the overall development environment, the base circle of fifths implementation, and the circle of fifths sidebar implementation.

1 OVERALL DEVELOPMENT ENVIRONMENT

1.1 Overview

Since our team's task is to create an application, the first hurdle that we must tackle is what environment are we going to define as our base to build the application upon. There are more possibilities than what we are going to discuss in this paper, however, for our problem we have narrowed the best choices for the development environment to Xamarin Studio, XCode and Android Studio to create separate but equivalent products, or React Native.

1.2 Criteria

To judge what will determine an acceptable development environment, we need to be able to meet all of the requirements we defined in the requirements document. The main hurdles in that document will be creating a chart to represent the circle of fifths, adding interaction capabilities to this chart, as well as creating a page to analyze a user's compositions. The other aspects of the application are mostly simple text based components and should be easily accomplished in any of the development environments we defined.

1.3 Pieces

1.3.1 Xamarin Studio

Pros

- One codebase for both android and ios platforms
- Component store
- Object oriented code base
- Good support and resources

Cons

- C# which only one team member has worked with
- Difficult user interface creation

1.3.2 XCode and Android Studio

Pros

- Guaranteed full use of mobile's capabilities since we are coding in the intended manner for both platforms

Cons

- Two codebases would be necessary for the two different languages
- No members of the team have worked in swift before

1.3.3 React Native

Pros

- Quick set-up
- Javascript is the programming language used which all team members are comfortable with
- Npm support

- Easy to convert code to a web platform
- Good support and resources/documentation
- Component based
- One codebase for both android and ios platforms

Cons

- Relatively new and doesn't have all of the built in features that a true development suite like xamarin has
- Might not have all of the capabilities that coding in the native environment would allow

1.4 Discussion

1.5 Conclusion

We decided on using React Native as our development environment for many reasons. One reason being the wide range of free third party libraries. Another being the fact that it is one codebase for both platforms. Lastly, there is the least boundary to start with React Native since every team member is comfortable with coding in JavaScript.

2 BASE CIRCLE OF FIFTHS IMPLEMENTATION

2.1 Overview

The main part of our application is going to be the Circle of Fifths page. This is what demonstrates most of our client's topics that he wants to teach. It is a circle with the 12 tones of western music around it. Going clockwise around the circle are the intervals of four and going counter clockwise are the fifth intervals. There are many ways we could implement this circle but we have narrowed our options down to creating the circle with something similar to a browser SVG (vector based graphic), loading specific images into the app and cycling through them when a user interacts with the app, or using ascii art to make up the circle.

2.2 Criteria

The criteria we defined to determine if the circle of fifths is acceptable are listed. It needs to be easy to make out all of the notes on the circle, it should also be easy to understand the flow from relative key to main key to parallel key on the circle. The circle should be visually pleasing to the user meaning it matches the rest of the theme and doesn't stand out in a bad way.

2.3 Pieces

2.3.1 SVG

Pros

- More customizability
- No reizing issues

Cons

- Harder set up
- More complex code in general because you need to draw out the paths of the image

2.3.2 Image

Pros

- Simple to code interactions with the image
- With good vector image software we could make really nice images

Cons

- Will need 12^4 images for all of the different options we need

2.3.3 Ascii

Pros

- Easy to code
- Easy to manipulate

Cons

- Looks ugly

2.4 Discussion

2.5 Conclusion

We ended up choosing the SVG option for making the circle of fifths. One reason for this choice is the customizability. Our client wants a color coded circle and if we decide later on that we want slick animations involved then all of this is easier witha drawn SVG in our codebase. We don't have to bog our repo down with tons of large image files. We can create the best looking circle with this option. We deemed that the difficulty of getting the SVG to work in our application to be worth it because of all of the other features we can implement. Since the circle of fifths is the biggest part of our application we can handle the difficulty of an SVG.

3 SIDEBAR CIRCLE OF FIFTHS IMPLEMENTATION

3.1 Overview

Since the main part of our application is the circle of fifths page, it is necessary to talk about our implementation of the sidebar for the circle of fifths. The sidebar's main purpose is to show the user the schedule of tonal gravity for the key that is currently selected. The second purpose of the sidebar is to alter the contents of the circle, for example, the sidebar should allow the user to change the current key in some manner.

3.2 Criteria

The criteria we defined for a working sidebar is the following. The user should be able to set the main key with the sidebar. The user should be able to view the tonal gravity of the current key.

3.3 Pieces

3.3.1 Clickable

Pros

-

Cons

-

3.3.2 Draggable

Pros

-

Cons

-

3.3.3 Combination of Click and Drag

Pros

- Maximizes user's gesture options

Cons

- Gestures could possibly cancel each other out or interact poorly

3.4 Discussion

3.5 Conclusion

We decided to go with the combination of clicking and dragging to give the user the most interaction with the circle of fifths.