

Chord Suggestions iPhone App for Original Melodies:

App Name: ARIA Chord

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Abstract

ARIA Chord is an app that can suggest chords to accompany an original melody in real time. The users can import their melody through a MIDI file. ARIA Chord focuses on suggesting unique chord variations that can make a progression ideal for any music genre. Its purpose is to allow anyone to write like a guitarist, pianist or any other polyphonic instrumentalist. Additionally, the suggested chords can be filtered out by using **the emotion filters**, which will then show the most related and desired chords. The emotion tool can help the user find more complex variations of chords that can access more complex emotions. Also, ARIA Chord will give you the option to filter out chords according to the genre you write (more complex chords and inversions for jazz, simpler catchy chords for pop, more aggressive chords for rock, etc.). What makes ARIA Chord unique is its ability to analyze an inserted melody and, after the user has set the desired key, show all the available chords that belong to that scale.

1. Introduction

The idea of creating an app that suggests chords was inspired by a Berklee Alumni and guitar teacher, John Savvides. He would give lessons to songwriters on how to make simple chords sound more interesting and suitable for any music style. The message that he was getting across was about the understanding of which chords work better than others in certain genres. This could be achieved by using alternative chord positions that incorporate open strings and give the option of adding extra notes beside those that belong to the chord. On the contrary, the idea of removing notes that are complicating or aren't as useful in the context of a song would be as effective. Additionally, he was giving "bad examples" of chords in relation to the different genres in order to help students relate that complicated chords aren't always the best choice in every type of music.

2. Background

Considering all these techniques and applying them to the programming of the app could lead to a powerful tool for composers and songwriters. The initial idea was to be able to conform chords into music genres. Consequently, another thought was to give the app the capability of analyzing the notes of a melody and suggest chords based on them. Furthermore, having the option of narrowing down chords that suit a particular music style would be very beneficial. Taking into account that single chords convey certain emotions, if used correctly, composers are able to give their music it's intended feeling. This thought brought another idea to light. That idea was to assign each chord to the emotion that it produces and show them to the writers accordingly. Also, this would lead to a new way of approaching chord progressions that could spark songwriters' creativity. Learning about Music Production, Technology and Innovation was a great opportunity for me to bring my idea into being.

Review of The State of The Art

In researching the idea for ARIA Chord, a few existing apps came forward. However, many of these apps are only doing one of the tasks that ARIA Chord will be able to deliver. For example, an app called *Music Memos*¹ can suggest chords, but it isn't very user friendly—the types of chords are limited and chord placement cannot be edited by the user. Another existing app named *Open Chords Pro*² allows the user to make an original progression by picking random chords, which later on can be edited from the chord variations' list. The problem is that the user cannot input an original melody for the app to analyze. As a result, the user still has to figure out the chords on their own. Also, there is no option to set the harmony's rhythm changes. However, there is an audition chord feature that allows the user to listen to the specific chord variation (ARIA Chord will have this too). Additionally, an alternative app that was found during the exploration of this idea was the *Suggester*³. This app, similar to the previously mentioned apps, can playback chords that the user can listen to. Also, it has a huge collection of chord types that are listed under the right mode/scale and separated into four categories: Basic, Seventh, Secondary and Other chords. This is very useful, but unfortunately it doesn't go beyond the knowledge of music theory that is taught at music schools. Composing is all about finding the right sound colors to support the emotional ideas of your music and less about complex chords.

1. "Apple's new Music Memos app makes recording easy", YouTube video, 2:05, posted by The Verge, January 20, 2016, accessed November 21, 2017, <https://www.youtube.com/watch?v=pSDCbXGIovM>.

2. "Top 10 Apps for Songwriters", YouTube video, 9:44, posted by EmmaMcGann, July 22, 2016, accessed November 21, 2017, <https://www.youtube.com/watch?v=DsmW4GYrydY>.

3. "Suggester – Chord Progression Tool and Music Scale Reference demo", YouTube video, 1:50, posted by rafport, March 12, 2012, accessed November 21, 2017, <https://www.youtube.com/watch?v=Xyn3QPhcPRw>.

ARIA Chord leaves no limitations compared to the above apps. It takes composition to next level by allowing the user to harmonize each original melody with as much control and efficiency as they would have by collaborating with a professional musician who is knowledgeable of all the musical styles and can adapt in real-time.

When researching the right tools to build ARIA Chord, an existing audio library called *Audiokit*⁴ was discovered. *AudioKit* was developed by Aurelius Prochazak, a computer software creator and is an audio synthesis, processing, and analysis platform for iOS, macOS, and tvOS. Aurelius coded an intelligent audio toolkit that includes Oscillators, Physical models of music instruments, Audio Effects, MIDI interaction and more. Embedding his MIDI libraries will enable ARIA Chord to identify the scale of a MIDI file in order to be able to suggest chords to the imported melody successfully.

3. Creating ARIA Chord

3.1. Introduction

The first step in the creation of the app included the finding of all existing chords and their assignment to the appropriate genre. Then, those chords were associated with every note in the C major scale. The ones that include the melodic note will be shown to the user. The next step was to create audio samples and use them to produce the sound of the melody and chords from the given MIDI File. Consequently, all the chords were analyzed and assigned to emotion categories that they produce. The categories of chord emotions were divided as follows: sad, happy, neutral, angry, dark, optimistic, and nostalgic. These categories were inspired by psychoacoustic research that explains the human perception of harmony. As I already stated, the purpose of the app is to narrow down the results and make it easier for

4. Aurelius Prochazak, "AudioKit Reference." AudioKit V4.2, May 6, 2018. Accessed May 27, 2018, <http://audiokit.io/docs/>.

songwriters and composers to find the perfect chord. Next, the chords were assigned to music genres that often make use of them. These categories are: Pop, Rock, Electronic and jazz.

3.2. Psychoacoustic Research

During the Psychoacoustic Research, some very important sources were discovered that explain how humans perceive certain emotions that single chords convey. *Imre Lahdelma*⁵ states in his academic dissertation for “*JYVÄSKYLÄ STUDIES IN humanities 313*” that “Zentner et al. (2008) have proposed a music-specific emotion model called the Geneva Emotional Music Scales (GEMS). GEMS comprises 9 emotion scales: 1) wonder, 2) transcendence, 3) tenderness, 4) nostalgia, 5) peacefulness, 6) power, 7) joyful activation, 8) tension, and 9) sadness. This model is derived from confirmatory factor analyses of ratings of emotions evoked by various genres of music (Zentner & Eerola, 2010). The current work harnesses various emotion models, as the focus is not only on basic emotions such as happiness and sadness, but also on complex, mixed emotions such as nostalgia/longing (Juslin & Laukka, 2004). Zentner et al. (2008) suggest that musical emotions tend to occur in a blended manner, and that these blended or mixed emotions can have features of both positive and negative qualities – “nostalgia” being a good example of an emotion encompassing a variety of closely related terms, including “wistfulness” and “longing”. In the GEMS model (Zentner et al., 2008) further terms associated with nostalgia include sentimental, dreamy, and melancholic. It is not surprising that scholars have labeled this emotion with a dual label, i.e., “nostalgia/longing” (Juslin, Liljeström, Västfjäll, Barradas, & Silva, 2008). To simplify the terminology, the

5. Imre Lahdelma, At the Interface Between Sensation and Emotion: Perceived Qualities of Single Chords, April 25, 2017, 19, accessed May 28, 2018, https://jyx.jyu.fi/bitstream/handle/123456789/54342/978-951-39-7067-3_vaitos22062017.pdf.

current work will label this complex and blended emotion as nostalgia to encompass the most common variants, such as nostalgia, longing, and wistfulness.” Imre Lahdelma also states in his dissertation that “1) neural processing in emotion-related brain areas is activated by single chords, 2) emotion processing is enhanced in the absence of cognitive requirements, and 3) musicians and non-musicians do not differ in their neural responses to single musical chords during passive listening”.

Example 1. Chords Table

	Emotion	Sad	Happy	Neutral	Angry	Optimistic	Nostalgic
Genre							
Pop		Minor, Minor7	Major			Sus4, Sus7	7(9) omit-3 rd , Major7(9) omit-3 rd , sus7 2 nd inv
Rock		Minor, Minor7, Minor6(omit3rd)	Major	Power Chord	Power Chord	Sus4, Sus7	Sus2
Jazz		Minor7				Sus4, 7 th Chord	
Funk		Minor7				Sus4, 7 th Chord	
Reggae		Minor, Minor7	Major			Sus7	

3.3. Programming

This is when programming came into place. Using Apple Swift, two big lists were created: The first one had all the existing chords including the different variations and added tensions as well as chords that omit notes, implementing the technique that my guitar teacher taught me. The second one consisted with all the associations of chords to each note of a major scale as well as to the different genres and emotions.

Finding a way to import the melody was a difficult task as the existing technologies and time constraints were limited. The most manageable and interesting way to do that was to access a melody via MIDI file online.

3.4. App Design

The final stage was to design ARIA Chord and to create an intuitive UX (user experience). A visual and comprehensive way of doing that was to have the notes of the melody shown as bars of different lengths which represented the length of each note. In addition, the notes of the melody were placed from high to low in order to represent visually the sonic difference. Furthermore, the user can preview the chords before placing them into their chord progression.

4. Conclusion

Each step of ARIA Chord's creation has really pushed my boundaries to learn new things that I didn't think I was capable of doing (i.e. coding.) Listening to suggestions from my peers and professors has really helped me to find the right way to improve my app's capabilities. Additionally, the experiences I gained throughout my recording and music production classes continually helped generate more ideas to make the app as effective as possible. ARIA Chord's evolution will not stop here as I will continue working hard to improve it by implementing more ideas to make sure it does not lack any features.

Multimedia Resources

“Apple’s new Music Memos app makes recording easy”,

YouTube video, 2:05, posted by The Verge, January 20, 2016, accessed November 21, 2017, <https://www.youtube.com/watch?v=pSDCbXGIovM>

“Top 10 Apps for Songwriters”,

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Perceived Qualities of Single Chords, April 25, 2017, 19, accessed May 28, 2018,
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