

Chordmaster

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Abstract

There are lot of musicians interested in playing the guitar or piano, but unable to identify the basic chords. A chord is a combination of two or more musical notes. In order to reproduce a song, a musician requires to know the chords of the song. At present, there are many number of applications that lively identifies and displays musical notes only but they do not detect the chords of a song. Our application provides a solution by using Android Smartphones to analyse sounds emitted from musical instruments, and will objectively detect and display the played chords in real time. Musicians are therefore able to determine their accuracy of chords, by observing the display. Since chords are the basic foundation of songs, the app will be very helpful for all musical instrument players especially beginners as chords will be lively displayed. Therefore our app will be an essential tool for all musicians, especially beginners. The application will be a self-standing platform for beginner musician so that he/she can find chords themselves without any other aid.

Keyword- Android, Chord Recognition, Pitches, Tuning

I. INTRODUCTION

Music is an art custom and cultural action whose medium is sound organized in time. General definitions of music include common basics such as pitch, rhythm, dynamics and the sonic qualities of timbre and texture. Music is performed with a huge range of instruments and vocal techniques of singing. There are various establishments related to music like music academies, music studios. In music, a note is the pitch and time of a sound, and also its symbol in musical notation (♩, ♪). Notes are the building blocks of music.

A chord in music is any harmonic set of pitches involving of two or more (usually three or more) notes (also called "pitches") that are heard as if sounding all together. For many practical and theoretical purposes, arpeggios, broken chords, or sequences of chord tones, may also be measured as chords.

At present, there are many number of applications that lively identifies and displays musical notes only. Since chords are the basic foundation of songs, the app will be very helpful for all musical instrument players especially beginners as chords will be lively displayed. An android application that helps a musician to find chords of songs or instruments played. The application will be a self-standing platform for beginner musician so that he/she can find chords themselves without any other aid.

II. LITERATURE SURVEY

A. *Da Tuner*

Da Tuner [8] is an all-purpose, accurate and responsive chromatic tuner app for Android with a simple interface. It is much easier to use. It converts the essential frequency to the nearest note and error in cents for quick and easy tuning of your guitar, ukulele, violin, bass, cello, mandolin, piano etc.

Its display is easy to read; nearest note and octave is displayed in a giant, easy to read font in the centre of the screen, and frequency in hertz plus error in cents is displayed at the bottom of the screen. Sensitivity is auto-attuned, but can also be adjusted by touch via a bar on the left-hand side of the screen and the speed/accuracy of the algorithm and the relative frequency (if other than 440Hz) can be adjusted by the configuration menu.

Both Screen and filter lock allow you to select the note that you would like to tune to, with filter lock ignoring anything outside of the range of the note you wish to tune, which is useful for tuning in noisy environs.

1) *Features*

- 1) No dead zone.
- 2) Auto-Sensitivity - no configuration required.
- 3) Bright, easy-to-read display.
- 4) Quick, accurate and precise.
- 5) Screen lock: Lock to the note you need to tune.
- 6) Filter lock: Lock and filter to a definite note and filter out all outside that note's range.
- 7) Reference frequency adjustment.
- 8) Choice of colours for sharp/flat/in-tune

9) 8 kHz – 48 kHz is the sample rate

B. Guitar Tuna

Guitar Tuna [9] is the easiest, fastest and most accurate tuner app among others. The decisive tuner for guitar, bass, ukulele and all popular string instruments. It is simple and easy to use. It works with electric and acoustic guitars and string instruments using the built-in microphone. No cables needed. It is a perfect application for complete beginners. It is simple and intuitive. It provides clear visual feedback with signal history.

1) It provides functions like

- Metronome
- Chord library: which find any chord diagram easily and hear how it should sound
- Learn Guitar Songs
- Alternative tuning sets
- Chromatic tuner

2) Additional Features

- It works in noisy areas, with background noise cancellation technology
- App designed by guitarists for guitarists and developed by the world's leading audio engineers
- It improve your skills in chords, riffs, tabs, and ear training, and increase your picking speed, just like you would with guitar lessons / classes

C. Basic Guitar Chords

Basic guitar chords [10] is just for guitar education from the creators of Guitar 3D - Final Guitar to guitar lovers who have trouble finding a real guitar teacher in their location. When it's hard to learn guitar chords with photos or videos or Need to see the finger positions from different angles, Then this app help to learn basic guitar chords with real-time 3D interactivity. Observe the correct finger movements between chord changes. Entirely animations and real guitar audio samplings are made with academic musicians.

1) Features of Guitar 3D Basic Chords Trainer

- To observe finger positions (fingerings) from different views 3D Camera is provided and 3D Hand and fingers to demonstrate correct positions on guitar
- Finger transitions between chord changes (chord progressions) lessons / classes

D. ZAX Chord Detector

Zax chord detector [11] is automatic chord detector that uses the internal device microphone and it also has some unique features as showing the music spectrum so you can actually see the notes in it.

ZAX can be used not only as a chord detector but also it shows any instrument timbre. It displays all notes that are available as a frequencies in the sound. Basic tempo detection (BPM detector) also added to help you find the BPM for your song.

This specific version is still alpha and is equipped only with major and minor chords. This is a free version that is fully functional. The app was not adjusted to find the chords for some specific instrument but is suitable for anything that makes sound.

1) ZAX Chord Detector Features

- Chord guess (major minor only)
- Timeline for chord chains
- Easy Pitch shift
- Bass note detected

It works in the range 70 - 450 Hz. ZAX chord detector has the same simple user interface just as my physical chromatic tuner. Other than chord detection, spectrum analyser also provided. As polyphonic music analyser, it can be used to help as music recogniser. It helps you to find chords of any song and to see why an instrument is sounding better compared to the other. In terms of audio frequency analyser it can display the under tones and over tones. So all the notes can be viewed in spectral audio analyser view.

III. STUDY OF THE EXISTING SYSTEM

The existing system widely provides instrument tuning such as acoustic, electric and bass guitars, ukuleles etc. Tuning of instruments are main focus. Pitch and musical note detection is also provided in most of the existing applications. There are several applications that also provides free and paid tutorials of scales and chord progressions. Guitar tutorials are also provided in which fingering and playing of chords in guitar is being taught by much improved graphical methods. Certain applications also provides tutorials on playing piano chords and also provides various games in which user learns how to play certain songs provided by application.

IV. DRAWBACKS OF THE EXISTING SYSTEM

There are large number of apps that provide real time note detection, guitar tuning, guitar or piano lessons, chords tutorials etc., but the major drawback of all these apps are they detect only a single musical note at a time. For a person who needs to reproduce the song using any musical instruments, the knowledge of chords of that particular song is very relevant and that cannot be achieved through single note detection. Therefore, single note detection is a major drawback.

When a song is played, it comprises collection of different musical notes at same time. When an application is put to real time detection of any song, these different notes collide each other due to single note detection and hence the app recognise them with less accuracy and causes confusion.

V. PROPOSED SYSTEM

Chord Master is an app that emphasis on real time chord detection of any song. As chords are the collection of musical notes and very relevant factor of a song, it is very essential for a musician to know the chords of song according to his or her choice. Hence Chord Master provides real time and easy detection of chords song that a musician especially beginner need not require to go in search of helping hands to give the chords.

VI. PROJECT OBJECTIVES

- Self Depending: The application will be a self-standing platform for beginner musicians so that he/she can find chords themselves without any other aid.
- Free Tutorials: The application will be freely available so that it will act as a free tutor for all musicians.
- Analysis: The Application will include chord recognition not only for individual instruments but for the song as a whole
- Other Features: Pitch detection, scale patterns display

VII. WORKING

A chord is a unity of specific notes lasting for a certain time. The recognition of the pitches or musical notes that happens at the first instance through detection of the frequencies of those notes captured through the microphone of the device is therefore fundamental for our chord detection process.

This work distinguishes two chord types: Major & Minor. As there will be more than one musical note detected per time, the dominating one and the most powerfully detected one will be its base note. Knowing the base note, the chord in the sequence can be identified and displayed. This can be achieved by analysing the context of each chord.

Although chord changes happen bar by bar, they most often last for a longer period of time. Thus, concept is to select the chord with high probabilities at a specific time according to the musical sense of the user.

VIII. USE CASE DIAGRAMS

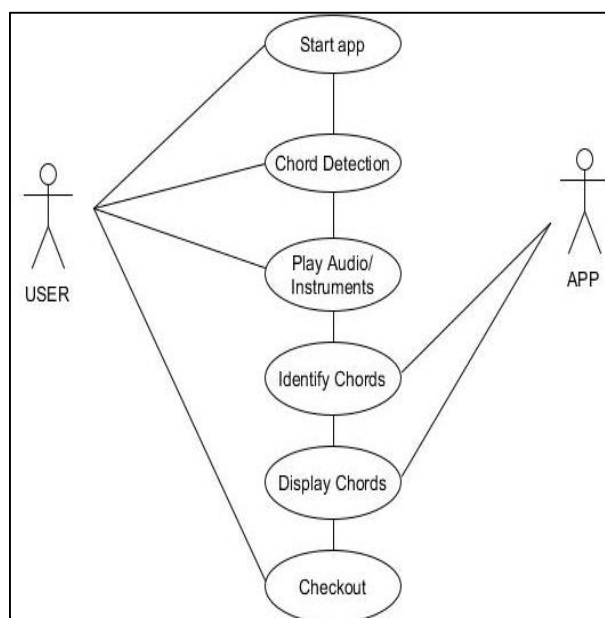


Fig. 1: Use Case Diagram- Chord Detection

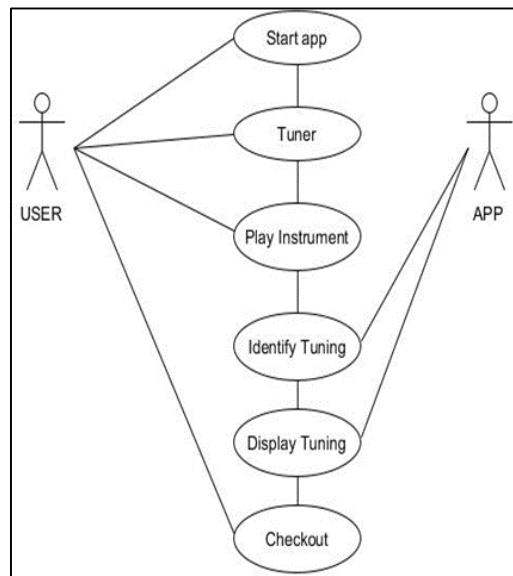


Fig. 2: Use Case Diagram- Tuner

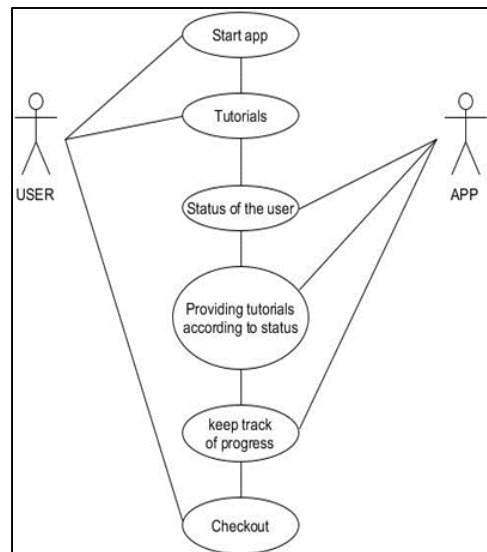


Fig. 3: Use Case Diagram- Tutorials

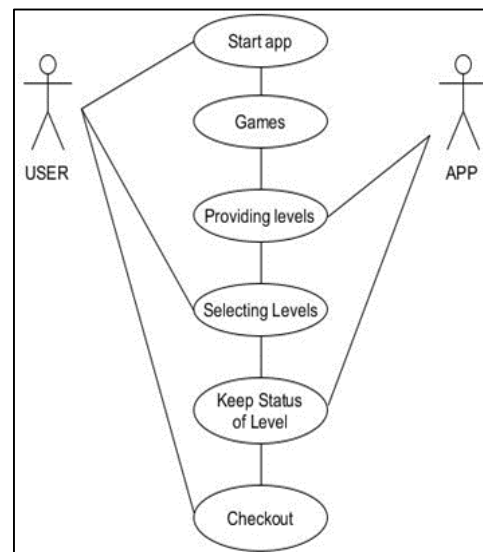


Fig. 4: Use Case Diagram- Games

IX. EXPECTED RESULTS



Fig. 5: Chord detection(C Major)



Fig. 6: Tutorials Section

It provides live detection of chords of any song or musical instrument played. The application will be a self-standing platform for beginner musician so that he/she can find chords themselves without any other aid.

X. CONCLUSION

In present world, the rate of musicians is increasing day by day. The rapid growth of technology plays a vital role in the life of every musician. As a result, there are many applications available in app store that can help a musician in pitch correction, musical note detection, instrument tunings etc. but, without being able to recognise the chords, it will be very hard for a musician to play a song, especially the instruments. As a solution, we introduce Chord Master that provides live detection of chords of any song or musical instrument played. It really help all musicians especially beginners for recognising chords of a song without external aid. We also include instrument tuning, tutorials and games so that our app can widely help emerging musicians to improve their skills.

REFERENCES

- [1] J. P. Bello and J. Pickens, "A robust mid-level representation for harmonic content in music signals," in Proc. ISMIR, pp.304–311, 2005.
- [2] K. Lee, "Identifying cover songs from audio using harmonic representation," in MIREX task on Audio Cover Song Identification, 2006.
- [3] A. Sheh and D. P. Ellis, "Chord segmentation and recognition using EM-trained hidden Markov models," in Proc. ISMIR, pp. 185–191, 2003.
- [4] H. Papadopoulos and G. Peeters, "Large-scale study of chord estimation algorithms based on Chroma representation," in Proc. CBMI, pp. 53-60, 2007.

- [5] K. Lee and M. Slaney, "A unified system for chord transcription and key extraction from audio using hidden Markov models," in Proc. ISMIR, pp. 245-250, 2007.
- [6] X. Huang, A. Acero, and H.-W. Hon, "Spoken Language Processing: A Guide to Theory, Algorithm and System Development," Prentice Hall, 2001.
- [7] C. Harte and M. Sandler., "Automatic chord identification using a quantised Chroma gram," AES Convention, 2005.
- [8] <https://play.google.com/store/apps/details?id=com.bork.dsp.datuna>
- [9] <https://play.google.com/store/apps/details?id=com.ovelin.guitartuna>
- [10] <https://play.google.com/store/apps/details?id=com.polygonium.basicchords>
- [11] <https://play.google.com/store/apps/details?id=com.pragmatic.apps.piano.chord.analyser>