

Matrix Implementation on Guitar Charts Application with Java Mobile

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Abstract- Guitar Chords app is needed as a chord dictionary or catalog. Processing of chord information in the form of a mobile device will make it easier to access the data. By applying the matrix theorem, it is easier to construct a guitar chord scheme. The implementation of this application uses the Java Mobile programming.

Keywords – chord, guitar, matrix, java, javame

I. INTRODUCTION

Everyone requires mastery of notes and chords in order to be able to play a melodic musical instrument properly and attractively. Before someone can master the technique of playing chords, they must first recognize the form of the chord.

There are many chord variations in the technique of playing certain musical instruments. Naturally, the entire chord form cannot be remembered or memorized. In helping to find out a particular chord scheme, a dictionary or catalog is needed that contains these chord forms.

One of the melodic musical instruments that have a very varied chord library is the guitar. If the guitar chord scheme can be managed through an application, of course it is very useful for people who will play a song arrangement.

The schematic form of a guitar chord can be illustrated in a matrix pattern. To more easily manage guitar chord data in the application, the theorem of the matrix can be used.

Therefore, in this study, a matrix is applied in processing data and information on guitar chord recognition application. The presentation of the application is designed on the basis of mobile devices.

II. THEORY BASIS

2.1. History of the Guitar

The guitar is a stringed musical instrument that is played with the fingers or a pick (guitar string instrument). The sound is produced by vibrating strings.

This musical instrument was originally known in the Persian region around 1500 BC. In 476 AD this musical instrument was brought by the Romans to Spain and transformed into the *guitarra morisca* (producing melody) and *guitarra latina* (producing chords).

The development of this musical instrument is always done by experts. Around the 17th century, the popularity of the guitar musical instrument was getting a good response from the public. The form of the guitar that was developed at that time had similarities to the form of the guitar that is played today.

2.2. Guitar Chords

A chord is a collection of three or more notes that are played in a certain technique and sounded harmoniously. The technique of playing chords can be done intermittently or simultaneously. If on a melodic musical instrument, for example, three notes, namely C, E and G are played simultaneously, then this has formed a chord.

On a guitar musical instrument, chords are formed by pressing a certain position on the guitar fret to produce a tone, then the strings are plucked together or one by one. The formations for a particular chord can have many variations.

The name of a chord is determined by the bass sound of the note combination. If a particular chord is plucked with a bass note C, then the chord name starts with C, for example C major, C minor or C7.

2.3. Definition of the Matrix

A matrix is a collection of values or elements arranged regularly according to rows and columns in the form of a square or rectangle. Writing matrix data can be formed with the sign "()", "[]" or "|| ||".

A matrix is denoted by capital letters, for example A, B, A1, A2 and so on. The size of the matrix is determined by the number of rows and columns it has, which is named as order.

2.4. Types of Matrix

Matrix has several special types, including:

- 1) Quadratic matrix, which is a matrix with the same number of rows and columns and having a main diagonal, namely elements with the same row number as the column number (a_{11}, a_{22}, \dots).
- 2) Diagonal matrix, which is a quadratic matrix in which all entries outside the main diagonal are 0 (zero).
- 3) Identity matrix, which is a quadratic matrix in which all the main diagonals are 1 (one) and the entries outside the main diagonal are 0 (zero).
- 4) Singular matrix, which is a matrix where all the elements in one row or column are 0 (zero) or if all the cofactors of the elements of a row or column are equal to 0 (zero).
- 5) Orthogonal matrix, which is a matrix whose inverse value is the same as the transpose value.

III. RESEARCH METHODS

3.1. System planning

The overall system design explains the system design in detail. The design includes the design of use case diagrams and activity diagrams, then proceed with the design of the user interface display of the application.

3.2. Application of a Chord Scheme with a Matrix

To make it easier to define a guitar chord scheme, the guitar fret form is transformed into a matrix. The guitar frets and strings are transformed into a 6x4 matrix.

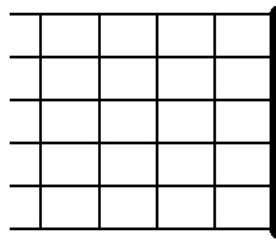


Figure 3.1. Guitar Frets

The entire matrix is given an element of 0 (zero). A value of 0 (zero) means that there are no pressing fingers on the note.

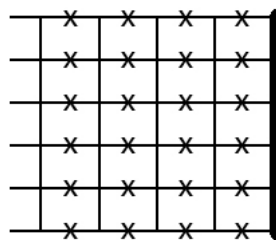


Figure 3.2. Guitar Notes

The matrix is denoted as follows:

$$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

For example, the D major chord form can be applied in a matrix like the following.

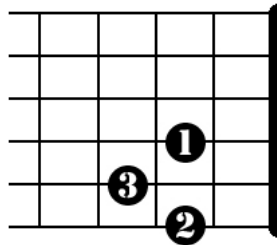


Figure 3.3. D Major Chord

The D major chord can be expressed in the following matrix:

$$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

3.3. System Development

The process is continued by coding the software. This software is designed using Java Mobile programming.

3.4. System Trial

Every software application that has been built must be tested first before use, to find out whether the software application built is as expected and is working properly or there are still bugs (errors). Any bugs (errors) that occur will be corrected again.

IV. RESULTS

The application displays a list consisting of the names of the chords that have been stored.

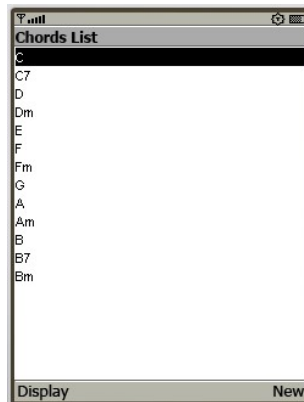


Figure 4.1. Chords List

To display the scheme of a specific chord, the user can select the Display menu. On this screen, the user can also delete the chord data by selecting the Delete menu.

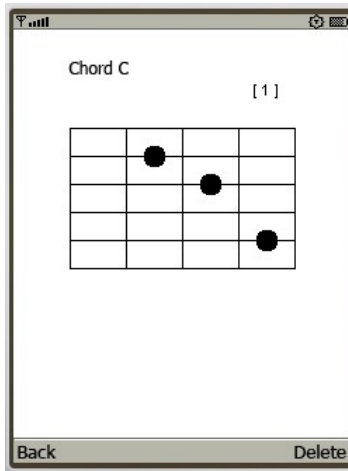


Figure 4.2. Chord Display

To add a new chord, on Figure 4.1, the user can select the New menu, so that the next screen will be displayed for filling in new chord data.

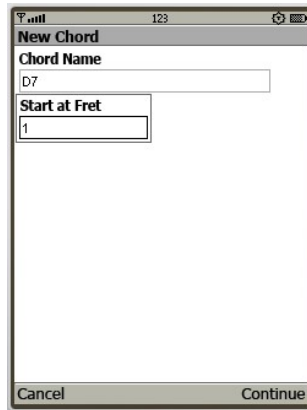


Figure 4.3. Add New Chord

After inputting the new chord name and fret number, then by selecting the Continue menu, the user can create a chord scheme.

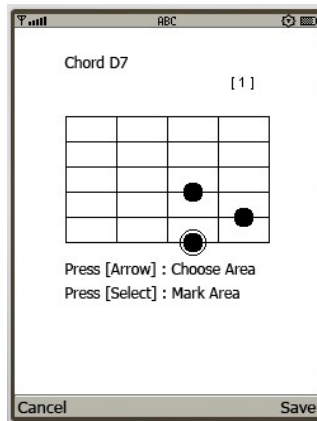


Figure 4.4. Set Chord Scheme

By selecting the Save menu on the screen in Figure 4.4, the chord data will be stored and simultaneously registered in the chord list display.

V. CONCLUSIONS AND SUGGESTIONS

5.1. Conclusion

1. The application of the matrix facilitates the system in processing guitar chord data.
2. By using a mobile phone device, processing (adding, deleting, reading) chord data becomes easier.
3. The application can display only one variation of a particular chord.

5.2. Suggestion

This research has shown how the matrix can be applied to guitar chord information processing application. It is hoped that further research can display more variations and be able to display the sound of certain chord.

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