

MIDI chord composition based on the chord generation and the auto accompaniment program

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Abstract—This paper shows the easy way to composite a music for non-musicians. Namely, only select a chord and put it to special program which called “the chord composition program”, and then the composition program creates the rest chords. After doing this process, non-musicians overwrite their own melodies in accordance with created chords. Finally, they can perform their own music with the sound of master-keyboard and other sound sources by using the band-in-a-box program.

a music and melodies using by the auto chord composition program and perform the music with the band-in-a-box which is a auto performance program.

I. INTRODUCTION

Music is mainly composed the chord and the melody. Namely, a music note can be classified as the chord and the melody. In case of the chord base, a music is created with some major chords(bright and light sounds) and minor chords(dark and heavy sounds). In other words, the music is composed by chords, and maybe it has some formulas which is not defined yet [1].

In the past, music were composed by some invisible rules, but, now a days, the popular music composition rules are almost unrestrained. The development of computer music helps non-musicians to compose music. We almost listen to music everyday and it helps us to have some music sense. That is why it does not make us feel constrained if we listen to a music which is composed by a non-musician. In other words, non-musicians practice some counter points and harmonics everyday without any trainings. Even though non-musicians, they do not make some unnatural chord progresses and bizarre melodies because they know it is strange.

We probably think that only musician can compose music, but this paper shows that non-musician can compose

II. THE CHORD PATTERNS AND ARRANGEMENT FOR MUSIC COMPOSITION

Generally, music composition divides into the melody composition and the chord composition [2]. The chord composition means to compose a music with various chords, and the melody composition means to compose with notations. We need to know what is the chord.

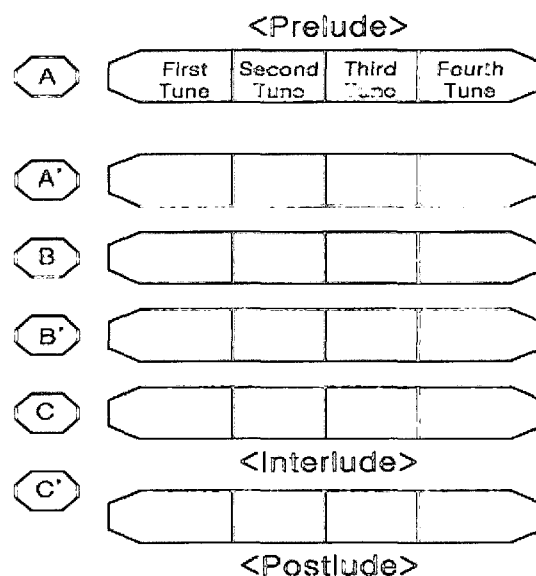


Fig. 1 Arrangement of the popular music chord pattern

Table 1 Basic chord progress rule

Start Cord	C	D	E	F	G	A	B	Cm	Dm	Em	Fm	Gm	Am	Bm
harmonic chord progress	G	G	Am	Fm	C	Dm	Gm	Fm	F	Am	C	Am	Dm	Gm
	F	Em	D	G	Dm	F	Em	G	Am	A	G	Em	Em	E
	Em	Gm	A	C	Em	E	Cm	Gm	G	C	Em	C	D	Cm
	Am	C	F	Bm	F	D	G	D	C	F	Gm	D	F	G

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The chord means the accord. For instance, C chord is the complex sound of do, mi and sol. G chord is the complex sound of Sol, Si and Re. The chord progress rule is not defined but we probably know about what is crude chord progress and what is harmonic chord progress. For example, to use F chord after C chord is very harmonic chord progress, but to use Bb chord after C chord should not make harmonic chord progress. There's a difference

between individual about harmonic chord progress. In this paper, we select 100 music which is chosen the top 10 music during 5 year, and we shows the harmonic chord progress Table. 1 which based on the 100 music [3].

In the Table. 1, we shows four possible chord progresses (chords are arranged by high probability to low probability) after each chords. As previously stated, the Table. 1 is made by top 10 popular music during 1 year. The Table. 1 show simply consisted of major and minor chords.

In the popular music, the chord arrangement has some patterns. The pattern is not always same, but, generally, the one of most widely used chord progress is as follow in the Fig. 1 In here, pattern A and pattern A' has similar melody but different text. It means that pattern A and A' has same chord progress but different text.

In other words, the pattern A is repeated 8 or 4 sections(number of sections are able to change), and should have pattern C, which is called climax, or should have pattern B and B' before pattern C. The Fig. 1 just shows an example of a lot of chord progresses in popular music. The various chord arrangement pattern is able to change. The chord composition program of this paper is embodied as the Fig. 1, so the standard of our explanation is based on the Fig. 1 [4].

To except intro, outro and accompaniment in Fig. 1, we can make some progress formulas with pattern A, A', B, B', C, and C' using by the Table. 1(chord progress scheme) For instance, if C chord is started, we should know the next chord will be G, F, Em or Am, In this theory, computer will select a random chord in these four chords, and next progress will be based on this selected chord. As this procedure, 4 sections will be made(on the assumption, each chord arrangement pattern is 4 sections).

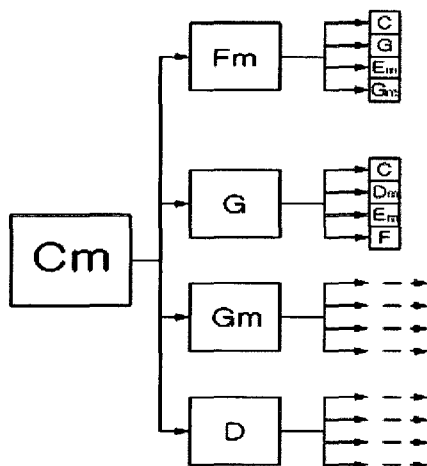


Fig. 2 Tree formation of chord progress

In other words 64 harmonic 4 section chord progress patterns will be created [5]. For making A' pattern as the popular music pattern creation in Fig. 1, we repeat 4 section pattern which is created. Proposed backtracking depth-first search algorithms are as follow

depth-first search algorithm :

```

void depth_first_tree_search (node v)
{

```

```

    node u;
    visit v;
    for (each child u of v)
        depth_first_tree_search(u);
}

```

backtracking algorithm :

```

void checknode(node v)
{
    node u;
    if (promising(v))
        if (there is a solution at v)
            write the solution;
        else
            for (each child u of v)
                checknode(u);
}

```

Chord searching algorithm by java :

```

public void actionPerformed(ActionEvent ae){
    if(ae.getSource() == cmdGeneration){
        lastchord=
            (String)melodyListCombo.getSelected
            dItem();
        syllable[0].setText(lastchord);
        timer.start();
    }
}

public static void main(String[] args){
    new Harmony(); }
    class TimeListener implements ActionListener{int
    rnd;

    int count = 1;
    public void actionPerformed(ActionEvent ae){

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        if(ae.getSource() ==
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```

The music composer give the first source chord, and computer make various chord progress patterns. If the first source chord is given and the first 4 sections of pattern A are created, "what kind of source will be beginning of pattern B and C for making the second pattern B and C" will be a problem. There a lots of solutions to solve this trouble, but we chose a method that the second chord among 4 used chord in pattern A will be started in B or C pattern. For example, if a computer

select C-F-G-Dm chord progress, F chord will be a start chord of pattern B or C. If you make a music which has pattern B also C, the second chord of pattern B will be given a start chord of pattern C. As these formula, every composition will be over(except intro, outro and accompaniment). In our investigation, the first chord of Intro is probably same with the first chord of pattern A.

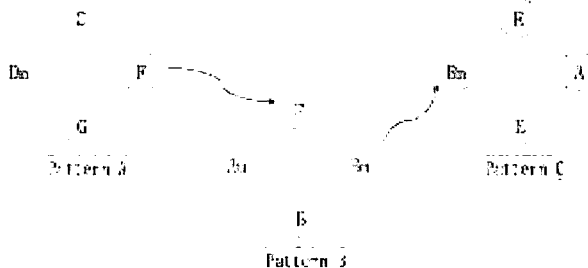


Fig. 3 The method of 1st source allowance of new pattern

The last chord of outro, the last part of a music, is probably same with the first chord of the music.(this case, C chord will be a last chord of the music, ex : E-D-Gm-C) We just have regard for most of popular music's first and last chord is same, as previously stated. The composition program which repeats 4 section chord progress continuously, and when the last chord accords with the first chord in a 4 section, the program select the section for outro [6]. The Fig. 4 is a screen of chord creation program using by JAVA. The first source chord will given if you click the generation button, and after this process, the source composition will be progressed [7][8][9].

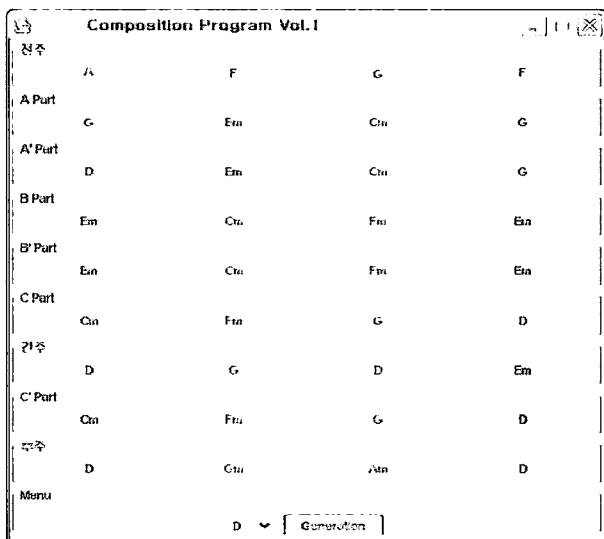


Fig. 4 Example of chord creation program

If you are non-musician, It is possible to overwrite melodies on the composed chords because you were already learned about music education unconsciously. In novice(non-musician)'s case, to create melodies over the composed chords is easier than to compose whole the music. It is possible to create a lot of harmonic melodies over the composed chords if you are a novice, because you already know about what is clumsy melody progress [10][11].

III. THE CONNECTION OF THE BAND-IN-A-BOX AND THE CHORD COMPOSITION PROGRAM

As a matter of fact, lots of people, who do not have any chord performance ability, probably do not know feelings of the composed chord and sounds of the performance. To solve these problem, we use the band-in-a-box which plays the composed chords. In other words, it is possible to hear the composed chords, also we can select the music genre and beat with a button in the band-in-a-box.

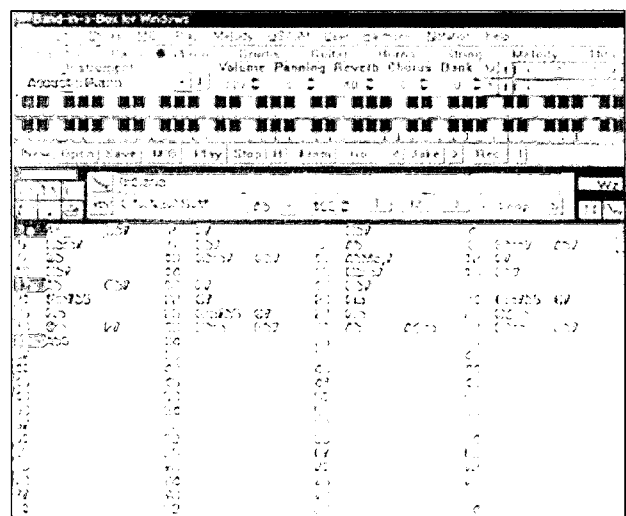


Fig. 5 The connection with the auto performance program

IV. THE CONCLUSION AND CONSIDERATION

In this paper, we realize the auto composition program instead of human. In the past day, in case of non-musician, it was hard to know how to perform the music and what kind of sound is performed even though the chord composition is completed. Now, we realize the connection of the band-in-a-box and the chord composition program for solve non-musician's problem. In result, If non-musician give a first source, he can have a perfect chord progress and hear the perfect performance with his wishful genre and beat. But in this paper, we just show four examples of the second chord per one beginning chord with major and minor chord. In other words, we need to find more possible chord progress for making perfect music by using major, minor and more chords. These approach can be used someone who do not have any priori knowledge for music composition such peoples as farmer, engineer, etc..

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