Research on the Nanyin Music Notation Software

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Abstract. With the development of science and technology, more and more traditional cultural elements are being forgotten gradually. Some can be saved in time, but some can only be forgotten. With research team of Nanyin growing constantly, people begin discussing it deeply in many aspects from different point of views. In this paper, the main research is the input method of Nanyin music, from the layout design of the font to the association of the internal and external coding, until the input method is generated, and ultimately realizing the function of convenient input about Nanyin music.

Introduction

Nanyin is part of the traditional Chinese culture, which has deep and rich historical and cultural accumulation. Nanyin music is consist of three parts, which are the fingering, spectrum, and song. Among them are instrumental performance and vocal singings. “the fingering” means Daqu which has words and spectrum, but also marks Pipa’s fingerings. "Spectrum" refers to the music of the instrument, which is playing with a Pipa. “song”means lyric verses, which takes a large proportion of music. It has no less than a thousand verses. It uses "Yi, gong, liu, dian, yi" to record, which is profound and unpredictable and has a long history. It only can be found in Nanyin.

Over the years, the Nanyin were inherited by oral instruction. Until the later it comes into the "academic research" stage. The academic elite from different fields, through interpreting and analyzing this ancient music, let us more people understand it and form consciousness to protect this excellent culture. All in all, Nanyin is a opera music with great cultural value, with long history, and great significance. Depth discussion of Nanyin is very important for the basic characteristics of the opera music, its artistic characteristics and development changes. And it can be inherited better.

Requirements Analysis

Nanyin music notation is a kind of notation system of ancient Chinese music self-contained form. it is now a Chinese characterized score recording Nanyin’s music language, which is made of three parts: score character, phalanx(Indicates the note values and the mark of the pipa),and the marks of “Liaopai”. The characteristics of Nanyin music notation are vertical arrangement, word mix arrangement and the use of special notation symbols. In order to facilitate the input and creation of Nanyin music notation in the computer, we need to use a special layout technology. This paper is designed to design a powerful tool for the input method of spectrum, to facilitate the Nanyin workers to use this method finishing Gongyi spectrum’s input. Through this input method, the user can easily finish the spectrum’s input and layout in Word. It has fast and convenient input, beautiful and generous font. Its birth can meet the majority needs of the Nanyin workers. It also contributes a lot for the heritage and protection of this non Material heritage of cultural Nanyin.
System Design

System Font Structure Design

1. This part of the design is mainly to let more than 3000 kinds of combinations in accordance with the performance characteristics of the spectrum and the actual application needs, and provides horizontal and vertical these two fonts. In order to be easily and rationally used in the input and layout, each word font is required to be consistent with the traditional, and pay attention to be pleasing to the eye.[1-4]

2. The design of the two typesetting fonts is respectively the encoded font and the candidate font. You can switch back and forth to change the direction of output of text’s font when you beat the spectrum. It is beautiful.

3. Coding font: that is, the font code, which is mainly used for the inner code (character encoding UCS-2) in an association form to facilitate the display on the screen coding, if the mapping association is designed.

4. Candidate font: the design of the 90-degree rotation of the font is used for the vertical output of the sound spectrum. The structure is also very beautiful.

5. To design the machine code for each design of the word, that is, to design all the code inside with the machine code design. Thus we can easily call out on the keyboard the word we want. This function can be achieved by the use of location code.

Figure 1 is not yet carried out before the machine code mapping. Firstly it is the font design. use of font editing software, combine AB two groups of words of the Nanyin music notation in accordance with the input method. It needs to be edited in the editing area of font editor, and save it. Secondly, it is to design vertical font, the same way as the horizontal font design method. 90 degrees to the left can be obtained. Then there are so many dense words in Figure 2, mapping manually one by one.[5-8]

Final Achievements:

![Machine code design 1](image1.jpg)
Machine Coding Design

Law of Nanyin music notation input:
1. Enter "full phonetic" or "shorthand input" to call character encoding.
   For example: A0104 + B05 = A0104B05


B group has 27 fonts in total, respectively are used "Yi, gong, liu, dian, yi" these basic fonts to do the main, and then combines into multiple words. The following is the combination of parts.

<table>
<thead>
<tr>
<th>字符</th>
<th>完整拼音</th>
<th>普通话</th>
<th>简写</th>
<th>编码</th>
</tr>
</thead>
<tbody>
<tr>
<td>dian</td>
<td>点</td>
<td>d</td>
<td>$\text{d}$</td>
<td>SAB72</td>
</tr>
<tr>
<td>tiao</td>
<td>眼</td>
<td>t</td>
<td>$\text{t}$</td>
<td>SAB73</td>
</tr>
<tr>
<td>nian</td>
<td>娘</td>
<td>n</td>
<td>$\text{n}$</td>
<td>SAB74</td>
</tr>
<tr>
<td>jiaxian</td>
<td>佳先</td>
<td>jx</td>
<td>$\text{jx}$</td>
<td>SAB75</td>
</tr>
<tr>
<td>qudao</td>
<td>角</td>
<td>qd</td>
<td>$\text{qd}$</td>
<td>SAB76</td>
</tr>
<tr>
<td>dianqiao</td>
<td>点挑</td>
<td>dt</td>
<td>$\text{dt}$</td>
<td>SAB77</td>
</tr>
<tr>
<td>zhanzhi</td>
<td>佔指</td>
<td>zz</td>
<td>$\text{zz}$</td>
<td>SAB78</td>
</tr>
<tr>
<td>luozhi1</td>
<td>落指1</td>
<td>liz1</td>
<td>$\text{liz1}$</td>
<td>SAB79</td>
</tr>
<tr>
<td>luozhi2</td>
<td>落指2</td>
<td>liz2</td>
<td>$\text{liz2}$</td>
<td>SAB7A</td>
</tr>
<tr>
<td>diannian</td>
<td>电年</td>
<td>dn</td>
<td>$\text{dn}$</td>
<td>SAB7B</td>
</tr>
<tr>
<td>jintiao</td>
<td>快挑</td>
<td>jt</td>
<td>$\text{jt}$</td>
<td>SAB7C</td>
</tr>
<tr>
<td>jinnian</td>
<td>紧年</td>
<td>jn</td>
<td>$\text{jn}$</td>
<td>SAB7D</td>
</tr>
<tr>
<td>jinjiaxian</td>
<td>紧佳线</td>
<td>jnx</td>
<td>$\text{jnx}$</td>
<td>SAB7E</td>
</tr>
<tr>
<td>gou</td>
<td>勾</td>
<td>g</td>
<td>$\text{g}$</td>
<td>SAB7F</td>
</tr>
</tbody>
</table>
As shown in Figure 6, words in group A are generated by the combination of "yi, gong, liu, dian, yi" and group B, so there will be so many groups of combinations as follows:

1. Group B has 27 characters. The value of starting and ending mapping is from $AB72$ to $AB8C$. Group B is an important part of the core group of Nanyin Gongyi spectrum, which is combined with "Yi, Gong, Liu, Dian, Yi".

2. The number of group A01 symbols is 6 in total. Each forms a word with the combination of B symbol. But the first one is special, which is not yet mapped. Reserve $ABB0$ firstly, and map $ABB1$—$ABCB$ follow-up.

3. The number of group A02 symbols is 6 in total. Each forms a word with the combination of B symbol. But the first one is special, which is not yet mapped. Reserve $A570$ firstly, and map $A571$—$A6AB$ follow-up.

4. The number of group A03 symbols is 8 in total. Each forms a word with the combination of B symbol. But the first one is special, which is not yet mapped. Reserve $A6D0$ firstly, and map $A6D1$—$A7CB$ follow-up.

5. The number of group A4 symbols is 7 in total. Each forms a word with the combination of B symbol. But the first one is special, which is not yet mapped. Reserve $A7D0$ firstly, and map $A7D1$—$A8AB$ follow-up.

6. The number of group A05 symbols is 12 in total. Each forms a word with the combination of B symbol. But the first one is special, which is not yet mapped. Reserve $A8B0$ firstly, and map $A8B1$—$AA2B$ follow-up.

7. Perform in-machine code mapping for each word:
This input method is designed according to the font and coding scheme, and uses the popular input method style, and supports all the codes in the coding scheme design. It also supports the fuzzy voice input according to the characteristics of the old artists and folk artists, which can solve the problem that the old artists do not understand the pinyin.

Manually mapping the word one by one is a little bit troublesome. compared to hand operation, the workload is so heavy and needs to spend a certain amount of time to complete. But it will go wrong in an inattentive moment, such as placing the value of a word mapping on the top of the other word. This is not right. Then when you need a certain spectrum, it plays out into another word. And this affects the work. So when mapping, it needs 120% of concentration, otherwise the efforts are in vain, because it must be compatible and not conflict with ASCII code.

**Machine Coding Design**

The code design outside of the Machine, it uses excel to input 1188 words by using the location code input method according to the design of the machine code, and enter the corresponding code to generate TXT text.

Modify the excel document, remove the separator, you can save as TXT text document. But if there is no format settings, there will be garbled. You need to select the font and then it can be displayed.

**Generate Duoduo Input Method**

With the final generation code table, we also need to use input method generator to achieve the generation of the input method. Duoduo input method generator is a good choice. It is a tool that can generate input method. We only need to import the final code table which has been achieved in front; and then it will use final code table and coding rules to generate an input method of the installation process automatically. So we only need to install this program, we can achieve our Nanyin music notation and play spectrum.

After installation, as is shown in the figure 8, we can do a simple set of input method, the aesthetic problems of the basic interface, such as color, font, candidate arrangement, the number of candidates and so on.

Finally, you can use the input method to achieve playing spectrum. Show the individual words of basic Nanyin music notation are as follows:
As shown in Figure 9, we can play our own spectrum according to figure

Conclusion
The future development of the application development in this paper mainly tends to two directions:

(1) The importance of the Nanyin music notation software: Nanyin music notation has now been applied for intangible cultural heritage, which is its value. Music and communication are closely linked. The reason why the Nanyin can flourish is mainly because of Gongyi spectrum. It represents the symbol of the Nanyin, so the meaning of the Nanyin music notation is extraordinary, which is the carrier of the Millennium ancient music. So we have the obligation to try every means to save it. Therefore this application is necessary!

(2) The effect of the application: Since there is a spectrum software of Nanyin music notation, those who do not know pinyin can easily play music. It supports fuzzy voice input, which can easily help to complete the entering of spectrum. In addition, it uses the popular input method design style, supporting all the coding of coding design, which is also a major feature.

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References
