Using Knowledge Discovery to Generate Melodies for New Chinese Lyrics

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Introduction

Music is a tool for expressing feelings. Composing good songs is not easy. It requires a basic knowledge of music, a good personal style, a music instrument and creativity. Normally, most people who are interested in composing good songs face difficulties.

Unlike Western songs, the lyrics of Mandarin or Cantonese songs already sounds rhythmical and melodic without mixing them with any music. Thus, Chinese songs have strong correlations between the melodies and the normal spoken tones of the lyrics. Composing good Chinese pop music can be a more challenging task than composing Western pop music.

Therefore, we aim to provide a system that uses knowledge discovery to help people generate sweet songs melodies for Chinese lyrics.

Features

- Support both Mandarin and Cantonese lyrics.
- Edit the rhythms and notes freely upon melody generation.
- Set the style of melody through groups of songs.
- Detail information show in user interface.
- Design for both light users and advance users.
Melody Generation Platform

Generating a melody requires 4 steps.
1. Input the song information.
   (The language and the title of the song.)
2. Input the lyrics.
3. Edit the character tones of the lyrics.
4. Choose a cluster to perform music generation.

Fig.3: Interface of information input

Lyrics Input
For each pair of chinese characters
Match the character to melody according to the patterns in database
Generate whole song

Fig.4: Basic flow of Melody generator

Working Principle

The project was divided into three main tasks:

Finding patterns (melody v.s. lyrics)
The database of patterns is based on the current existing
Chinese songs. Matched patterns are saved.

Finding frequent patterns
According to patterns found in Task1, the frequent patterns
were found according to the existing times for each pattern. The
infrequent patterns were ignored.

Mapping the lyric to melody
The melody of a Chinese song is generated by mapping the user
input (lyric) to the melody according to the frequent patterns
found. HMM model is used in the generation process.

Fig.5: First six tones in Cantonese
Implementation

The Melody Generator was developed under java platform. We analyzed around 500 Midi files in total for the frequent pattern database.

We also grouped similar pattern though clustering. It helps distinguishes the feelings when user generates songs.

Also, Hidden Markov Model (HMM) was used in melody generation. To improve the accuracy of generating melody, we make use of multiple-ordered HMM.

Evaluation

In normal length of song (around 200-300 words), it gives around 0.25 similarity between lyrics and melody.

![The average similarity of generated melodies comparing to lengths of given lyrics (with similar number of sentences)](image)

**Fig.7: Result of the similarity according to the lengths of lyrics**

Result

The quality of the melodies generated by our program is generally good. Although several methods have been carried out to improve the quality, the lyrics would play an important role in determining the quality of the melodies. We found that the more coherent the lyrics are, the sweeter the melodies are.