

# **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.

Dorkjumpar  
Hong  
andolin  
白玉蘭花 一陣清香 花鮮人愛  
蝴蝶翩翩 成雙成對 飛去飛來 一片潔白無比新鮮  
人人愛妳 我採一朵 白玉蘭花 來送給她帶  
她帶上了這玉蘭花 更加可愛

Fig.1: A sample sheet music

## 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 Generator  
File Edit  
New Ctrl+N  
Open... Ctrl+O  
Save Ctrl+S  
Import Midi Ctrl+I  
Export Midi Ctrl+E  
Close  
Exit  
Language: Cantonese  
Key Signature: C Major  
Time Signature: 4/4  
Similarity: Show Graph  
Frequent Patterns: Show Patterns  
MIDI: Export  
00:16.835 / 01:22.500  
Melody  
Key Signature: C Major  
Tempo: 120 BPM  
Export Lyrics  
Export Lyrics (With Tones)

Fig.2: User Interface of Melody Generator



Fig.3: Interface of information input

## 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.

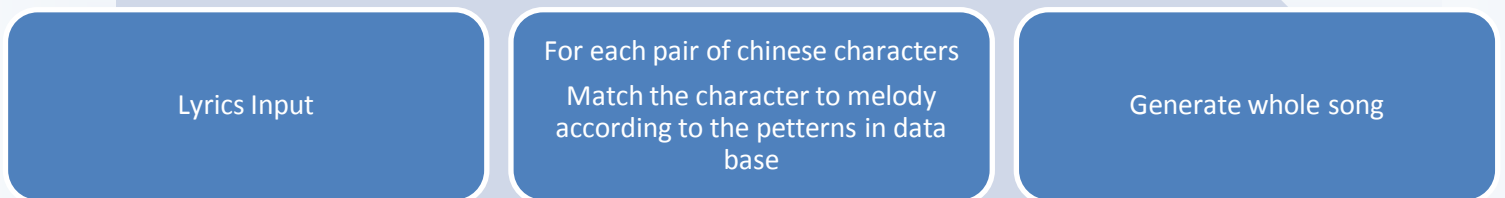


Fig.4: Basic flow of Melody generator

## 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.

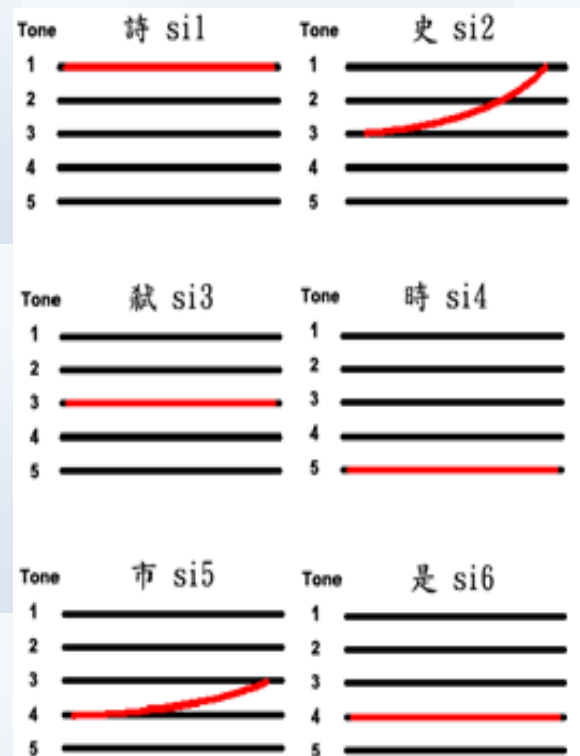


Fig.5: First six tones in Cantonese

## 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 through clustering. It helps distinguish 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.

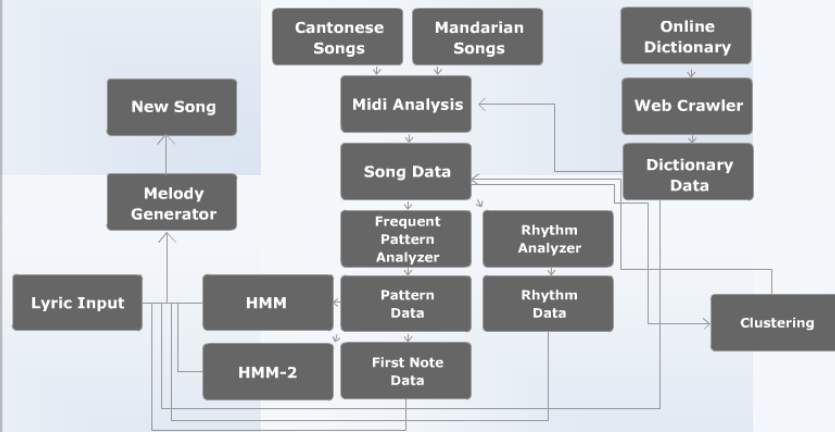


Fig.6: Design of the application

## Evaluation

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

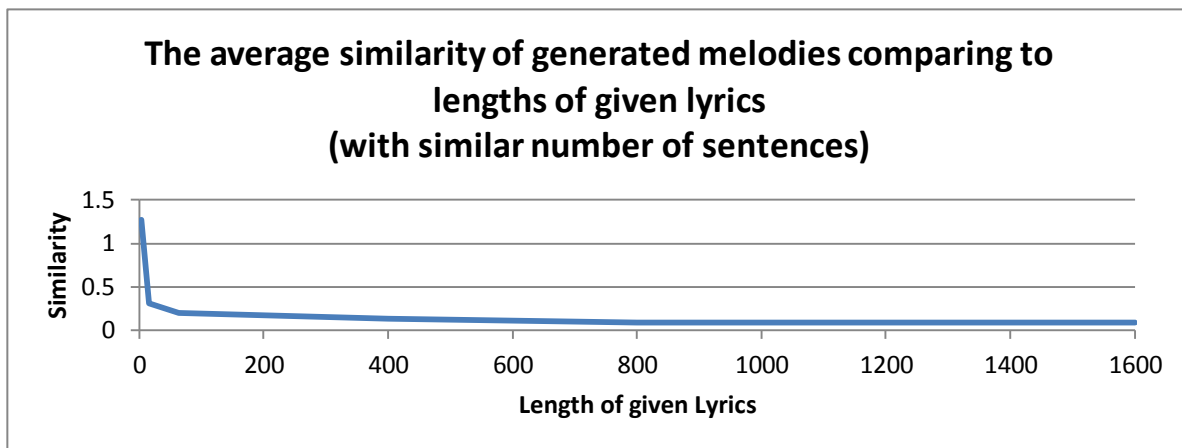


Fig.7: Result of the similarity according to the lengths of lyrics

## 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.

