Cooperative music composition platform

LUO Hong (jasonluo@gmail.com)
To be supervised by Prof David Rossiter

1. Background:

Many people like to record or singing for an existing song since the karaoke become popular in Asia recent years. It also arouses the interest of creating original music of many people. However, most of people did not have strong music background or computer knowledge. It's hard for them to express themselves and create a song by their own. It will be very nice if there is a platform for them to create music together.

2. Type of Music Platform exists:

There are different kind of music platforms exists nowadays, including the following kinds,

a. the singing forum.

Figure 2.1 traditional music forum

Most of the music platform use forum to collect the original music files from different users all over the Internet (see figure 2.1 for an example). People can upload there music as the mp3 format and comment on other's music. This kind of platform assembles a lot of people who love creating music. However, this kind of platform has a disadvantage side as follow:

1) There is not strict structure of the music and types. Take a song uploaded by one user for example. Most user will never hear it any more while it is not the "hotest or newest topic" of the forum. And if some one want to find a sad song, it's hard for them to find a collection of that kind of song. Since there is no specific tab to organize it.
2) It's hard to get a general idea of comment on the song. For example, people will comment on the topic, but it's hard to compare which song is more recommended by he listener. We can only judge it by the number of the comment; even the comment is bad but a lot. It will still become a "famous song" in the forum.

b. The music instrument introduction site.

Figure 2.2 music instrument introduce site

This kind of music sites provides lots of knowledge of creating music (see figure 2.2 for an example). But they do not provide any platform for user creating music.

c. Mp3 download platform.

Figure 2.3 mp3 download platform

This kind of music sites provides a better structure of music organization (see figure 2.3 for an example).

Most of it can sort the music by hit rate and emotional types, but they are still not providing a environment for users to upload or creating their own music.

3. The general idea:

As many people generate music from lyric and melody, I made this system beginning with melody and lyric creating. The user can input their lyric or melody by the system as the start point of the music creating tree (see figure 3.1 for an example).

For people who want to generate a melody, the platform provide a easy way for them, a virtual piano, which they can input the notes easily. Also, they can input notes by typing the pitch of the notes. At the same time, the system provide two interesting way for them generating midi, including the Mozart dice game method and a Markov method. Which they can generate the midi file randomly and interesting.

At the same time, people can provide a lyric for a melody. Since many people are not familiar with the melody creating, they can find some melody in the platform. While they hear some melody they like, it's possible that they will create some lyric for the melody. By adding the lyric, the melody will become a music demo, which can be singed by us.

For finding the melody or lyric they like, the system provide different type and hit rate for each melody or lyric, which convenience their search.

For the singers who only want to sing for some original music, they can find the music demo which contains both lyric and melody. They can download it and sing it on their own computer. Then they record their name on the music tree and append the mp3 file on it.

For people who want to hear original music, they can go to the gallery of the music platform. They can find the music by different emotional types. They will find the music including every authors of the music.

They can also find the music by different authors or by the "Top 20" list.

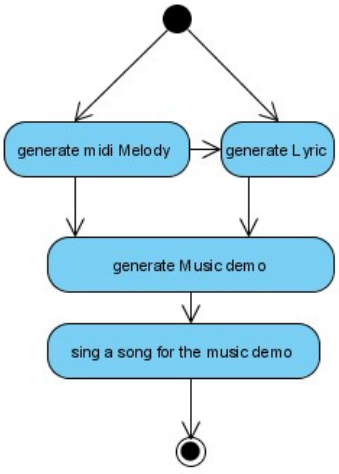

Figure 3.1 the sequence creating a music

4.Algorithm generating midi

a) Markov Chain

Markov Chains have a long and successful history in computer music research, and for good reason. Markov Chains provide an effective mechanism for creating and using stochastic matrices in musically satisfying ways. By Markov Chain, the states of the system become note or pitch values, and a probability vector for each note is constructed, completing a transition probability matrix. An algorithm is constructed to produce and output note values based on the transition matrix weightings, which could be MIDI note values, frequency (Hz), or any other desirable metric.

b) Musikalisches Würfelspiel

In 1787, Mozart wrote the measures and instructions for a musical composition dice game called Musikalisches Würfelspiel. The idea is to cut and paste pre-written measures of music together to create a Minuet. It sets out a series of short phrases which are selected randomly. This approach to the generation of music is known as the combinatorial approach because it involves the combination of a series of pre-composed musical elements.

There are 176 possible Minuet measures and 96 possible Trio measures to choose from (see figure 4.1 for an example). Two six-sided dice are used to determine each of the 16 Minuet measures (i.e. 11 possibilities for each of 16 measures). One six-sided die is used to determine each of the 16 Trio measures (i.e. 6 possibilities for each of 16 measures).

So in theory, there are (11^16) * (6^16) = (1.3 * (10^29)) possible compositions.

Minuet

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2	96	22	141	41	105	122	11	30	70	121	26	9	112	49	109	14
3	32	6	128	63	146	46	134	81	117	39	126	56	174	18	116	83
4	69	95	158	13	153	55	110	24	66	139	15	132	73	58	145	79
5	40	17	113	85	161	2	159	100	90	176	7	34	67	160	52	170
6	148	74	163	45	80	97	36	107	25	143	64	125	76	136	1	93
7	104	157	27	167	154	68	118	91	138	71	150	29	101	162	23	151
8	152	60	171	53	99	133	21	127	16	155	57	175	43	168	89	172
9	119	84	114	50	140	86	169	94	120	88	48	166	51	115	72	111
10	98	142	42	156	75	129	62	123	65	77	19	82	137	38	149	8
11	3	87	165	61	135	47	147	33	102	4	31	164	144	59	173	78
12	54	130	10	103	28	37	106	5	35	20	108	92	12	124	44	131

Trio

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	72	6	59	25	81	41	89	13	36	5	46	79	30	95	19	66
2	56	82	42	74	14	7	26	71	76	20	64	84	8	35	47	88
3	75	39	54	1	65	43	15	80	9	34	93	48	69	58	90	21
4	40	73	16	68	29	55	2	61	22	67	49	77	57	87	33	10
5	83	3	28	53	37	17	44	70	63	85	32	96	12	23	50	91
6	18	45	62	38	4	27	52	94	11	92	24	86	51	60	78	31

Figure 4.1 the dice game table to generate Musikalisches Würfelspiel

5. The Platform structure:

The website uses Struts1.2, Spring 2.0 and Hibernate 3.0 frameworks. Using the follow technical to

- use Acegi in Spring Framework to enhance the security.
- Enhance the user experience using JQuery as JavaScript framework.
- Using Tiles to create reusable view components.
- using MySQL as database.

5. UML Diagram of the website.

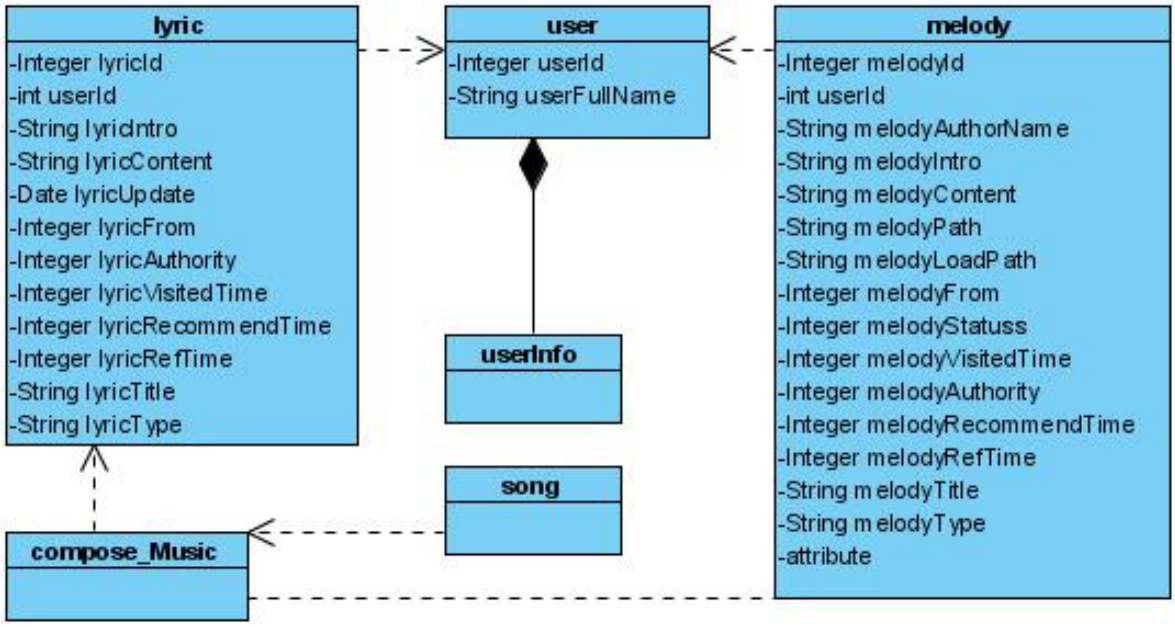

Figure 5.1 the main class diagram of the project.

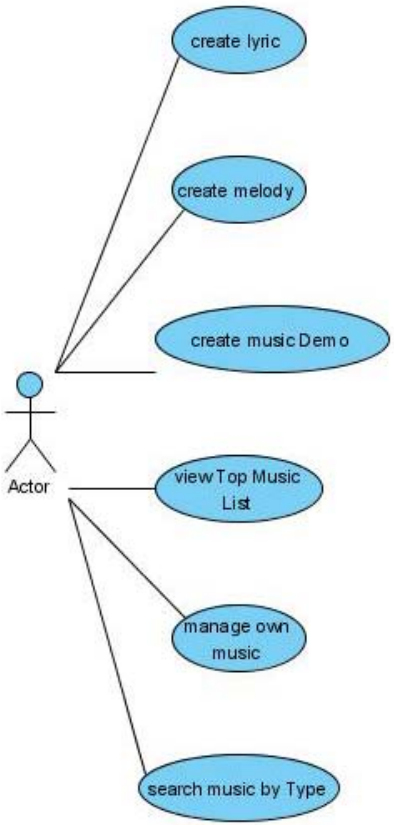

Figure 5.2 The user case diagram

A. CLASS

The website mainly uses six classes (see figure 5.1 for an example) to express the structure of the music. Including the ***user*** and ***userInfo*** class to express the user information. The ***Lyric, melody, compose_music*** and ***song*** class to express the flow of the music creation.

B. User Case

The user can mainly use six functions (see figure 5.2 for an example), includes:

1) create lyric: create the lyric with different types. Also, user can write lyric for a melody.
2) Create melody: user can generate midi file with a virtual midi keyboard and input some notes. Also, user can generate midi randomly by some default algorithms.
3) Create music demo: user can compose lyric and melody and sing a song for it.
4) View the top list: user can find a top list of famous melody, lyric or music demos.
5) Manage own song: user can find their own song easily and manage it.
6) Search music by type: user can find a song by different emotional types.
7) Search melody by input notes: User can input some notes, then they can find the melody include that key notes.

C. Active

The active sequence of the website is shown as Figure 5.3

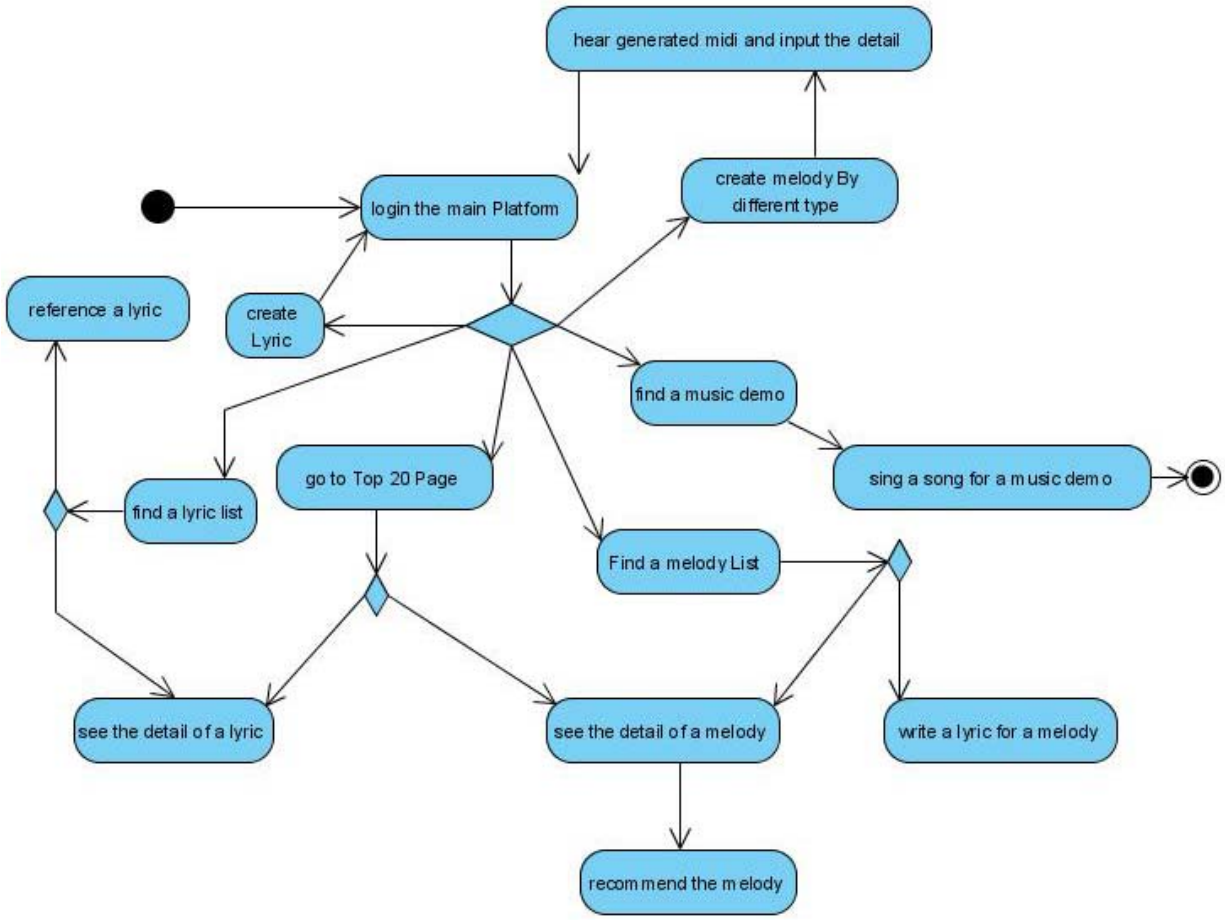

Figure 5.3 The Active Diagram of the project.

References:

[1].Generation of musical tone signals by the phrase, Youjiro Takabayashi. 29 Feb 2000

[2]. Music search by melody input, Ryuichi Iwamura. 13 Feb 2001

[3]. Computer control system and user interface for media playing devices, David C. Contois. 26 Jan 1999

Appendix:

The screen shot of the website with Firefox 3.0.

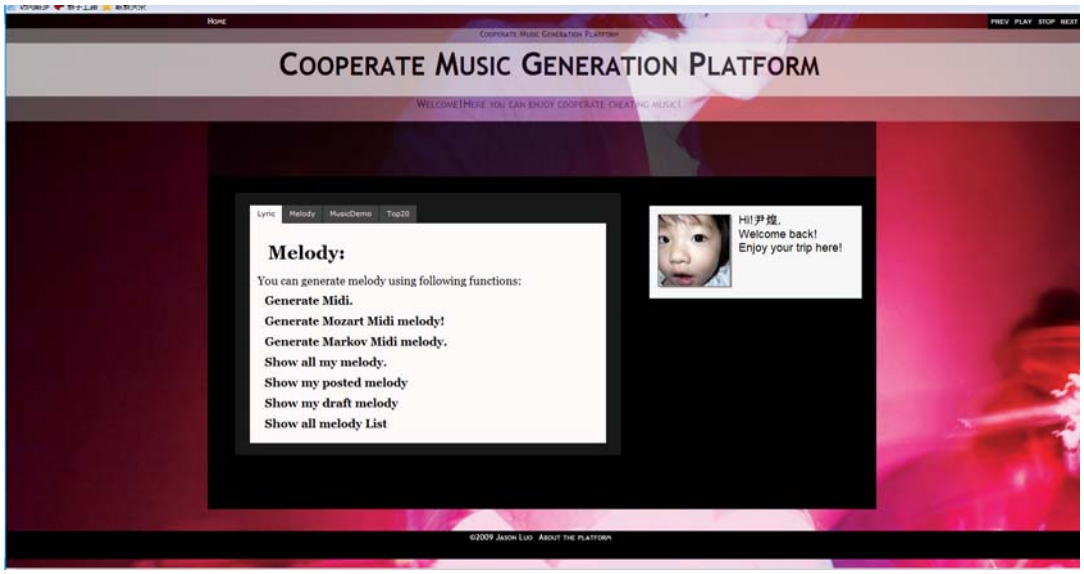

Figure 6.1 The main login page of the music platform

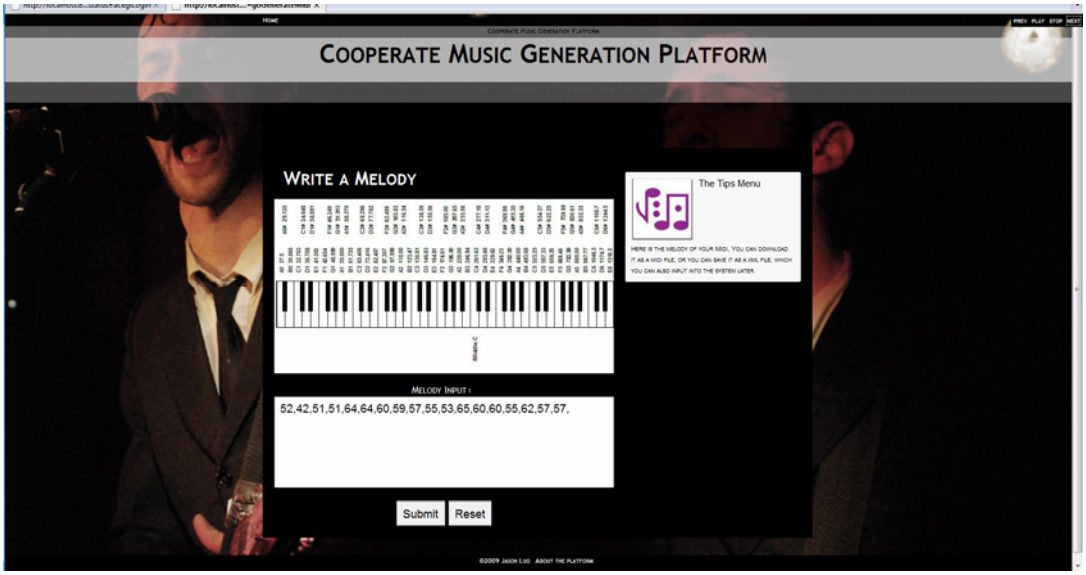

Figure 6.2 The midi notes input site. User can input midi notes by the virtual midi keyboard

Figure 6.3 The music output site.

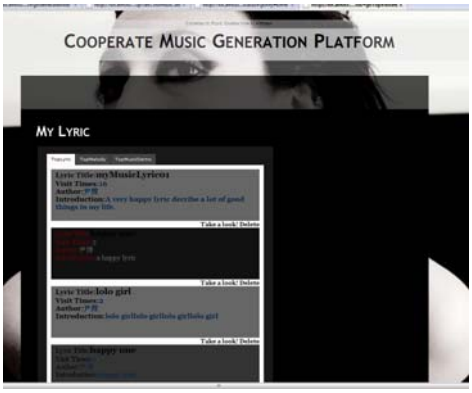

Figure 6.4 The top20 list Page.