HeartPlayer:
A Smart Music Player Involving Emotion Recognition, Expression and Recommendation

Songchun Fan, Cheng Tan, Xin Fan, Han Su, and Jinyu Zhang

Software Institute, Nanjing University,
22 Hankou Road, 210093, Nanjing, P.R. China
`{fsc07,tc07,fx07,suh07}@software.nju.edu.com`

Abstract. In this demo, we present HeartPlayer as a smart music player that can understand the music. When a song is being played, an animation figure expresses the emotion of the song by certain facial expressions. Meanwhile, the emotion of the music item is calculated according to the music features retrieved by a program running in the backstage. In GUI, we use six colors to indicate the six classes of songs with different emotions. Moreover, by recording the user's play history, HeartPlayer gets a series of analysis results, including the user's preference, today's mood and music personality. Our contribution mainly lies in providing a novel music player interface, and also exploring new facilities in music player.

Keywords: Music player, emotion-based, music information retrieval, music recommendation.

1 Introduction

Today, listening to digital music songs has become a common way to connect the digital world with the physical world. By using most of the traditional music players, we can only "hear" the music, which makes us disregard the emotion that the singers or composers want to express. Some music visualization technique, such as Isochords [1] only provide effects according to music structure, without giving out any further information of the music emotion. Most of the emotion-based music players such as LyQ [2] use emotion information to recommend related music rather than expressing them. Thus there is no music player that can both collect the emotion information of music items and express it.

In this demo, we present *HearPlayer* as a smart music player, which helps the user "see" the music by creating a visual way for the user to understand and feel the emotion of the tune. Moreover, through analyzing the songs which the user has been listening to, *Heartplayer* can identify the user's mood and recommend suitable songs. As a music player with complex functions, *HeartPlayer* consists of four parts: The player, the figure, the music library, and the emotion-calculating program. The first three parts make up the user interface, as is shown in Figure 1, while the third part is a

program that runs in the back-end. Every part, especially the last one, can be plug-gable, in order to be updated or replaced conveniently.

The player part cannot be more common. So we will only introduce the other three parts one by one in the rest of the paper. The rest of the paper is organized as follows. In section 1.1 we give a description of the figure which makes facial expressions. In section 1.2 we briefly introduce the music library. In section 1.3 we expound the calculating module and its logic. Finally we summarize our contribution in Section 2.
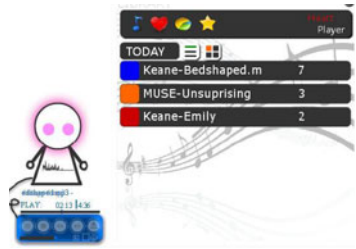

Fig. 1. A Runtime Screenshot

1.1 Figure

To show its understanding of music, *HeartPlayer* uses a figure which looks like a human kid to express emotion.

As soon as the emotion is calculated out, the figure changes its facial expressions. Before that, it only makes body movements such as waving its arms. Particularly, the movements are changed according to the instant music information like amplitude. The figure also shows a rapid changing in the color of its eyes when there is an obvious variation in the spectrum.

1.2 Music Library

In the music library, analyses like "My Favourites", "Today's Mood", "Emotion Log" and "Music Personality" are provided in the form of or dynamic charts or diagrams. Figure 2 contains the two of them mentioned above. Particularly, six colours stand for six kinds of music emotion. With the analysis results, the recommendation is made.
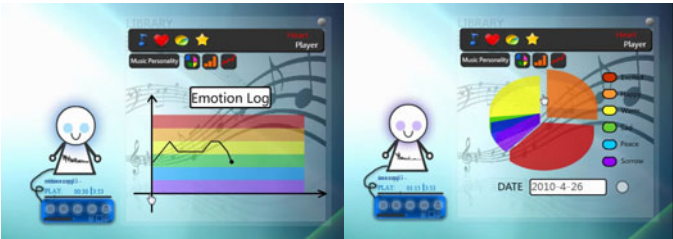

Fig. 2. Emotion Log and Music Personality

1.3 Calculating Program

We make this part isolated from other parts for the sake of a convenient procedure of updating or altering the algorithm.

Calculating program is responsible for calculating the emotion of the music synchronously when the music is being played. The program first retrieves some music features of the song, such as tempo, melody and amplitude. A model is built to calculate the emotion score via these music features. We define six intervals in the range of scores. The six intervals correspond to the six emotions, which are "excited", "joyful", "peaceful", "sorrowful", "desperate" and "nervous". The classification is made according to an optimization of the Tellegen-Watson-Clark model of mood [3]. The program then calculates the score, and if the score falls into one of the intervals, the emotion of the song is identified.

To verify the accuracy of the calculating program, an experiment was conducted. 200 college students were invited to a classroom and to identify the emotions of the 50 songs played in a recorder. We then compared the results, which the majority of students agreed to, with what had been calculated by the program. The results showed that the program reached an accuracy of 86% of all the songs tested.

2 Contribution

In this demo, we propose a music player: *HeartPlayer*. Our contribution mainly lies in providing a novel music player interface, and also exploring new facilities in music player. To the best of our knowledge, it is the first music player that can relatively precisely recognize the emotion of the instant music, express the emotion, and analyze the results to give recommendations. That's why we call it a ***smart*** player.

References

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