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LsM: A New Location and Emotion Aware Web-based Interactive Music System

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***Abstract*-- Music is ubiquitous in our daily life. People actively or passively listen to music at different locations and consciously or non-consciously experience it as a form of emotion expression. In this paper, we present a new location and emotion aware web-base interactive music system. It aims to provide the user preferred music with location and emotion awareness. The system starts recommendation with expert knowledge. If the user does not like the recommendation, he/she can decline the recommendation and select the desired music himself/herself. During this process, the user's interactions with the system, current location and emotion are logged for music preference learning. Thus, the system can adapt to the user's latest music preference. Also, the more the user uses the system, the more personalized music can be adapted to him/her.**

I. INTRODUCTION

Music is an art form consisting of sound and silence. Elements of sound in music include pitch, rhythm, and the sonic qualities of timbre and texture, etc. It is created by artists to express emotions, feelings and thoughts and plays an important part of most of people's lives. People actively or passively listen to different music at different locations and consciously or non-consciously experience it as a form of emotion expression. In this paper, we present a new location and emotion aware web-based interactive music system. The system mediates between the user's current location, emotion, music preference and the user's personal music collection which may be stored in different devices (e.g. mobile phone, personal computer, etc.) and scattered over the web to recommend the user preferred music at the right time to express the right emotion. To use the system, the user first needs to register his/her music, web terminal devices (office desktop, home laptop, etc.) and bio sensors (heartbeat sensors, etc. which is used to model the user's emotion) with the system, and then the system starts to recommend music according to the user's current location and emotion based on the expert knowledge. If the user declines recommendation, he/she can select the desired music himself/herself. During this process, the system recommendation, the user's selection, current location and emotion are logged for music preference learning. Thus, the more the user uses the system, the more personalized music can be adapted to him/her.

This paper is organized as follows: In section 2 the music system architecture is presented. And then the system implementation is given in section 3. Finally, in section 4 the main conclusion is drawn and the future work is discussed.

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II. FRAMEWORK OF THE NEW LOCATION AND EMOTION AWARE WEB-BASED INTERACTIVE MUSIC SYSTEM

In this section, firstly, the location, emotion, music and user music preference model are introduced, and then the system architecture is presented.

A. Location Model

Location is the place under which the music is delivered by the system. Each meaning location of the user has a unique identifier in the system. The location can be a fix IP address (office desktop, etc.) or a session id between the user interface and the system server (mobile phone, etc.). The user can register his/her current location with the system by either an IP address or a session.

B. Emotion Model

An emotion is a mental and physiological state associated with a wide variety of feelings, thoughts, and behavior. Emotions are subjective experiences, or experienced from an individual point of view [1]. Research has shown that emotions actually affect the way the heart beats. A person's heartbeat can be used as his/her emotional status [2].

C. Music Metadata

Music Metadata are data that are used to describe the characteristics of the music. For example, ID3 [3] is a metadata container most often used in conjunction with the MP3 audio file format. It allows information such as the title, artist, album, track number, tempo, emotion or other information about the file to be stored in the file itself. In this paper, our music system implementation is based on ID3 music Metadata.

D. User Music Preference

The information of a user which can reflect his/her music needs, requirements and desires is called a user music preference model. In [4], Liu present a user music preference model which includes not only the user's long term evolving commitment to certain categories of music service (classical, poop, etc.) but also user's spontaneous music service requirement which depends on context of use (location, emotion, etc.).

E. System Architecture

Figure 1 shows the main components that make up the new location and emotion aware web-based interactive music system. The whole architecture is divided into five abstraction

levels from the functionality point of view. The lowest level is the resource level which contains music, heart beat sensors and locations. The second layer is the resource manager layer which includes music manager, emotion model manager and location manager. The music manager is responsible for the music registration, un-registration, and etc. management functions. The emotion model manager collects and models from heartbeat sensors and updates emotion information in database. The location model collects, and updates the user's location information via IP addresses or session ids. The third layer is the database layer. The fourth layer is the adaptive control unit layer which includes user feedback log, inference and user preference learning components. The user feedback log component is responsible for logging the user's feedback to the recommended music. The user preference learning manger is responsible for user preference learning based on the user's past interactions with the system. The inference is the core component of the whole architecture. It is used to mediate between the user's music preference, emotion state, current location and available music to recommend the passenger preferred music with the right location to express the right emotion. The fifth layer is the interface layer. The user interacts with the system interface to get music services. For details of each component in figure 1, please refer to [5].

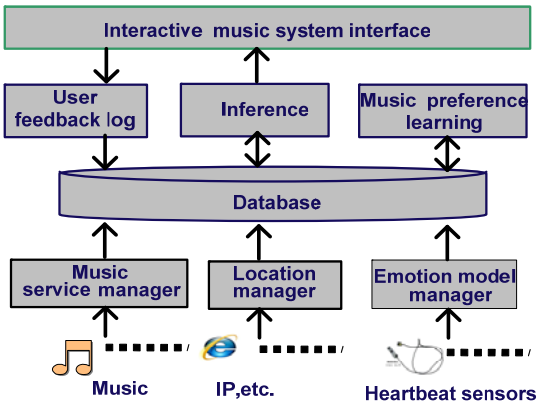

Figure 1. System architecure of the web-based interactive music system

III. IMPLMENTATION

Figure 2 is a screen print of our integrated http server, music service manager, location manager, emotion model manager, music streaming server, music display manager, etc. Once the user runs the software and this interface pops up, the http servers is on. The user can transfer between different managers (music display manager, music collection manager, location manger, etc.) by clicking on the corresponding tabs. Figure 3 is a screen print of the music system interface. The user can access this interface by visit the music server address in figure 2. In the figure, a music playlist is recommended to the passenger according to his/her current emotion state, location, music preference, etc. If the user accepts the recommendation, he/she can press the play button to enjoy; if the passenger declines the recommendation, he can browse the system by album, etc. to select the music himself/herself.

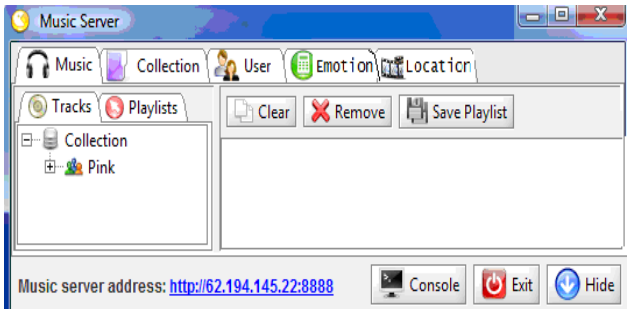

Figure 2. Music server

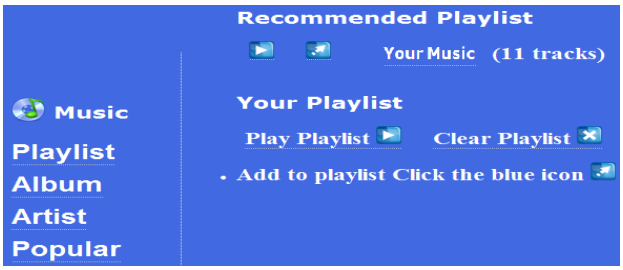

Figure 3. Music system interface

IV. CONCLUSION

In this paper, we present a new location and emotion aware web-based music system. We start by the introduction of emotion, location, music and music preference models. And then, the system architecture which mediates between these models to provide user preferred music at the right location to express the right emotion is presented. After that, the software implementation is introduced. We have already implemented our music system. Currently, we are doing user experiments to investigate the acceptance of our system.

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