

Recall and Communication Support System for Reminiscences Triggered by Humming

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Abstract. This paper proposes an effective reminder management system involving fond memory communication. Our framework helps users to manage and recollect fond memories they have. The system pays attention to the fact that unconscious humming is deeply related to the recollection of fond memories, and proposes a fond memory recollection system utilizing it. The system identifies a hummed song, and if a fond memory is related to that song and has been registered in the data base, metadata that accompanies the music gets displayed. Moreover, the system analyzes the music that the user used to trigger a fond memory recollection, resulting in recommended music that the user would probably like, along with other people's fond memories, being displayed.

Keywords: fond memories, recollection, communication, humming.

1 Introduction

People accumulate fond memories every day. Fond memories are part of what makes a person individual, while also being a form of communication by sharing similar memories and trying mutual understanding. The importance of fond memories was appealed to by Nojima, H. who advocated fond memory engineering that arranges and manages them [1]. We examined methods of managing, storing, and using fond memories, and then created a technological support framework for doing so.

This research focuses on the relationship between humming, which is an unconscious activity, and memory recollection. The system involves a memory recollection system that utilizes humming as a trigger.

Most past research has mainly used photographs, and rarely used music, in triggering people to recollect a scene from a certain time in fond memory engineering. We tend to recall past memories for no special reason when listening to music because there is close relationship between music and fond memories. Music is a strong trigger of prompting memory recollection, but an effective method of music-based fond memory communication support framework has yet to have been established.

2 Background

Fond memories involve three functions: self function, society function, and cognitive science instruction function [2].

The self-function provides a person with the base for supporting his/her own consistency and maintaining a preferable self-image. It is very useful in identifying growth by comparing the past self with the present.

The social function is useful in forming and maintaining interpersonal relationships. Moreover, inserting one's own experience into a conversation can improve the credibility of and enrich communication.

The instruction function is useful in directing various judgments and actions. Recollection of similar past experiences related to a present problem can be then utilized in problem solving and planning, which has been technologically modeled as case-based reasoning in Artificial Intelligence. Furthermore, past experiences motivate people and contribute to decision of their attitude.

These three functions are very important to support fond memory recollection, and thus which function should be constantly supported by the system is necessary to be considered.

3 Related Research

Some systems that effectively use the self and instruction functions have already been proposed for use in fond memory engineering. Photographs have been mainly used up to now to trigger fond memory recollection because of their strong evocativeness [3]. However, photographs are not suitable for supporting the social function because they are generally records of personal experiences. Nakatani, Y. pointed out importance of fond memory recollection using music [4]. Popular songs are shared among people and can be representative of a certain time. They are very strong triggers that encourage fond memory recollection and confirm companionship of the same generation sharing the similar experiences. Fond memories are recorded and recollected through their relationship to both past social and personal circumstances, and a song that is unconsciously expressed by humming it can include not only personal information but also information on the background time of that fond memory, thus making it an effective trigger in fond memories recollection. Music is especially better at evocating emotion and a sense of nostalgia than a photograph, and it can encourage a sharing of the consciousness of people of the same age.

4 Overview of the System

4.1 Automatic Search of What Is Hummed

We often hum in our daily lives, with doing so often increasing the possibility of unconsciously recollecting a fond memory. If information on the song hummed were to be made available at this time, it would consciously encourage fond memory recollection. Providing tags with the music would enhance effective memory recollection via being visual triggers.

The system uses an iPhone application “midomi” made by Melodis Company to identify the name of a hummed song [5]. The name of the hummed song and its singer are provided by this application. Then the system provides metadata related to the song (see 4.3). Some of the information gained in this process are used as triggers, and thus expected to encourage the recollection of a related fond memory into a chain reaction.

4.2 Automatic Detection of Rhythm

We tend to beat out rhythms during daily activities. At that time, humming the same rhythm song can often occur. Many experiments suggest that music enhances the storage and recall of memory. When a song and an event occur at the same time, the event is stored with a link to the music. Next time when the song is played, the memory is easily recalled, thus evoking a sense of nostalgia [6]. It can therefore be used to encourage fond memory recollection by the rhythm of a typical activity being automatically detected and then the same rhythm song provided.

This system uses an acceleration sensor to automatically detect a personal rhythm. When the system detects a rhythm of a person, then it provides a user with music of a similar rhythm to the user’s rhythm.

4.3 Metadata

This paper treats music as a trigger for fond memories recollection. Although the most important information included in a fond memory is an episode itself, the metadata of the episode, or when and where that episode occurred, is also important and useful to effectively manage and recollect fond memories. In this system, the metadata include classification of music, and “folksonomy” is used to classify music. Folksonomy involves classifying data without hierarchy, using tags that the user can freely define [7]. Music can be classified from various kinds of personal viewpoints specific to an individual user.

Fond memories can also be tagged by the folksonomy in the same way as music. Because more than one tag can be attached to a fond memory and a song, the fond memory and song can be classified and associated flexibly from several viewpoints. A list of all the tags is displayed on a computer screen as a form of “Tag Cloud.” Tag clouds are a user interface element commonly associated with folksonomy tags. Here, more frequently used tags are depicted in a larger font (Figure 1). Largely depicted tags often remind people of related memories, so a tag could be an effective trigger, as well as a platform of classification.



Fig. 1. Image of tag

4.4 Music Recommendations via Collaborative Filtering

If two persons prefer to the same song, their preference of music may be similar, and vice versa. This suggests that memory recollection can be prompted by a song which is preferred by the other user who has similar preferences of music as the user. Based on this idea, the system recommends songs by using “collaborative filtering.” Collaborative filtering is a method of recommending information that a user would probably like from a large amount of information [8].

The system makes recommendations based on the assumption as follows: if the user and another user, A, use the same music as a trigger, other music preferred by the user A could very probably be used as a trigger for the user. When users register fond memories, they are requested to register an associated trigger song. The system manages a list of all songs which were used as triggers. When a new song is used, it is added to the bottom of the list. Based on this list, the system prepares a used song list for each user. Each value of the list elements is set at 1 if the corresponding song has been used as a trigger by the user, and else 0. The system calculates the degree of similarity among used song lists, and recommends a song among the used song list of the other user with the highest degree of similarity to the users. The system uses the Pearson product-moment correlation coefficient that was used by Ringo to calculate the degree of similarity [9].

5 System Architecture

The system supports fond memory recollection, management and communication via three functions described above. PHP and Mysql were used in creating the system because PHP is very suitable for developing web applications and MYSQL is compliant with PHP. The current system is implemented on the mobile PC and will be implemented for use on iPhones in the next step because it is assumed it will be used in daily life.

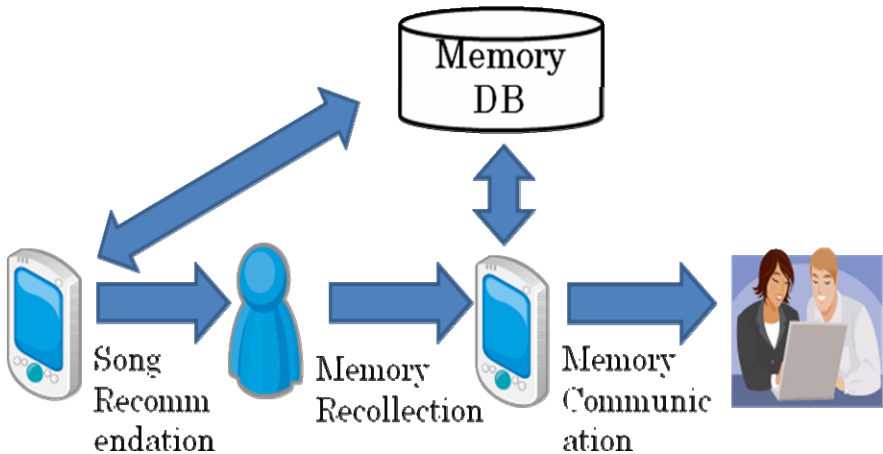


Fig. 2. System configuration

Fig. 3. Screenshot of fond memories being registered

曲名	歌手名	年代	タグ	思い出
負けぬ。	ZARD	1990年代	小学校	小学校の時の清水の歌でこの曲をみんなで歌った。亡くなって残念。
友達の間	ゆず	1990年代	中学校	中学校の時の友達と聞いた。楽しい思い出。
ロマンスの対様	広瀬香美	1990年代	小学校 スキー場	小学校の時にスキー場で良く流れていた。スキーを一生懸命練習したのを思い出す。

Fig. 4. Screenshot of music recommendation

A system configuration, screenshots of a list of fond memories being registered and music recommendation are shown in Figure 2, Figure 3, and Figure 4, respectively.

The main flow is as follows. First, the system prompts the recollection of a fond memory by providing information on the hummed song or recommending a song through use of rhythm detection. Second the recalled content is stored using a visual image within the system. Finally information on music from users with the same preferences is provided and other people’s fond memories then encourage communication.

6 Evaluation

An experiment was conducted to verify effectiveness of this architecture. The participants were 10 Japanese university students, including 8 men and 2 women, varying in age from 21 to 24 years old, with the average age being 22 years old. The participants

were asked to use the system in the conversation with the experimenter and to answer the questionnaire after the experiment. The questionnaire consisted of four questions:

- (1) Did you recall any memories in use of the system and, if so, what system function prompted it?
 - (a) when a name of a hummed song and its singer were identified
 - (b) when you looked at the metadata
 - (c) when a song was recommended
 - (d) when you talked on a recalled memory
- (2) Did the system help you have a comfortable talk?
- (3) Did you find any new side to your partner?
- (4) Did you have feelings of resistance toward the use of this system?

The answers were made in 5-point scale. The result is shown in Figure 5.

When a song was recommended, and when talk was made on a recalled memory, other memories were recalled. In the former case, the song had a link to the other participant’s memory. That memory reminded the participants of the similar own memories, which prompted active conversation. In the latter case, different experience about the same song prompted conversation. Both cases helped the participants find new side to their partner. The free answers revealed that conversation about the past experiences prompted deeper mutual understanding, which lead the participants to higher mutual confidence.

One participant had been enjoying quite different music from others of the same age. He felt difficulty to find a song which could be empathized with others. In his case, one-way conversation was observed and conversation was not active. Music recommendation should be refined.

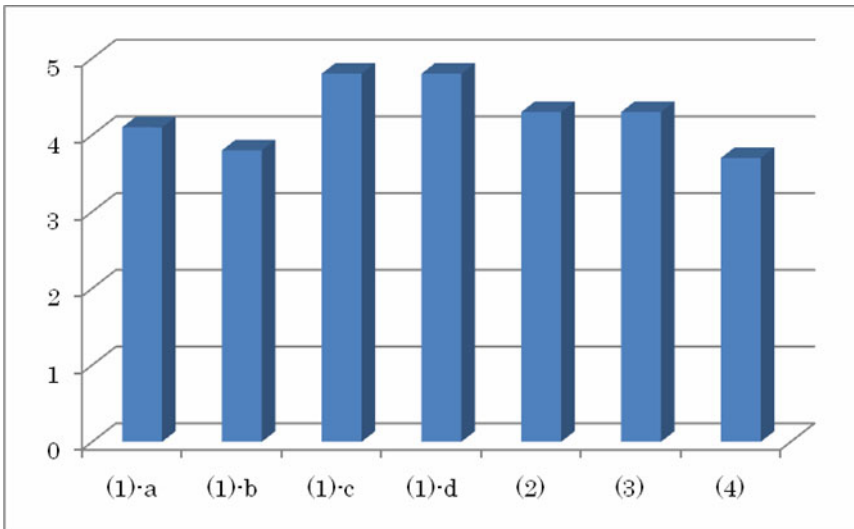


Fig. 5. Answers to the questionnaire

7 Conclusion

A recall and communication support system for fond memories triggered by humming was proposed. In the next step, the system is planning to be implemented on the iPhone platform, following which the system will examine how it encourages fond memory recollection and communication.

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