CoFeel: Using Emotions to Enhance Social Interaction in Group Recommender Systems

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ABSTRACT
Group recommender systems aim to suggest items of interest to a group or a community of people. Different from recommending to individuals, group recommender systems should also consider social interaction within group members. Prior art suggest that designing social interfaces is translated to a set of methods that enhance mutual awareness among group members. In this paper, we address emotional awareness. After a report in the current art, we describe how our work contributes to emotion awareness in group recommenders by introducing CoFeel, an interface that aims to enhance social interaction.

1. INTRODUCTION
A *group recommender system* suggests items of interest, such as music, movies, products, and etc, to a group of people. It aims to provide recommendations that are satisfied by the whole group. Current technology generates recommendations by modeling each group member's preference. Meanwhile, life experience suggests that emotion plays a vital role in social interaction among group members. Picture yourself in a group environment, such as a party hosted by a friend, or a big music festival. It is common that with the right music selected by the music band, excitement spread spontaneous within the group. In this situation, the music bands have been acted as a successful group music recommender in real life. Even though the music might not meet the taste of every individual, it is the contagious excitement that promotes enjoyment and engagement.

Based on experience leant from daily life, we propose to exploit the role of emotions to enhance user interaction and engagement in group recommender systems and thus promotes group satisfaction. In such systems, current methods to enhance user interaction are translated to enhance mutual awareness within a group, meaning the states in which users are aware of each other, including membership awareness, preference awareness, and outcome awareness. The main research questions of our work include: 1) what are the social functions of emotions in group recommender systems and 2) how to design interfaces in such systems.

To lay a solid foundation for validation our hypotheses, we first briefly report related work and then investigate the design rationale of CoFeel, which is a set of affective interface that aims to represent user emotions. We further implemented CoFeel in a mobile group music recommender system called GroupFun. In order to investigate the best modality to visualize user emotions, we attempted a variety of ways to design CoFeel.

The contribution of this work is two-folded. First, to the best of our knowledge, this is the first practical work that investigates the role of emotion in group recommender systems. Second, we have designed a set of emotional interface in the form of color wheels, kineticons and hapticons. Besides group recommenders, CoFeel is implemented as Android API and can be integrated in other online group environment.

2. RELATED WORK

2.1 Interaction Design in Group Recommender Systems
Jameson [1] studied some of the key user issues for group recommender systems and investigated several measures for promoting collaborating and coordination. These measures mainly aim at designing user interfaces to enhance mutual awareness. Mutual awareness in group recommender systems includes membership awareness, preference awareness and decision awareness. Membership awareness allows users to check which users are in the group. Being aware of members in a group facilitates users to decide how to behave and thus enhances trust in a group recommender [2]. Preference awareness enables users to be aware of the preferences of other members. One typical technique is Collaborative Preference Specification (CPS) [1], which enables persuasion, supports preference explanation and justification and reduces conflict. Decision awareness is important in helping users arrive at a final decision by assisting face-to-face discussions or mediated discussions [3]. Masthoff and Gatt [4] have considered satisfaction as an affective state. They also proved that in group recommender systems, members' emotion can be influenced by each other, and this phenomenon is called emotional contagion. However, they have not provided any practical solution that enhances emotion awareness.

2.2 Emotions in CMC
Emotion awareness, however, is not a new concept computer mediated communication (CMC). Want et al. [5] prototyped a chatting system that visualizes animated text associated with emotional information to show the affective state of the user. Users also claimed that emotional feedback has made chatting more engaging than only plain text chatting. Derks et al. [6] have reviewed current literature and argue that emotions can be found as frequently online as offline and that users try to express emotions online using various means such as emoticons or verbalizing in a more explicit way. iFeel_IM! [7] aims to enhance social interactivity and provide an emotionally immersive experience for real-time messaging. It automatically senses emotions through text messages, visualizes the detected emotions through avatars in a virtual world, and reproduces social touch through haptic stimulation in the real world.

3. CoFeel Design
We designed three different ways to visualize or input user emotion in Android platform, namely **color wheel**, **hapticons** and **kineticons**.

Color wheel allows users to choose their emotion category and intensity, as is shown in Figure 1. The wheel contains eight emotions from Russell's complex and visualizes them by valence and arousal. These emotions include exciting, happy, satisfied, relaxed, sleepy, sad, distressed and irritated. We choose the colors following principles of color science. The wheel is designed with the metaphor of plate with a rolling ball. Users make a selection by placing the ball in the hole that corresponds to the emotion category and intensity. Users move the ball by tilting the phone and the ball will move across the holes.

Figure 1. CoFeel Interface: Color Wheel

Hapticons are a set of icons to that present emotions in the haptic forms. We choose the same emotion categories as the ones in color wheel. We characterize hapticons by changing the duration, separating period and intensity of vibration on Android devices. Figure 2 shows example of modeling the emotion exciting visualized in software Immersion software[1].

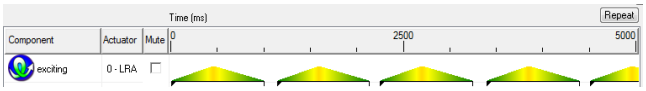

Figure 2. CoFeel: kineticons

Kineticons are a set of icons that conovey meanings by applying kinetic motions to images. Kineticons present nine categories of emotions that are evoked by music: transcendence, joyful, wonder, tenderness, power, nostalgia, peaceful, sadness, and tension, proposed by Zenter et al [8]. Figure 3 show four examples of such animations. Here the picture is the profile image of group member, and emotions are visualized by animating the image. For instance, joyful is visualized as jumping happily, and tenderness as waving cradle tenderly.

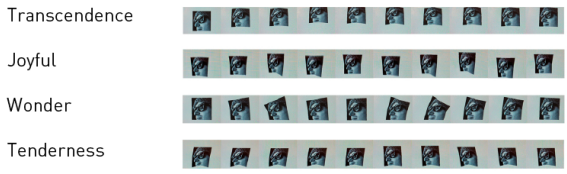

Figure 3. CoFeel Kineticons

We further applied CoFeel in a group music recommender system called GroupFun. GroupFun is a mobile application that suggest music playlist to a group connected via Facebook. We show the usage of kineticons in GroupFun as an example (see Figure 4). Section 1 is social space, consisting of Facebook profile pictures of all group members (1.a) and up to 3 members with emotional response (1.b). Section 2 is individual space, including name and artist of the current song, music controller (2.a), current emotion of the user himself (2.b), music progress bar (2.c) and emotion selection area (2.d).

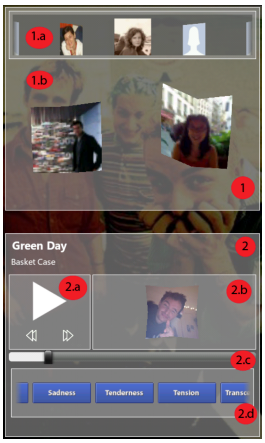

Figure 4. CoFeel kineticons in GroupFun

4. CONCLUSIONS

In this paper, we hypnotize that using emotion can enhance social interaction in group recommenders. We implemented CoFeel, an interface that supports emotion awareness in group environment. In order to understand which modality is most suitable, we attempted three varieties, namely color wheel, hapticons and kineticons. We further applied CoFeel in GroupFun, a group music recommender system. Comparisons and user study results on evaluating the interfaces are reported in other papers.

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