Do You Feel How I Feel? An Affective Interface in Social Group Recommender Systems

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ABSTRACT
Group and social recommender systems aim to recommend items of interest to a group or a community of people. The user issues in such systems cannot be addressed by examining the satisfaction of their members as individuals. Rather, group satisfaction should be studied as a result of the interaction and interface methods that support group awareness and interaction. In this paper, we introduced Affective Color Tagging Interface (ACTI) that supports emotional tagging and feedback within a social group in pursuit of an affective recommender system. We further apply ACTI to *GroupFun*, a music social group recommender system. We then report results of a field study and particularly how social relationship within a group influences users' acceptance and attitudes for ACTI.

Categories and Subject Descriptors
H.5.2 [**Information Interfaces and Presentation**]: User Interfaces *–Graphical user interfaces (GUI), User-centered design.* H.5.3 [**Information Interfaces and Presentation**]: Group and Organization Interfaces - *Organizational design, Web-based interaction*

General Terms
Design, Human Factors

Keywords
Group and Social Recommender Systems, Interface Design, Interaction Design, Affective Interface, Emotional Contagion

1. INTRODUCTION
With the proliferation of social networks, social groups have extended the meaning from families, friends and colleagues to people who share same interests or experiences in online communities, or people who are socially connected. The field trail version of Google+ allows users to define social "circles" of connections, share "sparks" they find interesting and join unplanned "hangouts"; interest groups on Last.fm are formed by members who support the same singers or music bands; members of LinkedIn groups are usually people who share similar academic, industrial or technical background.

Meanwhile, we have learned from theories in psychology field that multimedia files such as music, video and pictures evoke emotion. Purely numeric ratings are not sufficient for users to accurately provide feedback. Attempts have been made to recommend music by other methods. Hu and Pu [2] have proved that personality quizzes reveal more hidden aspects of user preferences and enhance recommendation accuracy. *Musicovery* [3] has developed an interactive interface for users to select music category based on their mood.

However, in group and social recommender systems, the affective states of users are more than the sum of its members. Users' emotion could not only be influenced by recommended items, e.g., music, but also that of others. Group formation and characteristics have been investigated as a premise to study social group recommender systems [4]. In this paper, we described the results of an empirical study of an affective interface for providing feedback in a social group recommender system. Our goal is to set a basic understanding of this area with a particular focus on the following two questions.

1) How would users like affective user interface in social group environment?

2) How does social relationship influence user behavior and attitude?

To answer this question, we implemented *GroupFun*, a music recommender system that suggests music playlists to groups of people. We conduct a field study, which allows users to indicate their preferences by rating music; we then invite them to evaluate the experimented Affective Color Tagging Interface (ACTI). This is followed by interview questions investigating their attitudes towards ACTI.

The next section discusses existing work and how they relate with our work. This is followed by descriptions on the functionalities and interface of *GroupFun* and design issues of ACTI in Section 3. Section 4 describes the hypotheses and procedure of a pilot study. After reporting the study results in Section 5, this paper concludes with limitations and future work in Section 6.

2. RELATED WORK

2.1 Emotion in Recommender Systems
The main goal of studying recommender systems is to improve user satisfaction. However, satisfaction is a highly subjective metric. Masthoff and Gatt [5] have considered satisfaction as an affective state or mood based on the following aspects in socio- and psycho- theories: 1) mood impacts judgement; 2) retrospective feelings can differ from feelings experienced; 3) expectation can influence emotion and 4) emotions wear off over time. However, they did not propose any feasible methods to apply the above psychological theories.

Musicovery is a typical example of websites recommending music by user selected mood. *Musicovery* classifies mood by two

dimensions: dark-positive and energetic-calm. It uses highly interactive interface for users to experience different emotion categories and their corresponding music. However, such recommender does not apply in social group environment, as individual emotion diversifies from each other.

2.2 Emotional Contagion

Masthoff and Gatt [5] also proved that in group recommender systems, members' emotion can be influenced by each other, and this phenomenon is called emotional contagion. Hancock et al (2008) [6] have investigated emotion contagion and proved that emotions can be sensed in text-based computer mediated communications. More significantly, they have proved the emotional contagion occurred between partners. Sy, T., S. Côté et al. (2005) [7] carried out a large-scale user study involving 189 users forming 56 groups. They proved that the leaders transfer their moods to group members and that leaders' moods impact the effort and the coordination of groups. However, to the best of our knowledge, implementation of features related with emotional contagion in group recommender systems is lacking.

2.3 Group Relationships

Emotional contagion depends on the relationship of group members. Masthoff defined and distinguish different types of relationships. In a **communal sharing relationship** (e.g., friends), group members are more likely to care about each other. Furthermore, their emotions are more likely to influence each other. For example, if your friend feels happy, then you are likely to feel happy and if your friend feels sad, you are likely to feel sad. In an **equality matching relationship**, e.g., strangers, members in such groups are less likely to be influenced by others. Such differences caused by relationships have not been proved by experiment. In our work, we compare how the two groups differ in their attitude towards affective interface in group environment.

3. Prototype System

We have developed a music group recommender system named *GroupFun* (http://apps.facebook.com/groupfun/), which is a Facebook application that allows groups of users to share music for events, such as a graduation parties. The functions of *GroupFun* mainly include: 1) group management, 2) music playlist recommendation. Users are able to create a group, invite their friends to the group, and join other groups. Each user rates uploaded songs[1]. The ratings follow a 5-scale style, as is shown in Figure 1.

We further designed Affective Color Tagging Interface (ACTI) as an additional widget that allows users to tag their emotions evoked by the music they have listened to. Different from *Musicovery*, which recommends music based on user mood, ACTI uses emotions as an explanation, feedback and re-communication channel. In group environment, each user usually actively persuades other users to take his/her own preferences. In previous user studies (reported in another paper), we observed that users would not use texts for explanations due to incurrence of much user effort. Users also commented that their preferences on music differ with contexts, which usually correspond to emotions in

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[1] The algorithms for recommending playlist and songs are introduced in another paper.

music. For instance, peaceful music is usually selected for chatting while energetic music is a top candidate for parties.

We adopted Geneva Emotional Music Scale (GEMS) for user emotion evaluation [8]. GEMS is the first instrument that has been designed to evaluate music-evoked emotions. We adopt the short version GEMS-9, consisting of 9 classifications of emotions, including wonder, transcendence, power, tenderness, nostalgia, peacefulness, joyful, sadness, tension. Each class provides a scale from 1 to 5 indicating the intensity of the emotion. However, asking users to evaluate the evoked emotion of music is not our research focus. Rather, we want to provide a ludic affective feedback interface for a group of users to participate. However, a survey-style questionnaire easily distracts users from the system itself. Inspired by Geneva Emotional Wheel (GEW) [9], we visualize the evaluation scale to a color wheel, as is shown in Figure 2.

This wheel contains 9 dimensions designed by GEMS, and each dimension contains 5 degrees of intensity, visualized by sizes of circles, distances from the center and saturation of colors in order to enhance visualization. The smaller size the circle has, the less intense the emotion is. Users could tag their evoked emotions in any of the 9 dimensions according to the intensity.
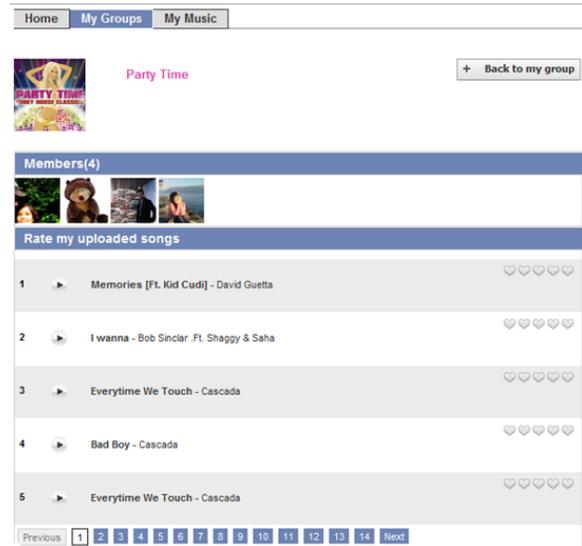

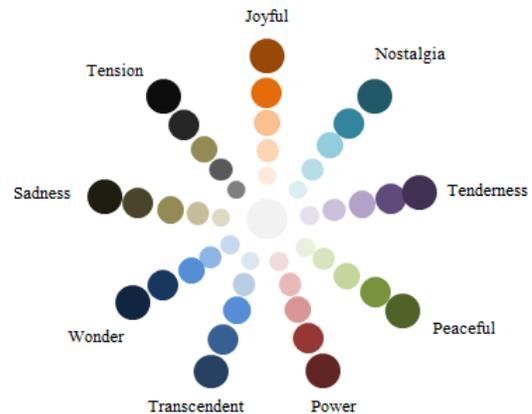**Figure 1**. Screenshot of original rating interface

Figure 2. GEMW distribution in *GroupFun*

We further include ACTI widget in *GroupFun* rating interface. Users could give emotional feedback to songs by clicking the emotional button at the left side of song ratings. The emotional rating interface will pop out with the collective emotions in a group, which visualize the overall emotional element of the music (Figure 3). This serves as an alternative way for explanation and persuasion.
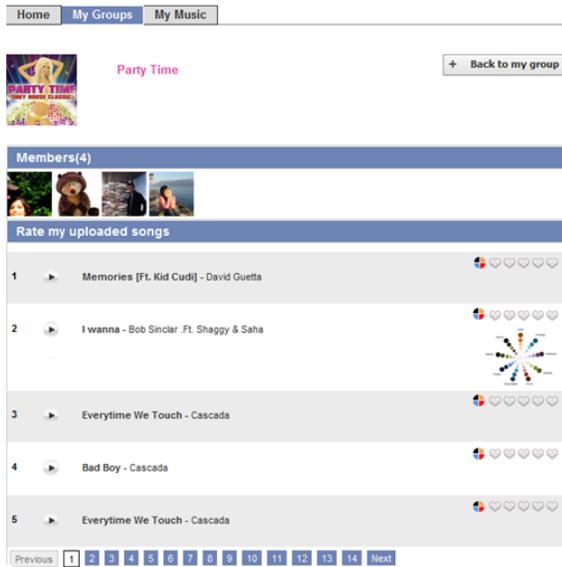

Figure 3. Screenshot of rating interface with ACTI

4. PILOT STUDY

4.1 Hypotheses

We postulated interface and interaction design in social group recommender systems depends on relationship among group members. In other words, interface and interaction design is different in groups constitute of friends and those constitutes of strangers. We also hypothesize that groups whose members are in close relationship like ACTI interface and groups whose members are not close with each other would less likely to use ACTI.

4.2 Participants

In total, two groups (4 participants each) joined the user study. Two PhD students from a course voluntarily participated in the user study. Each of them invited another three people to form a group. In order to investigate the effect of relationship on group behavior, we asked the first student to invite people who are not familiar with each other, while we asked the second student to invite people who are familiar with each other.

4.3 Scenarios and Roles

In order to organize the experiment, we design the car driving scenario. A group of 4 people are travelling together from Lausanne to Geneva by car. It is around 45 minutes ride. Based on different group relationships, we design the first scenario as strangers sharing a car-ride and the second scenario as friends travelling together. Among each group, one of the participants is a driver and the other three participants are passengers. They are using *GroupFun* to select a playlist for their trip. This scenario is a typical group activity where all members consume a

recommendation list simultaneously. This scenario provides two types of roles, one driver and three passengers. The driver could be the user who creates the group. Since the focus group is small, it is not realistic to design a large-group scenario such as a party. In this experiment, *GroupFun* provides 15 songs, which is suitable for the experiment in the sense that 15 songs are approximately suitable for a 45-minute ride.

4.4 Experiment Design and Procedure

We carried out the user study on two groups in two days. We first invited each member of the group to meet in our lab with their favorite music. We then debriefed each group on the procedure of the study and the usage of *GroupFun*. We then assigned roles for each group. Users started following the scenario after exploring original *GroupFun* for around five minutes.

In each group, the driver first created a group and sent invitation to his/her friends (other participants of the group), and uploaded his/her favorite music. Invited users accepted the invitation, joined the group and contributed songs respectively. Meanwhile, they could listen to group music and rate songs.

Then they continued with a survey questionnaire evaluating *GroupFun*. After that, we invited them to explore the experimented *GroupFun* interface with ACTI, followed by an interview. The user study process in both groups has been recorded for further analysis.

5. INTERVIEW RESULTS

In order to verify the differences in relationship among group members, each participant indicated their closeness with each other (except themselves) ranging from 1 (don't know him/her) to 5 (know him/her very well). For example, if Participant A is in very close relationship with Participant B, he is expected to rate 5 for Participant A. The total score in Group 1 is 33 while that in Group 2 is 44. This result verifies the group differences as we expected.

It is easy to discover from the video recording that both groups enjoy listening to the group music very much. For example, some of them even sang with the music while listening. More interestingly, we found out members in Group 2 even discussed with each other about a song that they particularly enjoyed.

During the interview phase, we first asked them to call back the experiment scenario and whether music influences their mood. All of them agreed on the evoked emotion by music.

Then each participant compared original *GroupFun* interface with the experiment interface with ACTI. In Group 1, only one member supported ACTI, while others thought it is not necessary and too complicated to include additional features. It cost them more effort. By contrast, members in Group 2 were highly positive about ACTI. As one user said, "It is interesting to listen to music while evaluating their mood. It is even more interesting to compare their results with group emotion."

Followed by this question, we asked them whether their emotions are influenced by group emotion. As we hypothesized, members in Group 1 do not see any influence, but they still enjoyed using *GroupFun* because of the recommended group music. By contrast, 3 out of 4 participants in Group 2 said they would like to view group emotion when tagging their own mood evoked by music.

The last question is to ask participants their suggestions on interaction and interface design of *GroupFun*. We collected some valuable suggestions from participants. One participant in Group

1 regarded simplicity as an important factor. He would prefer interesting functions, but the interface should not distract them from the main function of *GroupFun*, and that explains why he did not like ACTI. On the other hand, one member from Group 2 said some interesting group activity would help them to listen to suggested songs more carefully and therefore provide more accurate and responsible ratings. Another participant in Group 2 also mentioned that they would like to see more enjoyable interfaces in *GroupFun* as an entertaining application.

6. CONCLUSIONS

We designed an affective color tagging interface (ACTI) and applied it to *GroupFun*, a social group music recommender system. We further invited two different types of groups for our user study. While members of one group do not know each other well, the other group consists of friends in good relationship. Users in both groups prefer simple but interesting interface. Even though both groups of users enjoyed listening to group songs and indicated their positive attitudes towards *GroupFun*, the user study did show obvious differences in their group behavior. Members of the group with close relationship were active in discussion with each other and they like interfaces that support group emotion, and consider it interesting and entertaining. Meanwhile, groups whose members do not know each other well consider affective interface complicated and not useful. This further proves our hypothesis that interface design in social group recommender systems should consider group formation and relationship.

However, this work is still at the preliminary stage, and has some limitations. First, as a pilot study, we only invited two groups of users to survey their needs. In order to further establish design guidelines, we need more groups and more types of groups and conduct larger scale user studies. Furthermore, browser-based affective interface is limited. Rather, user emotion could be captured automatically in an ambient environment. Our future work also include ambient affective interface in social group recommender systems.

7. ACKNOWLEDGEMENT

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