Designing Emotion Awareness Interface for Group Recommender Systems

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ABSTRACT
Group recommender systems help users to find items of interest collaboratively. Support for such collaboration has been mainly provided by interfaces that visualize membership awareness, preference awareness and decision awareness. In this paper, we are interested in investigating the roles of emotion awareness interfaces and how they may enable positive group influence. We first describe the design process behind an emotion annotation tool, which we call **CoFeel**. We then show that it allows users to annotate and visualize group members' emotions in GroupFun, a group music recommender.

Categories and Subject Descriptors
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

General Terms
Design, Human Factors

Keywords
Emotion awareness; annotation; group recommender systems

1. INTRODUCTION
Group recommenders aim to produce a set of items that satisfy the interest and preferences of their members. An essential step is to elicit group members' preferences [5]. Eliciting preferences not only informs systems to propose a set of recommendations, but also allows members to proactively influence each other [8] and thus facilitates group decision-making. Currently, most group recommenders elicit individual preferences via ratings. Some systems offer critiquing functions such as 'lower prices' and 'better landscape' [5]. Additional information not only refines users' preferences, but also facilitates persuasion and influence within a group. However, such additional information varies with domains, e.g., users' requirements for movies differ from music, tourist places or hotels.

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We aim to investigate emotional feedback to recommendations as additional information for preferences. We also refer to this function as **emotional annotation**. Moreover, users' emotional feedback for recommended items may vary in the timeline of consuming recommended items. In music recommender system, for example, the emotions one experiences may change from the beginning to the climax to the end of a song. Providing emotional feedback in the timeline could enrich user preference information for recommended songs. Furthermore, Masthoff and Gatt [8] found users' emotional states could be affected by others. Thus we assume that supporting **emotion awareness** – a feature that allows users to be aware of each other's emotional response to recommended items – have the potential to enable positive group influence in group recommender systems.

However, it is not easy to accurately identify emotions, which are subjective and abstract, and motivate users to annotate emotions, which requires additional effort. As a first step to design emotion awareness interfaces, we aim to design an emotion annotation tool for group recommender systems that are accurate and engaging. We design and implement **CoFeel**, an emotion annotation tool to elicit users' emotional feedback for recommended items. We then integrate CoFeel into GroupFun, a group music recommender system, which provides emotion awareness features.

2. RELATED WORK
Emotion is identified as a crucial indication for user preference. In a datasets consisting of 61,080 tracks from Last.fm scrawled by Laurier et al. [7], the tag *sad* has been used 11,898 times. Among the top 33 adjective tags in songs retrieved by Hu et al. [4], 19 terms are associated with music moods. Lanz et al. [6] found that valence of emotion is ranked as the second important factor among tags for movie recommendations. The above suggests the roles of emotions as additional information for user preferences.

There have been various emotion categories. The best-known model is Ekman's [1], represented by six basic human emotions. The Geneva Emotion Wheel [10] evaluates emotional responses related to objects, events and situations; it is a more refined model of emotion, incorporating 20 emotion categories. Researchers also provide domain-specific emotions related to products, visual interfaces, music, films and pictures [2]. In this work, we aim to design an emotional interface that is less domain-dependent.

Emotions play an important role in group recommender systems. Masthoff and Gatt [8] modeled group satisfaction as users' affective states, but they did not provide concrete interface designs. Jameson [5] considers incorporating emotions in the agent's facial expressions but the mechanism is vague.

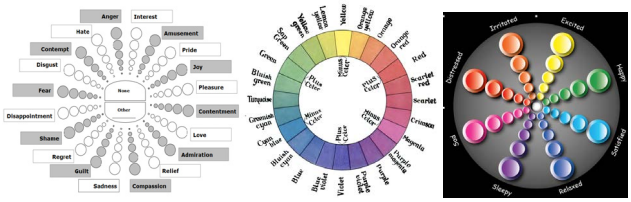

Figure 1: **(a) Scherer's Geneva Emotion Wheel [12]; (b) Hatt's color wheel [3]; (c) CoFeel interface.**

3. COFEEL

We aim to design an emotion awareness tool that 1) allows users to accurately tag their emotions and 2) is engaging to motivate users to provide emotional feedback.

- **Accurate.** We choose Russell's emotion complex [9] to map emotions into valence and arousal. We consider mapping emotions in a dimensional space to an emotion, and thus tend to have higher accuracy for annotated emotions.
- **Engaging.** The annotation tool should be engaging to motivate users to provide emotional feedback. We use Geneva Emotion Wheel [10] (Figure 1(a)) to visualize emotions and introduce colors based on Hatt's color wheel [3] (Figure 1(b)) to make the interface looks appealing.

Essentially, CoFeel incorporates Russel's complex as 'body', Scherer's Geneva Emotion Wheel as 'skeleton', and Hatt's color wheel as 'clothes'. The outcome of the design is shown in Figure 1(c). CoFeel contains eight spikes; each presents an emotion with five scales and in a color. We select the eight emotions (excited, happy, satisfied, relaxed, sleepy, sad, distressed, and irritated) from Russels' complex and consider their positions in valence-arousal dimensions. Aware that the emotional meanings of colors vary by cultures, we adopt common knowledge, e.g., yellow for *joy* and blue for *calm* and then turn Hatt's color palette and try to make the colors match the emotional meaning. The colors are more for visual appealing than emotional meaning.

To enhance user engagement, we use the metaphor of a plate with each emotion as a hole and a ball rolling on the plate. Users can change the emotion, i.e., the position of the ball, by rotating and tilting the plate surface. The aim of using the metaphor is to enhance user affordance to interact with the interface. We implement CoFeel on Samsung Galaxy SII 9100 with Android OS. It also applies in any other Android devices. The phone detects user movement and direction of surface plate using accelerometer and gyroscope. We filter out constant accelormeter data to increase accuracy when users are walking or commuting.

We then integrate CoFeel in GroupFun, a mobile group music recommender. Users can log in with Facebook accounts, create and join a group, invite members, and listen to a common playlist. The playlist generation mechanism and implementation details of GroupFun are out of scope of this paper. Figure 2 shows the group music interface of GroupFun. The interface consists of two components: individual emotion annotation and group emotion visualization. Users can annotate emotions with CoFeel by holding the phone, rolling the ball around the surface of emotion plate, and clicking the "Update Mood" to confirm the annotation. The annotation is recorded and visualized in the timeline of the song as group emotions, together with other group members' annotations. The group emotions are visualized as music score, distinguished by colors, corresponding to color wheel. Intensities are mapped to the position of the lines, e.g. the beginning of 'Fariytale' is rated as 'relaxed', with the level of 5 out 5.

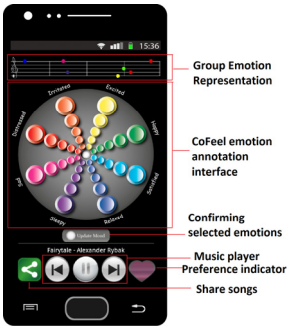

Figure 2: **Integrating CoFeel in GroupFun.**

4. CONCLUSIONS

This paper investigates emotion awareness features for group recommender systems. We first design an emotion annotation tool called CoFeel. We then integrate it in GroupFun, a music group recommender systems, which allows users to annotate individual emotions and view group emotions. This work extends literature in group recommenders by exploring design space for emotion awareness features. Future work includes continuing with the design and investigating its impact with comparative user studies.

5. REFERENCES

[1] Ekman, P. Basic emotions. *Handbook of cognition and emotion*, 4, (1999), 5-60.

[2] Gross, J. J. and Levenson, R. W. 1995. Emotion elicitation using films. *Cognition & Emotion*, 9, 1, (1995), 87-108.

[3] Hatt, J. A. H. 1908. The Colorist. *Van Nostrand*.

[4] Hu, X., Bay, M. and Downie, J. S. 2007. Creating a Simplified Music Mood Classification Ground-Truth Set. In *ISMIR*, 309-310.

[5] Jameson, A. 2004. More than the sum of its members: challenges for group recommender systems. In *AVI04*, 48-54.

[6] Lanz, C., Nowak, S. and Kühhirt, U. 2010. Determination of Categories for Tagging and Automated Classification of Film Scenes Categories and Subject Descriptors. In *EuroITV10,* 297–300.

[7] Laurier, C., Sordo, M., Serra, J. and Herrera, P. 2009. Music Mood Representations from Social Tags. In *ISMIR,* 381-386.

[8] Masthoff, J. and Gatt, A. 2006. In pursuit of satisfaction and the prevention of embarrassment: affective state in group recommender systems. In *UMUAI*, 16(3-4), 281-319.

[9] Russell, J. 1980. A circumplex model of affect. *Journal of Personality and Social Psychology* 39: 1161–1178.

[10] Scherer, Klaus R. 2005. What are emotions? And how can they be measured? *Social science information* 44, 4 (2005), 695-729.