GamIM: Affecting Chatting Behavior by Visualizing Atmosphere of Conversation

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Abstract  
The frequent practice of instant messaging via mobile devices encourages rich social interaction in terms of text communication. Conventional visual attachments such as emoticons used to augment emotional cues from texts but such attachments fail to visualize the atmosphere of a conversation between two interlocutors. In this paper, we present GamIM, a gameful instant messenger prototype, allows to visualize emotional interaction animated by messages. We hypothesize that such gameful approach may potentially affect user’s chatting behavior and encourage a more positive atmosphere of conversation.

Author Keywords  
Emotion; visualization; interaction design; instant messenger; computer-mediated communication;

ACM Classification Keywords  
H.5.2. User Interfaces: Graphical user interfaces (GUI).

Introduction  
The frequent practice of instant messaging via mobile devices encourages rich social interaction in terms of text communication. Such mobile messaging is where people’s ephemeral, intimate and emotional social
interactions take place, which enables them to develop parts of their social network.

Most existing applications concerning visualizing user’s emotion in instant messengers focus on adding visual attachments to messages themselves instead of visualizing the atmosphere of an ongoing conversation. The presence of visual attachments such as emoticons works to convey short-term emotional cues while the emotional context of a conversation can only be recalled afterwards by reviewing chat history.

The nature of mobile messaging is often spontaneous, short, informal and full of rich affective exchanges. As conventional instant messengers fail to remind users of an ongoing conversation atmosphere, users may suffer from the unawareness of emotional context and lose opportunities to alternate their conversation behavior.

In this paper, we present GamIM, a gameful instant messenger aims to affect user behavior in chatting and offers reflections to see their emotion interacting with one another. We hypothesize that, via the presentation of emotion bubbles, the emotional interaction animated by their messages will affect their ways of chatting.

In the next section, we review different methods that integrate emotional expressivities to instant messengers. Then, we present the design goals and metaphor behind GamIM. The implementation of GamIM is next described in terms of system training and functionalities along with a preliminary user feedback. The conclusion and future work are presented in the final section.

**Related work**

**Visual attachments with text**

Emoticons are one of emotional expressivities frequently used in conventional instant messengers. Emoticons, either textual or graphic, work to attach emotional cues on text to strengthen one’s intent. The use of emoticons highlights the nonverbal cues in each message, but it fails to visualize emotional context of the whole conversation.

Another concept called kinetic typography was firstly presented by Rosenberger and MacNeil [1]. Their idea is to translate speech into graphics by applying an affective form to present text. These enhanced applications can be found in several works [2] [3]. They provide different configurations to animate a text message. The drawback of kinetic typography is that predefined effect limits potential emotional expressions and the readability of animated texts is criticized. Stahl et al.[4] demonstrate a system visualizing emotions expressed in mobile messaging in terms of abstract background images built up by a combination of colors, shapes and animations. However, this abstract background image, instead of being automatically generated, is manually selected by navigating within the two-dimensional model of affect.

**Augmenting emotion by other nonverbal means**

Wang et al. [7] integrate physiological sensors with animated texts to augment the emotion expressed in conversation. Kaliouby and Robinson [5] apply facial recognition to represent user’s facial expression on the avatar on the messenger. Further, Angesleva et al.[6] combine facial recognition with detection of typing speed to generate a contextual image representing user’s affective state. In general, the information generated by nonverbal means is also ephemeral and may not be accumulated to simulate the permanent...
atmosphere of a conversation. Moreover, some users
take it as intrusive while their affective status is
physiologically detected. They may prefer their emotion
to be analyzed by their writings rather than
physiological sensors [7].

Visualization of chat history
Chat circles [8] shows abstract visuals in order to
present the activity and identity for synchronous
communications in a chatting room. Bubba Talk [9]
develops mappings from text data to animated effects
to represent different patterns of expression style of
sentences (capitals, exclamation marks and quantity of
characters) in online text communication. CrystalChat
[10] visualizes personal chat history in terms of facet
structure. Each message is presented as a circle whose
color and position reflect to the emotion and the
chronological order of each message. The problem of
ephemeral presence of emotion seems to be solved by
the visualization of chat history; however, unlike Chat
circles, CrystalChat and Bubba Talk only support post
visualization instead of synchronous presentation.
Among these three applications, only CrystalChat fully
deals with visualization of emotional context of
message.

Until now, most developed techniques in instant
messenger used to visualize emotional information in
terms of various visual attachments. Emotional cues
conveyed by visual attachments are not able to
visualize the ambiance in synchronous communications
and the emotional context of an ongoing conversation
is generally lost.

GamIM messenger
Design goals
The objective of GamIM is to affect user’s chatting
behavior. The design goals are developed as follows:

- To identify the ephemeral affective state of user,
each sent message is analyzed and instantaneously
visualized in terms of different color bubbles reflecting
user’s emotional intent.
- To illustrate a conversation atmosphere, the
emotional context of an ongoing conversation is
visualized by accumulated emotion bubbles of each
message on the background of chat interface.
- To recall efficiently the emotional context, the
visualization of atmosphere has to be constantly visible
and cannot be covered by the flow of messages.
- To affect user’s chatting behavior in terms of a
gameful approach, animations are generated to present
interaction of emotions in the conversation. Each
message therefore refreshes conversation atmosphere
and a number is displayed to remind the quantity of
emotion bubbles of each group.
- To observe alteration of emotional context, a
reversible navigation in the chat history is allowed.

Design metaphor
We use lava lamp as the metaphor of atmosphere
where the movement of blobs of colored wax with
translucent liquid reflects rich emotions, as illustrated
in Fig. 2. This metaphor is mapped on instant
messaging to present the interaction of emotions
between two interlocutors.
Implementation

System training
GamIM is a Python server combined with a client side interface. The server is integrated with a sentiment identifier that uses the Python NLTK library to train the classifier and to classify the content of user input. The training corpus is based on NPS Internet Chatroom Conversations of Linguistic Data Consortium (LDC2010T05) developed by Naval Postgraduate School. This corpus consists of 10,567 English posts (45,068 tokens) collected from various online chat services in accordance with their terms of service. The training set is differentiated into two labels (positive and negative) and trained as a naive bayes classifier. The probability sum of positive and negative labels in each message is 1. The probability of negative label is taken as a reference determining the polarity and the extent of sentiment. The classifier determines the sentiment label for each message by comparing the probabilities of negative label.

Graphic presentation in GamIM is implemented using JavaScript. The client side interface as illustrated in Fig.3, is organized into three areas: (a) input area, (b) message display area and (c) atmosphere display area. The message display area is implemented with a fade-out visual effect to orient the flow of messages to the background and to keep atmosphere display area always on the foreground. The sent messages are displayed on the right while those of other user are on the left.

Functionalities
- Generating emotion bubbles to visualize emotions of messages: the use of color reference is based on the finding by Mohammad [11] where eleven basic colors (white, black, red, green, yellow, blue, brown, pink, purple, orange, grey) are associated with emotion words and can be divided into two categories: positive and negative. Based on this color reference, the output of our semantic analysis can assign a color representing the emotional cues of a message.
  - Generating of emotion bubbles: once a message is sent, a group of emotion bubbles will be generated around the dialog message with an assigned color as illustrated in Fig.4. The number of characters in the sent message determines the quantity of emotion bubbles.
  - Emotional bubbles gathering together: after generating, emotion bubbles rise to the atmosphere display area and interact with existing emotion bubbles as illustrated in Fig.5
  - Resizable presentation of conversation atmosphere: the presentation of emotion bubbles is automatically resized to adapt to the area of atmosphere display so that all the emotion bubbles can be visible. Screenshots in Fig 6 and Fig.7 present normal mode and resized mode of atmosphere display. In normal mode, each emotion bubble is in a normal size when the quantity of emotion bubble is below a defined number.
Figure 5. Rising of emotion bubbles from a message.

Figure 6. Normal mode in the atmosphere display area.

Figure 7. Resized mode in the atmosphere display area with groups of positive (28 bubbles), negative (59 bubbles).

Therefore, as newly generated emotion bubbles go into atmosphere display area, they will be split into two groups (positive, negative) by their nature on the foreground of screen. A number will be attached on positive and negative group to indicate the quantity of bubbles, as Fig.7. An englobement effect is implemented to visualize the interaction of emotions between positive and negative group. The group whose quantity of bubbles is superior to the other will englobe the other group. When the quantity of both groups is equal, there will be no englobement effect and each group stays in a separated circle. This means what user types in the message turns to manipulate the englobement effect between positive and negative group. An example of englobement effect is illustrated in Fig.8 and Fig.9. A conversation with several messages is shown in Fig.1.

Preliminary test and user feedback
We conducted an informal test with 6 participants who have experience in instant messaging. For each test, the design brief was presented and each participant was invited to chat with a tester. The conversation with each participant was conducted using three scenarios: conversation of positive, negative and neutral emotions. We obtain preliminary user feedbacks as design implication:

- Participants generally agree that animation on the top of interface provides an alternative way (beside texts) to understand the interaction between two interlocutors and visually presents emotional context of a conversation.
- Participants are encouraged to try different messages in order to see different interaction results.
although some of them are not convinced by applied colors to represent different semantic analysis result.

- Participants consider the reversible navigation to be an interesting way to revise chat history where they have visual reference to reminisce their conversations.

**Conclusion & Future work**
The preliminary user feedbacks encourage us and provide important indication to refine our prototype. We consider our prototype as an alternative potential expressively bringing contributions to conventional instant messaging interfaces.

In the short run, we plan to carry out a formal experiment in order to obtain complete results including usability and user suggestions. In the long run, instead of using colors, we seek for more different presentation models and potentially including customized features to visualize emotional exchanges in a conversation. More complex algorithms will be explored for semantic analysis. We aim to integrate the reward system in our gameful approach in order to encourage users to create more positive atmosphere for conversation. We decide to collect behavior patterns by observing user behaviors in different presentation models as well.

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**References**