

# Interactive Mobile Communication System with Facial Expression Extracting Emotion

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*Abstract*— We have already proposed a chat system representing a facial expression corresponded to user's emotion called JavaFaceChat. However it is difficult to use JavaFaceChat on mobile phone because it requires some complicated tasks, large databases, and natural language processing. Therefore, we construct a simple version of JavaFaceChat. The system calculates seven types of emotions (angry, disgust, fear, happy, perplex, sadness, and surprise) from appearance of emotion words in the message and the strongest emotion is expressed by a facial expression image.

## I. INTRODUCTIONS

In the decade, mobile phone is popularized all over the world and many people communicate by using mobile phone. The most popular way to communicate using mobile phone is telephone function. However, there is another communication method which exchanges text message like a chat system. However, the chat system does not contain any non-verbal information (e.g. tone of voice and facial expression) like face-to-face communication.

We have already proposed a chat system representing a facial expression corresponding to the user's emotion called JavaFaceChat as shown in Fig. 1 [1]. First of all, inputted message is analyzed morphologically and parsed at the server. The system calculates emotions from the parsing result by using EGC method [2]. The EGC method extracts 20 types of emotions according to personal preference database. The emotions are classified into 6 types of expressive emotions. Then, the center of gravity among each emotion type and the values is calculated. The server sends the message and selected facial image to all users at every new message. Furthermore, JavaFaceChat has a function to make a new chat room among the users who have the same tendency of emotion changes.

In order to run the JavaFaceChat system, however, some databases such as grammar database for parsing, favorite value database to calculate aroused emotion, and facial expression databases for each user are required. Furthermore, it is hard for small computer such as mobile phone to run parsing, emotion calculation, and chat room management in real-time.

Therefore, we construct a simple version of JavaFaceChat. The input message is exchanged through the Internet. The emotion analyze process extracts some keywords (emotional words) which indicates seven types of emotions from the

message. A facial expression image is output based on the strongest emotions.

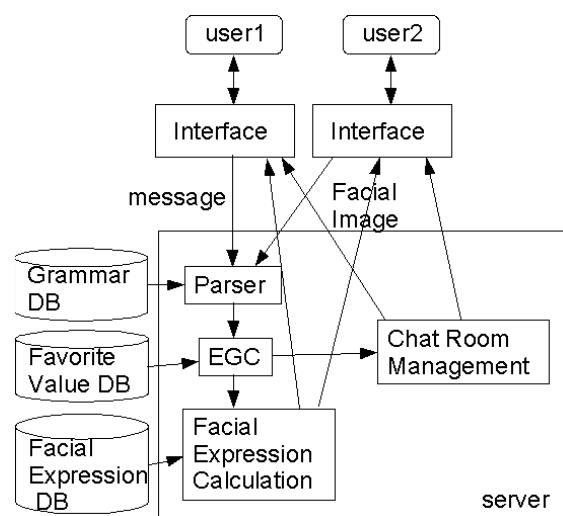


Fig. 1. JavaFaceChat

## II. SIMPLE CHAT SYSTEM WITH FACIAL EXPRESSION

### A. Overview of Simple Chat System

Figure 2 is the overview of the chat system. This chat system exchanges the message through the Internet. Firstly, the operator inputs the message to the chat system. The content of the message is analyzed and the intensities of seven types of emotions (angry, disgust, fear, happy, perplex, sadness, and surprise) are calculated. Then, the emotions are expressed using a facial expression image. The input message and the facial expression image are displayed to the operator. On the other hand, the conversation partner receives the message from the server. The received message is also analyzed and its emotion is calculated from point of view of the partner. The facial expression changes according to the content of the message and the elapsed time. As a result, chat log and two facial expression images are displayed.

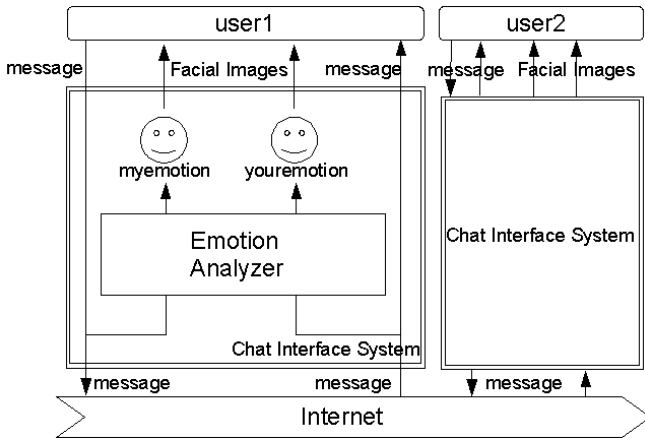


Fig.2. Simple Chat System with Facial Expression

### B. Emotion Calculation Method

Our system calculates the emotion from the message. Seven types of emotions are calculated according to the appearance of each “emotion words.”

The emotion words indicate emotion in the message. The group of the emotion words is defined for each emotion as shown in Table 1. We picked up the emotion words from a Japanese dictionary for elementary school [3] considering to the definition of the words. The number of emotion words is 234 (angry: 13, disgust: 48, fear: 14, happy: 101, perplex: 20, sadness: 30, and surprise: 8). 29 facial characters registered in mobile phone such as (^\_^) or (T\_T) are added in the emotion words.

TABLE I  
EMOTION WORDS (PARTLY)

| Emotion  | Emotion Words   |
|----------|---|
| Angry    | <i>iraira</i> (annoyance), <i>ikaru</i> (anger), <i>suneru</i> (sulk), <i>semeru</i> (accuse), <i>jirettai</i> (provoking), <i>nikumu</i> (hate)      |
| Disgust  | <i>akiru</i> (tire), <i>ijiwaru</i> (viciousness), <i>urusai</i> (noisy), <i>unzari</i> (tired), <i>kitanai</i> (dirty), <i>kyuukutu</i> (cramp)      |
| Fear     | <i>abunai</i> (dangerous), <i>osorosii</i> (horrible), <i>kowai</i> (scary), <i>kiken</i> (dangerous), <i>oboreru</i> (drown)                         |
| Happy    | <i>akarui</i> (bright), <i>asobu</i> (play), <i>atarasii</i> (new), <i>amai</i> (sweet), <i>iwau</i> (celebrate), <i>sawayaka</i> (fresh)             |
| Perplex  | <i>ijime</i> (bully), <i>kurusii</i> (telling), <i>koshou</i> (trouble), <i>komaru</i> (perplex), <i>sippai</i> (failure), <i>tomadou</i> (confuse)   |
| Sadness  | <i>akirameru</i> (give up), <i>ayamaru</i> (apologize), <i>itai</i> (sore), <i>gakkari</i> (disappoint), <i>kanasii</i> (sad), <i>kawaisou</i> (poor) |
| Surprise | <i>awateru</i> (panic), <i>igai</i> (surprising), <i>ikinari</i> (suddenly), <i>odoroku</i> (surprise), <i>kyuu</i> (sudden)                          |

### C. FacialExpression Image Selection Process

The system expresses the state of the emotion as a facial expression image. Therefore, the system chooses the strongest emotion and displays the correspond image as shown in Fig. 3. The system displays “normal” facial expression when none of emotion is aroused.



Fig.3 Facial Expression Images

### III. EXPERIMENTAL RESULT

We constructed the chat system with emotion expression as shown in Fig. 4. The conversation log is displayed at the top of the display. Then, two facial images are displayed. The left facial image expresses the emotion of the operator. The right facial image expresses the emotion of the conversation partner. Under the facial images, there are a message input frame, “submit” button, and “receive” button.

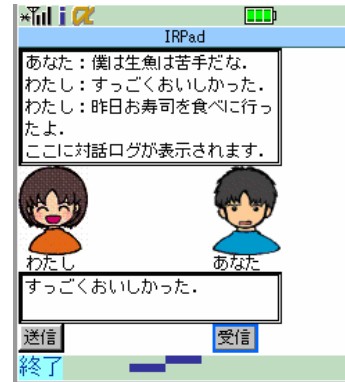


Fig.4 Screen Image of the System

We experimented about the effectiveness of facial image comparing with facial character and text only output by questionnaire. As a result, the subjects said “it gives them pleasure,” “it helps to communicate the emotion well,” and “they feel familiar with the output” [2].

### IV. CONCLUSION

In this paper, we proposed a simple version of JavaFaceChat system which can calculate emotion from input message and output facial expression image. The chat messages are exchanged through the Internet. The message is analyzed and seven types of emotions are calculated based on the appearance of 234 emotion words. A facial expression is output from the intensities of the seven emotions.

### REFERENCES

- [1] T. Ichimura, et al., “Emotional Interface for Human Feelings by Mobile Phone,” Proc. of KES2002, Vol.1, pp.708-712, 2002.
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