Emoticon Recommendation System Reflecting User Individuality
A Preliminary Survey of Emoticon Use

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Abstract: As the Internet has become widespread, text messaging has become a major means of communication. Because it is difficult to express emotion through text, emoticons were developed. There are many kinds of emoticons, and people often have difficulty finding one that conveys their meaning appropriately. This research aims to propose an emoticon recommendation system that considers individual differences. To this end, we conducted a survey about the use of emoticons. In this study, we report and analyze the results of this survey.

1 INTRODUCTION

Along with the development of Internet technology, Internet communications have become popular. Many types of Internet communications are text-based. Typical examples include e-mail, Twitter, Facebook and LINE (Japans largest instant communications application). These applications make it easy to use the Internet for communication. However, it is difficult to convey non-verbal information, such as facial expressions or tone of voice, using only text. Therefore, emoticons are widely used to convey emotions and facial expressions in text-based communications. Emoticons comprise various punctuation marks and are designed to convey an emotional state in plain text messages(Riva, 2002)(Walther and DAddario, 2001).

(Arakawa et al., 2006) demonstrated that emoticons exist to controll the feelings of the communicating parties and facilitate communication. However, emoticons are different from language vocabulary because emoticons by themselves do not have a clear meaning. Therefore, it is left to the user to determine what meaning their selected emoticon conveys, and its interpretation also remains ambiguous. (Ono et al., 2003) defined two types of emoticons: emoticons that tend to have a similar interpretation and emoticons that are interpreted differently. (Nakamaru, 2002) confirmed that the degree of confidence, feelings, and evaluation increases when the meaning of the sentence and emoticon match. On the other hand, (Nakamaru, 2002) also noted that when an emoticon is used that does not match the meaning of the text, it is important to consider whether the intention is conveyed correctly to the receiver.

There is a gender difference in emoticon use (Wolf, 2000). There are also differences in emoticon interpretation across cultures (Park et al., 2013). (Park et al., 2013) determined that an emoticons meaning can vary depending on the identity of the speaker by investigating a large-scale dataset of over one billion tweets from different time periods and countries.

These studies suggested two important points. One is that emoticons play an important role in communication. The other is that if the sender does not understand the receivers background, he or she may not be able to convey the correct feelings if the emoticons are incorrectly interpreted. This research aims to propose a system to help the sender select an emoticon that is appropriate for the receiver. In this study, we report the results of a survey on emoticon use, which will inform the design of the proposed emoticon recommendation system.

2 RELATED STUDIES

Many studies have been conducted on emoticons and face character recommendation systems. (Urabe et al., 2013) created an emoticon database using a survey and proposed a system to recommend an emoticon that expresses a similar feeling as estimated from the text. (Emura and Seki, 2012)proposed a method to recommend emoticons by estimating the feeling, type of communication and movement from a text in-

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put by the user. The type of communication includes emoticons that assume communication like apology. The type of movement includes emoticons that convey the movement like sleep. However, the goal of these studies is to recommend emoticons that suit the users text from a wide range of emoticons. Certainly, these emoticon recommendation systems are useful because the number and type of available emoticons are increasing. However, as (Arakawa et al., 2006) suggested, the role of emoticons is not merely to emphasize the emotion of the text but to modify the overall meaning of a sentence and facilitate communication. It is possible for a sender to use an emoticon that expresses a feeling that is different from that of text. For example, a smiley emoticon may be used after the text expressing anger to modify the expressed anger. Thus, we believe it is not sufficient for an emoticon recommendation system to simply recommend an emoticon that suits the text. (Ono et al., 2003) suggested, it is also important to consider individual differences when using emoticons because there are individual differences in recognizing the meaning of an emoticon.

3 THE PROPOSED SYSTEM: AN OVERVIEW

Figure 1 shows an overview of the proposed system. In this system, the intended feeling of the senders emoticon is first estimated from the text and emoticon by the sender (a database that relates each users feelings with emoticons is created in advance). Second, emoticons that generate feelings in the receiver that are similar to those intended by the sender are selected. Finally, the emoticon candidates are displayed to the sender. The sender selects a new emoticon from those displayed emoticons and completes the text. We believe this system will make it easier for a sender to select an effective emoticon.

In Figure 1, the sender selects the emoticon (^_^). The system extracts the evaluation of (^_^) from the senders database and estimates certain emoticons that express a similar emotion from the receivers database. The sender then selects emoticon (·∀·).

4 PRELIMINARY EXPERIMENTS AND RESULTS

It is necessary to obtain an individuals impression of each emoticon to complete the proposed system. Therefore, we conducted two surveys: one was about how users use emoticons, and the other was about the various emotions users ascribe to an emoticon. In this study, we used the emoticons selected by (Kawakami, 2008) and common emoticons determined by a web questionnaire.

4.1 Survey 1: How Users Use Emoticons

We conducted a survey about how users commonly use emoticons. Users were asked 1) what communication apps they usually used, 2) who their communication partners were and how frequently they communicated with them, 3) the average number of messages sent per day, and the emoticons most frequently used.

4.1.1 Subjects

We collected the answers to the survey from 37 people with an average age of 22.6 years. The youngest person was 22 years old, the oldest was 27 years old, and the median age was 22 years. Further, the survey sample comprised 15 males and 22 Females. In terms of education, 28 had an engineering education and 9 had a humanities education. Twenty-four respondents were students and 13 were employed. Thirty-two Japanese, 4 Indians, and 1 Chinese participated in the study.

4.1.2 Results

Figure 2 shows the results for commonly used communication apps, and Figure 3 shows the results for the types of communication partners and frequency of communication. Table 2 shows the average number of messages per day sent by the survey participants, and Table 1 shows examples of their frequently used emoticons. In this table, colored cells indicate emoticons used by more then one subject.

4.1.3 Communication Partners and Frequency

As Figure 2 shows, all subjects use LINE, which indicates that LINE is widely used as a common communication application. Table 2 shows that the majority messages are sent between real friends and then internet friends. Figure 3 shows that the frequency of communication between real friends is every day. In contrast, the most common frequency of communication between Internet friends is not at all and the next most common frequency is every 2 or 3 days. This means that there are two types of subjects, those who communicate with Internet friends frequently and those who do not.

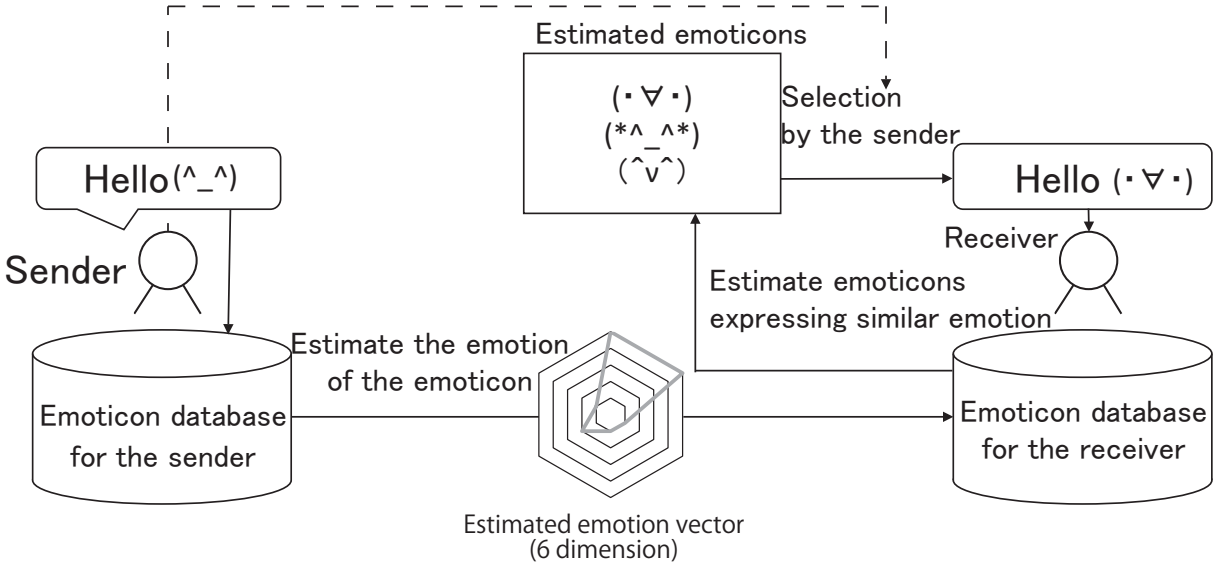

Figure 1: Emoticon recommendation system.

Table 1: Part of frequently used emoticons. In this table, colored cells indicate emoticons used by more than one subject.

Subject ID	Emoticon 1	Emoticon 2	Emoticon 3	Emoticon 4		Total
1	(´・ω・`)	\('ω')/	(乂'ω')	(¯-¯)		12
2	(` ・ω・ ´)	(´・ω・`)	(^○^)			3
3	(°∀°)o彡°	ㄣ(彡⑧^_ㄱ三				2
4	✧ʕ('ω')ʔ ✧	(*´ `*)	(人 ´∀ `*)	(ノ)・ω・(ヾ)		6
5	^ ^	(*^^*)	f^_^;)	(>_<)		6
6	(*^o^*)	。・゜・(ノД`)・゜・。	(((o(*°▽°*)o)))	*・゜゜・*:.。..。.:*・'(*°▽°*)'・*:.。. .。.:*・゜゜・*		5
7	⁀(ë)⁀	(´,_ゝ`)	(°Д°)	(´;ω;`)		13
8	(^^)	(*_*)	^_^;	(´-`).。oO(		5
9	\(˙▿˙)/	\(˘)/♡	(*˙ω˙*)ﻭ ｸﾟｯ!	('ω'≡'ω'≡'ω'≡'ω')		23
⋮	⋮	⋮	⋮	⋮		⋮
37	:)	:-)	:o)	8)		34
					Average	8.6

Table 2: Average number of messages per day(SD) .

Real friends	Family	Internet friends	Strangers
20.6(23.7)	8.0(15.8)	11.5(34.1)	2.6(12.4)

4.1.4 Emoticon Use

The average number of emoticons subjects usually used is 8.6. This number is extremely low compared with the approximately 100 million types of emoticons registered in the emoticon dictionary *Minna no Kaomoji* (Minna no Kaomoji, 2016). In addition, as Table 1 shows, there are a few emoticons that are used by more than one subjects. In total, 234 varieties of emoticons were collected in this survey and 197 varieties of emoticons (almost 84 %) were unique to one user. Hence, we conclude that subjects select emoticons from an enormous range of emoticons depending on their preferences and characteristics. In other words, the emoticons selected by a subject could represent individuality of that person. This suggests that emoticons are used as a way of not only expressing emotion but also describing personality.

4.2 Survey 2: User Interpretation of Emoticon Emotions

It is necessary to evaluate individual emotions conveyed by emoticons to implement the proposed system. Therefore, we conducted a survey to determine the various emotions users ascribe to an emoticon.

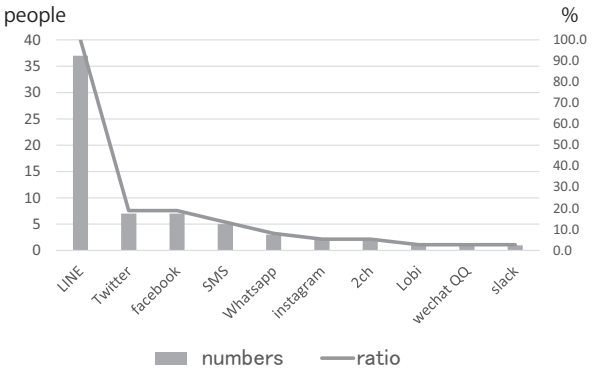

Figure 2: Frequently used ommunication apps.

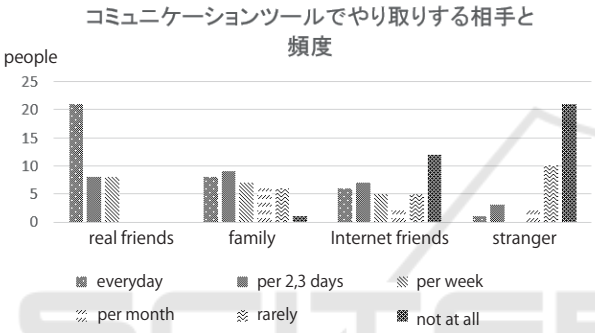

Figure 3: Communication partners and the frequency.

4.2.1 Affective Evaluation Method for Emoticons

Using a five-point scale, (Kawakami, 2008) studied the degree of six emotions for 31 emoticons. (Kawakami, 2008) used the basic emotions: happiness, sadness, anger, amusement, impatience, and surprise to evaluate the emoticons and created a database. We also used the same basic emotions for our evaluation. In the questionnaire, subjects evaluated 131 emoticons using the six emotions on a five-point scale from 1 (You cannot feel the emotion) to 5 (You can feel the emotion very well). The emoticons were displayed randomly. The subjects were instructed to not imagine the communication partner to eliminate the possibility of the type of communication partner affecting the evaluation.

4.2.2 Consideration of Obtained Evaluation

Figure 4 shows combined results for happiness obtained by (Kawakami, 2008) and this study. It also shows how the results of both studies are similar. This similarity is also seen for the five other emotions. we

Table 3: Emoticons divided into two clusters(partial results shown).

cluster A	cluster B
(^-^)	(￣ー￣)
(・∀・)	:-D
(´∀｀)	(T_T)
(^_^)	(>_<)
(^0^)	(;_;)
(^▽^)	(ToT)
(>∀<)	(><)

next compared the sevaluation values of males and females. Figure 5 shows that females tend to give lower emotion scores and this tendency is also seen in the five other emotions. Furthermore, we investigated the evaluation values of each emoticon. Figure 6 shows an emoticon to which males anger the highest score and females gave sadness the highest score. This result indicates a difference in the emotion evaluation of males and females.

We conducted a cluster analysis using a six-dimensional vector to represent each emoticon. We used the hclust function of R and calculated it using Wards criterion. Figure 7 shows the result, which indicates two clusters. Table 3 shows example emoticons for two clusters. The emoticons are divided into positive and negative emoticons.

5 CONCLUSION

In this study, we focused on computer-mediated communication and the use of emoticons used as a way to express emotion in text. Our aim is an emoticon recommendation system that depends on individuality. We thus conducted two surveys to determine how users use and interpret emoticons. The results show that users may select emoticons depending on their preferences and characteristics and sometimes they may have different interpretations of the same emoticon. However, the number of subjects in this study is small, so more subjects are needed to verify the results. In the future, we plan to implement the proposed system and have subjects evaluate the system. There are many challenges to implementing the proposed system, which include determining the emoticons that are best suited to express emotions, how to guarantee the individuality of users and how to compare emoticons. Further, we need to determine the best interface for our system and how to implement it. We plan to tackle these all challenges in the future.

Figure 4: Evaluation values for happiness from the results of a previous study (31 emoticons from Kawakami (2008)) and this study.

Figure 5: Comparison of happiness evaluation values given by males and females (131 emoticons).

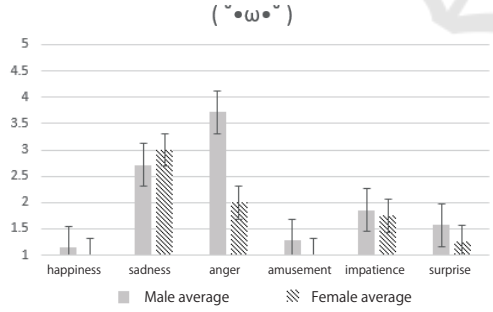

Figure 6: Example of Evaluation value to a emoticon.

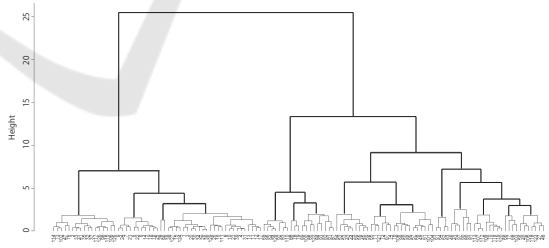

Figure 7: Clustering of the emoticons.

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