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<b>Author(s)</b>	Urabe, Yuki; Rzepka, Rafal; Araki, Kenji
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# Emoticon Recommendation System for Effective Communication

Yuki Urabe, Rafal Rzepka, and Kenji Araki  
Graduate School of Information Science and Technology,  
Hokkaido University  
Sapporo, 060-0814, Japan  
{y\_urabe, kabura, araki}@media.eng.hokudai.ac.jp

**Abstract**—The existence of social media has made computer-mediated communication more widespread among users around the world. This paper describes the development of an emoticon recommendation system that allows users to express their feelings with their input. In order to develop this system, an innovative emoticon database consisting of a table of emoticons with points expressed from each of 10 distinctive emotions was constructed. An evaluation experiment showed that 71.3% of user-selected emoticons were among the top 10 emoticons recommended by the proposed system.

**Keywords**—emoticon recommendation, recommendation method, affect sensing and analysis, text processing.

## I. INTRODUCTION

Today, the social networks Facebook<sup>1</sup> and Twitter<sup>2</sup> handle 665 million<sup>3</sup> and 288 million<sup>4</sup> active users respectively throughout the world. Such services have dramatically increased social user interaction on the Internet from the days when only e-mail and online chatting systems existed. However, due to a lack of nonverbal cues such as facial expressions, body movements, and emotional tones, computer-mediated communication (CMC) often fails to present personal dispositions that are transparently expressed in face-to-face communication. Hence, users compensate for these shortcomings by using emoticons.

This paper presents an Emoticon Recommendation System (ERS) that recommends appropriate emoticons to the user input sentence. The system is comprised of an emoticon database which we developed for this system and an affect analysis system, ML-Ask [1], which was previously developed in our laboratory. The system recommends Eastern-type emoticons (e.g. “(^\_^)”), in contrast to Western-type emoticons, “:-)”), which are mainly used in Japan. Moreover, Eastern-type emoticons have a great number of emoticons recorded in an online emoticon dictionary (58,130 emoticons are recorded in an Eastern emoticon dictionary<sup>5</sup> while a Western emoticon dictionary<sup>6</sup> records 260 emoticons). Therefore, we consider

Eastern-type emoticons sophisticated enough to express users’ feelings in CMC.

## II. EMOTICON RECOMMENDATION SYSTEM

The system utilizes two main procedures (Fig. 1). First, the system analyzes the emotion in the user input. We used an affect analysis system: ML-Ask [1]. Secondly, the system rearranges the emoticon database in the order of suitability to the emotion specified by ML-Ask and recommends the top five emoticons to the user. The original emoticon database was created by performing a survey of Japanese university students. The system continues to recommend the next five emoticons until the user chooses one for the sentence. Lastly, the system outputs the user input with the chosen emoticon.

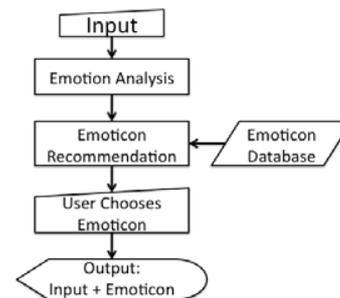


Fig. 1. System Procedure

### A. ML-Ask

ML-Ask [1] was previously developed by Ptaszynski et al. in our laboratory. ML-Ask separates emotive utterances from non-emotive utterances and specifies the specific emotion types in the emotive utterances. It uses 10 distinctive emotion types as defined by Nakamura [2]. These are: “joy/delight”, “anger”, “excitement”, “sadness/gloom”, “liking/fondness”, “fear”, “relief”, “dislike”, “surprise/amazement”, and “shyness”. ERS utilizes the result of the emotion types obtained from ML-Ask and reorders the emoticon database.

### B. Emoticon Database

The original emoticon database was developed by adopting an idea of Kawakami’s [3]. The database is organized in a table of 59 emoticons with the points expressed from each of 10

<sup>1</sup> [www.facebook.com](http://www.facebook.com)

<sup>2</sup> [www.twitter.com](http://www.twitter.com)

<sup>3</sup> Facebook Investor Relations: <http://investor.fb.com/releasedetail.cfm?ReleaseID=761090>, last accessed on 31st May 2013.

<sup>4</sup> GlobalWebIndex: <http://www.globalwebindex.net/twitter-the-fastest-growing-social-platform-infographic/>, last accessed on 31st May, 2013.

<sup>5</sup> <http://www.kaomoji.sakura.ne.jp/>

<sup>6</sup> [http://www.techdictionary.com/emoticon\\_cont3.html](http://www.techdictionary.com/emoticon_cont3.html)

distinctive emotions [2]. These points (Fig. 2) are an average of ratings given by 60 Japanese university students (Fig. 3).

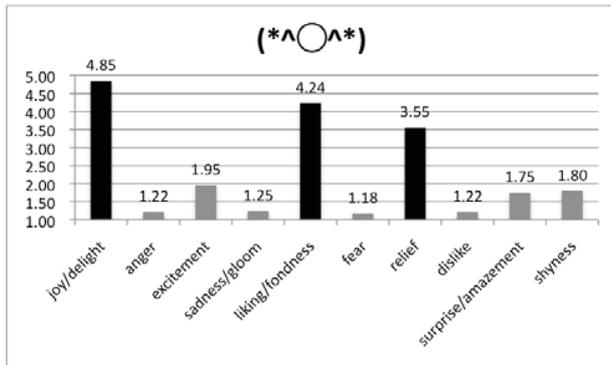


Fig. 2. Example of average rated values for an emoticon

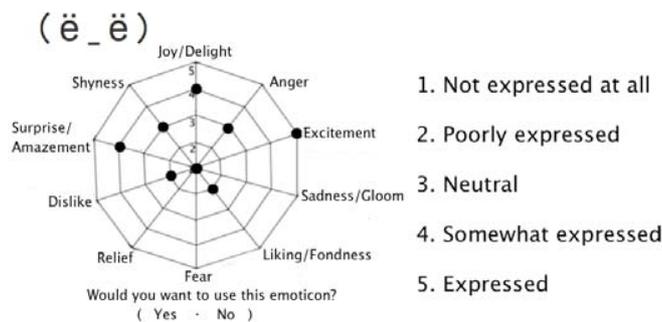


Fig. 3. Example of emoticon ratings in each of the 10 emotions

### III. EVALUATION EXPERIMENT

Comparative experiments were performed to confirm that the proposed emoticon recommendation system is superior to the current system, which recommends emoticons from users' chosen emoticons in the past. The current system can be seen on the iPhone<sup>7</sup>'s Japanese keyboard. We independently developed a system using the same method as the current system used on the iPhone in order to coordinate the proposed system and the interface. The experiment was performed for 10 days from 22<sup>nd</sup> Oct, 2012 to 31<sup>st</sup> Oct, 2012 with the cooperation of 20 Japanese undergraduate and masters students, consisting of 8 men and 12 women.

The participants were given a list of 15 emotive words (in Japanese) and asked to create and input sentences for each word and evaluate each system. We employed the semantic differential scale [4] for the evaluation of the system.

### IV. DISCUSSION AND CONCLUSIONS

We examined the emoticons chosen by participants from both systems. Fig. 4 shows the percentage of emoticons that were chosen among the top 10 in the emoticon database (the database is reordered into each emotion type according to the result from ML-Ask.). We can see a significant difference between the two systems: we achieved 71.3% on average with

the proposed system, while we only achieved 45.0% on average with the current system. From this result, we can reasonably state that people are motivated to choose emoticons to express their feelings, and the proposed system can assist them in choosing more appropriate emoticons than the current system. Moreover, we can consider that participants may procrastinate when choosing emoticons, meaning that they tend to choose an emoticon in the higher-listed options rather than carefully looking for the most appropriate one in the list. The current system may be useful for people who choose a limited variety of emoticons; however, the system will become more useful, enabling users to choose appropriate emoticons easily if we integrate the current system and the proposed system.

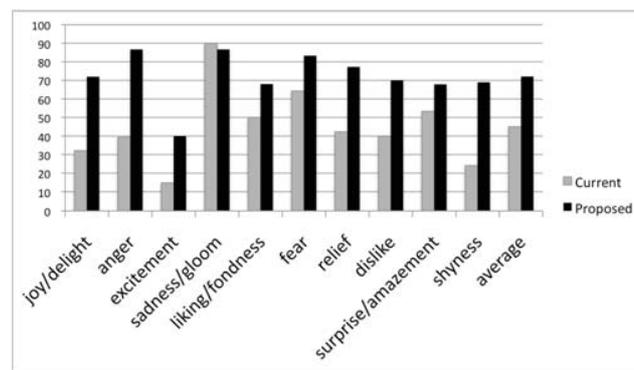


Fig. 4. The percentage of chosen emoticons ranked top 10 in the database

Our future work will be to integrate both systems in order to make the system more useful to a wide range of users. Moreover, expansion of the emoticon database is required. More emoticons in the database will be helpful for discovering the types of symbols that articulate each emotion type and creating a system to generate emoticons fitting to the user input. Also, this emoticon database will be helpful for sentiment analysis not only in social media, but also in all computer-mediated content.

At present, the system only works on terminal emulators such as Terminal in Mac OS X<sup>8</sup>. However, because smartphone users are significantly increasing in recent years, we will develop an application for smartphone users and investigate how the system appeals to users. Moreover, we plan to make the proposed method open source for developers, so that anyone can build in any kind of communicative interface.

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<sup>7</sup> iPhone is a registered trademark of Apple Inc.

<sup>8</sup> OS X is a registered trademark of Apple Inc.