A Study on Conveyance of Conversation-Context-Awareness in On-Line Communications Using Tactile Sensation

Yuko Yamada (050088)

School of Knowledge Science,
Japan Advanced Institute of Science and Technology

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In this thesis, I propose a system that conveys conversation-context-awareness in real-time text-based communications. For this purpose, I developed an on-line chatting system named "Tangible Chat," which transmits not only character data but also a user's behavior data by vibration.

Most of non-verbal information is lost in communications over computer-network. It is well known that such non-verbal information is important to convey meanings of the conversation as well as context of the conversation. Therefore, it is hard to obtain the user's information about presence and behavior without the non-verbal information. Consequently, there has been numbers of study on conveyance of the conversation-context-awareness done, e.g., a communication system with advanced realistic sensations.

An on-line chat focused in this paper is a typical communication medium that is widely used. However, it can usually transmit only verbal information. Therefore, there is lack of non-verbal information. Consequently, it is hard to exactly know the situation of conversation at remote locations.

In this study, I focused on "key-stroke" that is taken necessarily in an on-line chat. It is considered key-stroke-act expresses some conversation-situation. Simply, the user's key-typing shows that a he/she is inputting

his/her comments. Also, it is often observed that, for example, people strongly types the keys at angry. Therefore, from these key-stroke-acts, people become able to be aware of his/her situation and emotions.

Accordingly, I developed "Tangible Chat" that conveys the conversation-context-awareness mutually by transmitting vibration that is naturallly produced by the key-stroke-act in the on-line chat to a dialog partner, and by displaying it as tactile information. The acceleration sensor was employed to extract the vibration by the keystroke. Namely, the acceleration sensor is attached to the keyboard to detect the vibration. The detected vibration is transmitted to the remote side in real-time manner. The transmitted vibration is transformed into a sound signal and output as vibration with using a cushion that is equipped with a vibrator. By sitting on this cushion, the user is able to feel the vibration produced by the remote dialog partner while chatting.

Thus, they can be aware of the remote partner's situation from the vibration. As a result, the users become able to know whether the remote partner is inputting a message or not by the vibration. Therefore, a smooth turn-taking can be achieved by using Tangible Chat. Moreover, Tangible Chat can express the strength of the key-stroke as the intensity of the vibration. It is expected that emotion of the users can be expressed by this function.

In order to estimate the above mentioned features and the usefulness of Tangible Chat, experiments by subjects were conducted. Cooperation-type problems and opposing-type problems were discussed by using three different chatting systems, i.e., Tangible Chat, Tangible Chat without transmitting the vibration, and MSN messanger that indicates whether the remote partner is inputting a message by showing a simple short message on the chat window. I examined the turn-taking and transmission of emotion based on the number of utterances, and the questionnaire. Consequently, I confirmed that simultaneous progress of two or more topics decreased and that smooth turn-taking was achieved by using Tangible Chat comparing to the other two systems. Moreover, I also confirmed that the chats were more activated by Tangible Chat.