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Design of a tool for browsing the interaction histories by E-mail to Augment their communication

Yasuo Kodera

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

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1 Background and Purpose

In recent years, the computer network has been widely extending, and electric-mail has become popular as a new way of communication. In cooperative work, e-mail is used for various purpose and intent. In the most of studies about support for e-mail communication, by tracking and recording the e-mail messages, the different methods to grasp the condition of an argument or a conversation, share and reuse mutual knowledge, are proposed. And respective communication models are defined by such methods, the supports for e-mail communication tend to be based on these models.

In a kind of communication, at which the topic is not clear or the purpose is to create a new sense, conversation and utterance are not restricted to the only topic, and then the methods to communicate with the others are not also restricted. Hence the above modeling approach might not fit the way of such a communication. In this paper, we describe an analysis of communication in cooperative work and propose methods of supporting e-mail communication by non-modeling approach. Concretely, we propose the method of visualizing the interaction history by e-mail to facilitate communication. Then we design and implement a prototype system. Finally we evaluate our system and examine the effect of our proposal.

2 Analysis of Communication

In cooperative work, all of the communication are classified into two kinds of categories; *formal* or *informal*. The classification would be defined by a range of conversation, content of utterance, the method of communication and a cause for occurrence of communication. Two kinds of communication complement each other and have the following features;

- Formal communication: deliberate occurrence, restricted range, restricted topic, formal method

- Informal communication: accidental occurrence, changeability range, unrestricted topic, informal method

From the above features, the method of the support for formal communication would fit modeling approach. On the other hand, the method of the support for informal communication would fit flexible communication system such as e-mail. However, if workers use e-mail, they would have to arrange a number of e-mail messages, which are exchanged each other, and they would have to deal with several topics at the same time. As a result, it might be difficult to understand and recognize the conversation and the context of the conversation in informal communication. These conditions cause some unnecessary communication that, for example, same messages are sent to same worker or messages are sent to irrelevant range of conversation.

3 Our Approach

First, from the above features in informal communication, we intend not to define any communication models. The model-based communication system would not have some effect on a group wholly, unless all the participant, who are present at a cooperative meeting, use the same system. For informal communication, which workers perform at the changeability range, and the support for individual activities would be suitable. So we propose the methods of the above support. The methods are as follows;

- To visualize some kinds of attributes accompanied by e-mail communication; e.g. distributed range, sending time, mail size, reference

- To visualize the relation between the value of the same kind of attribute on the time-axis

Expression using the time-axis helps to understand time flow and arrange of several kinds of data. Visualizing their attributes on the time-axis would support understanding conversation and the context of conversation, and also help retrieving a mail on time-position.

4   Implementation of the Prototype System

From our approach at the above proposal, we designed and implemented a prototype system. The system consists of *httpd* that is set up for individual use and Web browser. The httpd program communicates with CGI scripts, which can access e-mail messages and visualize their flow.

The system scans *reference* fields of a number of messages by e-mail and extracts some *threads*, which represent the collection of the messages refernce fields are relevant to each other. The threads are basic units of communication. The system forms images of each thread with spheres and lines, and display them in a list using the time-axis. These images express the scale and outline of the threads as follows;

- How many messages is exchaged in each day

- How long the thread continues

A user can select the preferred thread among the list of threads and check the detail in the selected thread visually. The system forms image of this thread with spheres, lines and boxes. This image express the detail of selected thread as follows;

- Who sends and receives each message

- Size of each message and interval of them

Our system can show the flow of messages in the thread on the time-axis. And a user can read the content of each message included in the thread.

5   Evaluations of the System

To examine the usability of our system, we have get a user to use our system. He have had to deal with a number of e-mail messages. We have interviewed him about experience of his using our system. Then we have analyzed his impression in the interview. The results are as follows;

- Visualized images in the thread list would support to grasp a scale and an outline of each communication.

- Visualized images of the detail of threads would show the active participants by relation between sender and receiver.

- It is not easy to understand the relations among different threads or utterances.

- Expression for the time-axis is short of exactness and sometimes makes users at a loss.

- Our system does not provide a sufficient function of sending and receiving e-mail messages.

From the above results, we think that expression for visualization would be deficient.

6   Future Works

For the informal communication, whose content is free and the way of communication is unrestricted, we recognized that visualizing e-mail history would help to support for understanding the conversation and the context of conversation. We think that our approach would become more powerful way in the case of solving the above problems. The ideas for solving are as follows;

- Using 3D graphic to enrich expression for visualization

- Adding the function to send/receive e-mail messages to our prototype system.

- Extracting the kinds of attributes in terms of the content of utterance such as keyword matching and visualizing efficiently