

Communication Activation Technology for Suggesting Conversational Topics

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Abstract

NEC has been developing a technology that can lead to one-to-one communication activity by offering topics to encourage conversation. By supporting communication, this technology will be able to prevent the isolation of the elderly and the detachment of youth from the community. These are two issues that become important social problems. In our user trials, we provided users with news articles for topics. As a result, we found that the amount of communication increased twofold compared to using conventional technologies. We also conducted a field trial of this technology at the temporary housing for victims of the 2011 Tohoku Earthquake and found that there was great interest in topics related to reconstruction and residents' associations.



communication support, social networking service, information recommendations

1. Introduction

The recent increase of Japanese elderly population has revealed issues that are increasingly affecting the elderly, such as an “unattended death” and an increase in the number of crimes that are being committed by the elderly. Human relationships are also tending to decline, with the result that the human resources that are allocated in support of the elderly are becoming overstretched. These issues are not peculiar to Japan, but they are now becoming worldwide problems.

The results of a recent questionnaire for the elderly that was conducted by the Japanese government showed that the ones that had friends to whom they could talk freely felt that they were living a meaningful life more than those without friends. It can be inferred from this survey that increasingly their acquaintances and other community residents to whom the elderly are able to talk freely are for them closely related to the meaning of life.

We are developing a technology to stimulate communication by finding topics that will start conversations via social networking services (SNSs). We believe that this technology will help encourage conversation among community residents and workers, thereby increasing the number of people with whom

the elderly can empathize and to whom they can talk freely.

First of all we discuss suitable environments to support communication, and then go on to consider aspects of the technology under development.

2. The Communication Support Environment and Its Relevant Issues

We assume that our communication support environment will use online social networking services (SNSs). SNS users can thus share information of mutual interest with friends and exchange comments with them. Communication is encouraged via such information sharing and by the posting of comments etc. For example, an SNS user who is interested in health can introduce health-related newspaper articles to friends. By exchanging information regarding their interests online, SNS users can know of each other's interest and build deeper relationships. Building online relationships, we think, can make people feel freer to talk to others within their actual communities and workplaces.

Nonetheless, it cannot be expected to increase communication opportunities just by introducing SNSs. There are two main issues. The first one is that people are not able to begin

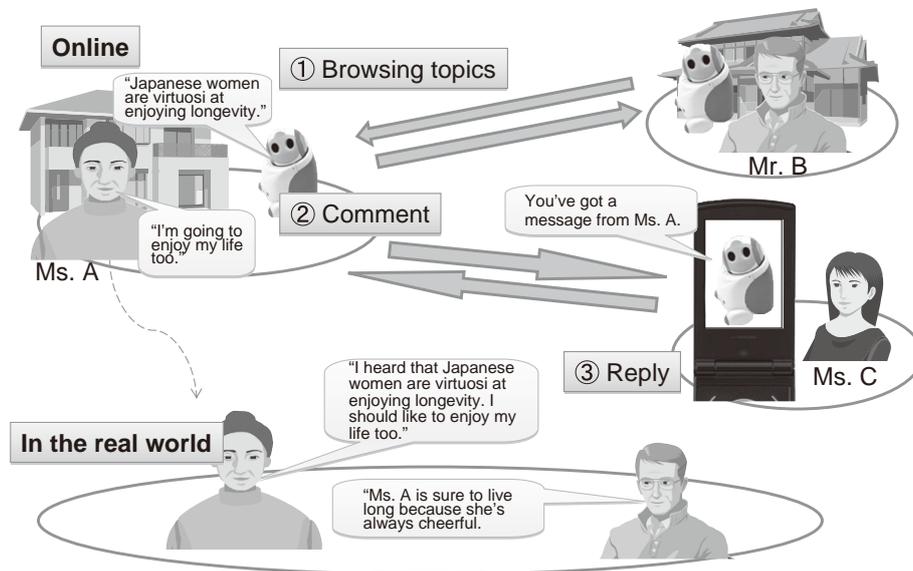


Fig. 1 Communication support environment.

a conversation if they cannot find a mutual topic. For people living in the community that have weak ties in the first place and also those that have become friends with each other only recently, it is difficult to find a common topic each other. This makes it even more difficult to create new communications. The second issue is that the expansion of a relationship is not possible due to the difficulty of finding a suitable candidate for friendship. There should be people in the community who can potentially be friends. However, no communication is possible unless there is a means for them to conveniently make contact.

3. Communication Activation Technology

In order to solve the two above-mentioned issues we have developed a topic recommendation technology to offer topics that can be shared both with active and prospective friends and a prospective friend recommendation technology that supports building wider relationships.

Recommendation of topics that can be shared with friends helps create communication prompted by the topics, which results in the building of deeper relationships (Fig. 1). Using this actual example, the system (the robot that supports communication in Fig. 1) provides the user with a topic, and other users browse the topic. If it stimulates a user's interest, he or she make remarks and the comments may be shared with other friends, who may make a comment later on.

Moreover, the system recommends prospective friends after estimating the relationships among other users based on the history of browsing topics and the history of comments of a particular user. This creates ties with prospective friends by

helping users to build wider relationships. In the following, the communication support system's topic recommendation method for building deeper relationships and the prospective friend recommendation method for building wider relationships are both described.

3.1 Topic Recommendation Methods to Help Build Deeper Relationships

Conventional topic recommendation technology consists of two methods; (1) a content-based filtering method that recommends topics assumed to be of the user's interest and (2) a collaborative filtering method that recommends topics assumed to be of his or her friends' interest.

The content-based filtering recommendation is a method that compares the similarities between words that are indicative of the user's interest and the words describing the topics and then recommends the most similar topics. The words indicative of the user's interest can be found through experience based on the words in the topics of his or her interest. There is, however, a lack in the variety of topics since this method is dependent solely on the past browsing history of each user. In addition, matching is possible as long as each user's interest is concerned, but matching is not necessarily possible when it comes to the interests of the interlocutor. Uncommon topics cannot serve as clues to communication (Fig. 2).

The collaborative filtering recommendation method specifies a user who has selected the same topic as a similar user, and then it recommends the topics that the target user has not yet read, after sorting out the topics that are of the similar

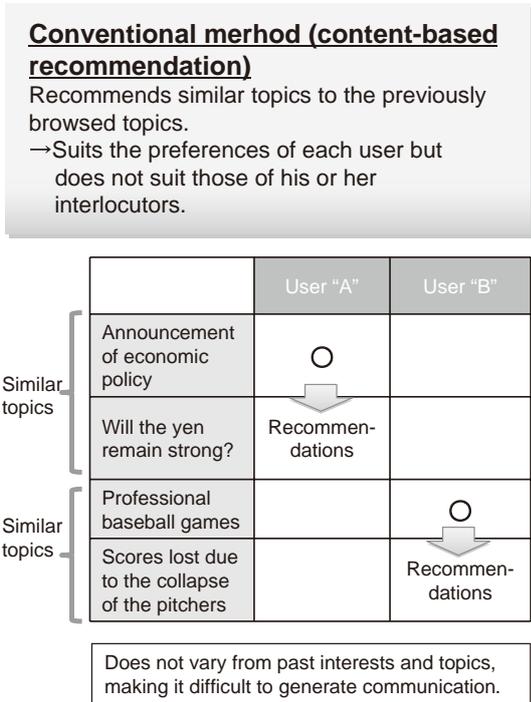


Fig. 2 Conventional topic recommendation method 1 (content-based recommendations).

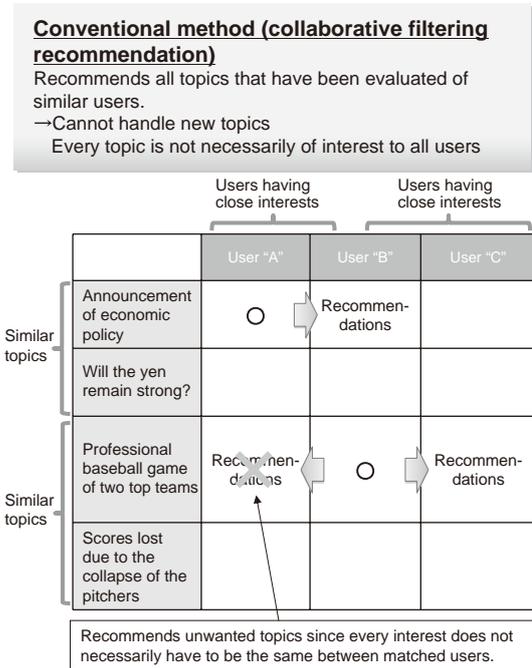


Fig. 3 Conventional recommendation method 2 (collaborative filtering recommendations).

user's interest. Nevertheless, this method cannot handle new topics because it is not capable of recommending topics that have not yet been read by anyone. Moreover, the interest of the target user is not necessarily the same as that of the similar user, which may result in the recommendation of unwanted topics (Fig. 3).

Our method groups the users who have common interests as common users and also groups the topics that are of the common users' interest. Then the topics in the group are recommended to the users in the group (Fig. 4).

To put it concisely, the interest of a user is learned based on the topics he or she has browsed in the past. Next, the similarities between the words that are of the user's interest and the words used in the topics are calculated. Now, based on the similarity of each topic browsed by each user, the users who are interested in the same topics are grouped and the topics that are of interest to the same users are grouped. Finally, the user is recommended new topics that he or she has not yet browsed from the topics with high similarities in the group to which he or she belongs.

With this method, new topics that are of common interest can be recommended to users who have similar interests. This enables recommendation of topics that match the interest both of the users and of their interlocutors, helping thereby to encourage communication.

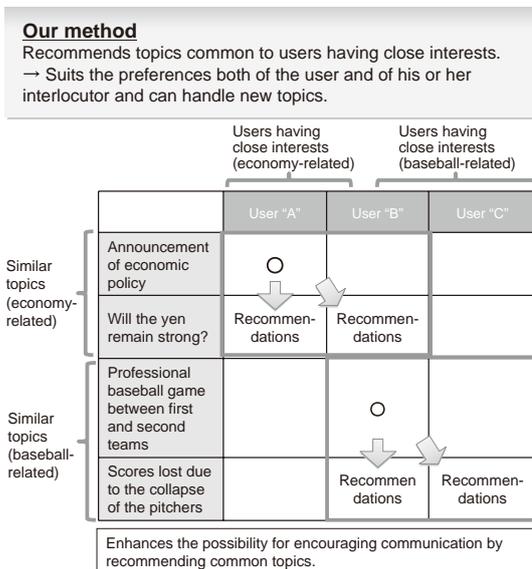


Fig. 4 Common topic recommendation method.

3.2 Prospective Friend Recommendation Method for Building Wider Relationships

Recommendations of prospective friends via SNSs are conventionally performed using a one-to-one procedure for

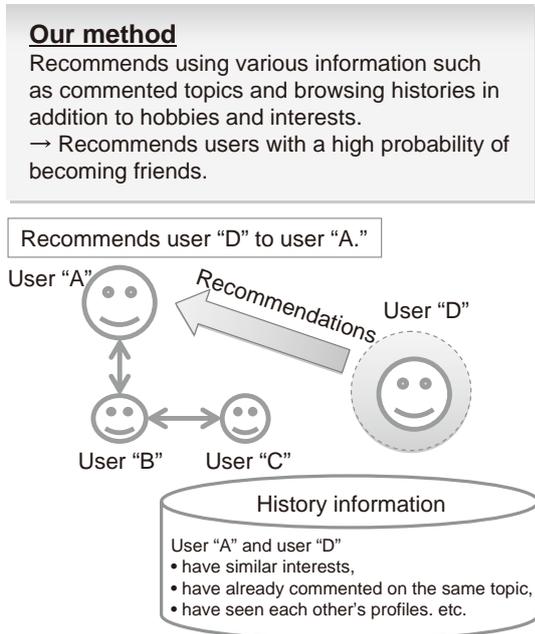


Fig. 5 Prospective friend recommendation method.

recommending the friends of friends as the “People You May Know”. This method is effective for finding friends on the Internet who are to be friends in the real world. It is not, however, effective for users to build wider relationships by searching for friends-to-be from people who are completely new to them.

Our method recommends prospective friends among users who are performing similar activities (Fig. 5). Similar activities are activities in which the users are highly likely to encounter with each other in the SNS, such as by posting comments on the same topic or by seeing each other’s profile pages. By recommending users who have seen each other many times in addition to considering their interests, our method does not suggest friend candidates who are completely unfamiliar to them, but recommends to them prospective friends that they have previously contacted.

4. User Trials

We have developed a system that has achieved a communication support environment using SNSs and have conducted two communication activation trials. In our first user trial we asked 20 people living in the Kanto region, whose average age was 60, to use the system for a certain period of time. In second field trial, we have invited 20 people to use the system, who lived in the temporary housing of a disaster-stricken area where population aging and community development are becoming issues.

In the user trial, the subjects used tablets installed with the client applications of the communication support system for

more than once a day over 3 weeks; they were asked to comment on a recommended topic if they liked it. The topics were restricted to the news articles on the Internet. The amount of communication was confirmed by counting the number of comments on the topics that were accumulated by the server over this time period. The amount of communication here means the number of recommended topics that were commented on twice or more. As a result, we found that communication was generated 2.1 times that of the conventional recommendation method (Fig. 6). We also asked the survey participants about their opinions on points to be improved.

A field experiment in the temporary housing of the disaster-stricken area was also conducted after simplifying the comment entry procedures (Fig. 7). Simplification of the comment entries, such as by the introduction of handwriting comments was favorably received. We also included information about events held by the residents’ associations and the municipalities in addition to the news articles. Among the recommended topics many comments were posted on those related to the reconstruction of the disaster-stricken area and information

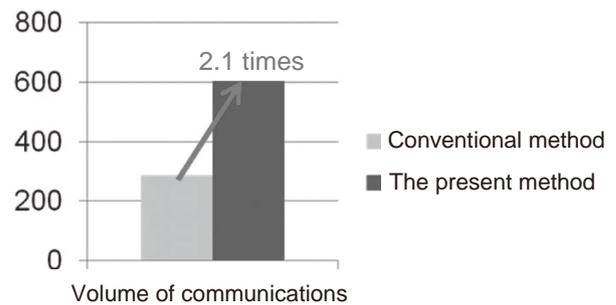


Fig. 6 Results of the user trial regarding the volume of communications.



Fig. 7 Conceptual diagram of the use of a communication support system.

about the events held by the residents' associations and the municipalities.

5. Conclusion

This paper has introduced a method of suggesting topics in order to encourage communication. Topic recommendations are made based on common interests among the targeted groups. This strategy enables the presentation of topics that serve to encourage communication. Subsequent user trials confirmed that the amount of communication was increased about twofold compared to conventional experience. We also conducted a field experiment among the residents of the temporary accommodation of a disaster-stricken area.

We intend to continue our efforts in the fields of communities and workplaces, and in other situations.

A part of this study was the results analysis of the study entitled "R&D of Life-Support Type Robot Technology" (formerly known as the "Research and Development for a Ubiquitous Network Robot Technology for Elderly and Challenged People"). This study was entrusted by the Ministry of Internal Affairs and Communications and conducted in co-operation with the C&C Innovation Initiative and Cloud System Research Laboratories over the years 2009 to 2012.

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