Community as a New Communication Layer in the Internet

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1. Introduction

The amount of information on the Internet has been increasing with the accelerating speed. The problem we are facing is how to ensure the quality of information within the enormous amount of information. Information exchanging among people is one of powerful and practical ways to solve information flood because we can act intelligent agents for each other to collect, filter and associate necessary information. The power stems from personal human network. If we need variable information to exchange, we must have a good human network. Personal human network is useful for various utilization of information like information gathering. Personal human network thus has a great potential that can take us out of information flood. We are conducting a series of research to support and utilized activities to form personal human network and communities from the viewpoint of information technology, in particular artificial intelligence.

2. Roles of communities in CMC

Personal human networks and communities exist everywhere in our real life. It is so natural that we can seldom be aware of their existence explicitly. When shifting our communication directly among people to computer-mediated communication, their importance should be phrased explicitly.

In this paper, we regard personal human networks as the basic information and communities as structures upon personal human networks.

From the viewpoint of computer-mediated communication, we can enumerate some roles of communities. The first is that communities provide channels for information exchange on specific topics. An typical example is a Mailing List. Becoming a member of a community is obtaining a channel to send and receive information related on the community. The second is that they can work as filtering information. Members of communities collect and distribute information specific to some topics either explicitly or implicitly. Once a consensus can be formed in a community, information specific to the topics can be easily collected or selected by members of the community. The third is that communities can offer a field for collaboration to produce new information. Discussions in communities can yield new information.

These roles are essential to realize better communication on the Internet, but online communities or communities on the Internet are still by far un-mature in comparison with real-world communities. We need more technologies both to make online communities more natural like real-world ones, and to leverage features of online communities rather than real-world ones.

We show three research results to support community activities in this paper. We can model it in the following way:
1. Forming communities
   (1) How to know relationship among people?
   (2) How to form communities from relationship among people?
2. Facilitating activities in communities
   (1) How to make communities more natural?
   (2) How to utilize information in communities?

The first research concerned 1(1), the second 1(2), and the third 2(1).

3. Finding relationship among WWW bookmarks

The first work is to find human relationship through WWW bookmarks[1][2]. WWW bookmarks are results of implicit or explicit efforts to represent personal views for the Internet. Regarding WWW bookmarks as personal concept systems, we can find relationship among them with the similar method to the previous work. We call it *shared topics network* because concepts represent some topics which the user are interested in and they are shared among users by the relationship generated by this method. Figure 1 is an example of the generated shared topics network with three users. We can find some common relationship like (search, IR) and (academia, research-related), and community-dependent relationship like (Unix, academia).

The evaluation as recommender systems is good enough. Topics found by the system were apparently more acceptable than pages themselves.
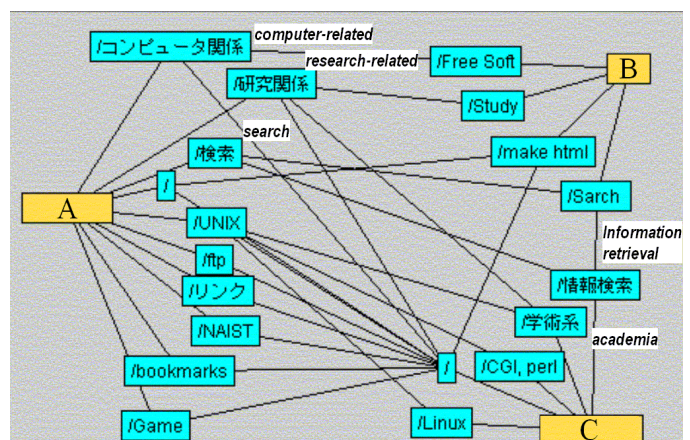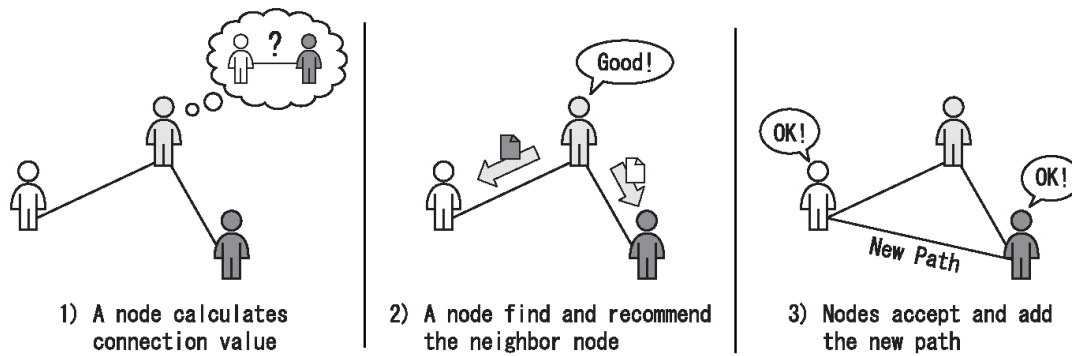

Fig 1: Mapping among WWW bookmarks

Figure 2: Neighborhood Matchmaker Method

4. Re-configuration of Personal Human Networks

Personal human network is useful for various utilization of information like information gathering, but it is usually formed locally and often independently. In order to adapt various needs for information utilization, it is necessary to extend and optimize it. We propose Neighborhood Matchmaker Method as a re-configuration method for personal human a network[3][4]. It can optimize networks distributedly from the arbitrarily given networks.

Extending or optimizing human network is not easy even in the real world. We should meet new persons then select some of them as friends.

How can we solve this problem in our daily life? The practical way is introduction of new friends by the current friends. It is realistic and efficient because the person who knows both can judge whether this combination is suitable or not. Friends work as matchmaker for new friends. We formalize this "friends as matchmaker" as an algorithm to extend and optimize networks (see Figure 2).

The key feature of this approach is no need for central servers. The benefits of this approach are threefold. The first is to keep spread of information minimally. Information on a person is transferred to only persons connected to her/him directly. It is desirable to keep personal information secure. The second is distributed computation. Computation to figure out better relationship is done by each mode, i.e., computers used by participants work for it. It is appropriate for a personal human network because we do not have to care the size of network. The third is gradual computation. The network will be converged gradually so that we can obtain the optimal network to some extent even if we stop the computation anytime.

5. Expressive Media for Online Communities

We proposed an asynchronous community system named TelMeA[5][6], which employs avatar-like agents, or scriptable animated agents, as the conversation interface. Few of current online community systems are close to real communities both in reality and in functions. We show with the proposed system that online community can be more like our real community in awareness of participants and of community itself.

TelMeA realizes the following functions for asynchronous communication using avatar-like agents: individual embodied presence, physical communicative cues, interpersonal spaces, and cooperative reference. Participants can easily identify other participants with avatar-like agents. And people can understand meanings of other participants' messages well and become expressive in their messages with non-verbal behaviours of agents. We performed a preliminary psychological experiment to clarify functions of avatar-like agents, and implemented the result in TelMeA. We also evaluated TelMeA by a test use and showed that TelMeA is natural and useful for asynchronous communities.

6. Concluding remarks

In this paper, we show our motivation and attempt to support and utilize online communities. We do not aim just to make online community close to real-world communities, although naturalness to human users is mandatory. Online communities have new features that real-world communities do not have, i.e., free from spatial and time constraints, capability of larger and deeper communities, re-use of records, seamless connection with computing like agents and so on. Our purpose is to pursue possibilities of such features of online communities to realize new and better community activities.
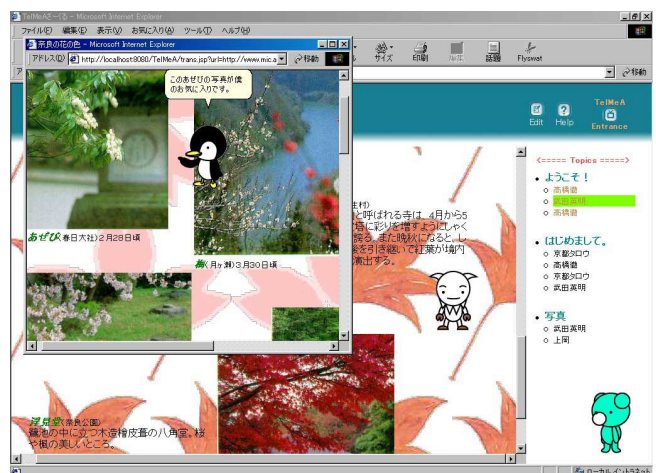

Figure 3: TelMeA: Asynchronous Community System with Avatar-like Agents

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