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Future large-scale online collaboration and negotiation

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My main areas of research include multiagent systems, artificial intelligence, computer science, automated negotiation, collective intelligence, social computing, computational mechanism design, smart city, software engineering, etc.

My main interest is to envision the future of collaboration and negotiation among people in the global world. As Internet has been growing, the large paradigm shift has begun in IT society and computer science. In essence, thanks to fiber optical cables and their enough equipment, the network bandwidth has been increased drastically compared with 10 years ago. Also, things are going to be all connected with each other via the Internet as IoT. People are starting to realize its huge merits on its scalability and its speed for collaboration and negotiation in global world. We can easily expect the increase of the number of participants in such a global collaboration and negotiation.

In such a situation, computational supports will play huge role to enhance the power of collaboration and negotiation. For example, during negotiation, computer software could help shaping uncertain utilities, finding a better contract, find alternative contracts for huge amount of possible contracts. Also, theoretical analysis and design of such negotiation and collaboration center is critical so that huge number of transactions and communication will be able to be processed and computed. Based on such theories and models, we can innovate real applications, which have never been in the past in the world.

As one of such research endeavours, Internet-based direct democratic discussions have received much attention and are likely to be one of the next generation methods for open and public citizen forums. Such forums require systematic methodologies that can efficiently achieve consensuses, reasonably integrate ideas, and avoid flaming. We are trying to apply artificial intelligent technologies and multiagent algorithms in order to efficiently facilitate large-scale citizen’s discussion and support consensus and collective decision making.

Such intelligent computation would largely enhance citizen’s collective intelligence. My research group are pursuing the advanced possibility of such paradigm shift, and also trying to apply such higher technologies into the real-world.

For instance, we developed an open web-based forum system called COLLAGREE that has facilitator support functions and deployed it for an internet-based town meeting in Nagoya as a city project for an actual town meeting of the Nagoya Next Generation Total City Planning for 2014-2018. Our experiment ran on the COLLAGREE system during a two-week period with nine expert facilitators from the Facilitators Association of Japan. The participants discussed four categories about their views of an ideal city. COLLAGREE registered 266 participants from whom it gathered 1,151

opinions, 3,072 visits, and 18,466 views. The total of 1,151 opinions greatly exceeded the 463 opinions obtained by previous real-world town meetings. We clarified the importance of a COLLAGREE-type internet based town meeting and a facilitator role, which is one mechanism that can manage inflammatory language and encourage positive discussions

Because any people did not realize such large-scale discussion and collaboration, many unexpected things might happen. For example, in large scale discussion, some worse discussion called “Framing” could happen very often. Such bad discussion leads also bad group decision called “group think” that means some local group decision making. It is a case that in the real world and small group discussion, a human facilitator adequately lead such discussion so that group will have a good decision. However, applying a facilitator to such large-scale discussion is a kind of very new challenge. Even the professional facilitators did not have any experience about facilitating such large-scale discussion on the Internet in our 2013 experiment with Nagoya-city.

Thus we applied several artificial intelligence techniques including natural language processing in order to support facilitators to lead large scale discussions. Techniques used in the experiment were very simple. However, we found that they are very useful for facilitators. Currently, we are polishing up the technologies more and also trying to conduce real field experiments.

Our goal is to make “automated facilitators” who can automatically lead discussion and group decision making. People might feel this is very big dream but in multiagent research, we have been already studying “automated negotiating agents” who can automatically and efficiently find agreements and consensus in the pre-define domains.

To make advancements in this technology, the methodologies to analyze consensus and discussion process are required very much, which would be a new study of group process about discussion and consensus. By using very precise sensor and video monitoring tools, it would be possible to catch people’s very detailed moves and also emotions during discussions and meetings. By analysing such dynamics of moves and emotions, we can understand how people go into good conclusions (consensus) or bad conclusions (failure). And then we can dynamically give feedback as facilitation to the people so that they can go better conclusions.

The next big thing would be emergence of “Intelligent Social Network”. As I explained above, after our research makes progress, it would be possible to figure out social network more precisely and more quickly. In addition, it would be possible to extract emotions and also effects among people in that social network. Further, dynamic change and movement of such social network can be caught and analysed. It would be called “social network dynamics”.

Once we have a technology that can catch the behaviour of such social network dynamics, we could build intelligent programs that can adequately monitor such social network dynamics. With multi-agent theories that can manage the distributed

intelligence, it becomes possible to manage and “control” such dynamic social network.

We can imagine the entities in the social network are people, animals, and other things in the world. Moreover, if such entities are “rational” enough, it becomes easy to predict their dynamics with the game-theoretic multiagent algorithms.

Artificial intelligence technologies have been focused very much, and I agreed it’s usefulness. But, the algorithms themselves are not so evolved rather actually the other side includes the entire system, computations, networks, human being, etc. evolved very much. For example, the main reason why (deep) neural networks are successful is, of course, some breakthrough on the way to build the network itself. Rather I think, more important point is the evolution of the huge, stable, distributed and parallel computing technologies, not only the evolution of the techniques. Thus, there are going to be a lot of break-through that utilizes those evolutions of computing in our life.