Interpersonal Relationships in Group Interaction*

Yang CAO, Golha SHARIFI,
Yamini UPADRASHTA, Julita VASSILEVA
Computer Science Department, University of Saskatchewan
Saskatoon, SK, S7N 5A9 Canada
{yac614, gos787, ysu156, jiv}@cs.usask.ca

Introduction

The successful deployment of computer supported collaborative learning systems (CSCL) requires taking into account social factors, like preexisting and developing attitudes, relationships between users, incentive mechanisms, organizational flows of control and information. There are examples of solid user communities that formed around pieces of technology (e.g. slashdot.com), but there are also hundreds of examples of failed ones. In our experience with peer help system named I-Help [4], we discovered widely varying levels of user participation in different classes. Our conclusion from this experience was that it is important to study the sociological aspects of cooperation, to discover and describe existing relationships among people, existing organizational structures [1,7] and incentives for cooperative action [8] in the learning community.

There are many research studies on the evolution of cooperation in CSCL environments. Methods have been proposed to support and manage students' metacognitive activities in collaboration e.g. detecting and helping resolve conflicts, assigning tasks depending on the expertise [5]. Environments have been developed, that create awareness of the other participants' actions or focus of attention [3], create models of how these acts relate to effective knowledge sharing and provide guidance on activities which will improve collaboration [2]. Most of this work is applied to settings where implicit social structures already exist, i.e. the users knew each other in advance. With the advance of tele-learning environments, there will be an increased need for CSCL environments supporting collaboration between users who have never met face to face and who don't know each other. Building up social relationships in such environments happens during the process of collaboration is mediated through the collaborative environment and can be strongly influenced by the design of the environment. This can bring significant side effects in the processes of collaboration and learning. We are interested in how people actually develop attitude of liking or disliking other people and how they change their attitudes towards other people when they realized the others' feelings towards themselves. There have been studies of CSCL environments using social analysis, e.g. [6], which measures the social network cohesiveness of the group to identify the prominent participants in collaboration.

1. Game Design

We propose a new way of exploring emerging interpersonal relationships in a computer-mediated environment by using specially designed multi-player games. In this way we can capture the time

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evolution of social networks of real people since people are more willing to reveal their attitudes to each other in a context of a game than in a real environment.

The goal of the game is to send a package to a destination player with minimum loss by passing it to other players, who depending on their attitude to the sender can "eat" part of the package or even destroy it. In the course of the game, each player tries to find out the attitudes of other players to him/her, to the other players, and changes his/her attitude accordingly. Every player tries to find a cooperative path of people who like each other, along which she can send her packets. In any round of game playing a player is able to obtain some information about the sign of the others' attitude towards her (positive / negative). The game is designed as a web-based multi-player (at least 3 players) game. In each round, a player chooses a destination player and sends a signed packet containing multiple items to one of the other players. Depending on her attitude to the originator of the packet, the selected player passes it (or part of it) to another player whom s/he likes or destroys it. The amount taken away from the packet or destruction depends on the how much the selected player likes the originator of the packet. The round finishes when the packet reaches the destination player or is destroyed. The system traces the packet, monitors the activities of each player, and models the relationships among the players. At the end of the each round, each player can see the system model which describing the others' attitudes towards him/her, and can change his/her attitudes to the other agents.

FIPA-OS platform is used in building a multi-agent system where each player is represented by a player agent, which is "instructed" by the user about his/her attitudes to other players. During the game, the personal agent decides to whom to pass each packet that is sent to it and how much to take away from it, depending on this information and the rule of the game. The agents communicate via agent communication language (FIPA-ACL).

2. Experiment

We carried out a 45-minute experiment with the game. Six participants played fifty rounds of the game (i.e. total number of packages sent by all different players) and filled a survey form in the end. The participants had different gender, age, ethnic background, education, and interests. The participants did not know each other (aliases were used). Each round of the game was played by five to six players (some players joined the game at a later stage).

The length of the route is not a criterion for the level of cooperation in the group. For example, the shortest route occurred with a package that was destroyed by the first player to whom it was passed, since there was a strongly asymmetrical relation between the two players. However, long routes with less loss in package indicate a high level of liking and cooperation among the players. The longest path in the experiment involved all six players and the packet reached the destination with small amount of package loss.

The results from observations and questionnaire show that 60.87% chose "neutral" as their initial attitudes to other players. 82.61% of the players incremented reciprocally and 52.7% decremented reciprocally their attitudes in response to seeing the computer's model of the other's attitude towards them. These numbers seem that the players had neutral to positive attitude disposition at start and were conservative in changing their attitudes. The individual players displayed different evolution in their attitudes. Examples of the evolution of attitudes of two participants towards the other participants are shown in Figure 1 and Figure 2. Player B in Figure 2 started with very positive attitude, but changed his/her attitude to all other players radically after a failure to send a packet. Player A was more conservative, changing his/her attitudes towards other players reciprocally depending on the system's model and outcome of the game.

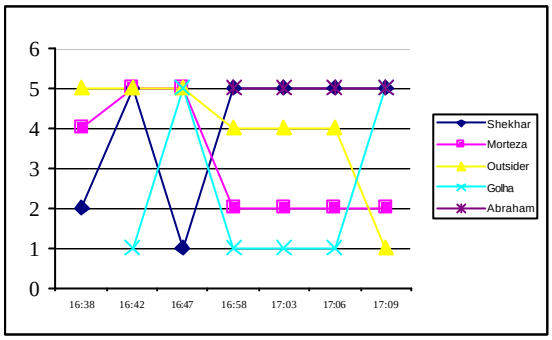

Figure 1: A's attitude towards the others

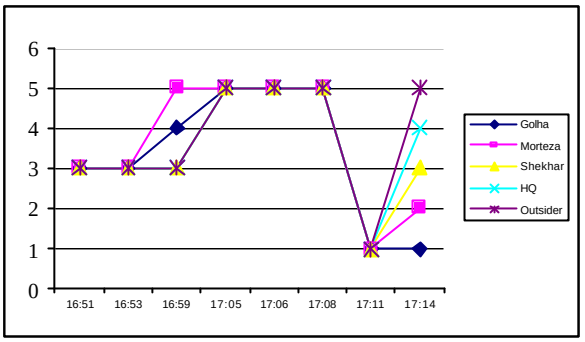

Figure 2: B's attitude towards the others

3. Discussion and Future work

Individuality plays an important role in how people change attitudes in response to events resulting from the attitudes of other people (e.g. B's radical change). People also differ in the way they assign blame for a situation, which they can not fully understand because of the complex interaction of the factors involved. One possible approach (e.g. B) is to blame everyone involved. Another approach (e.g. A) is to blame the closest (most liked) person involved in the situation. Such individual differences need to be considered when designing CSCL systems. A classification of users with respect to the most typical reaction they chose can be used in the design of adaptation mechanism for the advice component of collaborative management system. The collaboration management acts available for the users (which express the protocol of interaction and the "rules of the game") need to be designed in a way to encourage development of positive social relationships.

As our next step we intend to run large-scale experiments for longer time to find a finer grain of stereotypical reactions and classify users according to these stereotypes. Also it would be interesting to find a way to alter the game rules to drive the group attitudes into a positive equilibrium.

References

[1] Artikis, A., Pitt, J., & Sergot, M. (2002) Animated Specification of Computational Societies, *Proc. Autonomous Agents and Multi-Agent Systems Conference*, AAMAS'2002, ACM Press, 1053-1061.

[2] Barros, B., & Verdejo, M.F. (2000) Analyzing student interaction process in order to improve collaboration: the DEGREE approach, *International Journal of AI in Education*, 11, 221-241.

[3] Cao, Y., & Greer, J.(to appear). Supporting Awareness to Facilitate Collaborative Learning in an Online Learning Environment. Proceeding of Computer-Supported Collaborative Learning, CSCL 2003, Norway.

[4] Greer, J., McCalla, G., Vassileva, J., Deters, R., Bull, S., & Kettel, L. (2001) Lessons Learned in Deploying a Multi-Agent Learning Support System: The I-Help Experience, *Proceedings of AI in Education* AIED'2001, San Antonio, IOS Press: Amsterdam, 410-421.

[5] Jermann, P., Soller, A., & Muehlenbrock, M. (2001). From Mirroring to Guiding: A Review of State of the Art Technology for Supporting Collaborative Learning. *Proceedings of the First European Conference on Computer-Supported Collaborative Learning*, Maastricht, The Netherlands, 324-331.

[6] Nurmela, K., Lehtinen, E., & Palonen, T.(1999) Evaluating CSCL Log Files by Social Network Analysis. In *Proceedings of the Computer Support for Collaborative Learning 1999 Conference*, C. Hoadley & J. Roschelle (Eds.) Stanford University. Mahwah, NJ: Lawrence Erlbaum Associates.

[7] Soller, A., Wiebe, J., & Lesgold, A. (2002). A Machine Learning Approach to Assessing Knowledge Sharing during Collaborative Learning Activities. *Proceedings of Computer-Support for Collaborative Learning*, CSCL2002, Boulder, CO, 128-137.

[8] Vassileva J. (2002) Motivating Participation in Virtual Communities, Proc. of the *12th International Conference of Women in Engineering and Science*, ICWES'12, July 27-31, 2002, Ottawa, Canada. <http://julita.usask.ca/Texte/ICWES12.pdf>