Towards Providing Intelligent Support to Enhance Collaborative Learning at the Tabletop

Roberto Martinez Maldonado, Judy Kay and Kalina Yacef

School of Information Technologies, University of Sydney, NSW, Australia
roberto, judy, kalina @it.usyd.edu.au
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1 Research

Collaboration skills are very useful both in learning a knowledge domain and in helping people interactions at the workplace. Benefits of face-to-face collaboration include: facilitating the development of reasoning, communication and reflection abilities. Recently, the need to explore, share and analyse data from different perspective and grounding on the expertise of different persons, in situ, has brought forth the development of new user interfaces that offer large display areas and multiple input capabilities. Multi-touch interactive tabletops form part of this group. These have the potential to afford new ways of interactions, an opportunity to design supportive intelligent tools to aid students' face-to-face interactions, and a great prospect to investigate groups' learning processes to help teachers' orchestration at the classroom.

This research project aims to exploit the audio and application digital footprints of activity that can be automatically captured from an augmented multi-touch interactive tabletop [1]. Our system recognises the student who touched the interactive surface to perform an action and their speech. This is captured through a depth camera and a microphone array located above the tabletop [2]. All actions and verbal participation are recorded in a similar way to the web-based collaborative tools logged data. These data can be used to help students, their teachers or researchers to analyse and reflect about the collaborative learning process. Our project aims to use the data in order to:

- Extract a model of the different facets of collocated groups learning [3]
- Generate visualisations that mirror aspects of the collaborative dynamics [4]
- Mine the data to extract frequent patterns associated with either healthy groups or groups with collaboration issues [5]
- Provide teachers with a dashboard that distils key information about [6]
- Analyse the data to describe the collaborative processes [7].

2 Suggested Topics for Discussion

- Use of Data mining to enhance collaboration and collaborative learning.
- Complementing web-based and face-to-face tools.

3 Biography

Roberto Martinez Maldonado is currently doing his PhD with the Computer Human Adapted Interaction Research Group at the University of Sydney. His research is supported by the University of Sydney World Scholars program. His interests include using novel technologies and data mining techniques to improve education and helping students through the implementation of intelligent tutors.

Judy Kay is a principal of the Computer Human Adaptive Interaction (CHAI) lab, at the University of Sydney, Australia. Her research aims to exploit the huge amounts of data available about people, from conventional and emerging systems, to create useful mirroring tools and user models to support lifelong learning and personalization of pervasive computing environments. She has over 200 publications in the areas of personalization, teaching and learning. She is on the editorial board of UMUAI, User Modeling and User Adapted Interaction, Associate Editor of International Journal of Artificial Intelligence in Education and IEEE Transactions on Learning Technologies.

Kalina Yacef is a Senior Lecturer in the Computer Human Adaptive Interaction (CHAI) research lab, at the University of Sydney, Australia. She received her PhD in Computer Science from University of Paris V in 1999. Her research interests spans across the fields of Artificial Intelligence and Data Mining, Personalisation and Computer Human Adapted Interaction with a strong focus on Education.

Relevant Publications

[1] R. Martinez, A. Collins, J. Kay et al., "Who did what? who said that? Collaid: an environment for capturing traces of collaborative learning at the tabletop," in Interactive Tabletops and Surfaces, Kobe, Japan, 2011, pp. 172-181.
[2] R. Martinez, A. Clayphan, K. Yacef et al., "Sensing, tracking and modelling with ignition - a framework for supporting classroom collaboration.," in Educational Interfaces, Software, and Technology (EIST 2012) Workshop (CHI 2012), 2012.
[3] R. Martinez, J. Kay, J. Wallace et al., "Modelling symmetry of activity as an indicator of collocated group collaboration," in UMAP, 2011.
[4] R. Martinez, J. Kay, and K. Yacef, "Visualisations for longitudinal participation, contribution and progress of a collaborative task at the tabletop.," in CSCL, 2011, pp. 25-32.
[5] R. Martinez, K. Yacef, J. Kay et al., "Analysing frequent sequential patterns of collaborative learning activity around an interactive tabletop," in EDM, 2011, pp. 111-120.
[6] R. Martinez, K. Yacef, J. Kay et al., "An interactive teacher's dashboard for monitoring multiple groups in a multi-tabletop learning environment.," in ITS, 2012.
[7] R. Martinez, K. Yacef, J. Kay et al., "Unpacking traces of collaboration from multimodal data of collaborative concept mapping at a tabletop," in ICLS, 2012.