University of Pittsburgh | School of Computing and Information

Proposal Defense

Doctor of Philosophy in Intelligent Systems

"**Multimodal User Simulation for Balancing Student Participation in Interactions with Pedagogical Agent**" by **Tristan Maidment**

Date: July 22, 2024
Time: 12:00 p.m. – 2:00 p.m.
Place: Room 6106, Sennott Square, 210 S. Bouquet St, Pittsburgh PA 15260
https://pitt.co1.qualtrics.com/jfe/form/SV_3JzHxjb5shXJZMG

Committee:

- Adriana Kovashka, Associate Professor, Department of Computer Science, University of Pittsburgh
- Erin Walker, Associate Professor, Computer Science, University of Pittsburgh
- Diane Litman, Professor, Department of Computer Science, University of Pittsburgh
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Abstract:

Pedagogical agents offer opportunities for enhancing student learning within educational settings. Historically, these agents are through systems governed by hand-written rules, which allow for strict adherence to established learning theories, but may not adapt well to individual users or new situations. This PhD proposal looks to expand upon the potential of an existing physical pedagogical robot, which was designed to improve middle school students' mathematical understanding, by incorporating a more dynamic form of verbal communication and learning how to leverage strategic nonverbal behaviors such as gaze and gesture to improve student participation.

A key component of this research involves the development of a multimodal user-simulator. This simulator will replicate student interactions by generating realistic dialogue, as well as simulating student gaze and gesture. The use of large language models enables the simulation of nuanced and varied verbal interactions, while the incorporation of gesture generation models adds layers of non-verbal communication. This research looks to discover adaptive multimodal communication strategies that are both sensitive to individual student differences, but also grounded by established learning theories. The design of the simulation is grounded by the ICAP theory of cognitive engagement and the Interactive Alignment Model of communication. This simulation approach allows the robot to be trained and tested in a controlled environment, prior to being presented to real students.