Computer Science Department
PhD Proposal Defense

Theory and Practice: Improving Retention Performance through Student Modeling and System Building

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Time: 12PM - 2PM
Location: Fuller Labs 141

Committee members:

Professor Joseph E.Beck, Advisor, WPI - Computer Science
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Abstract:

The goal of Intelligent Tutoring systems (ITSs) is to engage the students in sustained reasoning activity and to interact with the student based on a deep understanding of student behavior. In order to understand student behavior, ITSs rely on student modeling methods to observes student actions in the tutor and creates a quantitative representation of student knowledge, interests, affective states. Good student models are going to effectively help ITSs customize instructions, engage student's interest and then promote learning. Thus, the work of building ITSs and advancing student modeling should be considered as two interconnected components of one project rather than two separate topics.

Our work focuses on improving student learning and advancing cognitive science by constructing an adaptive tutor system and applying data mining and machine learning technologies.

First, we describe the work of building an adaptive learning environment to improve students' long-term retention performance. Automatic Reassessment and Relearning System (ARRS) is a system that utilizes spacing effect theory to assign expanding retrieval assignments to students. Along with ARRS' adaptive algorithms, we have tests show that we can improve students' retention learning performance significantly. Second, we describe our work on modeling students' long-term retention performance. We show that not only can we utilize what we have learned in student modeling to improve the adaptive algorithms of ARRS system, we have also created a new performance metric to measure predictive models' stability. Last, along with the development of next generation ASSISTments, we propose to develop a set of modules that supports building generic assignment workflows to support several ASSISTments' adaptive learning system, including ARRS. Inspired by the recent development of deep learning, we will also experiment new approaches of using deep neural networks to model students' long-term retention performance.