

Injecting Machine Learning into the Apprentice Learner Architecture, Project Milestone Report 2 15-400, Spring 2020

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1 Major Changes

Due to Dr. Koedinger having a busy semester, my main point of contact will now be Dr. Erik Harpstead. Both Dr. Koedinger and Dr. Harpstead are faculty leads on the Apprentice Learner (AL) project, and both sit in on weekly research meetings, so a change of point person will not affect my research in a major way.

At the start of the semester, I sat down with Dr. Harpstead to determine what exactly I could work on with integrating ML with AL. One of the open research questions the AL group has is how AL performs in game-like environments. Since some of Dr. Harpstead's prior work focused on educational games and AL's performance in such games, he recommended updating a game called RumbleBlocks to interface with a combination of AL, reinforcement learning agents, and maybe a hybrid of the two, for the purpose of comparison between learning methods on open game problems.

RumbleBlocks is an educational game created in a single semester by the Entertainment Technology Center master's students. The goal of the project was to examine how children engage with educational video games and how learning can be tracked over the course of a play session. The RumbleBlocks website may be found at: http://www.etc.cmu.edu/engage/?page_id=840. The game was then modified by the AL team to interface with a now older version of AL. Initial results were inconclusive, but the older AL did not incorporate its current sophisticated learning heuristics, and so updating the software to the current version of AL is a step I am planning to take over the next week or two.

2 What I've accomplished since last meeting

I have my first meeting today, but since the start of the semester, I have read several of the AL and RumbleBlocks papers, have been given access to GitHub repositories and MySQL databases with student data, and have attended weekly research meetings.

3 Milestone progress

Since the direction of my research has changed since last semester, I will need to establish new milestones. Currently, I need to familiarize myself with AL's codebase—including TRESTLE—and port RumbleBlocks over to a new version of Unity. Along the way, the RumbleBlocks interface that works with the AL will need to be tweaked, as AL's input parameters have changed over the past two years.

4 Surprises

No surprises to report, except perhaps that another undergraduate has joined the AL team. She appears to be a statistics-ML major.

5 Looking ahead

As noted in the **Milestone progress**, I will need to read over two code bases and install software such as Unity and MySQL. The next two weeks will likely be spent updating softwares and setting up an initial agent.

6 Revisions to future milestones

My milestones will need to be made specific to the RumbleBlocks project. Since I haven't gone too far into exploring the RumbleBlocks research problem, I don't have a timeline, but Dr. Harpstead appears to have experience directing undergraduates doing research in AL, and he appears to have good instincts as to the scope of potential semester-long projects.

7 Resources needed

All code and research papers have been provided to me. All I may need is to learn the Unity IDE. I have a friend or two that have likely used Unity before, though, so I don't anticipate this being too steep a learning curve.