Applied Mathematics Honors Declaration Form

Concentrators in Applied Mathematics (APMA), APMA-Biology, APMA-Computer Science (with primary APMA advisor), and APMA-Economics (with primary APMA advisor) who wish to pursue honors need to complete this form and return the completed form by the third week of their 7th semester to Candida Hall (APMA Department).

Student's name: Rajen Parekh

Concentration: Applied Mathematics - Computer Science

Proposed honors thesis title: Studying Strategy Game Complexity with Machine Learning

Outline of honors thesis project:

I am planning to study how strategy games can be learned and represented by using machine learning techniques, specifically transformers and reinforcement learning. I hope to first study a simpler class of strategy games known as m-n-k games (i.e. tic tac toe) to see how varying m, n, and k, parameters that define the rules of the game, affects the architecture needed to learn the strategy of the game. Next, I will move on to more complicated games with different sets of rules. The ultimate goal of the project is to develop a generalized understanding of game complexity by comparing the complexity of models needed to learn each game.

Honors thesis advisor: Yair Shenfeld

Second reader: Ritambhara Singh

Concentration advisor: Chi-Wang Shu

Student's signature and date: 9/14/24

Thesis advisor's signature and date: 9/19/24

Second reader's signature and date: 09/23/2024

As the concentration advisor of the student indicated above, I certify that the student

- is in good academic standing,
- has demonstrated excellence in grades for courses in the concentrations[1], and
- is scheduled to complete two semesters of independent study with the thesis advisor.

Concentration advisor's signature and date: 9/19/24

[1]Excellence is demonstrated by earning grades of A or S-with-distinction in at least 70% of the Brown University courses used for concentration credit, excluding calculus and linear algebra, or be in the upper 20% of the student's cohort (as measured by the fraction of grades of A or S-with-distinction among courses used for concentration credit, excluding calculus and linear algebra).