

# 1 Project Description

The final project should be an application of reinforcement learning to a problem of interest to you. Possible application areas include: robotics, health care, control, autonomous vehicles, game playing agents, online agents, etc. I also encourage you to explore different parameter settings or variations on the algorithms we have/will study. For example, you might explore the effect of varying the size of replay buffers and training intervals in DQN. Or, you could explore different methods of prioritizing the replay buffer. It doesn't matter so much what you choose to do. The key requirement is that you explore a non-trivial problem and you explore multiple potential RL solutions. You don't need to try every possible RL algorithm we have studied, but I do expect that projects will run more than a single algorithm/parameter setting. Ideally, you will evaluate performance of a creative solution (a new parameterization/algorithm variation/way of framing the problem) relative to an out-of-the-box solution (i.e. a baseline solution). Note that some projects are too ambitious, so make sure you schedule the work to make sure you have something to show at the end.

You may work alone or in groups of two.

# 2 Timeline and Deliverables

**10/25/2018 Project proposal due.** Please submit a one-page document describing a proposed problem and solution via email to [rplatt@ccs.neu.edu](mailto:rplatt@ccs.neu.edu) and [kohler.c@husky.neu.edu](mailto:kohler.c@husky.neu.edu). We will review all project proposals. Some projects will be given the go-ahead via email while we will ask to meet in person with other project groups. The proposal must show that you have read background material on your topic and are qualified to undertake what you propose to do. It should include full references for the papers and other sources that you have consulted and that will form the foundation for your work. If you are working in a group, you must say who is responsible for each portion of the work. It must specify (using the same titles and questions as below):

1. Problem description: What problem are you solving? Describe the problem from a computational perspective. What are the inputs and outputs (exactly)? Why is it interesting?
2. Algorithms: What algorithms do you use? Why are these algorithms appropriate? How are these algorithms typically used, and how are you using them?
3. Results: What results and comparisons do you expect to show?

**12/8/2018 Final project due.** The papers should be written using the AAAI format (for the AAAI Conference on Artificial Intelligence): <http://www.aaai.org/Publications/Templates/AuthorKit17.zip>. Of course, we don't expect these projects to be submitted to the conference (although you are certainly welcome to!), it is helpful to look at papers from previous years to get an idea how they are written. AAAI papers (and papers from several other conferences) for many years can be found at this link: <http://www.aaai.org/Library/conferences-library.php>. Some sample project reports will also be made available. Also submit the code used to produce your results as a separate directory in the project git directory. Your report can be organized differently, but the general organization is the following:

1. Abstract: A short summary of what problem you are solving, how you solved it and what the results are.
2. Introduction: A longer description motivating the problem and solution method.
3. Background: Any background information needed to understand the methods used in the project (e.g., a description of a general search problem or some simpler algorithms that you build off of).
4. Related work: What other methods could be applied to your problem, why didn't you use them and how they relate to your method.
5. Project description: What you actually did in formal detail (with algorithms, equations, etc.).
6. Experiments: A description of how you chose these experiments, how the experiments were run, what the results were and why you got these results (Under what circumstances does the algorithm solve your problem successfully? When does it fail?) Again, they should be formal, often with graphs. These results could also include analysis such as a comparison of different methods or performance on different variants of the problem.
7. Conclusion: A summary of the results and what you learned by trying to complete this project.

Project reports must be detailed and self-contained, explaining the problem, methods and results.