CS 4180/5180: (Fall 2019) Chris Amato

Project: Due (Midnight) December 11th, 2019

1 Project Description

The final project should be a study of some area of RL of interest to you. For example, you might develop a game playing RL agent for version of poker, blackjack, or some other card game. The game playing agent might be based on any of the methods we've discussed in class, will discuss in class or anything else that is RL. Alternatively, you might use common video game (e.g., Atari, Doom or Starcraft) or robotics domains that have been studied before in RL. It doesn't matter so much which algorithm or application you choose to study. The key requirement is that you think about how the methods we studied in class (or perhaps other methods that we did not study!) can be applied.

Note that some projects are too ambitious (e.g., deep learning methods often require a long time to train and debug), so make sure you schedule the work to make sure you have something to show at the end.

We encourage students to work in groups of two or three, but you may also work alone. Projects with more than three students need explicit permission before a project proposal can be submitted.

2 Timeline and Deliverables

10/22/2019 Project proposal due. Please submit a one or two-page document describing a proposed problem and solution via git. This should be submitted in a /project/ directory in your account. (Keep an eye on Piazza with more details on this submission process.) 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, each student should work on a different algorithm and what each student will work on should be explicitly listed in the proposal. It must specify (using the same titles and questions as below):

1. Problem description: What problem are you solving? Describe the problem *formally* from a computational perspective. What are the states, actions and rewards? What simulator or domain are you using (exactly)? Why is it interesting? Does it already have an interface for RL? Have other researchers already used it?

2. Algorithms: What algorithms do you use (exactly)? Why are these algorithms appropriate? How are these algorithms typically used, and how are you using them? Have

other people use similar algorithms to solve your problem before?

3. Results: What results do you expect to show? What comparisons will you do? Are there risks for not getting all the results? If so, what will you do about it?

12/11/2019 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/AuthorKit19.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.

Note: there can not be any extensions on the final project!