

Final Project of Graduate Students

*Due Date: 2021/06/26***1. Final Project Arrangement**

- (a) Due date of project proposal: 2022/06/01, 11:59am
- (b) Due date of project final report & Slides: 2022/06/26, 11:59am
- (c) Please send project files to TA Shangshang Wang on time.
- (d) Zero credit for all files received after due date.

2. Final Project Requirements

The final project in this course requires implementing, evaluating, and documenting a new, research-style idea in the field of reinforcement learning (including bandit learning). Students will be required to prepare a proposal, a final report, and a corresponding Slides to illustrate your work.

All projects should evaluate novel ideas that pertain to reinforcement learning or its applications. Here are some examples of weak proposals and how to improve them.

- (a) Weak: re-implement a recent paper on RL.
Strong: re-implement a recent paper and investigate an extension mentioned in the paper as potential future work.
- (b) Weak: run a RL algorithm out of the box on a new application.
Strong: modify the algorithm to better suit the application

It's a good idea to think early about the data (simulated or real) that you'll need to collect, and the computational resources you'll need. You are encouraged to use your ongoing research work as a project in this course, provided that this work relates to reinforcement learning. If you are not sure about the topic, we encourage you to speak with us.

3. Writing the Proposal.

The project proposal should be a one page single-spaced extended abstract motivating and outlining the project you plan to complete. Your proposal should have the following structure:

- (a) **Objective** 1/4 page. Explain the objective of the project and why that objective is relevant and important.

- (b) **Related Work** 1/4 page. Briefly review the most relevant prior work, and highlight where those works fall short of meeting the objectives described above.
- (c) **Technical Outline** 1/2 page. Explain your approach at a high-level, making clear the novel technical contribution.

The proposal should include a brief overview of the proposed project and project plan that includes the following:

- What is the problem that you will be investigating? Why is it interesting?
- If relevant, what data, simulator or real world RL domain will you be looking at? If you are collecting new datasets, how do you plan to collect them?
- What method, algorithm or theoretical analysis are you proposing? If there are existing implementations, will you use them and how? How do you plan to improve or modify such implementations? If you are addressing a theoretical question, how do you plan to make progress?
- What literature have you already surveyed or will be examining to provide context and background?
- How will you evaluate your results? Qualitatively, what kind of results do you expect (e.g. plots or figures)? Quantitatively, what kind of analysis will you use to evaluate and (or) compare your results (e.g. what performance metrics or statistical tests)?

4. Writing the Final Report.

The final report should be in the style of a research paper, preceded by a one-page extended abstract. One report is required per student. The one-page extended abstract should summarize the main findings and accomplishments of your final project, while the main paper should describe and motivate the method in detail, and discuss the results, including any relevant figures or plots. The extended abstract should be attached as the first page of the full report.

Successful reports will have a main body that is about eight pages in length, but there is no hard length limit or requirement on the length or format, except the one-page extended abstract. We recommend the LaTeX template of NeurIPS for the writing of final report.

The following is a suggested structure for the main body of report:

- Title, Author(s).
- Abstract: It should not be more than 300 words.
- Introduction: This section introduces your problem, and the overall plan for approaching your problem.

- Background/Related Work: This section discusses relevant literature for your project.
- Approach: Algorithms used or developed.
- Theoretical results (if relevant): Include assumptions, proof sketches.
- Experiment results (if relevant): Details on experiments done. The goal is to describe in enough detail that the results are reproducible.
- Conclusion: What have you learned ? Suggest future ideas.
- References: This is absolutely necessary.

Supplementary Material is not counted towards your 8 page limit. Examples of things to put in your supplementary material:

- Full proof details (if doing a project with theoretical results).
- More simulation results.
- Cool videos, interactive visualizations, demos, etc. (optional)

5. Preparing the Slides.

The project slides should be in the style of a research conference presentation. We recommend both powerpoint and LaTeX beamer template for the slides (you can choose either one).

6. Groups.

You may work in groups of up to three people. Each group will submit the report and the slides together. The expectations for the project scope will increase depending on the number of students in each group, and for groups of two or three, we will also expect a short paragraph to explain the role of each group member along with the final report.