10703: Final Project Overview

1 General Guidelines

- The goal of the final project is two-fold:
  1. Gain hands-on experience with reinforcement learning (RL) and controls algorithms on interesting problem domains
  2. Coherently explain your problem, solution, relevant background, methodology and results.
- We expect two types of projects:
  1. Novel applications of existing algorithms with appropriate comparisons and experimental results of performance.
  2. A Simple, but original, research idea which is described clearly and experimentally tested.
- In either case each of the project deliverables will be evaluated based on the following criteria
  - Clarity of problem description
  - Background and literature review
  - Methodology and experimental design
- You should work in groups of up to four people. We highly encourage groups of four people. Project's will be evaluated based on the number of group members. In other words, the more members the larger the project should be.

2 Specific Requirements

- Your project must be related to RL and controls in some manner. The RL and controls may be part of a larger algorithm that is applied to a different field: e.g. using RL to make decisions in an NLP algorithm.
- Your project should be focused on at least one of the following:
  1. Implementing different algorithms and applying them to some dataset, robot, or simulation. Testing these algorithms and comparing them with prior approaches.
  2. Investigating theoretical properties of an algorithm, accompanied by appropriate proofs and experiments, along with a comparison with at least one existing approach.
- Your submission may include figures/tables which graphically illustrate quantitative aspects of your results, such as training/testing error curves, learned parameters, algorithm outputs, etc.
- Your submission must include at least 5 references to previous published papers or book sections. Please include page numbers for all references to indicate that you actually looked at the paper you are referencing.
- Your submission should follow the generally accepted style of paper writing: include an introduction section to motivate your problem and model, a section describing your approach and how it compares to previous work, a section outlining the experiments you ran and the results you obtained, or outlining theoretical analysis of the proposed model, and a short conclusions section to sum up what you have discovered.
- The proposal and all reports related to the project must be prepared in the NIPS paper style.
- Specific page length requirements are as follows:

  - The proposal should be approximately 1 page
  - The midterm report should be approximately 4 pages
  - The final report should be 8 pages
- More specific requirements for each of the individual reports will be released before each deadline.

3 Project Deliverables

The following is a brief description of the expected deliverables for the project. Please refer to each deliverables specific instruction PDF for more details, due dates, etc.

- Project proposal
  - Approximately 1 page report
  - Basic literature review and explanation of project goals
- Midterm report
  - Approximately 4 page report
  - You should expect to have initial experimental results by this time
  - It is okay to change project direction, at this point, but you should justify the change based on your experimental results
- Final Report
  - Approximately 8 page report
  - All experimental results should be finished by this point
- Project Presentation
  - More details about presentation will be released closer to the end of the semester. Expect to have either a few minute group presentation or a poster session.

4 Marking Scheme

- The following criteria will be taken into account roughly equally when marking each project deliverable:
  1. Clarity of problem statement and description of approach.
  2. Discussion of relationship to previous work and references.
  3. Design and execution of experiments, or presentation of theoretical analysis of the proposed approach.
- Each deliverable is a particular portion of your overall project grade:
  - Proposal — 5%
  - Midterm Report — 20%
  - Final Report — 75%
  - Project presentation — Factored into your final report grade.

5 Additional Advice

- Be honest, as you are not being marked on how good the results are. What matters is that you clearly formulate the problem, describe your method, what you did, and what the results were.
- Do not pick a project that is to hard. Usually, if you select a modest approach to try, and do it carefully, it will take much longer than you think.
- Be carefull not to do foolish things like test on your training data, set parameters by cheating, compare unfairly against other methods, include plots with unlabeled axes, use undefined symbols in equations, etc.