10703: Project Proposal Instructions

Due Feb 28
5% of Project Grade

Instructions

Please submit a pdf of your proposal using provided NIPS style via gradescope. Only one person from each group should submit. The person submitting should add their project partners to the submission via gradescope.

We will provide feedback and the TA assigned to your project after reviewing your proposals. Grading will be based on whether you answre the questions below in a coherent manner.

Groups should consist of up to four people. We highly encourage groups of four. We will evaluate the scope of each project with respect to the number of group members. In other words, larger groups should have larger projects.

Proposals should be 1-2 pages long (excluding references) and include the following information:

- Project title and list of group members.
- Overview of project idea (approximately half a page). Elaborate on the following:
  - Why the problem is important.
  - What challenges you need to solve.
  - Which datasets, simulators, and/or robots you are planning to use.
  - What metrics you are planning to use to measure your performance.
- A short literature survey of 3 or more relevant papers (up to half a page).
- A plan of what you wish to accomplish by the second milestone and by the end of the project (preferably, a list of bullet points).
- An estimate of your required computation resources and where you are going to get them from.

Project Area Suggestions

The following are some suggested project areas and related papers. You are not restricted to working in these specifica areas or with these particular algorithms. However, it should give you a head-start into your literature review.

- DeepRL Architectures
  - `https://arxiv.org/abs/1511.06581`
- Hierarchical RL
  - `https://arxiv.org/pdf/1604.06057v2.pdf`
- Learning to Learn
  - `https://arxiv.org/abs/1606.01885`
  - `https://arxiv.org/abs/1606.04474`

- Learning Programs
  - https://arxiv.org/abs/1511.06279
- Improved Exploration
  - https://arxiv.org/abs/1606.01868
- Interpretable RL
- Imitation Learning
  - https://papers.nips.cc/paper/5495-learning-to-search-in-branch-and-bound-algorithms
- Sample Complexity of RL
- Transfer Learning
  - https://arxiv.org/pdf/1610.04286v1.pdf
- Conditional computation (learning policies for efficient use of computation)
  - https://arxiv.org/abs/1511.06297
- Combining policy gradient and planning
  - https://arxiv.org/abs/1602.02867
- RL and search
  - https://papers.nips.cc/paper/5495-learning-to-search-in-branch-and-bound-algorithms
  - https://gogameguru.com/i/2016/03/deepmind-mastering-go.pdf
- Prioritized Experience Reply
  - https://arxiv.org/abs/1511.05952
- Multiagent
  - https://arxiv.org/pdf/1605.06676v2.pdf

Simulation Environments

Below are some suggested simulation environments. You may also work with real robot hardware, but you will be responsible for sourcing that yourself.

- MuJoCo — http://mujoco.org/
- OpenAI Gym — http://gym.openai.org
- OpenAI Universe — https://universe.openai.com/
- Gazebo — http://gazebosim.org
- Torchcraft — https://github.com/TorchCraft/TorchCraft
- DeepMind Lab — https://github.com/deepmind/lab
- THOR — https://arxiv.org/pdf/1609.05143.pdf
- Project Malmo (Minecraft for AI) — https://www.microsoft.com/en-us/research/project/project-malmo/
- AirSim (Quadcopter simulator) — https://github.com/Microsoft/AirSim