Project Information

Dates:

- Project proposals are due on **March 11**.
- Literature survey projects are individual. Projects with implementation, or progress toward a new solution, can have more than one contributor (2-3 students). Such projects are encouraged as you are likely to learn more, have more fun, and accomplish more.
- The proposal (one page) should include:
    - A brief description summarizing the project.
    - A carefully curated reading list with fundamental and influential papers—avoid selecting a random set of papers from a Google search.
    - The key directions you plan to explore and your expected outcomes
- Final project (as report or virtual presentation, the format will be announced later) is due on **May 12**. Instructions will be posted later.

Topics:

The applications of reinforcement learning in Information systems (communications networks, wireless systems, data centers, etc.) is encouraged, but if you prefer, you can pick **any** topic for the project so long as there is a direct connection to reinforcement learning.

Here are examples of possible types of projects:

- Study and survey one of the many related topics not covered in this course. Examples include:
    - inverse RL
    - multiagent RL,
    - imitation learning,
    - contextual bandits
    - application of RL in information systems or other domains such as robotics, self-driving cars, natural language processing, vision, finance, etc.
    - Recent progress in RL, look at recent papers in ICML, COLT, NeurIPS conferences.
    - Connection between RL and Large Language Models
- You can design algorithms, propose better solutions, or do implementations related to one of these topics if your project is beyond the literature survey.
- You can design algorithms and run experiments on some simulation environments like advanced environments on openAI gym, Mujoco simulator http://www.mujoco.org/, OpenSim http://opensim.stanford.edu/. Compare to existing work.

Some papers on the application of RL in Information systems (just to name a few):

Mao, Hongzi, et al. "Learning scheduling algorithms for data processing clusters." *Proceedings of the ACM Special Interest Group on Data Communication*. 2019. 270-288

Mao, Hongzi, Ravi Netravali, and Mohammad Alizadeh. "Neural adaptive video streaming with pensieve." *Proceedings of the Conference of the ACM Special Interest Group on Data Communication*. 2017.

Zhang, Chaoyun, Paul Patras, and Hamed Haddadi. "Deep learning in mobile and wireless networking: A survey." *IEEE Communications surveys & tutorials* 21.3 (2019): 2224-2287.

Spiteri, Kevin, Rahul Urgaonkar, and Ramesh K. Sitaraman. "BOLA: Near-optimal bitrate adaptation for online videos." *IEEE/ACM Transactions on Networking* 28.4 (2020): 1698-1711.

Chen, Li, et al. "Auto: Scaling deep reinforcement learning for datacenter-scale automatic traffic optimization." *Proceedings of the 2018 conference of the ACM special interest group on data communication*. 2018.

Kirilin, Vadim, et al. "RL-Cache: Learning-based cache admission for content delivery." *IEEE Journal on Selected Areas in Communications* 38.10 (2020): 2372-2385.

Naderializadeh, Navid, et al. "Resource management in wireless networks via multi-agent deep reinforcement learning." *IEEE Transactions on Wireless Communications* (2021).

Wang, Hao, et al. "Optimizing federated learning on non-iid data with reinforcement learning." *IEEE INFOCOM 2020-IEEE Conference on Computer Communications*. IEEE, 2020.

Park, Jihong, et al. "Communication-efficient and distributed learning over wireless networks: Principles and applications." *Proceedings of the IEEE* 109.5 (2021): 796-819.

You do not have to restrict yourself to these papers.