CAP 6635 – Adv. AI

Professor: Dr. Ayan Dutta

Student: Aaron Goldstein

2/2/2024

Greetings Professor,

I am listing my project preferences as we discussed earlier in office hours on Thursday.

Highest Preference:

Project 2 - Sampling-based pathfinding in an unknown environment.

- Uses sampling-based search strategies and local search techniques such as found in Chapters 3-5.
- It's an exploratory research topic. Dr. Dutta has a research problem in hand and a potential solution to test.
- The student(s) working on this topic will research necessary relevant topics to solve the given problem.
- If the results are promising, they will be sent to a recognized robotics conference for potential publication with the students(s) being the primary authors.
- Reference paper: Chandler, B., & Goodrich, M. A. (2017, September). Online RRT* and online FMT*: Rapid replanning with dynamic cost. In *2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (pp. 6313-6318). IEEE.

Medium Preference:

Project 1 - Pathfinding using machine learning.

- Uses search strategies potentially along with machine learning techniques such as deep reinforcement learning.
- It's an exploratory research topic. Dr. Dutta has a research problem in hand and a potential solution to test.
- The student(s) working on this topic will research necessary relevant topics to solve the given problem.
- If the results are promising, they will be sent to a recognized robotics conference for potential publication with the students(s) being the primary authors.
- Reference paper: Panov, A. I., Yakovlev, K. S., & Suvorov, R. (2018). Grid path planning with deep reinforcement learning: Preliminary results. *Procedia computer science*, *123*, 347-353.

Lowest Preference:

1. **Project 6 - Paper Implementation + Transformers**:
   Low, E. S., Ong, P., & Cheah, K. C. (2019). Solving the optimal path planning of a mobile robot using improved Q-learning. *Robotics and Autonomous Systems*, *115*, 143-161.

   - We will try to improve the quality of the found solution using **Transformers** -- which might be implemented by project topics 1 and 3 and we will collaborate with them.
   - Reference paper on Transformers: Esslinger, K., Platt, R., & Amato, C. (2022). Deep transformer Q-networks for partially observable reinforcement learning. *arXiv preprint arXiv:2206.01078*.