CS63 Spring 2024
Final Project Checkpoint

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1 Project Goal

Using AI methods: Reinforcement Learning (RL) and A Star (A*) search, to explore how to solve a maze problem similar to that of lab 1's. We want to compare if there is a significant difference between the performance of these two techniques and also how the implementation differs between these two techniques.

2 AI Methods Used

External Tools:

ATIK library (Backup)
10 500x500 Pixel maps png format (Drawn artfully in pain)

Packages:

Keras
Numpy
Cv2 (Graphical Rendering)
Matplotlb

Algorithms:

Reinforcement Learning via Approximate Q algorithm
A* State Space Search

3 Staged Development Plan

Week 1

- Make maps
- Make an Environment
- Implement A* for search task

Week 2

- Finish implementing A*
- Test A*

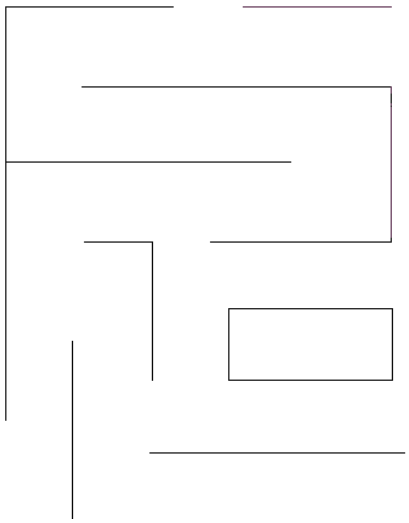

Figure 1: Example of Map

- Implement RL

Week 3

- Finish implementing RL
- Test RL
- Compare results
- Write paper

4 Measure of Success

Our main goal, is to successfully implement our own environment and build a A* and RL algorithm that is able to solve a maze. Our measure of success in developing these two algorithms will be its capabilities to explore and solve the 10 maps we created without any prior knowledge of any of the maps.

Our subgoals would be to see if A* and RL is able to generate suitable and optimal policy through the maze. Even if we are unable to actuate the robot, a optimal policy which the robot theoretically can navigate will still be usefull.

5 Plans for Analyzing Results

Quantitatively, we can explore which of the two algorithms perform their maze searching prowess in faster time. A faster algorithm should indicate better performance. We can also explore things such as states searched, nodes explored and training time. While RL may theoretically find an optimal solution it doesn't have the same garuntees as A* to converge on an optimal solution. So

each method may have different pros and cons that we want to compare. Also we want want to compare our implementations of these methods and how they compare to the theoretical benefits of each algorithm.