RL Group Project Proposal

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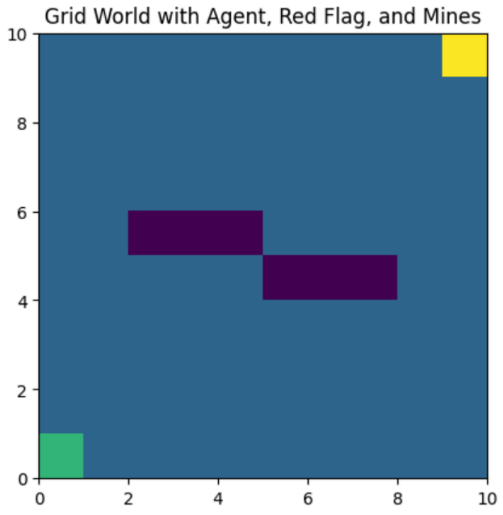
Motivation

Our project aims to harness the power of Reinforcement Learning in the context of a grid world, drawing inspiration from the success of RL implementations in video games. By delving into the intersection of RL and grid worlds, we aspire to not only advance the understanding of autonomous decision-making but also to contribute valuable insights that can be applied to enhance gaming experiences and real-world problem-solving scenarios.

Environment and Agent

We will design a 10x10 grid world, where there's an agent born at (0, 0), and there's also a red flag at (9, 9). The target of the agent is to get the red flag as early as possible to win the game. There are also some mines on the map, located at (4,5), (4, 6), (4, 7), (5,2), (5,3), (5,4). If the agent moves into the grid with mines, it will die and the game is over immediately. The agent can only move up, down, left, and right.



Second Stage

If possible, we will make our environment and the setting more complicated after completing the first stage of our project.

In the second stage, we will replace the red flag with another agent. Therefore, there will be two agents in our map born at (0, 0) and (9, 9). There are 9 movements for each agent to choose in one round. The agent can move via four directions, and stay still, and shoot in for directions. The effective range of the arrow is determined to be 3 grids, meaning that opponents within a range of 3 grids can be shot and eliminated.

The cool-down period of shooting would be 2 steps, meaning that after one shot, the agent can only stay still in the following 2 steps. There are still mines in the map, and the arrows cannot destroy the mines. The target of agents is to eliminate the opponent and take over their spawn point.