Report on Multi-Agent Path Finding

Two robots from random locations are required to reach their respective goals without collision. The project is about designing two policies, one for each robot. The primary condition of the policies is the robots don't collide and then they take the most efficient way to their goals. There are 3 maps in this project. The task is to implement the MyAgent.get_action() function which will decide which action to do in each state.

To return corresponding action in each state, I have built a database of state-action pairs so the get_action() function would look up the database to get the action. Then, it can check if any collision exists by their successor states. If they exchange their states or their successor states are identical, collision exists. If collision exists, agent 'p1' will try to find an alternative action from all available actions. However, if there is no alternative act for 'p1', 'p2' will find an alternative action from all available actions instead to avoid collision.

To construct a database for an agent, I started searching from the goal of an agent. If a goal state can move up to another state, that state can also move down to the goal state. Therefore, I started the search from the goal and got all its available move to explore its adjacent states. The search would terminate until all available states were exploited. Therefore, an agent can reach the goal state from any initial states.

By this approach, the two agents can reach their respective goals in all three maps.