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The Enforcers: Reinforcement Learning in the Wumpus World Environment

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*Abstract*— This is a team project for Arizona State University’s Artificial Intelligence course 571. The project was to create a reinforcement learning agent to be deployed inside the Wumpus world. Reinforcement learning allows the agent to explore its environment and learn while executing actions. The agent can access prior knowledge about a state when faced with the same situation in a later episode. These situations are stored in q-table.

*Index Terms*— Wumpus, Wumpus world, artificial intelligence, reinforcement learning

# INTRODUCTION

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HIS project is using reinforcement learning in the Wumpus world environment. This project was chosen to allow the team members to gain a new skillset for many of them were new to the topic area.

The Wumpus world is a simple problem used in artificial intelligence to examine how a knowledge-based agent will react in an environment. The goal of the game is for the agent to collect the gold then climb out of the cave while avoiding the Wumpus agent. If our agent enters a location where a Wumpus is, our agent will parish and the game will end. However, if the agent senses there is a Wumpus in that location before it enters it, our agent can shoot the Wumpus and the Wumpus will parish making that location safe for our agent. If our agent’s sensors were wrong and there was no Wumpus in that location, then our agent loses points from the overall score. Our agent must also avoid falling into a pit while navigating the environment or else our agent will parish and the game ends.

Reinforcement learning allows the agent to explore its environment and learn while executing actions. The benefit of this technique is that it allows the agent in the environment to access prior knowledge about a state when faced with the same situation in a later episode. These situations are stored in q-table.

# technical Approach

## Q-Learning

The actions stored inside the q-table are moving up, moving down, moving left, moving right, shooting the arrow up, shooting the arrow down, shooting the arrow to the right, and shooting the arrow to the left.

## Environment

The environment was constructed to be simple. The basic environment consists of a 4x4 grid containing a Wumpus and 3 pits, and gold. The locations of these, as well as the starting location of the agent are randomized.

# Results

# Conclusion

# Team Effectiveness

1. Completed 01 May 2020. This work is a part of a course for Arizona State University graduate program.

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