CS-370 Module 7

Project Two-Design Defense

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* **Analyze the differences between human and machine approaches to solving problems.**
* **Describe the steps a human being would take to solve the maze.**

Human’s approach in the beginning is to analyze the maze with eyes and find the best

option to complete the maze. Human start from the top left which is the starting point of

the maze and identify the direction should be taken. If the cells are occupied, and they

cannot move forward, human will look for other open cells to and change direction and

move forward and these steps will be repeated until they reach the end of the maze.

* **Describe the steps your intelligent agent is taking to solve this pathfinding problem.**

The intelligent agent uses different approach to solve this problem. As the intelligent

Cannot think rationally like humans they use algorithms to find the best way to finish the

maze. The method the agent will use is through trial and error. This algorithm uses

rewards, where agent gets rewarded for each correct step and if the step ends in an

occupied cell or moves outside of the maze the agent will lose point.

* **What are the similarities and differences between these two approaches?**

What is similar between two approaches is that both are trying to achieve a same goal

is completing the maze and get rewarded. Both approaches identify efficient moves to

take, but what is different between these two is the method each use to achieve the

desired outcome. Human method is visual and logical to decide which way to move and

understand how to move around the cells and not to move outside of the maze, but the

intelligent agent and the algorithm need to be taught and learn its move through trial and

error and it will take more time for it to learn the proper moves and bad moves. This

means it must try so many times and fail to eventually find the way to solve the

problem.

* **Assess the purpose of the intelligent agent pathfinding.**
* **What is the difference between exploitation and exploration? What is the ideal proportion of exploitation and exploration for this pathfinding problem? Explain your reasoning.**

When an agent tries to use get the rewards without taking the proper steps it is called an

Exploitation where the agent makes decision based on the current available information.

In this method an agent is looking the find the ways to get rewarded.

Exploration is a method that the agents primary focus is learn and improve knowledge

by gaining more information to make the best decision. In this problem agent explores

by moving between cells to understand more about the cell and the rewards and

penalties involved and by learning the best move it can go to the next step and finally

complete the problem.

* **How can reinforcement learning help to determine the path to the goal (the treasure) by the agent (the pirate)?**

Reinforcement learning provides more context to the agent that helps to determine the

path to the goal. The path involves two types of move good move which helps the agents

get rewarded for its move and get closer to the treasure and the bad move which

penalizes the agent. The agent learns through reinforcement learning that the penalties

will move it away from the treasure and delays the goal achievement.

* **Evaluate the use of algorithms to solve complex problems.**
* **How did you implement deep Q-learning using neural network for this game?**

Deep Q-learning uses neural networks and Q-learning together. Q-learning provides

current state value based on the actions taken throughout the process which provides a

path to solve the problem. The idea of neural network provides a relevance value within

Q-learning which makes it more scalable and more complex than a simple q-learning

matrix and provides faster and more accurate learning of the problem in this case the

maze.

Resources:

*Exploitation and exploration in machine learning - javatpoint.* www.javatpoint.com. (2021).

https://www.javatpoint.com/exploitation-and-exploration-in-machine-learning