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**Project Two: Defense Design**

When solving problems, machines and humans process things differently. Machines observe and learn through patterns, which allows them to make accurate predictions. Humans on the other hand has emotions to work through so they can find the best, unbiased way to accomplish a task. Even though that’s “What makes a human, human,” it is a major time waster. If a human were attempting to solve this maze, it would take much longer than a machine. A human would have a roller coaster of emotions to work through, while trying to solve the problem. Instead of accepting their failure and learning from their mistake, a human would get sad and start to doubt themselves. The human would need to learn to work through their emotions in order to find the best solution, and solve the maze problem. However, a machine would not have an emotional reaction to their failure. It would simply start again and repeat the steps till it finds the pattern and start to make accurate predictions. The similarities in approach would be the entire process… Learning from their mistakes, finding the pattern, and repeating till the problem is solved. However, the difference between humans and machines are emotions and insight. Due to the machine observing and learning through identifying patterns, it is able to learn faster than a human because it doesn’t have emotions clouding their predictions or judgement. Due to machine learning and reinforcement learning, machines will learn how crippling emotions are to humans.

Exploitation means taking advantage of someone or something for one’s beneficial gain, while exploration is one seeking new information or a new discovery. In this pathfinding problem, the proportion of exploitation and exploration changes. In the beginning, the agent is initially exploring. It needs to learn the problem and identify the pattern. As the agent learns the best routes and strategies, the exploitation shifts to a higher proportion. This will allow the agent to find more treasure locations and win/solve the problem. Using RL can help the agent find more treasure locations by learning through trial and error. This will improve its decision making based on rewards and penalties.

The way I implemented deep Q-learning using neural networks was by allowing the agent to interact with the game so it can receive an award or a penalty for their action. Using algorithms like this would allow the agent to learn in a high-dimensional state space, preparing it for difficult scenarios. This act allows the machine to learn the best action to take, in doing so making accurate predictions. The machine would learn the benefits of an award, so it will start to exploit what it learned and start to maximize the awards received. This is how the machine learns with neural networks instead of storing Q-values in a table.

**References**

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