Project 2

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To defend my design for the Treasure Hunt Game algorithm, I will need to analyze the differences between human and machine approaches to solving problems, assess the purpose of the intelligent agent in pathfinding, and evaluate the use of algorithms to solve complex problems.

Problem-solving is a very human and intellectual thing that we are trying to model and create within machines. A human would greatly rely on its experiences, analyses, and experimentation. We try to make a machine capable of these through algorithms by keeping a history for it to compare with and a way for it to decide based on values. It can also iterate through many possible choices before choosing one. We can even add some experimentation to break out of ruts in experience data. The one thing we cannot do yet is create a machine with human creativity and intuition. To solve the treasure hunt game maze, A human will very quickly assess a rough route to complete the game. The solution might not be perfect but it is very easy to get to the treasure. This is due to our varied experiences being able to make sense of the game quickly. Machines however has to test every incremental change to see if it is getting better or worse and go from there. The pirate is being scored and is using its score to judge if it is doing better or worse, allowing it to make tiny adjustments and learn as it goes. Both approaches use feedback and rewards to learn as humans have generally learned this way with games for a long time and accumulated a large amount of experience compared to a minutes-old AI. They do however rely on different methods to compute choices. Humans can judge the outcome by sight, social cues, or internal feelings, while a machine has to compute a value to use and compare.

A strong ability of humans is their innate ability to exploit and explore. Exploit is the ability to follow one proven pattern while explore is to deviate from a known pattern to find a better one. Humans are especially great explorers. The typical way a machine will exploit is by using history to make decisions it has already proven to be successful. This can be very efficient in smaller environments. Exploring can be harder for a machine as it usually entails random choices instead of humans' intuition-based explorative decisions. I tested 3 values for exploration(5%, 10%, 30%) and I found that 10% was more effective and had much less volatility in the growth of the learning. Reinforcement allows the machine to know if it is going on the right direction and is crucial to machine learning by being the mechanism to facilitate a goal or direction to go in.

I used deep Q-learning in the neural network by making a loop to compare possible choices with prior experiences and also account for exploration. It evaluates the choices using an algorithm and decides by the resulting values. The more it experiences the more likely it can decide the correct path through the maze.