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CS 370 AI/ML

## **Project Two Design Defense (Treasure Hunt Game)**

**Analyze the differences between human and machine approaches to solving problems in the Treasure Hunt Game AI project.**

The Treasure Hunt game is a classic pathfinding problem that can be solved either by a human or an intelligent agent. A human typically uses a trial-and-error approach, by observing the maze, processing possible solutions, and executing the output to find the right path and solve the maze with minimal errors.

On the other hand, an intelligent agent would solve this problem by using random paths to discover the solution. As the agent does not know the correct path to take, it would need to perform multiple trials to find the correct path. The agent will get input data for the problem from the start point, target point, and any other possible points that the agent will make. It will then run through the problem multiple times until it finds the optimal path for solving the problem, then it will emulate an output of the shortest optimal path.

Although the two approaches share similarities, they differ in the time needed to solve the problem. The human does not usually think of the maximal rewards and penalties at each step throughout the course, whereas the agent thinks of the maximal rewards and penalties at every step and improves throughout the course, allowing it to learn from its mistakes and provide the solution faster than a human.

**Assess the purpose of the intelligent agent in pathfinding.**

Exploration and exploitation are two methods an agent can use to solve the problem. Exploration involves pursuing potential solutions by searching, testing, finding, and improving every possible combination of solutions. Exploitation involves searching the whole amount of sample inputs and testing for every possible combination of solutions. The ideal proportion of exploitation and exploration for this pathfinding problem is that the agent usually learns through different paths of exploitation, although the agent can choose to explore and discover new paths of exploration for this pathfinding problem.

Reinforcement learning can help determine the path to the goal using trial and error, and the agent can only discover the optimal path by using a testing method to solve this pathfinding problem.

### **Evaluate the use of algorithms to solve complex problems.**

Finally, implementing deep Q-learning when using a neural network for this game involves importing libraries, creating training environments, creating reward systems, creating learning agents, using enhanced learning algorithms, and testing agents within an environment. Going through the implementation steps for deep Q-learning helps to find the best possible sequence that navigates and has great outcomes in reaching the treasure cell while increasing the reward.

## References

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