Project Two

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CS-370 Current/Emerging Trends

SNHU

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* Analyze the differences between human and machine approaches to solving problems.
  + Humans and intelligent machines are alike in some ways and differ in others. If a human were to solve this maze, they could apply multiple different strategies for fast success. Humans generally take environmental cues to help orient themselves (Weissmann, 2014b), so as they navigate this maze, they could take notes of the first wall or block and move accordingly. A simpler approach that is closer to machine approaches would be for a human to continually take right turns until they fail. Then, they take note of the failure and adjust accordingly.
  + In the Treasure Hunt game, the intelligent agent solves the maze by choosing a direction and moving until it fails. Then, it learns and stores the information, begins again, and tries in a different direction. This process occurs over and over until the agent learns the maze and wins.
  + Between humans and intelligent agents, approaches are similar. Both execute decision-making through failure and learning based on that experience. However, humans will take the fastest route possible, instead of iterating through all possibilities.
* Assess the purpose of the intelligent agent in pathfinding.
  + Exploration and Exploitation are methods in which learning algorithms are built and adapted (GeeksforGeeks, 2024b). Exploitation uses learned knowledge or “memories”, to make decisions and learn further. Exploration “explores” the environment. Using exploration, an intelligent agent will make decisions without certainty of what is to come about, then gather information based on the outcome. Each method can be used complimentary to the other in order to create balance.
  + Reinforcement Learning (RL) can determine a path to a goal by using an established environment and associating it with a high reward. As an example, an intelligent agent in a maze will earn a better reward the faster it solves the maze (Salloum, 2021).
* Evaluate the use of algorithms to solve complex problems.
  + In the Treasure Hunt game, deep Q-Learning was implemented for the intelligent agent to solve the maze. In order to do so, the environment needed to be set up correctly. The maze is constructed of an 8X8 matrix with a series of 1s and 0s representing open and closed pathways. Of course there is error handling to prevent any out-of-bounds moves included. After the environment was created, the intelligent agent needed to be instantiated and tested. Because a neural network was used, the agent was able to find the path quickly and efficiently.
* Cites
  + Weissmann, E. (2014, July 31). Amazing Maze: What science says about solving labyrinths. *Science*. <https://www.nationalgeographic.com/science/article/140730-science-mazes-labyrinth-brain-neuroscience>
  + GeeksforGeeks. (2024b, May 18). *Exploitation and exploration in machine learning*. GeeksforGeeks. <https://www.geeksforgeeks.org/exploitation-and-exploration-in-machine-learning/>
  + Salloum, Z. (2021, December 12). Basics of Reinforcement Learning, the Easy Way - Ziad SALLOUM - medium. *Medium*. <https://zsalloum.medium.com/basics-of-reinforcement-learning-the-easy-way-fb3a0a44f30e>