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CS-370

7-3 Project Two Submission

**Analyze the differences between human and machine approaches to solving problems.**

There are a lot of key differences between how humans and machines approach solving a problem, for example machines are very good at cognitive problems, whereas humans are good at perceiving and reacting to new situations (Goel & Davies, 2020). For a human agent playing the treasure hunt game they may make an arbitrary decision which way to go initially, using intuition to avoid obvious walls and excluding them from the decision process. Then they may go with a strategy that has worked well for them in previous maze experiences, for example the “right is right” mentality to always turn right whenever possible. The human can then move about the maze however they see fit, trying not to back track on themselves and cover as much of the board as possible as quickly as possible. As for my intelligent agent, it is told that at each step it can move in 4 directions, up, down, left, and right. The pirate is told its starting position and at every stage it uses its q table to decide the best direction to move. At first the agent explores the maze, picking directions at random, then as the agent learns what directions are best, it starts to exploit more than explore, using previous experience as its guide. The biggest similarity that I noticed between how humans and machines approach this problem is that both can only pick arbitrary directions to try and find the treasure, the differences between how that direction is picked is very different though, For the human agent they can see the blocked areas and avoid those without needing to explore that option, they can also instinctively know to not back track as much as possible to speed up the finding process. For the machine agent they must learn that trying to move into an obstacle or going back over itself is a negative reward action.

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

When it comes to an AI agent learning pathfinding, exploration is when the agent either chooses its next action randomly or chooses an action that has not yet been taken, and exploitation is using its experience to make more and more accurate predictions and making moves that have the best probability of being a successful move (Gulli & Pal, 2017). Using reinforcement learning, the agent can learn to determine where the path is by being given a minor positive reward for exploring a new space, a massive reward for finding the treasure, and negative rewards for either trying to go into an obstacle or moving back on itself (Goel & Davies, 2020).

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

To implement deep Q-learning using neural networks for this game I had the network develop a dense neural network with the adam optimizer with the code provided, then using that neural network I gave it positive rewards for every game it won, in which it found the treasure, and a negative reward for every game it lost, in which it did not find the treasure. I did this reward system by updating an array with either a 1 for a won game or a 0 for a lost game.

References

Goel, A. K., & Davies, J. (2020). Artificial Intelligence. In R. J. Sternberg (Ed.), The Cambridge Handbook of Intelligence (pp. 602–625). chapter, Cambridge: Cambridge University Press.

Gulli, A., & Pal, S. (2017). Deep learning with keras : Get to grips with the basics of keras to implement fast and efficient deep-learning models. Packt Publishing, Limited