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Project 2

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To solve this puzzle a human would follow the trail over and over and through trial and error find the correct path. A human would start from the beginning and go through the maze to see what the best path is ahead of time then take that action. If the action did not work they would do it again and again till the achieved the right path. The human has some insight as they can see which paths didn’t work and use that information immediately. They might also forget as they are moving which were the correct route. A common path for mazes is to start from the end and work their way to the start as well.

The intelligent agent would solve the pathfinding problem by following random paths till it reaches a the end and find the correct path. The agent would not know the correct pathfinding solution so it would use trial and error to reach the end. The agent would take steps to print out the correct pathfinding solution. The first step is the agent will get the input data for the problem such as the input data from the start point as well as the target point the end of the maze. The next step is the algorithm will keep running the maze doing multiple attempts and iterations until it finds the optimum path. The last step is the agent will output the working and optimum path solution.

There are many similarities and differences between a human and an intelligent agent. A similarity is that both the human and the agent know the input where the starting point is. They both also know what they have to do put the correct input path to reach the correct solution by the output. They both approach the problem with a trial and error approach and choose the optimum path. Some differences are the human uses their eyes to find the optimum path while the agent uses a number array. Another difference is the human would be faster at finding the solution as they can process the information with less trial and error while the agent would take longer in the trail and error phase. The agent would do many tries where as the human might do it in one of fewer tries.

The difference between exploitation and exploration are exploitation involves searching the entire sample input and then testing all the combinations possible for the correct solution. Exploration is the process of looking for potential solutions by testing them and improving to find the optimum solution. The ideal proportion of exploitation and exploration for the pathfinding problem is the agent learns through exploitation and testing out all possible solutions to find the correct solution. The agent uses exploration as well trying out new paths as well learning off them and applying them to exploitation. Reinforcement learning is used to find the treasure by having the agent(pirate) use trial and error to find the best path going through multiple iterations of the maze and using a testing method and storing the most effective paths and using the most optimum one.

We used deep Q- learning using neural networks for this game using multiple steps. The first step is import the libraries required to make this neural network run. The second step is to set up an environment for the network to train. The third step is to create a learning agent with a reward system to reward points for more successful iterations. The fourth step is to use and enhanced learning algorithm. The fifth step is to test the agent inside the environment and reward its successful progression with points from the reward system. Using these steps we build a system that has a testing environment an agent that will learn in that environment and will be told if it is making progress to the solution with the rewards system. This will help the agent find the best possible solution in this case finding the best path out of the maze and to the treasure.

REFERENCES

Gulli, A., & Pal, S. (2017). Deep learning with keras: Implement neural networks with Keras  
on Theano and tensorflow. Packt Publishing.

Akshay Lamba (2018) An introduction to Q-Learning: reinforcement learning

https://medium.com/free-code-camp/an-introduction-to-q-learning-reinforcement-learning-14ac0b4493cc