Luis Garcia

SNHU

Project #2

CS 370 Current/Emerging Trends in CS

8/14/2022

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

1. Describe the steps a human being would take to solve this maze.

Every human has different approaches to solving problems. When it comes to solving the maze from the project even if different human will think differently there will be a better path. The first thing human should do is gather the most information available possible to make the problem easier to assess. This information (data) is compiled by us and learned by us too. Any decision we take on how we move through the maze comes from the data and what we have learned in the process. This process is an input, process, output process that we do while we work in the problem. While we go through the process our environment may change and we should adapt to the changes and learn form the changes to be able to manage our way to the end of the maze. As human when we finish the problem of getting out of the maze, we will reward ourselves like any human would do.

1. Describe the steps your intelligent agent is taking to solve this pathfinding problem.

Differently from humans, the intelligent agent doesn’t have any data/information from the problem the need to solve. The agent may not find the solution the first time. The agent learns from trying and save the data it has come to while going through the maze. The agent will keep in memory the different path, this way the next time it can assess what it already did and not do it if it was the wrong way. Once the agent has learned from the environment and from the different tries it will learn the right path through the maze and will go through the maze without problem.

1. What are the similarities and differences between these two approaches?

Some differences between a human and the intelligent agent are that humans can get some data from the start point by analyzing the environment. The agent needs to go through the process to get data from the environment. Humans and the agent learn by themselves from the environment and keep in memory the process the when through, so the next time is easier. Even if our brain doesn’t work the same way the AI, we both are teaching ourselves by going through the maze and by solving the problem. Maybe at the start of solving the problem the human has some advantages, but once the agent solves the problem once, the agent will beat the human in solving the maze.

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

1. What is the difference between exploitation and exploration? What is the ideal proportion of exploitation and exploration for this pathfinding problem? Explain your reasoning.

Exploitation is when the sample is been search or investigated for different combinations to solve the problems. Exploration involves checking for potential solution on how to solve the problem, in this case the maze. In exploration the agent goes through searching, risk taking, experimentation and discovery and it will learn new thing, innovating in the way of solving the problem. For example, I can we as humans are always exploring for new thing, so we must go through the process or learning in the path. Exploitation is more like knowing what we are going to solve, and we just are looking for an easier way to do it by researching the problem first. In Exploration we just learn through the process.

1. How can reinforcement learning help to determine the path to the goal (the treasure) by the agent (the pirate)?

Reinforcement learning will teach the agent and the agent will save I memory different ways path, some path will not be successful, but this way the agent know what paths are wrong and how to keep going without failing. Once the agent finds the path, that it teaches itself, and finish the maze, the next time it will finish the problem without the need of learning the whole maze again because it already knows the solution. Finding the optimal path is the goal, it makes take an amount of tries, but once the agent has it, next time will be faster. So, that’s what Reinforcement Learning do, the agent will learn form the environment, trying to solve the problem and once it solves the performance of the program will improved and be faster.

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

1. How did you implement deep Q-learning using neural networks for this game?

The implementation of the Q-Learning algorithm was to find the best possible navigation for the agent. It was created to maximize the reward the agent could get once it finish navigating the maze. Finding the numbers of epoch that will give us the result plus making sure the agent will get the best reward possible. I selected a free cell to assign the agent, gave some action to the agent, train the neural network, and evaluate the losses. I make sure that the win rate was above the threshold and that my model passes the completion check.