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The way that human and machines(AI or algorithms) go about solving problems is vastly different in their process but they both utilize trail and error to solve the problem at hand. For instance a human would first evaluate the type of problem they are attempting to solve in this case trying to find the quickest way to navigate the maze. They will use trail and error because the first approach might not lead them to exit the maze so they have to come up with an alternative method. Eventually they will find the right solution to successfully navigate the maze with minimal mistakes. The machine would utilize randomness to learn and find a solution. The machine will encounter various trail and error situations to successfully discover the right path. With the agent unaware of the route to initially take it will experience various circumstances that will lead it to locate the right path. The machine would then follow mathematical calculations to solve the problem. For example the first step would be to obtain some input data to start the problem such as locating the starting point. Next the agent would navigate the maze numerous times until the AI has a favorable path to effectively solve the problem. When the training has concluded the agent would have discovered the most efficient path to be to take.

These two approaches have some similarities between them. They both have the same starting point and they both are trying to make to the end of the maze. How they implement the problem however is vastly different. A human would utilized their eyes to evaluate what’s going on while the machine would utilize mathematical equations and operations such as arrays and matrices to absorb what’s going on. The time it takes to solve this problem could be a big difference between the two. The machine would look at this particular problem and identify the rewards and penalties that are at every step of the problem and utilizes this to improve its algorithm which would allow the machine to learn from its mistakes and become more efficient with the time it takes to navigate the maze. On the other hand humans don’t look at rewards and penalties the same way as the machine does so it could take the human a lot longer to discover the most efficient path to the end.

The difference between exploitation and exploration is that exploitation requires searching for the entire amount of sample inputs and testing for every possible combination of solutions. Exploration is comprised of pursuing potential solutions by searching, testing, finding, and improving every possible combination of solutions. These two are vital when applied to the pathfinding problem because the agent generally learns through taking different paths for exploration. The agent may also use exploration to uncover new path while it explores the environment. Reinforcement learning assist with deciding the most efficient path to take by utilizing the trail and error technique. The agent can locate the most desirable path when utilizing testing methods to resolve the pathfinding problem. I chose to implement the deep learning technique utilizing neural networks for this game to find the solution in several steps. First I implemented the libraries that gave the Q learning techniques different functionality so the agent can accomplish the goal of finding the best path to the end of the maze. Next I created the environment in which the agent will be trained in and created an system of rewards for the agent. A learning agent was also created to decide at each step or decision made is more efficient than the previous one. The algorithm gains substantial improvements by testing and learning within the environment. These steps used for deep Q learning with the neural networks acting as helpers support the best possible solution that would help the agent maneuver to the most efficient path within the game to increase the chances of finishing the game.

Resources

Guili, A & Pal, S. (2017). Deep Learning with keras: Implement neural networks with Keras on Theano and Tensorflow.

Samyzaf. (2021, December 10). Qmaze. Deep reinforcement learning for maze solving

<https://www.samyzaf.com/ML/rl/qmaze.html>

Guru99. (2022, September 17). Reinforcement Learning : What is, Algorithms, Types & Examples. https://www.guru99.com/reinforcement-learning-tutorial.html