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CS 370

7-3 Project Two Submission

Design Defense

The approach a human would take to solve a maze involves trial and error, where the human observes the maze, processes possible outputs, and executes them to find the correct path while minimizing mistakes. In contrast, an intelligent agent solving a pathfinding problem would use random paths to discover the solution since it does not know the correct path and needs to perform multiple trials to find the optimal path. The agent would get input data, run through the problem multiple times until it finds the optimal path, and then provide the shortest optimal path as output. Both approaches involve understanding the problem by input and providing the correct solution by output, but the main difference is in the time needed to solve the problem. The human may repeat the same path several times at random, while the agent thinks of the maximal rewards and penalties at every step, learns from its mistakes, and provides the solution faster.

Exploitation involves testing every possible combination of solutions, while exploration involves pursuing potential solutions by searching, testing, finding, and improving every possible combination of solutions. The ideal proportion of exploitation and exploration for this pathfinding problem is that the agent usually learns through different paths of exploitation, but it can also choose to explore and discover new paths of exploration. Reinforcement learning can help determine the path to the goal using trial and error, and the agent can discover the optimal path by using a testing method to solve the pathfinding problem.

To implement deep Q-learning using neural networks for this game, one would import libraries, create training environments, create reward systems, create learning agents, use enhanced learning algorithms, and test the agents within an environment to find the best possible sequence that navigates and has great outcomes in reaching the treasure cell while increasing the reward.

REFERENCES

* Beysolow, Taweh II. (2019).Applied Reinforcement Learning with Python: With OpenAI Gym,Tensorflow, and Keras.Apress L. P.
* Blog, G. (2020, November 24).Reinforce algorithm: Taking baby steps in reinforcementlearning. Analytics Vidhya.<https://www.analyticsvidhya.com/blog/2020/11/reinforce-algorithm-taking-baby-steps-in-reinforcement-learning/>.
* Gulli, A., & Pal, S. (2017).Deep learning with keras: Implement neural networks with Kerason Theano and tensorflow. Packt Publishing.
* Samyzaf. (2021, December 10).qmaze. Deep reinforcement learning for maze solving.<https://www.samyzaf.com/ML/rl/qmaze.html>.
* Sinha, S. (2015, October 1).SAGE Journals. The Exploration - Exploitation dilemma: A reviewin the context of managing growth of new ventures.<https://journals.sagepub.com/doi/full/10.1177/0256090915599709>.
* Tao, D. Couzin, I. (2019, May 2).Trends in Cognitive Sciences: Reinforcement Learning, Fastand Slow.https://www-sciencedirect-com.ezproxy.snhu.edu/science/article/pii/S1364661319300610?via%3Dihub