Design Defense  
CS 307 Current/Emerging Trend in Computer Science

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What makes humans different from machines? Since the creation and implementation of technology there have been a lot of theories of where human civilization is leading in the future, conspiracy theories and other ideas become stronger with the innovation of newer technologies. Every decision that we take can be analyzed by a machine to understand the critical thinking of the computer. Since computers can analyze many variables and get the best results, it could be the most effective solution but is the best solution always the best solution?

We can analyze Pirate Maze, a maze game that consists in looking for the best path to find the treasure, to compare the problem-solving process of humans and machines. As humans, we will follow conscious or unconscious steps to solve a problem.

1. Identify the problem.
2. Define the problem.
3. Forming a strategy.
4. Organizing information.
5. Implementing procedure.
6. Evaluating the result.

Based on Geek for Geeks, a large website dedicated to sharing knowledge about technology and other fields, the process of solving a problem for a machine is:

1. Problem definition.
2. Problem analysis.
3. Knowledge representation.
4. Problem-solving.
5. Action
6. Goal test
7. Replication

As we notice, humans and machines have a similar approach to solving a problem, we both analyze the problem and based on experience, in the case of the machine would be data, try to find the best way to solve a problem. But humans, we first try to analyze the solution while we are working on it and the machine solves the problem first and then implement the solution.

Artificial Intelligence will implement and use two different Reinforcement Leaning that is used to develop better answers and solutions. The agents are exploitation and exploration. Exploitation is the analysis of a subject or theme, and the biggest part would be the acquisition of knowledge studied. In other words, exploitation is the desire of the agents to get more rewards by using values close to the actual result. Exploration is the use of resources, knowledge, and experience with the most efficient information from them and use it to benefit us in the process for our goal. The improvement of the knowledge and technique will benefit the reward acquired either to make it easier or to have more experience of it. Exploitation and exploration are crucial requirements for Artificial Intelligence since both functions will balance to create a perfect equilibrium that will provide more efficiency and accuracy to a system. “Though both functions are necessary for an AI to function an even balance between the two needs to be made as too much exploration and the agent takes too long to find the solution. Alternatively, too much exploitation and the AI never learns from exploration.” (Butvinik, 2022)

Problems will have more than one solution and millions of ways to solve them, but humans do not have the capability to analyze every solution to determine which would be the most accurate and implemented in many problems, that is how algorithms and artificial intelligence help to find the best solutions since the machine are capable to find many solutions and determine the best solutions. In our game, Pirate Treasure Maze, Deep Q-Learning uses neural networks to solve the best way for the pirate to get to the treasure. First, our project uses imported Python libraries which were built for a neural network environment and algorithm that will be used to train the agent. In the TreasureHuntGame (later name differently) I created and implemented an algorithm that helps us to solve the puzzle. In the end, the puzzle would be tested using all the necessary functions and will be using and following the rules established earlier.

Reference

Cherry, K. (2022, April 18). *Overview of the Problem-Solving Mental Process*. Verywell Mind. <https://www.verywellmind.com/what-is-problem-solving-2795485>

*Problem Solving in Artificial Intelligence*. (2020, October 11). GeeksforGeeks. <https://www.geeksforgeeks.org/problem-solving-in-artificial-intelligence/>

Butvinik, D. (2022, May 14th). *Medium.com*. Retrieved from Fraud Prevention: Exploration-Exploitation Tradeoff in AI-based Systems: https://medium.com/analytics-vidhya/fraud-prevention-exploration-exploitation-tradeoff-in-ai-based-systems-fbd41c87c592#:~:text=There%20is%20a%20relationship%20between%20the%20level%20of,is%20a%20disbalance%20between%20exploration-exploitation%20over%20a%