Teaching AI Pong Notes

Source 1: [RL_Pong_Final.pdf (sc.edu)](RL_Pong_Final.pdf)

Notes: -Reinforcement Learning (RL) agents in AI and Deep Reinforcement Learning (DRL) agents. RL agents can be used to teach AI how to play, have it improve, and then have it recognize/discover other hidden patterns within a game. Paper talks about implementing DRL via two algorithms (Deep Q-Network & Double DQN) to understand the configurations of the RL agent in Pong.

-DQN and DDQN implemented to train AI using deep learning approximate with two-layered CNNs. Environment set up in OpenAI gym and uses a simple agent (can't access coordinates of pong ball; is an absolute potato) as a training opponent.

-Has the RL agent keep the ball in the game and implement a strategy to score

-Big issues faced, computational time complexity & optimizing tensor allocation

Significant advice - transform image into tensor object

-Game is played as "Episodes"

-Rewarding System: If an agent scores (+10) if it concedes a goal (-10); performance is measured during recent episodes and win rate.

Source 2: [DeepReinforcementLearning.pdf (wisc.edu)](DeepReinforcementLearning.pdf)

Notes:

- Q-learning is a function

-Q-learning is a value-based reinforcement learning algorithm used to find the optimal action-selection policy for an agent. It is model-free, meaning it doesn't require a model of the environment and learns purely through interaction

DQN (Deep Q-Learning) builds on Q-learning by using a neural network to approximate the Q-values, enabling it to handle complex, high-dimensional spaces like images.

Double Deep Q-Network (DDQN) improves upon DQN by addressing a bias in the Q-value estimates. In DQN, the agent uses the same Q-network to both select and evaluate actions, which can lead to overestimation of Q-values. DDQN was introduced to solve this.

Other Sources currently getting inspiration:

Source 3: [Learning to play Pong with PyTorch & Tianshou | by Krzysztof Joachimiak | Medium](#)

Source 4: [final_report.pdf](#)

Source 5: [mmcbrien3/MLBS_FinalProject: Pong-like game and reinforcement learning.](#)