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CMPE – 258: Deep Learning

Assignment 4

Question 1 – Determine the environment, agent, action, observation, and reward for the following:

A Game of Chess:

- Environment: The chess board, pieces, and rules of the game.
- Agent: The agent is the player making moves.
- Action: An action would be any of the valid moves in chess.
- Observation: The observation is examining the changes in the game state. Generally, this would also include the moves made by the opposing player.
- Reward: The reward might be more complicated depending on how the reinforcement learning algorithm was designed (for instance, capturing pieces and certain piece trades might be rewarded) but the most obvious reward would be for checkmating the opponent's king.

Dog Training:

- Environment: For dog training, the environment would be pretty much the real world.
- Agent: The agent in this case would be the dog.
- Action: The dog performs certain actions, sometimes in response to commands issued by the trainer. Mostly anything that the dog does could be considered an action on its part.
- Observation: The dog has senses to observe the world around it like sight, smell, and hearing. This is how it observes the state of the environment.
- Reward: Could take different shapes, usually treats or positive affection and encouragement

A Computer Game:

- Environment: The environment of a computer game is defined by what the user can interact with. However, it would usually be limited to gameplay portions as opposed to menus, settings, and other functions in the computer game. For instance, an RL agent trained to play a first-person shooter would probably not count the in-game sensitivity and graphics settings as part of the environment, only the actual game world.
- Agent: The agent would be the character in the game controlled by the user. In some games, there is no 'main character' so the agent would represent a person playing the game.
- Action: The actions would be the moves determined by the programmers that are allowable for a user to make. In mario, this would be things like jumping, moving, and shooting fire balls.
- Observation: The state of the game, usually determined by examining the output pixels created by a game on a screen.
- Reward: Depends heavily on which game is being played. In mario there would be rewards for completing a level, and in a first-person shooter there would be a reward for eliminating enemies.