**CMPE - 260 Homework 1**

Submitted By :

Soumyendra Shrivastava (016670121)A game of chess:

* + **Environment**: The 8x8 chessboard represents the environment. Each square can hold a piece or be empty. The rules of chess dictate how pieces move, and the game's objective (to checkmate the opponent's king) sets the ultimate challenge.
  + **Agent**: A player, whether human or artificial intelligence, making decisions about moves. In a computer simulation, this could be a sophisticated AI like AlphaZero.
  + **Action**: Every legal move is an action. For instance, a knight has up to eight possible moves, but these are restricted by the board's edge and by whether friendly pieces occupy potential landing squares.
  + **Observation**: At any time, a player can observe the entire board, noting the position of every piece. For more advanced players or AI, this also includes understanding potential threats, foreseeing future moves, and strategizing accordingly.
  + **Reward**: If an AI is being trained, rewards can be granular: +1 for capturing a pawn, +9 for a queen, and so on. A significant reward might be given for checkmating the opponent. Negative rewards can be given for making non-optimal moves or losing one's pieces.

1. Dog training:
   * **Environment**: This is the setting where training takes place. It's not just the physical location but also includes other stimuli, like other animals, people, scents, sounds, and the overall mood or energy level.
   * **Agent**: The trainer, who can be a professional dog trainer or the dog's owner, is making decisions on when and how to reward or correct the dog.
   * **Action**: These are commands or cues given to the dog. Beyond verbal commands, this can also include hand signals, whistle blows, or even tools like clickers.
   * **Observation**: The trainer observes the dog's behavior in response to commands. This involves noting if the dog followed the command, was confused, distracted, or outright disobedient. Non-verbal cues from the dog like ear position, tail movement, and overall body language can provide additional information.
   * **Reward**: Positive reinforcement is crucial in dog training. Rewards can include treats, affectionate touch, verbal praise, playtime, etc. In some cases, negative reinforcements (not to be confused with punishment) may be used, like withholding a treat or using a firm "no."
2. A computergame (platformer game):
   * **Environment**: The in-game universe, which is dynamic. Platforms can move, enemies can change patterns, and different levels can introduce novel challenges or terrains.
   * **Agent**: The entity interacting with the game. This could be a human using a controller or an AI bot developed to navigate the game's challenges.
   * **Action**: All potential moves a player can execute. In a platformer, this includes basic movements like running left/right, jumping, ducking, or more complex actions like a double jump, shooting a weapon, or activating a power-up.
   * **Observation**: This involves the current game state, including the main character's position, remaining lives, score, power-up statuses, and the positions and states of enemies and obstacles.
   * **Reward**: Points collected, levels advanced, or enemies defeated can all be positive rewards. In contrast, negative rewards can be received for losing lives or failing to overcome a challenge.