

Capstone Project Reinforcement Learning: Tetris

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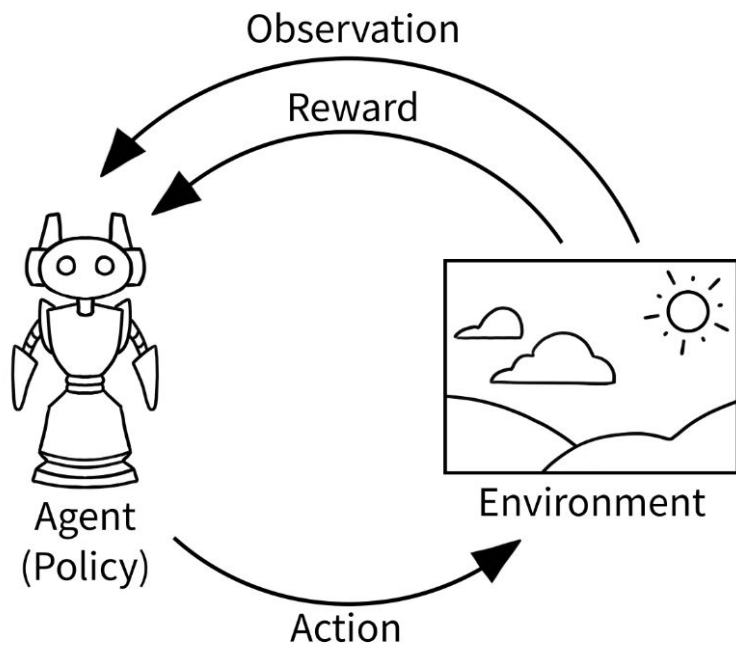
Project Summary:

Program Tetris and program an agent to play the game.

- 1) Create the game playable for humans
- 2) Create an agent able to play the game optimally
 - Limitations: agent is only able to choose to swap, rotate and then position piece. No rotations or slides upon landing to reduce training complexity. As an extension, I will add this in at a future time
- 3) Create an app so you can test your skills against this agent.



Reinforcement Learning





Goals Outline

- 1) Program the game to be played either by humans or by the computer where computer would initially play a random strategy of placing pieces
- 2) Use neural networks through reinforcement learning to have agent improve in play
 - a) Agent will predict value of a given state when a piece is placed
- 3) Extensions
 - a) Add slight rule variations
 - b) See how model adjusts without training
 - c) Retrain new models on variations and compare



Data

Reinforcement Learning Problems generate their own data and do not need external datasets!

-Predictions are how well (the *value*) certain moves will cause the *state* to be evaluated by the agent.



Challenges

- 1) New stuff
 - a) Programming games in python
 - b) Have not practiced making RL models
- 2) Bugs mid-game are difficult to find
- 3) Exploitation vs Exploration
 - a) Tetris agent learning that silver and gold blocks as well as finishing 4 lines at once is the optimal way to score points
- 4) Training time
- 5) Implementing RL from scratch vs using libraries

