Group 20

Reinforcement Learning and Dino Game AI

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Project Overview

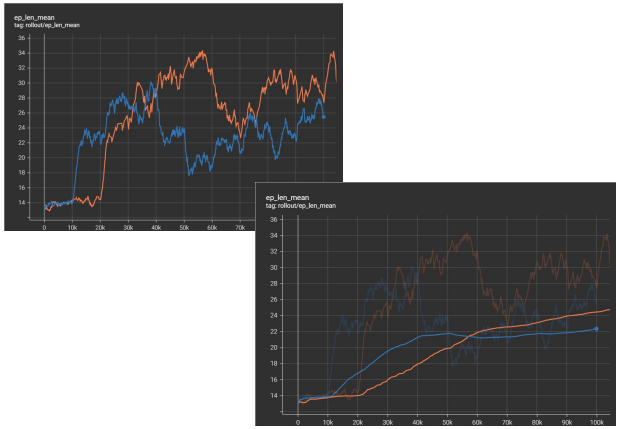
Inspiration/motivation:

- The remarkable success of Google's AI AlphaGo in mastering a complex and strategic game like GO
- Impressive performance of the DQN(Deep Q-network) model in Atari games
- Google's Dino Game as the test environment for simplicity

Reinforcement Learning:

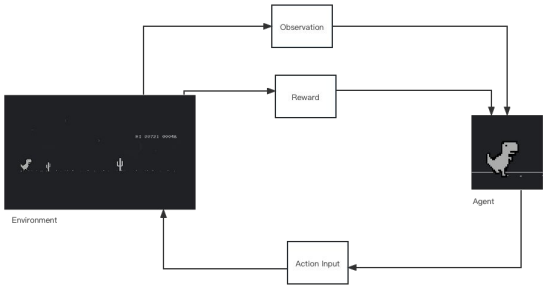
- Training models to decide the optimal decision by learning through a feedback system.

Observational Window



Model implementation: General Outline

1. Set up observation windows
2. Set up Key Mapping direction
3. Set up Reward System
4. Set up the DQN model



DQN Hyperparameter / Reward system

- Policy:
  - Choosing between MLP and CNN
- Environment:
  - The gaming environment we built
- Log directory:
  - Where to store the training logs
- Verbose:
  - Frequency of returning information
- Buffer size:
  - Storage of past experience
- Learning starts:
  - Size of initial database

```
reward = 1 # one point for each frame being alive
```

```
if not done:
    reward = 1
else:
    reward = -5
```

Conclusion/Potential Improvements

Conclusion:

Built our own RL model, capable of playing a simple webgame
The experimental results highlight the trade off between cautious decision-making and exploration of new strategies when considering penalties in the RL models.

Improvements:

- Hardware Upgrade
  - More RAM supports larger database
  - Better CPU and GPU supports faster processing
- Add Gamma hyperparameter
  - Discount factor for reward
- Better image preprocessing
  - Reduce down the noise