Controlling 3D gaming agents in an adversarial setting with Deep Reinforcement Learning

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January 6, 2021

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Q Learning

Q Learning

$$\underbrace{\mathrm{Q}(s,a)}_{\text{New Q-Value}} = Q(s,a) + \underset{\text{Learning Rate}}{\alpha}\,[\underbrace{R(s,a,s')}_{\text{Reward}} + \underset{\text{Discount rate}}{\gamma}\,\overbrace{\max Q'(s',a')}^{\substack{\text{Maximum predicted reward, given}\\ \text{new state and all possible actions}}} - Q(s,a)]$$

Sample = R(s,a,s') + $\gamma(maxQ(s',a'))$

Q(s,a) = (1-α)$Q(s,a) + \alpha(Sample)$

Grid World

Grid World

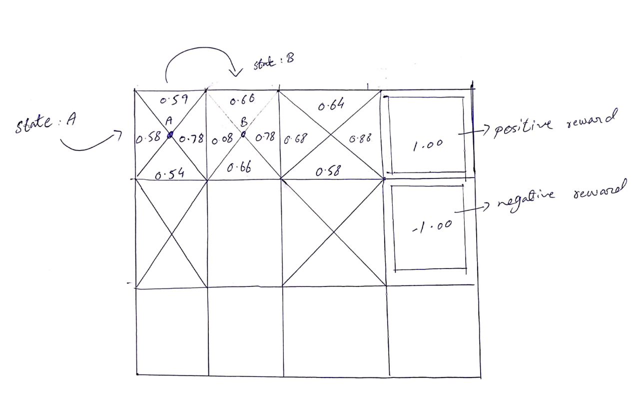


Figure 1: Grid World

Calculation

Calculation

R(s,a,s') = 1

s = state(A),
s' = state(B) next state,
a = move right(Random Action)

Q-Values with different actions 0.66, 0.40, 0.78, 0.66

max Q(s',a') = max (0.66, 0.40, 0.78, 0.66) = 0.78

Sample = R(s,a,s') + $\gamma(maxQ(s', a'))$

Sample = 1 + 1(0.78) = 1.78

Q(s,a) = (1-α)$Q(s, a) + \alpha(Sample)...(A)$

Let $\alpha = 1$
putting values in equation (A)

Q(s,a) = (1 - 1)(0.78) + 1(1.78)

Q(s,a) = 1.78

Bridge Design Pattern

Bridge Design Pattern

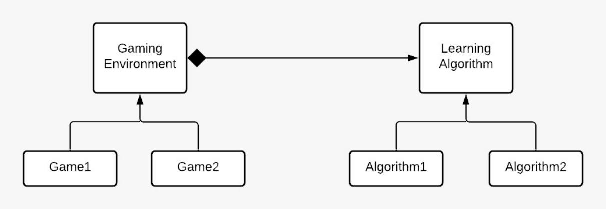


Figure 2: Factory Design Pattern

Coding Convention

Coding Convention

- Tensorflow v2 vs tensorflow v1

Coding Convention

- Tensorflow v2 vs tensorflow v1
- Snake case naming convention

Coding Convention

- Tensorflow v2 vs tensorflow v1
- Snake case naming convention

Airstriker

Airstriker

- State Space: 215040
- Action Space : 12

CartPole

CartPole

- State Space: 16
- Action Space : 2

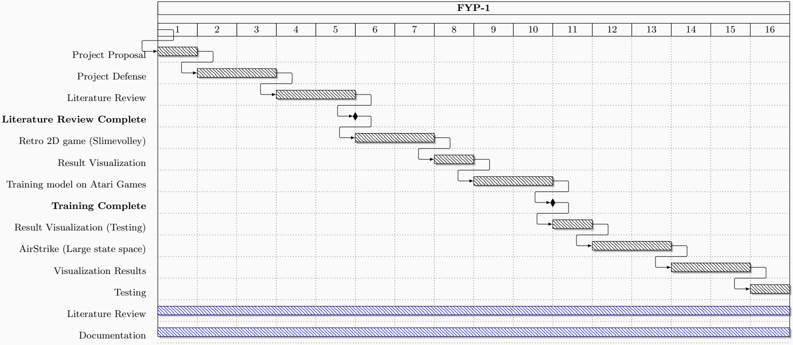
Slimevolleygym

Slimevolleygym

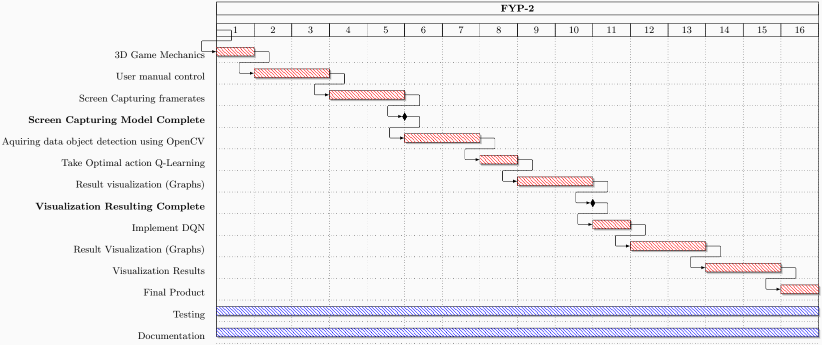
- State Space: 12
- Action Space : 3

Work Breakdown

FYP-1


FYP-1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Project Proposal
Project Defense
Literature Review
Literature Review Complete
Retro 2D game (Slimevolley)
Result Visualization
Training model on Atari Games
Training Complete
Result Visualization (Testing)
AirStrike (Large state space)
Visualization Results
Testing
Literature Review
Documentation

FYP-2


FYP-2
1
2
3
4
5
6
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11
12
13
14
15
16
3D Game Mechanics
User manual control
Screen Capturing framerates
Screen Capturing Model Complete
Aquiring data object detection using OpenCV
Take Optimal action Q-Learning
Result visualization (Graphs)
Visualization Resulting Complete
Implement DQN
Result Visualization (Graphs)
Visualization Results
Final Product
Testing
Documentation

Questions?