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

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Environment

Environment

- Fully or Partially
- Single or Multiagent
- Static or Dynamic
- Deterministic or Stochastic
- Discrete or Continuous

Figure 1: Diamond Collection

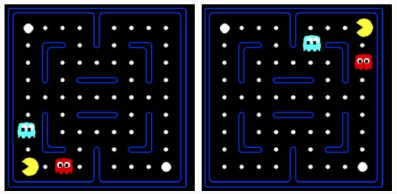


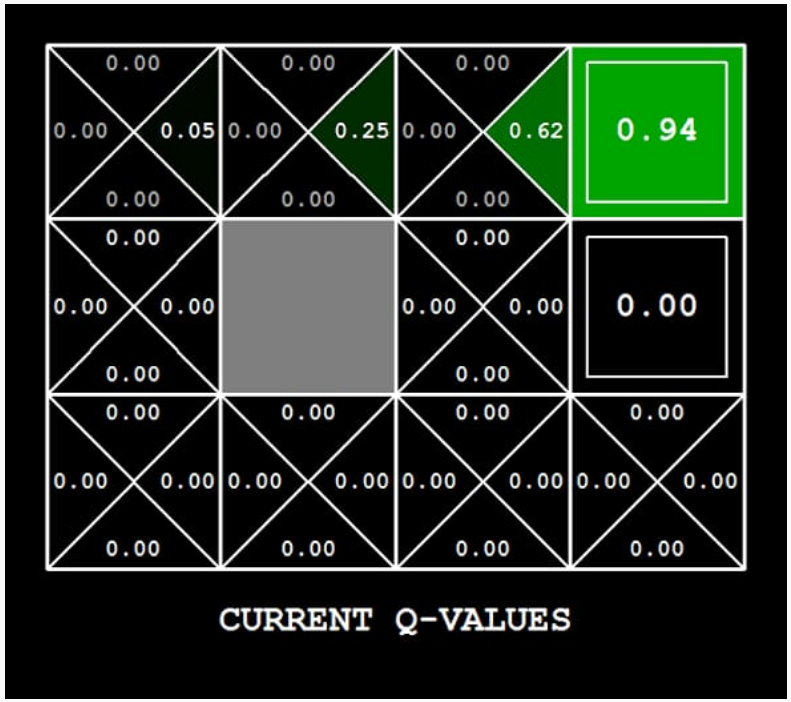
Figure 2: Pacman

Figure 3: Tekken

Reinforcement Learning Model

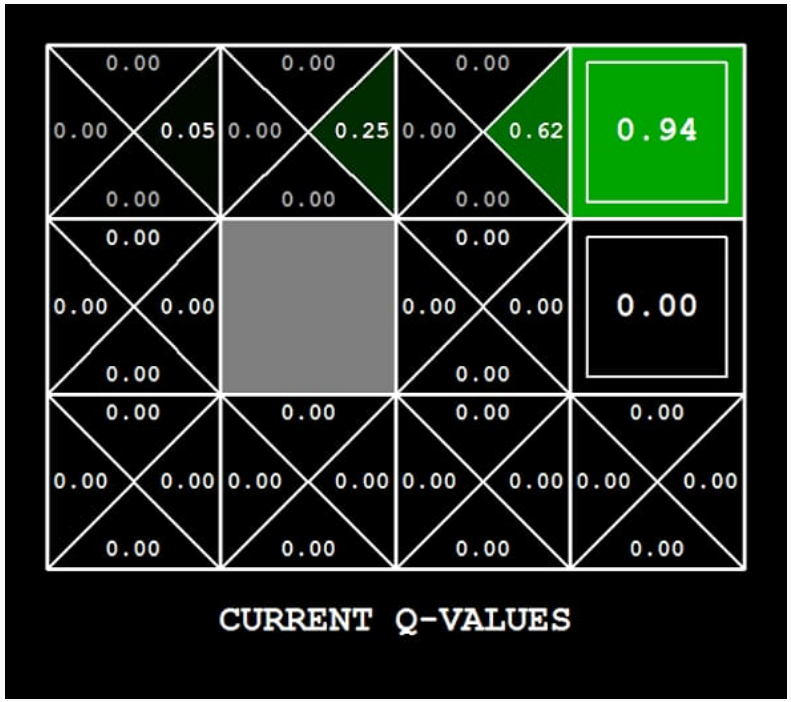
Reinforcement Learning Model

- Q-Learning



Reinforcement Learning Model

- Q-Learning



- Equation

$$Q^{new}(s_t, a_t) \leftarrow \underbrace{Q(s_t, a_t)}_{\text{old value}} + \underbrace{\alpha}_{\text{learning rate}} \cdot \overbrace{\Big(\underbrace{r_t}_{\text{reward}} + \underbrace{\gamma}_{\text{discount factor}} \cdot \underbrace{\max_a Q(s_{t+1}, a)}_{\text{estimate of optimal future value}} - \underbrace{Q(s_t, a_t)}_{\text{old value}} \Big)}^{\text{temporal difference}}$$

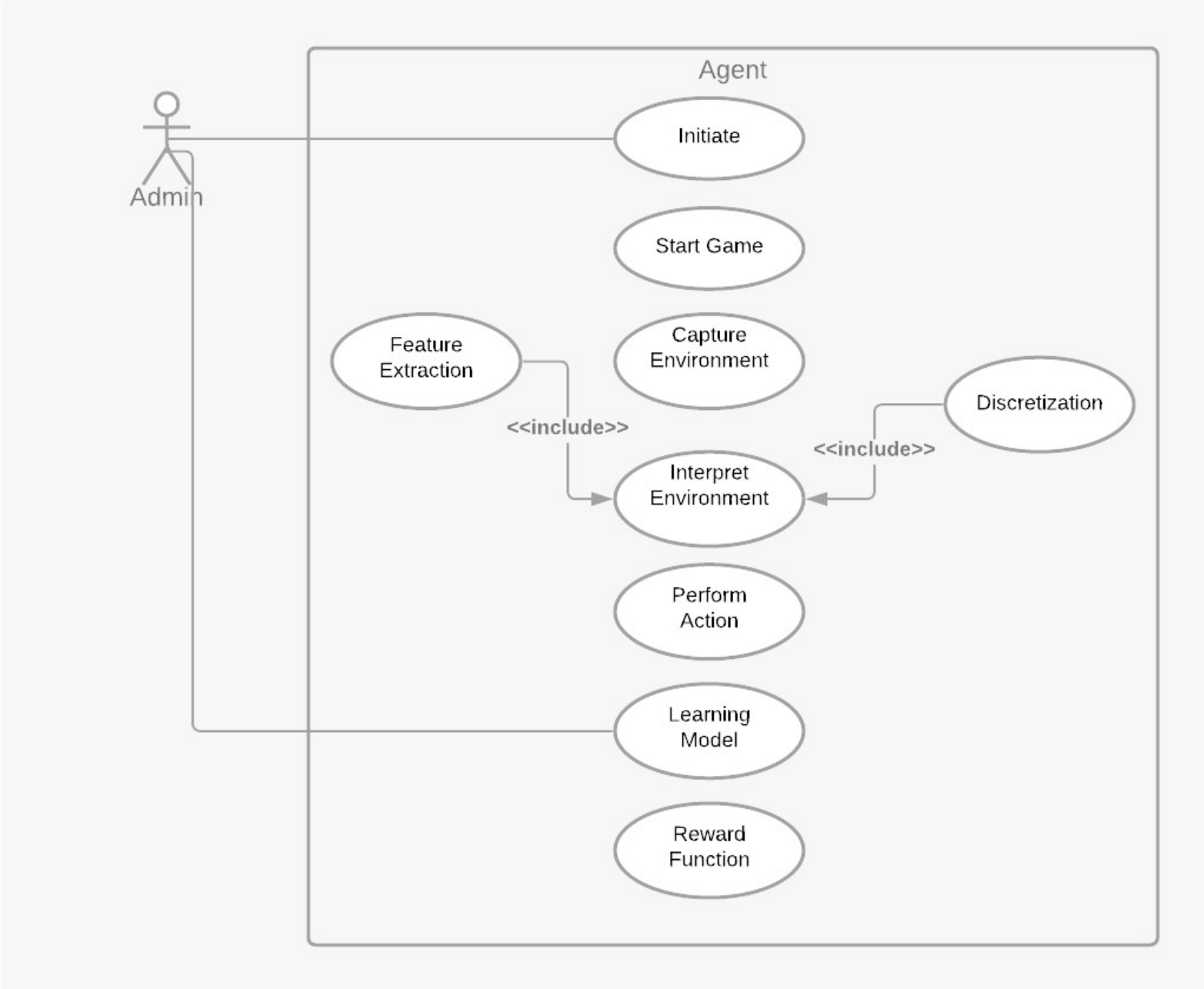
$$\underbrace{\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad}_{\text{new value (temporal difference target)}}$$

Demo

Demo

Use Case

Use Case


Agent
Admin
Initiate
Start Game
Feature Extraction
Capture Environment
Discretization
<<include>>
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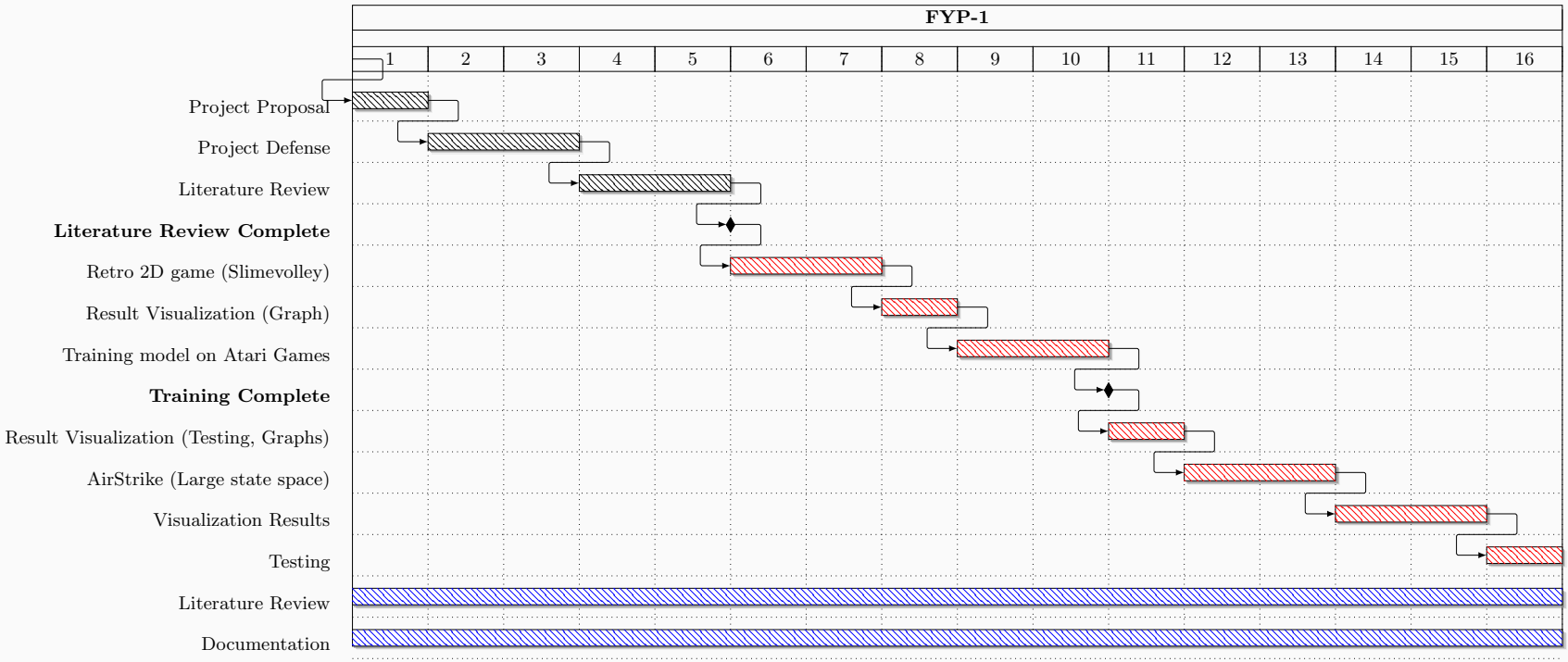
Interpret Environment
Perform Action
Learning Model
Reward Function

Work Breakdown

FYP-1


FYP-1
1
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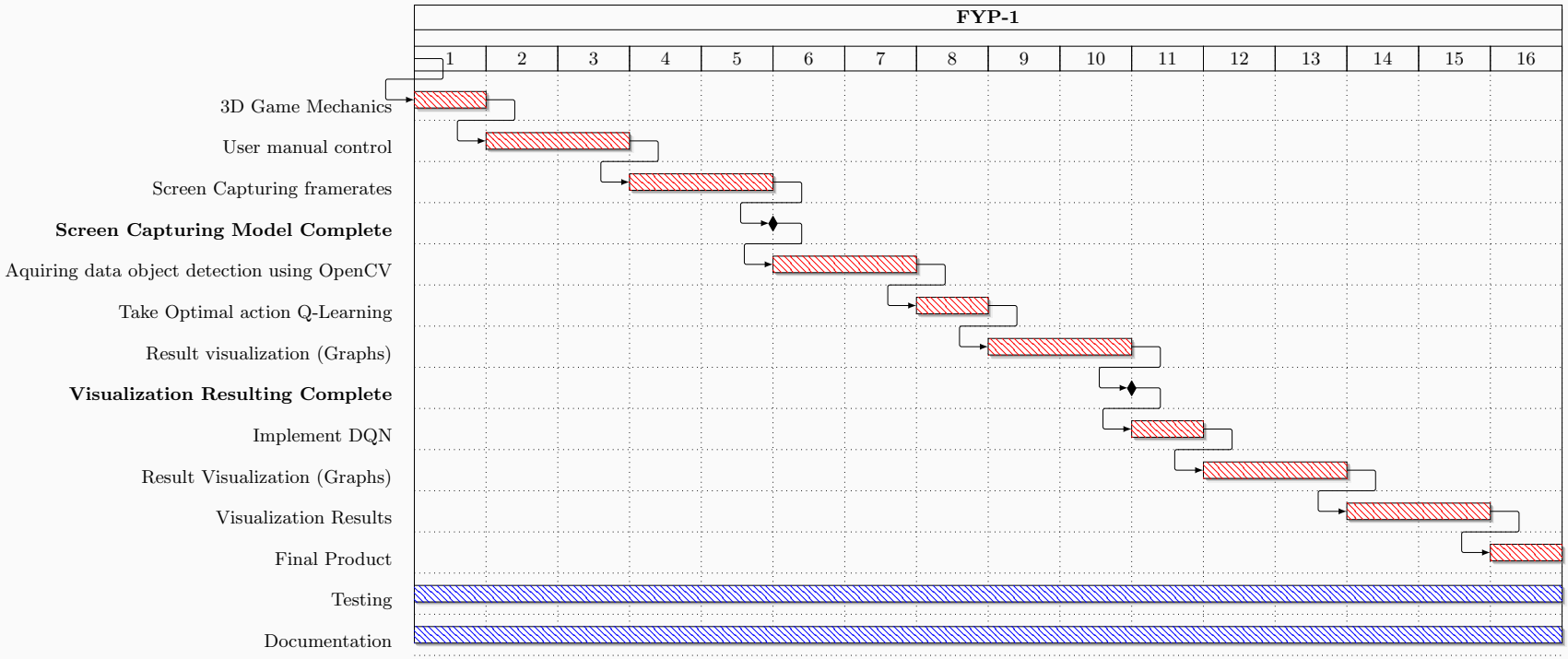
16
Project Proposal
Project Defense
Literature Review
Literature Review Complete
Retro 2D game (Slimevolley)
Result Visualization (Graph)
Training model on Atari Games
Training Complete
Result Visualization (Testing, Graphs)
AirStrike (Large state space)
Visualization Results
Testing
Literature Review
Documentation

FYP-2


FYP-1
1
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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

GitHub

GitHub

- Our project code is uploaded on GitHub under repository "Reinforcement-learning-demo"
- You can visit this link: [https://github.com/halcyoona/reinforcement-learning-demo] to check our progress

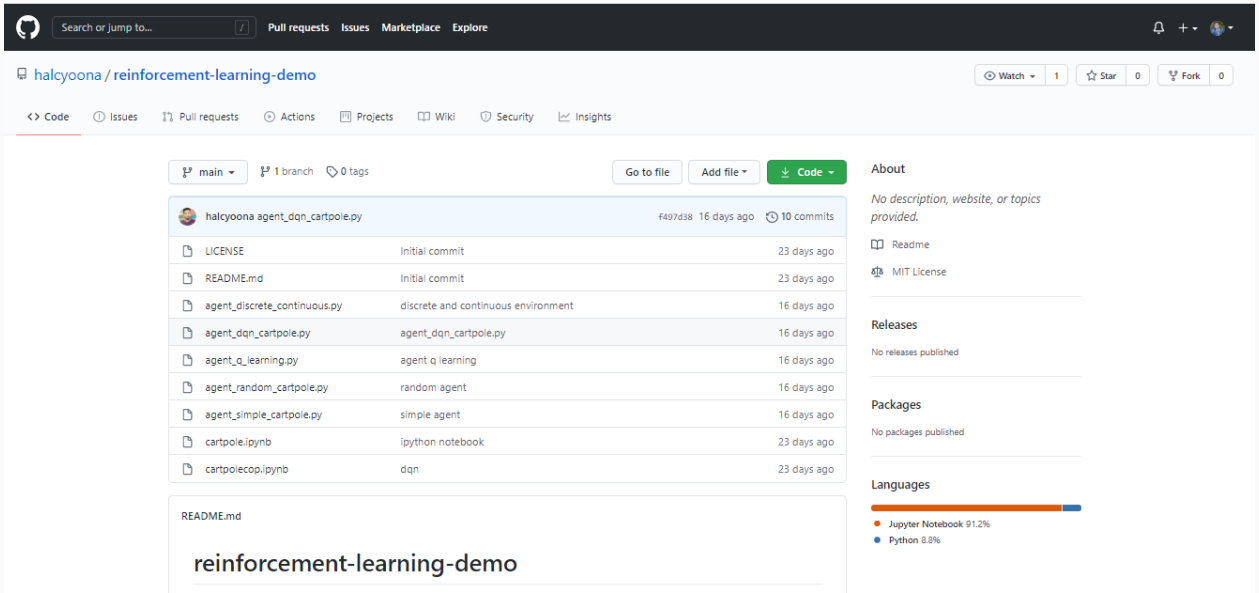

Figure 4: GitHub

Literature Review

Literature Review

- Dota-2 [1]

Literature Review

- Dota-2 [1]
- Alphago [2]

References

References

Christopher Berner, Greg Brockman, Brooke Chan, Vicki Cheung, Przemyslaw Debiak, Christy Dennison, David Farhi, Quirin Fischer, Shariq Hashme, Chris Hesse, et al.
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Questions?