Learning to play Pong with DQN

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1 Introduction

This

2 Deep Q-network (DQN)

Deep Q-network is a Reinforcement learning algorithm that combines the use of neural networks and the classic reinforcement learning technique, Q-learning. In Q-learning the agent

- Experience Replay
- Target network

3 Cartpole-v1

Hyperparameter	
memory_size	50000
n_episodes	1000
batch_size	32
lr	1e-4
train_frequency	1
gamma	0.95
anneal_length	10^4
n_actions	2

Table 1: Hyperparameters for CartPole-v1

Hyperparameter	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
target_update_frequency	100	5	150	100	100
gamma	0.95	0.95	0.95	0.95	0.95
eps_start	1.0	1.0	1.0	0.5	1.0
eps_end	0.05	0.05	0.05	0.05	0.5

Table 2: Hyperparameters for CartPole-v1

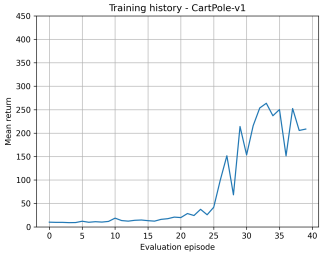
Discussion

Masking the terminating states difficult, Forgot to update state = next_state

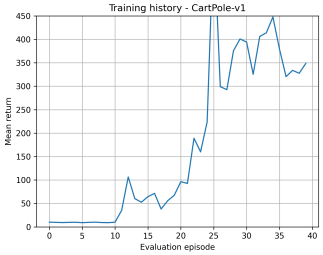
4 Pong

Discussion

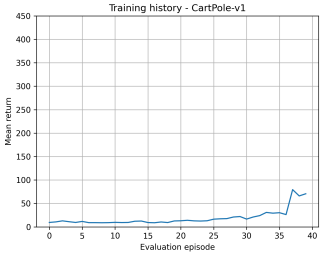
Stacking frames tricky, what actions to take during the 4 frames?



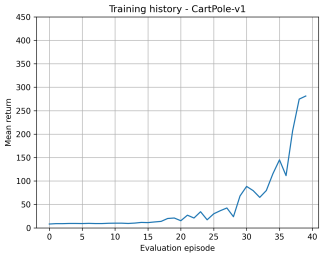
(a) Model 1



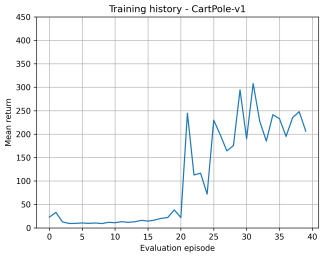
(b) Model 2



(c) Model 3



(d) Model 4



(e) Model 5

Hyperparameter	**Value**
Observation stack size	4
Replay memory capacity	10000
Batch size	32
Target update frequency	1000
Training frequency	4
Discount factor	0.99
Learning rate	1e-4
Initial epsilon	1.0
Final epsilon	0.01
Anneal length	10^6

Table 3: Hyperparameters

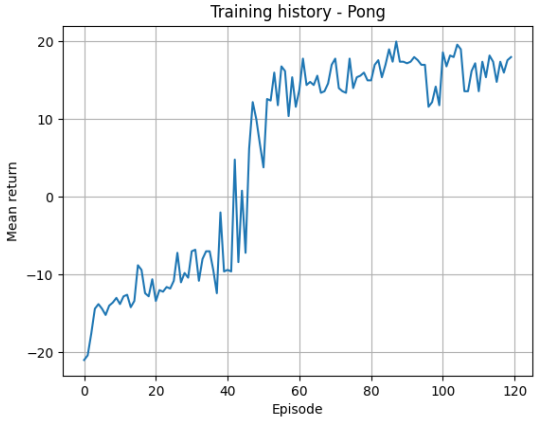


Figure 2: Example of caption