Investigating the Effects of Double Deep Q-Learning in Video Game Environment

Abstract

Over the past decade, the advancement of Deep Reinforcement Learning (DRL) has shown a great potential towards creating autonomous systems capable of understanding the surrounding world without supervision. This dissertation aims at examining the performance of Double Deep Q-Learning (DDQN) and Deep Q-Learning (DQN) techniques with different epsilon decay strategies on the learning and performance of a RL agent in a video gaming environment. Three AI agents including Deep-Q Network (baseline model) using decaying epsilon greedy strategy, Backward Q-Learning using greedy approach and Double Deep Q-Learning using sinusoidal exploration decay are trained and evaluated in different environments of a popular arcade-style game called Flappy Bird. The performance of the agents are measured using standard metrics such as maximum/average score and number of training iterations to achieve the best score.