

Deep Reinforcement Learning - Project1: Navigation

Training an Autonomous Agent Space Navigation Skills Using Deep Q-Network and Sensory Data

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1 Introduction

In this report, we explain our method to solve the first project Navigation in Udacity's Deep Reinforcement Learning course, using Deep Q-Networks. The task in this project is to train an autonomous agent to navigate a large and square space to collect bananas. The agent is rewarded +1 for collecting yellow bananas and -1 when collecting blue ones. The agent ultimate goal is to maximize his rewards. In this case, The state space information used to train this agent is defined by 37 dimensions of sensory information of the agent velocity and ray-based perception of objects around the agent's forward direction. Based on this information the agent takes discrete actions: 0 - move forward, 1 - move backwards, 2 - turn left, 3 - turn right. The goal is to design a policy PI based on Deep Q-Networks which maps the state information S into actions A which allow the agent to maximize his rewards R .

2 Method

Hyperparameter	Value
Number of episodes	500
Max number of timesteps per episode	2000
Epsilon start	1.0
Epsilon minimum	0.1
Epsilon decay	0.995
Replay buffer size	1e5
Batch size	64
γ (discount factor)	0.99
τ	1e-3
Learning rate	5e-4
update rate	4

Table 1. The Hyperparameters used in this project

3 Results

The environment solved in 424 episodes! Average Score: 13.00

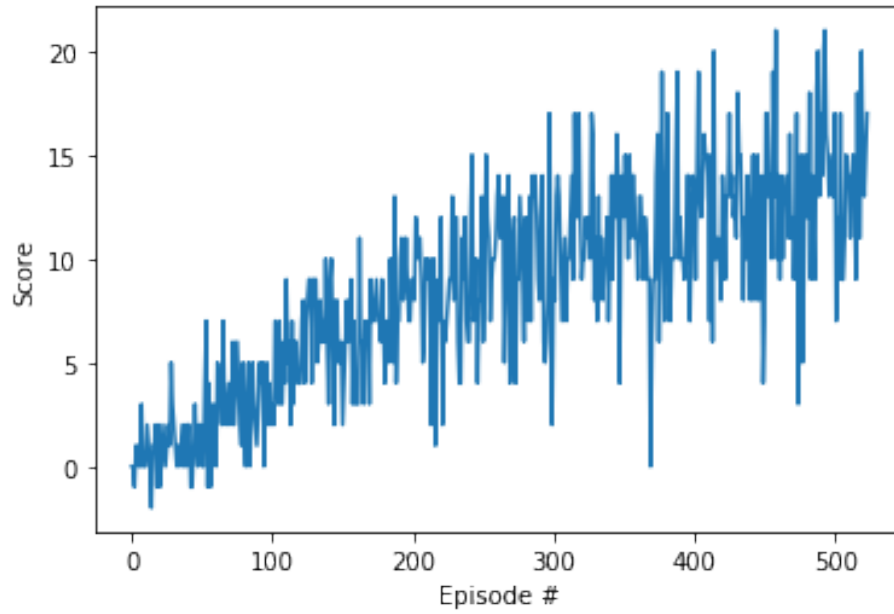


Fig. 1. A diagram showing the scores per episode