

Deep Reinforcement Learning Nanodegree Syllabus



Contact Info

While going through the program, if you have questions about anything, you can reach us at support@udacity.com. For help from Udacity Mentors and your peers visit the Udacity Classroom.

Nanodegree Program Info

Learn cutting-edge deep reinforcement learning algorithms—from Deep Q-Networks (DQN) to Deep Deterministic Policy Gradients (DDPG). Apply these concepts to train agents to walk, drive, or perform other complex tasks, and build a robust portfolio of deep reinforcement learning projects.

Prerequisite Skills

A well-prepared learner is able to:

- This program requires experience with Python, probability, machine learning, and deep learning.
- Intermediate to advanced Python experience. You are familiar with object-oriented programming. You can write nested for loops and can read and understand code written by others.
- Intermediate statistics background. You are familiar with probability.
- Intermediate knowledge of machine learning techniques. You can describe backpropagation, and have seen a few examples of neural network architecture (like a CNN for image classification).
- You have seen or worked with a deep learning framework like TensorFlow, Keras, or PyTorch before.

Required Software

- Jupyter notebook 6.0.1 or latest
- Anaconda 4.7
- Python 3.6
- IDE for C++ code OpenAI gym
- API stack for Deep RL Optional
- Unity Environment Optional
- AWS Regular acct. with CC

Version: 2.0.0

Length of Program: 100 Days*

** This is a self-paced program and the length is an estimation of total hours the average student may take to complete all required coursework, including lecture and project time. Actual hours may vary.*

Part 1: Introduction to Deep Reinforcement Learning

Part 2: Value-Based Methods

Project: Navigation

Train an agent to navigate a large world and collect yellow bananas, while avoiding blue bananas.

Supporting Lessons

Lesson	Summary
Study Plan	Obtain helpful resources to accelerate your learning in the second part of the Nanodegree program.
Deep Q-Networks	Extend value-based reinforcement learning methods to complex problems using deep neural networks.

Project: Optimize Your GitHub Profile

Other professionals are collaborating on GitHub and growing their network. Submit your profile to ensure your profile is on par with leaders in your field.

Supporting Lessons

Lesson	Summary
Opportunities in Deep Reinforcement Learning	Learn about common career opportunities in deep reinforcement learning, and get tips on how to stay active in the community.

Part 3: Policy-Based Methods

Project: Continuous Control

Train a double-jointed arm to reach target locations.

Supporting Lessons

Lesson	Summary
Study Plan	Obtain helpful resources to accelerate your learning in the third part of the Nanodegree program.
Introduction to Policy-Based Methods	Policy-based methods try to directly optimize for the optimal policy.
Policy Gradient Methods	Policy gradient methods search for the optimal policy through gradient ascent.
Proximal Policy Optimization	Learn what Proximal Policy Optimization (PPO) is and how it can improve policy gradients. Also learn how to implement the algorithm by training a computer to play the Atari Pong game.
Actor-Critic Methods	Miguel Morales explains how to combine value-based and policy-based methods, bringing together the best of both worlds, to solve challenging reinforcement learning problems.
Deep RL for Finance (Optional)	Learn how to apply deep reinforcement learning techniques for optimal execution of portfolio transactions.

Project: Improve Your LinkedIn Profile

Find your next job or connect with industry peers on LinkedIn. Ensure your profile attracts relevant leads that will grow your professional network.

Part 4: Multi-Agent Reinforcement Learning

Project: Collaboration and Competition

Train a pair of agents to play tennis.

Supporting Lessons

Lesson	Summary
Study Plan	Obtain helpful resources to accelerate your learning in the fourth part of the Nanodegree program.
Introduction to Multi-Agent RL	
Case Study: AlphaZero	



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