



Module Five Introduction

Module Five

Learning Objective

By the end of this module, you will meet this learning objective:



Apply Q-learning algorithms to programming problems

Module Overview

In the previous module, you learned about the basics of reinforcement learning and how an intelligent agent learns through trial and error. In this module, we will explore various types of algorithms used to implement reinforcement learning. One such algorithm that forms the foundation for many other algorithms is Q-learning.

Q-learning is a value-based reinforcement learning algorithm. It finds the optimal action-selection policy using a Q function, which is a value function that determines how good a state is for an agent to be in. Q-learning works based on the concept of a Q-table, which is a lookup table for calculating the expected future rewards for actions at each state. As part of the exploration process, the values of cells are updated using an iterative process that leverages Q function, which takes state and action as the input and returns expected future reward. Once the Q-table is populated, the agent will begin exploiting the environment and start taking better actions.

In Q-learning, as the numbers of states and actions increase, it becomes impractical to effectively leverage a Q-table because of the amount of memory required to save and update the states. The time required to explore each state will also increase drastically. Deep Q-learning helps to solve this problem by using a neural network to approximate the Q-function. Double-deep Q-learning is an improvisation of the deep Q-learning approach. In this module, you will explore the concepts behind Q-learning, deep Q-learning, and double-deep Q-learning through your readings and assignments.

As a part of your work for this module, you will complete an assignment and a milestone for Project Two. For your milestone, you will create the code for an intelligent agent to solve a pathfinding problem. This will require you to use the algorithms that you have learned about in this module. It is important to submit the work that you have completed, even if you are not able to completely finish the work for the milestone. This will allow you the opportunity to get feedback on your work before you submit the final version of your code in Project Two, which will be due in Module Seven.

Module at a Glance

This is the recommended plan for completing the reading assignments and activities within the module. Additional information can be found in the module Resources section and on the module table of contents page.

- 1** Review the Module Five resources.
- 2** Complete the Module Five Assignment.
- 3** Complete the Project Two Milestone.



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Activity Details

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Read this introduction to learn what you'll be working on in this module.

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