Module Four Introduction

Listen

Module Four

Learning Objective

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

- Explain the basic concepts of reinforcement learning

Module Overview

Recently, we have been seeing a rise in the evolution of self-driving cars. We are also seeing cutting-edge breakthroughs in technology where software is beating the world's best players in complex games such as go and chess. We can also see the increased use of robots in manufacturing, warehouses, and even in the home, performing tasks such as loading and unloading dishwashers. Behind every one of these different innovations is one common concept: reinforcement learning.

In previous modules, you discovered how machine learning could be used to predict a target or label, such as in your assignments with identifying the numbers from hand-written digits. Reinforcement learning is a whole different paradigm. Instead of predicting a label or target, reinforcement learning relies on a trial-and-error approach to find the best way to solve a problem.

An AI system typically consists of an agent and its environment. An agent could be anything that makes decisions, such as a person, machine, or software. Agents act in an environment. In reinforcement learning, agents can receive a reward or punishment for making a decision; right decisions will receive rewards and wrong decisions will receive punishments. Eventually, the agent will learn to make the right decisions.

Three key concepts of reinforcement learning are state, action, and reward. State indicates the current situation the agent is in. Action is what an agent can do in each state. Reward is feedback from the environment for taking an action, which could be positive or negative (punishment). For example, consider a robot learning to walk through hurdles. If it bumps into a hurdle, it will receive a negative reward, and the robot will remember not to repeat that mistake. For every step forward without bumping into a hurdle, it will receive a positive reward. Eventually, the robot will learn to walk by skipping the hurdles.

The Markov Decision Process (MDP) forms the basis for reinforcement learning, which is how an intelligent agent learns through trial and error. This module provides an important foundation for your work in the rest of the course, where you will learn more in depth about different types of

your work in the rest of the course, where you will learn more in depth about different types of algorithms and applications of reinforcement learning.

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 Four Resources.
2. Post your initial response to this week's discussion.
3. Submit Project One.
4. Review the Project Two reminder.
5. Post peer responses to the discussion.

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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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