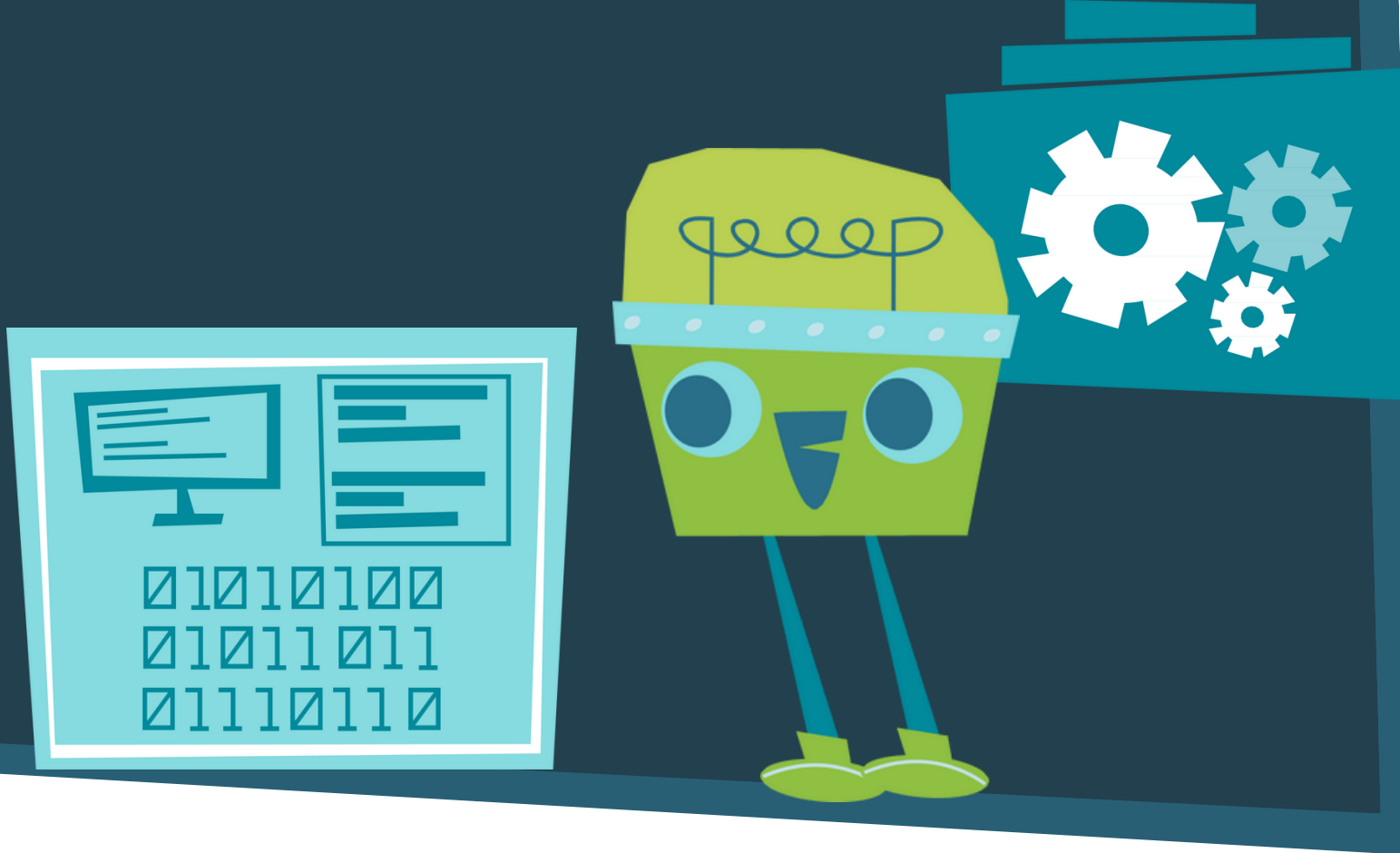




Success Through AI Mastery
STUDENT GUIDE

LESSON 2

Machine Learning Foundations



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Lesson 2:

Machine Learning Foundations

OVERVIEW

In this lesson, you will explore how Machine Learning works and how computers learn from data. You will get to know the three main types of Machine Learning: **Supervised Learning** (learning with a teacher/labels), **Unsupervised Learning** (finding patterns on its own), and **Reinforcement Learning** (learning through trial and error), and see how they help computers make predictions and decisions.



KNOWLEDGE CHECK

Instructions: Place a check mark (✓) next to the correct answer or write your answer in the space provided.

An email provider wants to improve its spam filter. They have a massive dataset of millions of emails that have already been manually labeled by users as either “spam” or “not spam.” Which type of machine learning would be the most effective approach to train a model for this task?

- ☐ a) Supervised Learning, because the AI learns from data that has already been labeled with correct answers.
- ☐ b) Unsupervised Learning, because the AI needs to discover the hidden patterns of spam emails on its own.
- ☐ c) Reinforcement Learning, because the AI should be rewarded for correctly identifying spam and penalized for errors.
- ☐ d) None of the above

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2. Match the type of machine learning to its description.

- **Supervised Learning** matches with: _____
- **Unsupervised Learning** matches with: _____
- **Reinforcement Learning** matches with: _____

A. Learns by trial and error, receiving rewards or penalties for its actions.

B. Learns from data that has been pre-labelled with the correct answers.

C. Learns by finding hidden patterns and structures in unlabeled data on its own.

3. An online retail company wants to better understand its customers. They have a huge database of customer purchase histories, but none of the data has been labelled or grouped. They want to use an AI to automatically identify natural groupings of customers with similar buying habits. Which type of machine learning is best suited for this goal?

- ☐ a) Supervised Learning
- ☐ b) Reinforcement Learning
- ☐ c) Unsupervised Learning
- ☐ d) All of the above

4. Imagine we're building a simple AI model to tell the difference between a hockey puck and a baseball. Using Supervised Learning, what would we need to do? Select all the steps that apply.

- ☐ Collect hundreds of pictures of hockey pucks.
- ☐ Collect hundreds of pictures of baseballs.
- ☐ Show the computer a single picture of a baseball and hope it figures it out.
- ☐ Label each picture correctly as either "hockey puck" or "baseball."
- ☐ Teach the computer the rules of hockey and baseball.

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ACTIVITY: CHOOSE YOUR LEARNING METHOD

Design your AI Companion: Step 2

Think about the AI Companion you proposed in Lesson 1. How would it learn to do its job?

1. State the Feature:

(e.g., "My AI, 'StudyBuddy', helps me review for tests by creating flashcards.")

2. Choose the type of Machine Learning:

Supervised, Unsupervised, or Reinforcement Learning)

3. Explain Your Choice:

Why is that the right type of ML? What kind of data would it need to learn from?

(e.g., "It would use Supervised Learning. I would feed it my class notes and textbook chapters (the data) and highlight the key terms and definitions (the labels).")

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LESSON 2 ANSWER KEY

1. a
2. Supervised: B, Unsupervised: C, Reinforcement: A
3. c
4. Collect puck pictures, Collect baseball pictures, Label pictures correctly.



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GLOSSARY

Machine Learning (ML): A subfield of AI that gives computers the ability to learn from data and make predictions or decisions without being explicitly programmed for every single task.

Artificial Intelligence (AI): The field of computer science focused on creating systems that can perform tasks that typically require human intelligence, such as learning, reasoning, and problem-solving.

Deep Learning (DL): A specialized subfield of Machine Learning that uses complex, multi-layered neural networks to learn from vast amounts of data and is especially powerful for tasks like image and speech recognition.

Supervised Learning: A type of Machine Learning where an AI model is trained on a dataset that has been pre-labeled with the correct answers, much like a student learning with an answer key.

Unsupervised Learning: A type of Machine Learning where an AI model is trained on unlabeled data and must find hidden patterns or structures on its own, without an answer key.

Reinforcement Learning: A type of Machine Learning where an AI agent learns to make decisions by performing actions in an environment and receiving rewards or penalties as feedback, similar to trial and error.

Labeled Data: Data that has been tagged with a correct answer or classification, which is then used to train models in Supervised Learning.

Algorithms: A set of step-by-step instructions or rules that a computer follows to perform a specific task or solve a problem.

Sentiment Analysis: An NLP application used to determine the emotional tone (positive, negative, or neutral) within a piece of text.