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Lesson 2: What is Machine Learning

◇ Introduction

Now that you've seen where machine learning is applied, it's time to truly understand **what machine learning is**. In this lesson, we'll define machine learning in simple terms, explore its different types of algorithms, and look at examples that demonstrate how these algorithms work in the real world.
Whether you're trying to build intelligent systems or just understand how Netflix knows what to recommend — it all starts with understanding the core concept of machine learning.

◇ What is Machine Learning?

Machine Learning is a field of computer science and artificial intelligence that focuses on building systems that can **learn from data** and **make decisions or predictions** without being explicitly programmed.
At its core, ML answers questions like:

"Will this customer buy the product?"
"What will the weather be like tomorrow?"
"Is there a cat in this image?"

◇ Types of Machine Learning Algorithms

Machine learning isn't a one-size-fits-all. There are three main categories of ML algorithms, each suited for different kinds of tasks:

✅ **1. Supervised Learning**

- **Definition: The model is trained on labeled data (input and known output).**
- **Goal: Predict the output for new, unseen data.**
- **Examples:**
  - **Predicting house prices.**
  - **Classifying emails as spam or not spam.**

🔍 **2. Unsupervised Learning**

- **Definition: The model is trained on data without labeled outputs.**
- **Goal: Find hidden patterns or structures in data.**
- **Examples:**
  - **Customer segmentation.**
  - **Market basket analysis.**

🔁 **3. Reinforcement Learning**

- **Definition: The model learns by interacting with an environment and receiving feedback in the form of rewards or penalties.**
- **Goal: Learn the best strategy (or policy) to maximize reward over time.**
- **Examples:**
  - **Game-playing AI (like AlphaGo).**
  - **Robotics and self-driving cars.**

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◇ Examples of Machine Learning in Action

Application	Algorithm Type	Description
House Price Prediction	Supervised	Predict the price based on features like location, size, etc.
Customer Segmentation	Unsupervised	Group customers based on behavior without predefined labels.
AI in Gaming	Reinforcement	AI learns to win by trial and error with rewards for success.
Email Spam Detection	Supervised	Classify emails as “Spam” or “Not Spam” using past labeled data.
Market Basket Analysis	Unsupervised	Discover which products are bought together.

◇ Outro

To Summarize the lesson

- Machine learning enables computers to learn from data.
- It’s categorized into **supervised**, **unsupervised**, and **reinforcement learning**, depending on how the model learns.
- Real-world examples span industries like finance, healthcare, entertainment, and retail.