



# IBM AI course (MOD 5)

## How does machine learning use different ways to solve different problems?

Machine learning solves problems in three ways:

Supervised learning

Unsupervised learning

Reinforcement learning

Let's explore each one!

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**Supervised learning** is about providing AI with enough examples to make accurate predictions.

All supervised learning algorithms need **labeled data**. Labeled data is data that is grouped into samples that are tagged with one or more labels. In other words, applying supervised learning requires you to tell your model:

1. What the key characteristics of a thing are, also called **features**
2. What the thing actually is

For example, the information might be drawings and photos of animals, some of which are dogs and are labeled “dog”. The machine will learn by identifying a pattern for “dog”. When the machine sees a new dog photo and is asked, “What is this?”, it will respond, “dog”, with high accuracy. This is known as a **classification problem**.

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In **unsupervised learning**, a person feeds a machine a large amount of information, asks a question, and then the machine is left to figure out how to answer the question by itself.

For example, the machine might be fed many photos and articles about dogs. It will classify and cluster information about all of them. When shown a new photo of a dog, the machine can identify the photo as a dog, with reasonable accuracy.

### **Learn how AI clusters information**

Here's an interactive demonstration to show you how an AI system labels and clusters images that are unlabeled.

**Unsupervised learning occurs when the algorithm is not given a specific “wrong” or “right” outcome. Instead, the algorithm is given unlabeled data.**

Unsupervised learning is helpful when you don't know how to classify data. For example, imagine you work for a banking institution and you have a large set of customer financial data. You don't know what type of groups or categories to organize the data. Here, an unsupervised learning algorithm could find natural groupings of similar customers in a database, and then you could describe and label them.

This type of learning has the ability to discover similarities and differences in information, which makes it an ideal solution for exploratory data analysis, cross-selling strategies, customer segmentation, and image recognition.

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**Reinforcement learning** is a machine learning model similar to supervised learning, but the algorithm isn't trained using sample data. This model learns as it goes by using trial and error. A sequence of successful outcomes is reinforced to develop the best recommendation for a given problem. The foundation of reinforcement learning is rewarding the “right” behavior and punishing the “wrong” behavior.

You might be wondering, what does it mean to “reward” a machine? Good question! Rewarding a machine means that you give your agent positive reinforcement for

performing the "right" thing and negative reinforcement for performing the "wrong" things.

### **Learn how AI uses trial and error**

Here's an interactive demonstration to show you how AI can learn through the process of trial and error to complete a task, and in this example get a reward.

As a machine learns through trial and error, it tries a **prediction**, then compares it with data in its **corpus**.

- Each time the comparison is *positive*, the machine receives positive numerical feedback, or a **reward**.
- Each time the comparison is *negative*, the machine receives negative numerical feedback, or a **penalty**.

Over time, a machine's predictions will grow to be more accurate. It accomplishes this *automatically* based on feedback, rather than through human intervention.