

Data Science Cont

In our previous lesson, we explored Graphs and Plots in Data Science. We learned how to visualize data using different types of plots such as bar charts, pie charts, count plot etc. These visualizations help us better understand our data.

Today's Focus: Machine Learning

Machine Learning (ML) is a core part of Data Science. Machine Learning focuses on creating models that can learn from data and make predictions or decisions. Later we will find out how Machine Learning is also part of AI.

Machine Learning is a powerful tool within it—used to make machine learn from data and make predictions.

Types of Learning in ML:

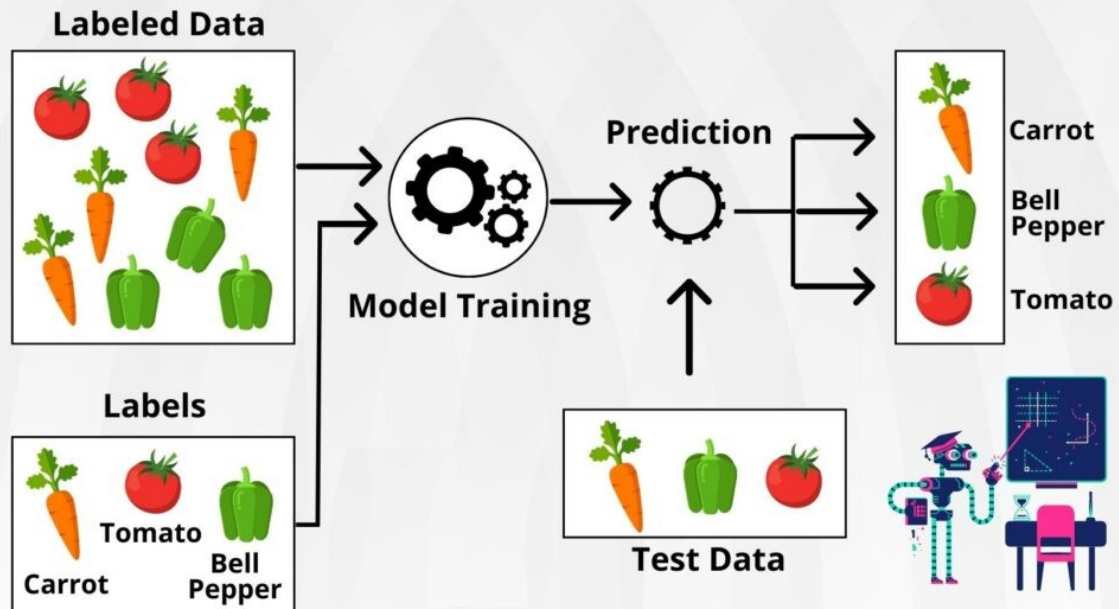
There are two main types of learning in ML: **Supervised Learning** and **Unsupervised Learning**.

1. Supervised Learning

- **What it is:** In supervised learning, we **teach the model using labeled data**. This means we provide both the **input (features)** and the **output (labels)**, so the model can learn from these examples and make predictions on new data.
- **Example:** Teaching a computer to identify cakes based on ingredients by showing it a bunch of cake recipes with their corresponding types. See example below

SUPERVISED LEARNING

Supervised machine learning is a branch of artificial intelligence that focuses on training models to make predictions or decisions based on labeled training data.

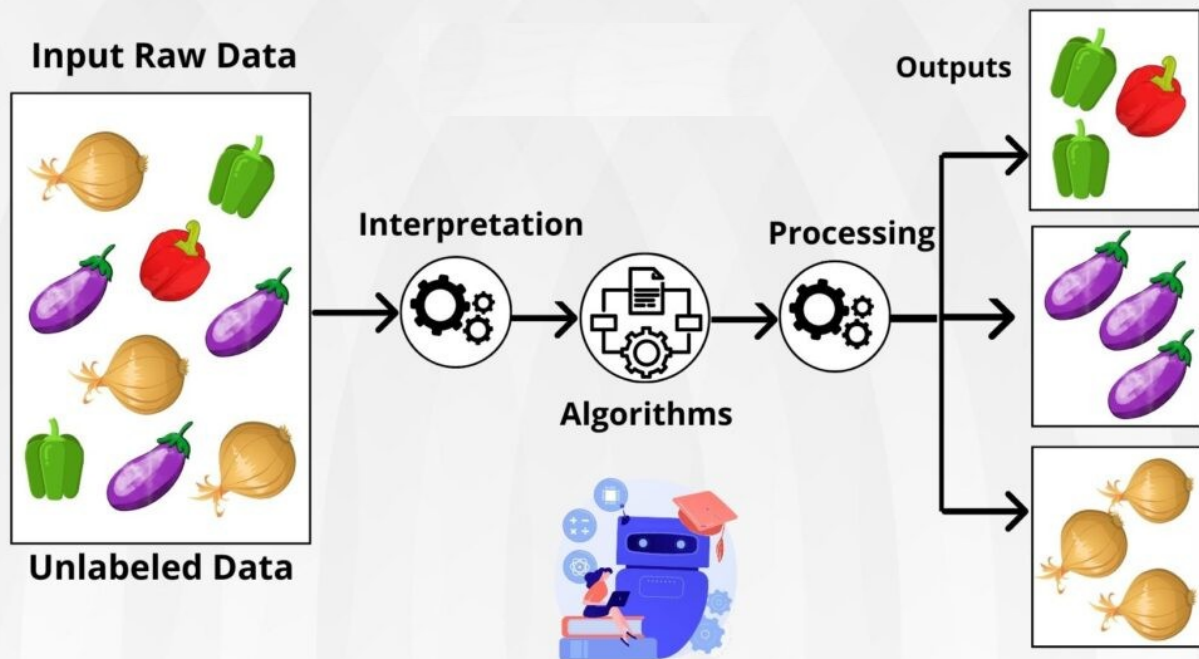


2. Unsupervised Learning

- **What it is:** In unsupervised learning, the model is given data **without labels**. It must find patterns, groupings, or structure in the data **on its own**.
- **Example:** Grouping similar customers together based on their shopping habits without knowing the group labels beforehand.

UNSUPERVISED LEARNING

Unsupervised learning is a type of machine learning where the algorithm learns from unlabeled data without any predefined outputs or target variables.



Supervised Learning: The Classroom Example

Imagine a **classroom** where the **teacher** trains the students:

- **Training:** The teacher gives the students lots of examples, explaining the lessons in detail. These are the **training data** (just like labeled data in supervised learning).
- **Testing:** After the training, the teacher gives a **test** to see how much the students have learned. This is like **testing the model** to see how well it predicts or classifies new data.

Supervised Learning with Cake Example

Now, let's use a **cake recipe** to understand **supervised learning**:

1. Step 1: Collect Data

We collect data about different cakes, including ingredients and the type of cake.

For example:

Ingredients	Cake Type
Flour, Sugar, Eggs, Milk	Sponge Cake
Flour, Sugar, Cocoa, Butter	Chocolate Cake
Flour, Butter, Sugar, Cream	Vanilla Cake

- This data is our **labeled data**. We know the ingredients (inputs) and the corresponding cake type (output).
- Step 2: Train the Model**
Using the labeled data, the model is trained to understand **which ingredients** lead to **which cake types**.
- Step 3: Test the Model**
After training, we give the model **new ingredients** (e.g., Flour, Sugar, Butter, Eggs) and ask it to predict the **type of cake**. The model will use what it learned during training to make an accurate guess (prediction).

Example:

If we give the model the ingredients **Flour, Butter, Sugar, Eggs**, it might predict **Butter Cake** because it has seen similar patterns in the training data.

Training and Testing Data

To train and test our **cake recipe model**, we need two sets of data:

- Training Data:** The set of cakes with their ingredients and types, used to **teach** the model.
- Testing Data:** A new set of cakes (with ingredients) that the model has never seen before, used to **evaluate** how well the model works.



In Summary:

- Machine Learning (ML)** is a part of **AI/Data Science** where machines learn from data.

- In **Supervised Learning**, the model is trained with data, tested with new data, and used to make predictions, like predicting a **cake type** based on its ingredients.

Next, we do a Supervised Learning – Cakes Classification Example

<https://colab.research.google.com/drive/1tu0UvklfVszdFlbLzBaO3ux1r9SZEwal?usp=sharing>