

## PRIOR KNOWLEDGE

### Machine learning

Machine learning is defined as making machines learn and act as humans by feeding them with data.

Supervised and Unsupervised Learning In Machine Learning | Machine Learning | What is Machine Learning?

Machine Learning is the science of making computers learn and act like humans by feeding data and information without being explicitly programmed!

The flowchart illustrates the machine learning process:

- Past Data** (represented by a bar chart icon) is used to **Train** the system.
- The system **Analyse** the data and **System Learns**.
- The trained system performs **Prediction** to produce an **Output** (represented by a cloud and gear icon).

Below the flowchart, three boxes describe the stages:

- Data is processed** (under Past Data)
- System Learns** (under the central computer icon)
- Machine Learning makes predictions and decisions based on past data** (under Output)

Video player controls show 1:12 / 9:39. The video is from the channel **simplilearn** on **YouTube**.

There are two types of learning in machine learning.

### 1. Supervised learning

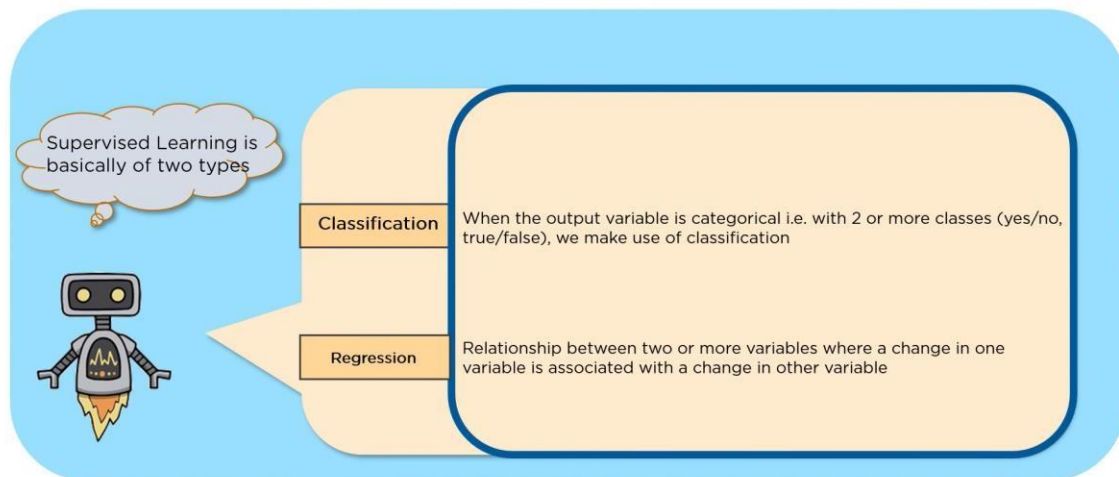
#### Supervised Learning



Supervised learning is done with the help of a labelled dataset.

## Two types of supervised learning

### Types of Supervised Learning



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## 1. Classification



Introduction to Machine Learning

### Classification Problem

**Goal:** predict category of new observation

Earlier Observations  $\xrightarrow{\text{Estimate}}$  CLASSIFIER

Unseen Data  $\xrightarrow{\text{CLASSIFIER}}$  Class



# Classification Applications

- Medical Diagnosis
- Animal Recognition

## Important:

- Qualitative Output
- Predefined Classes



## 2. Regression

# Regression

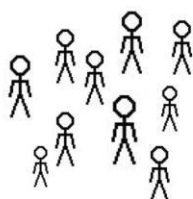
PREDICTORS



REGRESSION  
FUNCTION



RESPONSE



- Relationship: **Height - Weight?**
- Linear?
- Predict: **Weight** → **Height**



## Regression Model

Fitting a **linear** function

$$\text{Height} \approx \beta_0 + \beta_1 \times \text{Weight}$$

- **Predictor:** Weight
- **Response:** Height
- **Coefficients:**  $\beta_0, \beta_1$

**Estimate** on previous input-output

```
> lm(response ~ predictor)
```



## Regression Applications

- Payments → Credit Scores
- Time → Subscriptions
- Grades → Landing a Job
- Quantitative Output
- Previous **input-output** observations

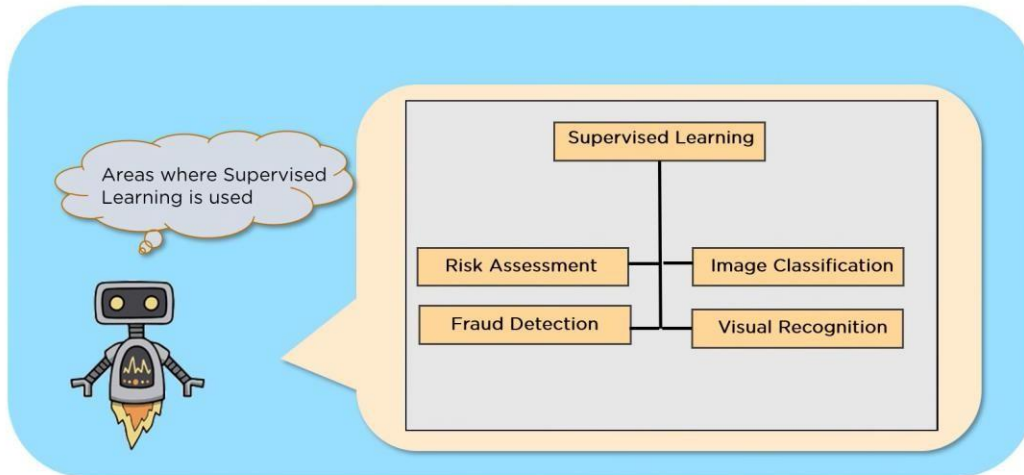


## Applications of supervised learning

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### Applications of Supervised Learning

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## 2. Unsupervised learning

Unsupervised learning is defined as using unlabelled data to train the model.

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### Unsupervised Learning

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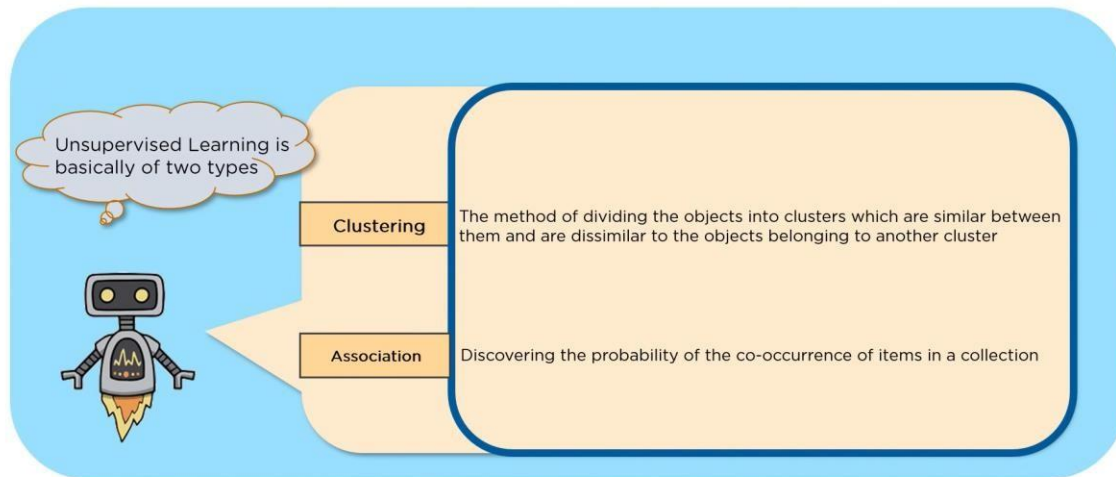


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## Types of unsupervised learning

### Types of Unsupervised Learning



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#### a) Clustering



DataCamp

Introduction to Machine Learning

## Clustering

- **Clustering:** grouping objects in clusters
  - *Similar* within cluster
  - *Dissimilar* between clusters
- **Example:** Grouping similar animal photos
  - No labels
  - No **right** or **wrong**
  - Plenty possible clusterings



#### b) Association

## Applications of unsupervised learning

### Applications of Unsupervised Learning

