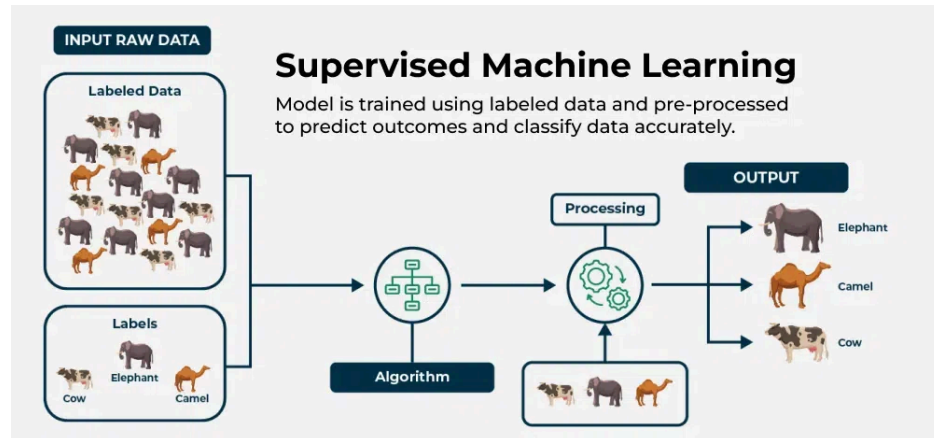


Types of Machine Learning

There are four types of Machine Learning

1- Supervised Learning

- Supervised ML uses the labeled data (data with inputs and their corresponding outputs)
- Understand the relation and identify the patterns between the input and output and based on that make predictions on new data

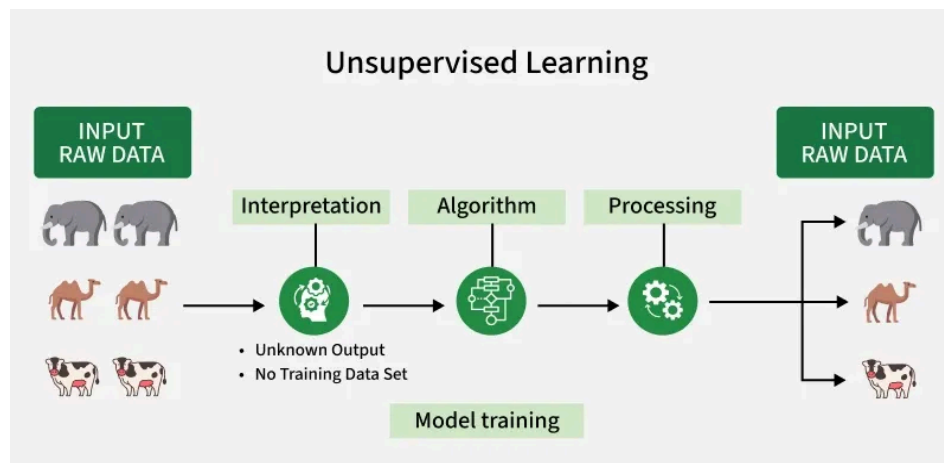


Types of Supervised Learning:

- **Regression** : Where the output is a continuous variable (e.g., predicting house prices, stock prices)
- **Classification** Where the output is a categorical variable (e.g., spam vs. non-spam emails, yes vs. no)

2- Unsupervised Learning

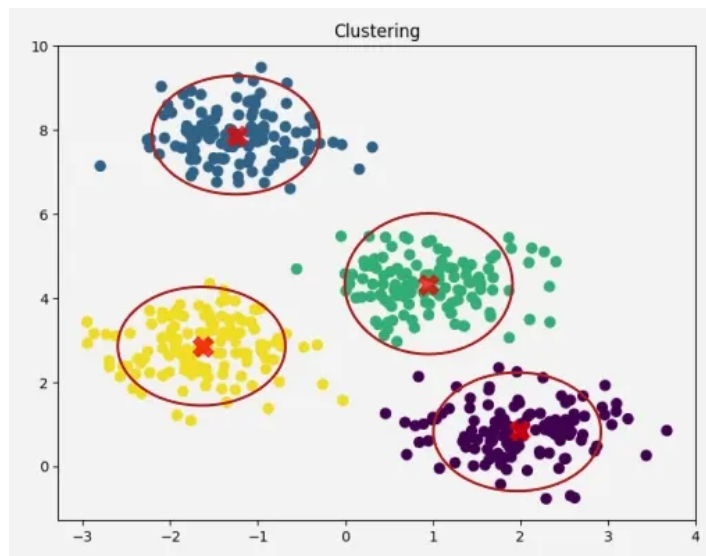
→ Unsupervised learning uses unlabeled data to discover hidden patterns, structures, and relationships within the data without any prior knowledge or human guidance



→ As we can't make prediction in unsupervised learning so we do 4 things:

- 1- Clustering
- 2- Dimensionality Reduction
- 3- Anomaly Detections
- 4- Association Rule Learning

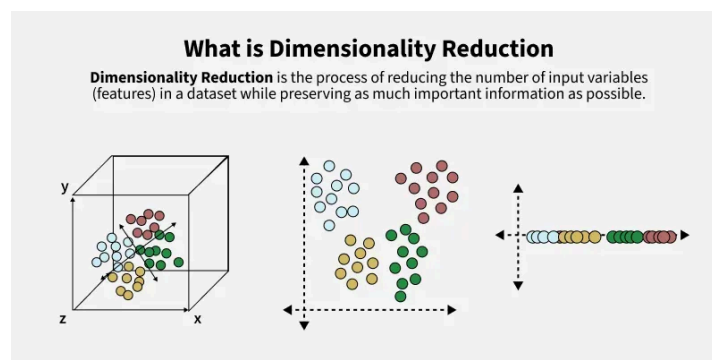
- **Clustering:** technique that groups similar data points together into clusters based on their characteristics, without using any labeled data.



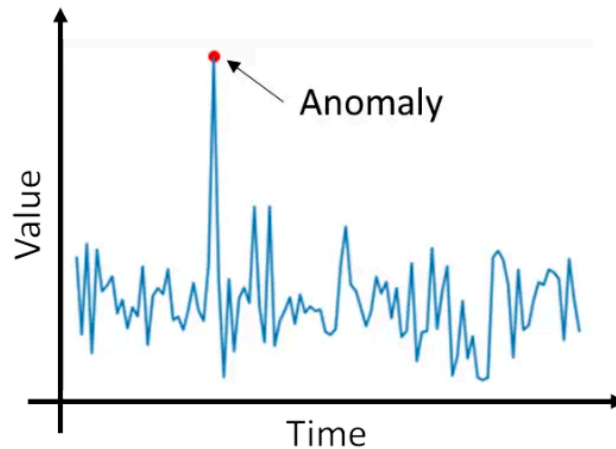
- **Dimensionality Reduction:**

→ When working with machine learning models, datasets with too many features can cause issues like slow computation, overfitting and sometimes by adding more column doesn't create any impact on the model performance

→ Dimensionality reduction helps to reduce the number of features while retaining key information.



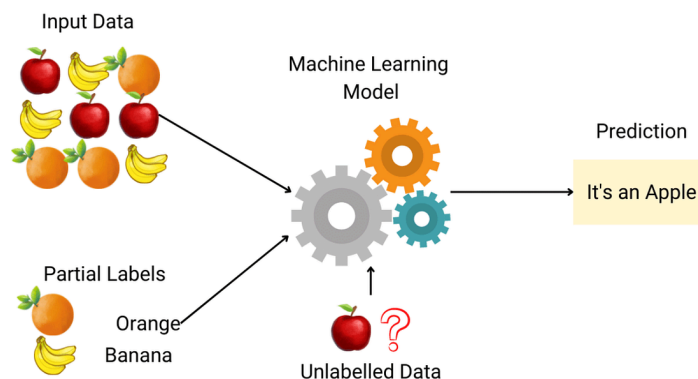
- **Anomaly Detection:** it's a technique also called outlier detection, is the identification of unexpected events, observations, or items that differ significantly from the normal



- **Association Rule Learning:** Association rules are a fundamental concept used to find relationships, correlations or patterns within large sets of data items.

3- Semisupervised Learning

- machine learning approach that trains models using both a small amount of labeled data and a large amount of unlabeled data
- bridges the gap between fully supervised learning (only labeled data) and unsupervised learning (only unlabeled data) to improve model accuracy and efficiency.
- It is particularly useful when acquiring large amounts of labeled data is expensive or time-consuming



4- Reinforcement Learning

- In reinforcement learning we don't have any data
- the algorithm start learning from the scratch
- we called 'Agent' to the algorithm

- the agent learns to make decisions by interacting with an environment through trial and error, receiving rewards or penalties for its actions
- the goal of agent is to maximize the reward

