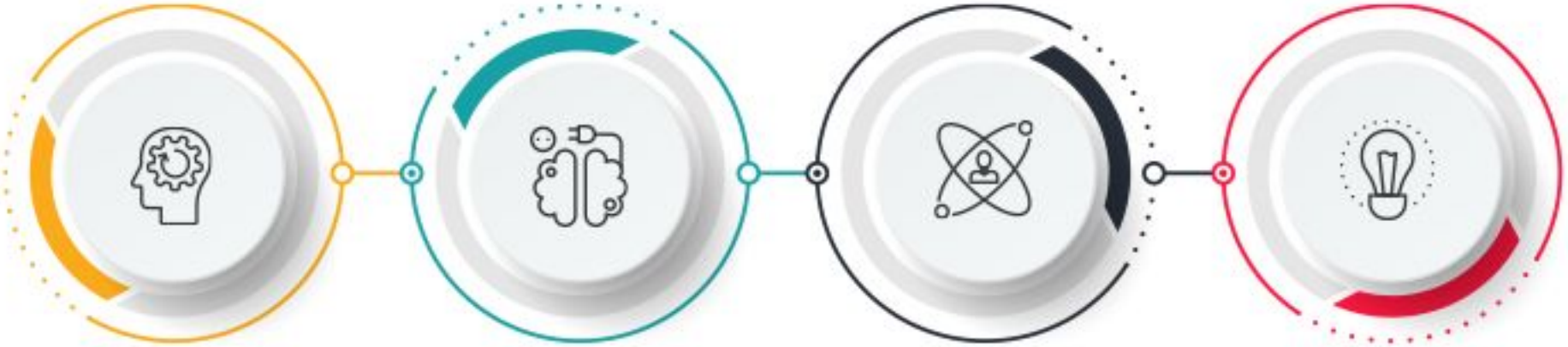
What Is Machine Learning?

Machine learning (ML) is a discipline of artificial intelligence (AI) that provides machines with the ability to automatically learn from data and past experiences while identifying patterns to make predictions with minimal human intervention.

TYPES OF MACHINE LEARNING



Supervised Machine Learning

Unsupervised Machine Learning

Semi-Supervised Learning

Reinforcement Learning

1. **Supervised Learning**

In supervised learning, the algorithm is trained on labeled data, where the correct output is already known.

The goal is to learn a mapping between input data and output labels, so the algorithm can make accurate predictions on new, unseen data.

Examples :- image classification, sentiment analysis, and spam detection.

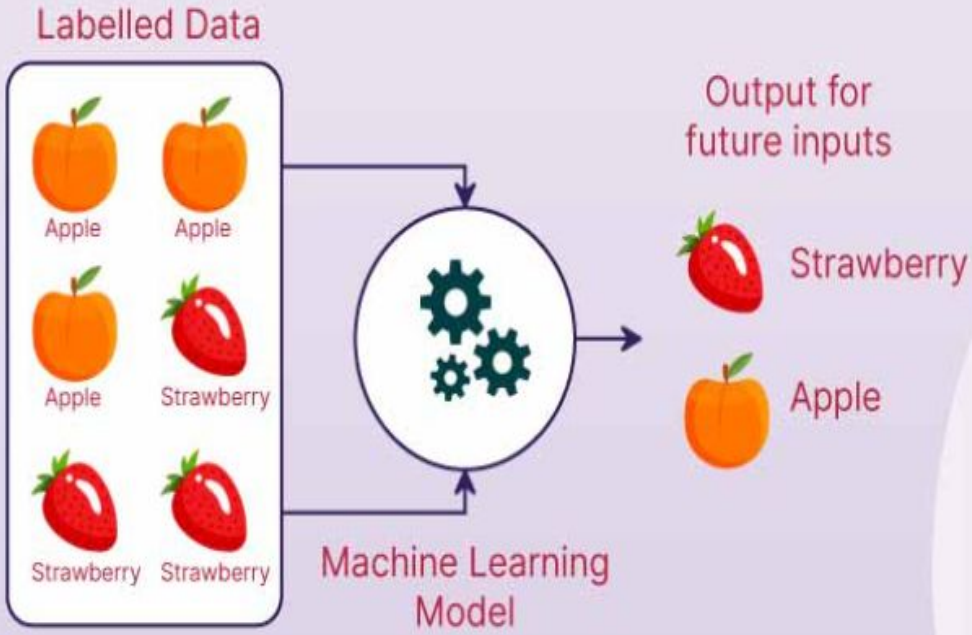
Example of Label Data:-

Consider the following data regarding patients entering a clinic .

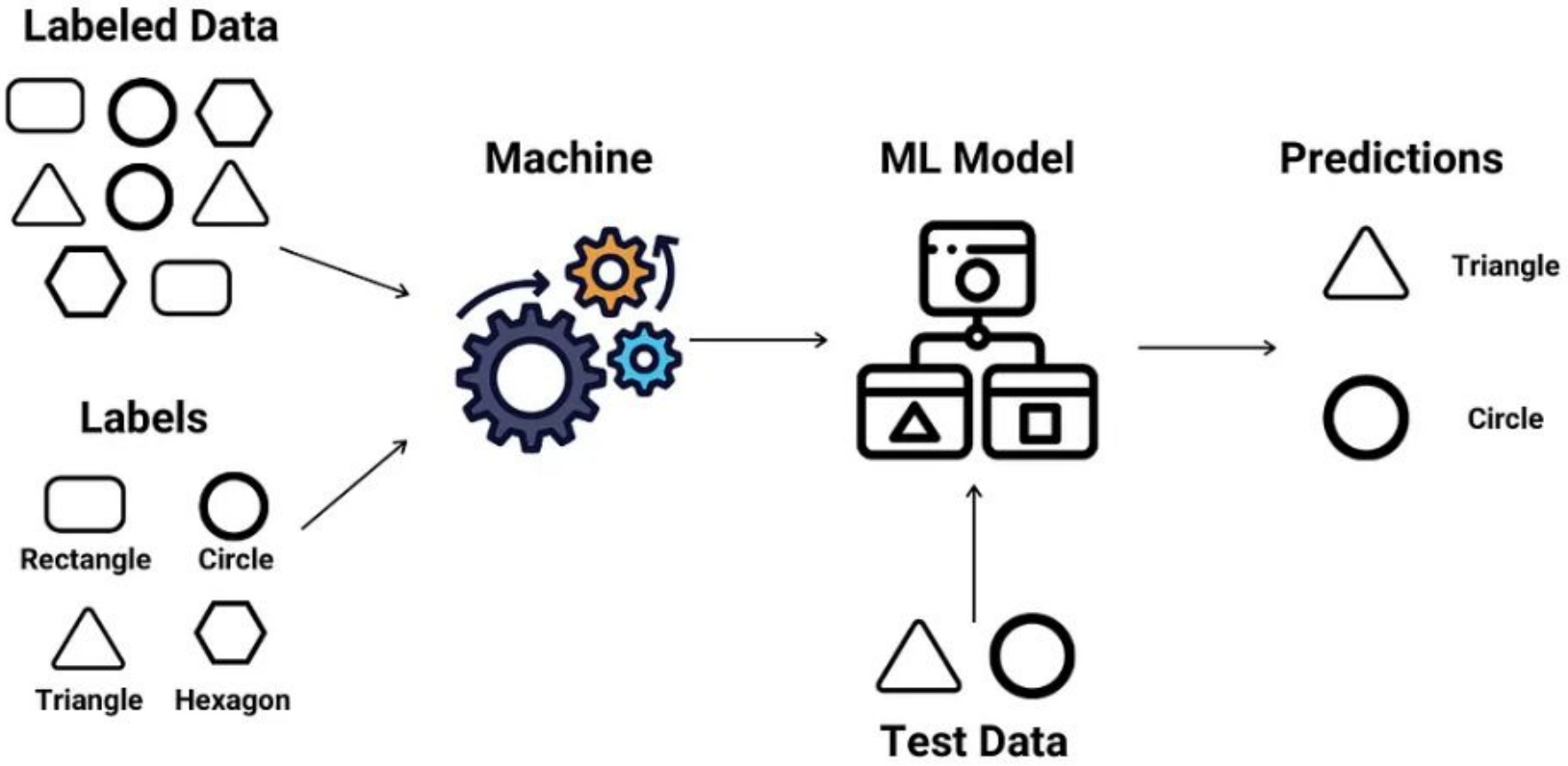
The data consists of the gender and age of the patients and each patient is labeled as “healthy” or “sick”.

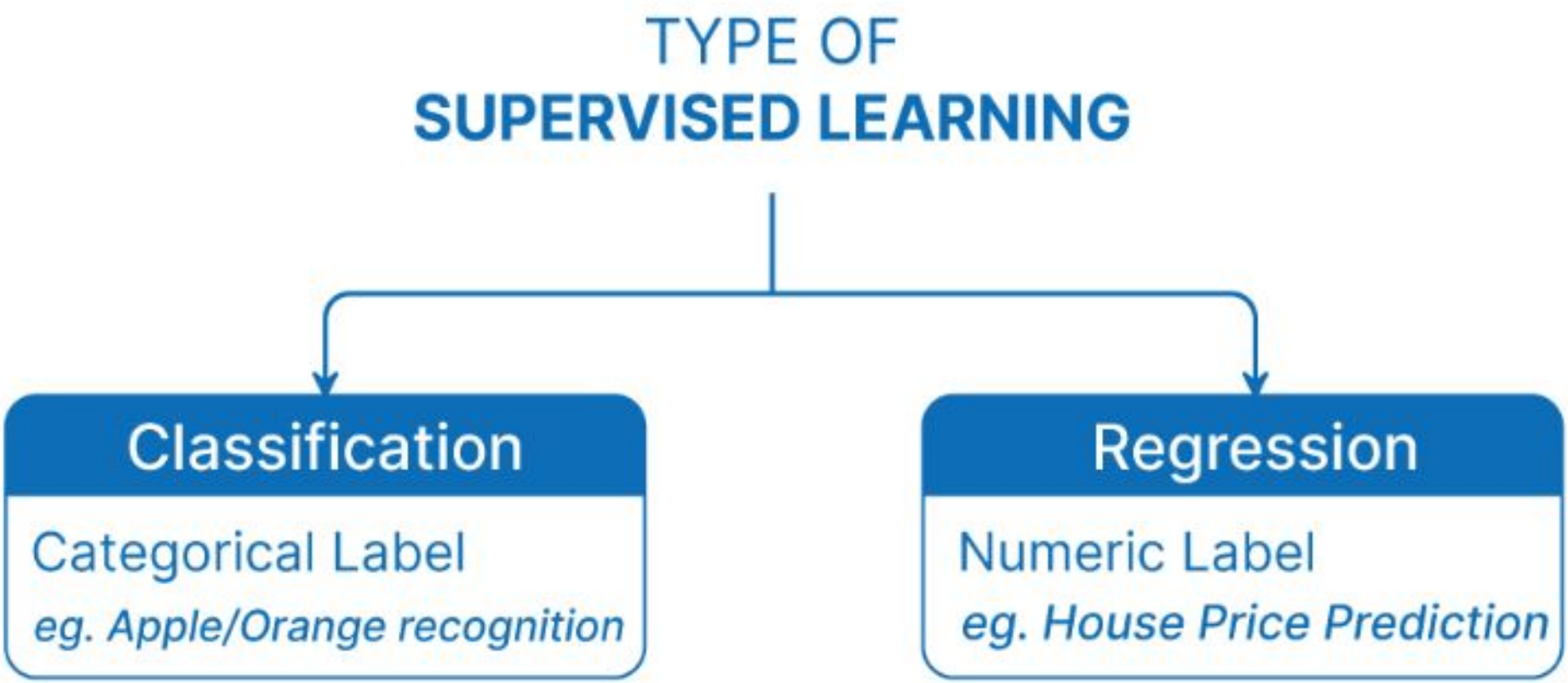
Gender	Age	Label
M	48	sick
M	67	sick
F	53	healthy
M	49	sick
F	32	healthy
M	34	healthy
M	21	healthy

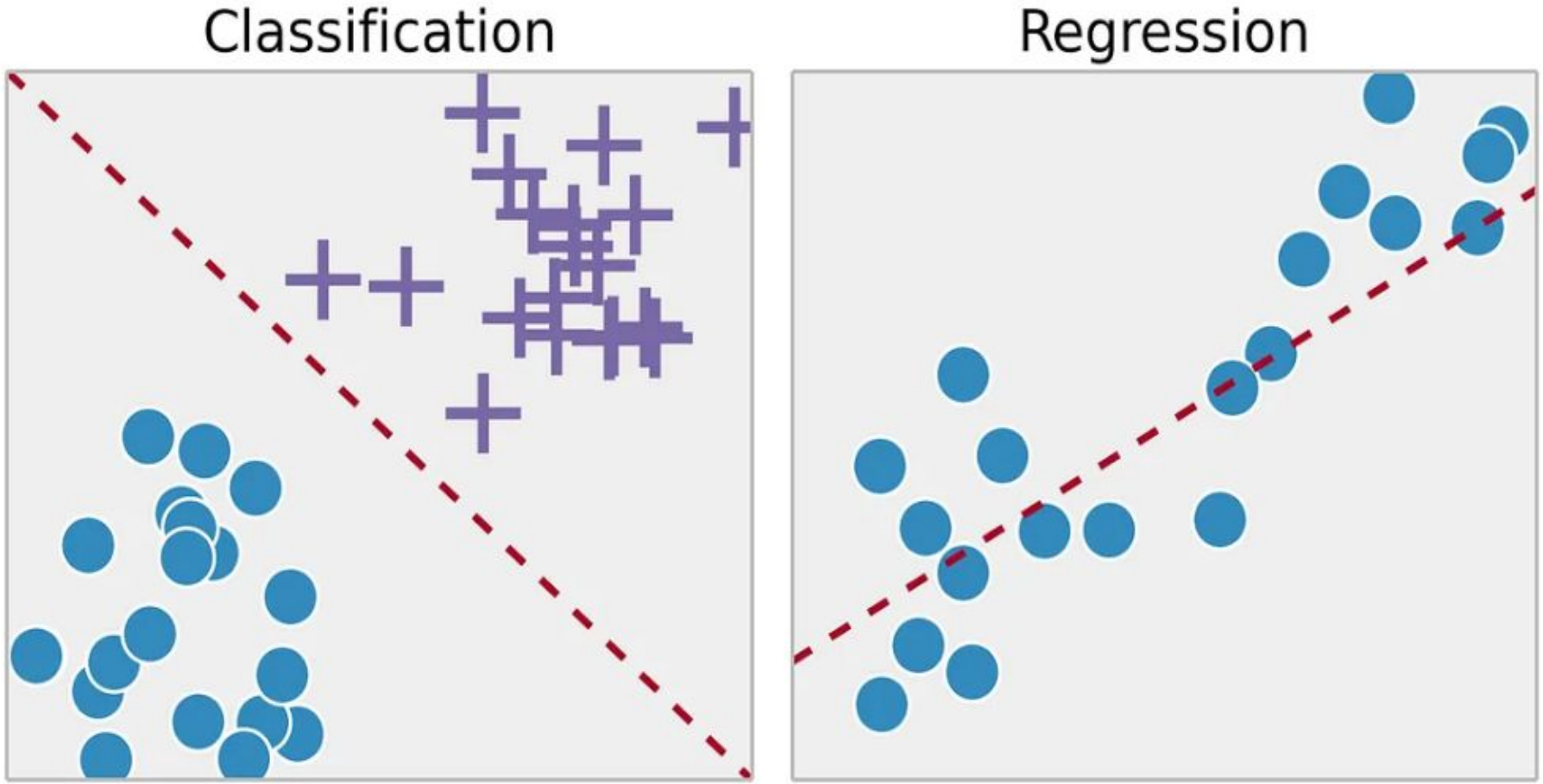
Supervised
Machine Learning



Supervised Learning




TYPE OF
SUPERVISED LEARNING
Classification
Categorical Label
eg. Apple/Orange recognition
Regression
Numeric Label
eg. House Price Prediction


Classification
Regression

2. Unsupervised learning:-

In unsupervised learning, the algorithm is trained on unlabeled data, and the goal is to discover patterns, relationships, or structure within the data.

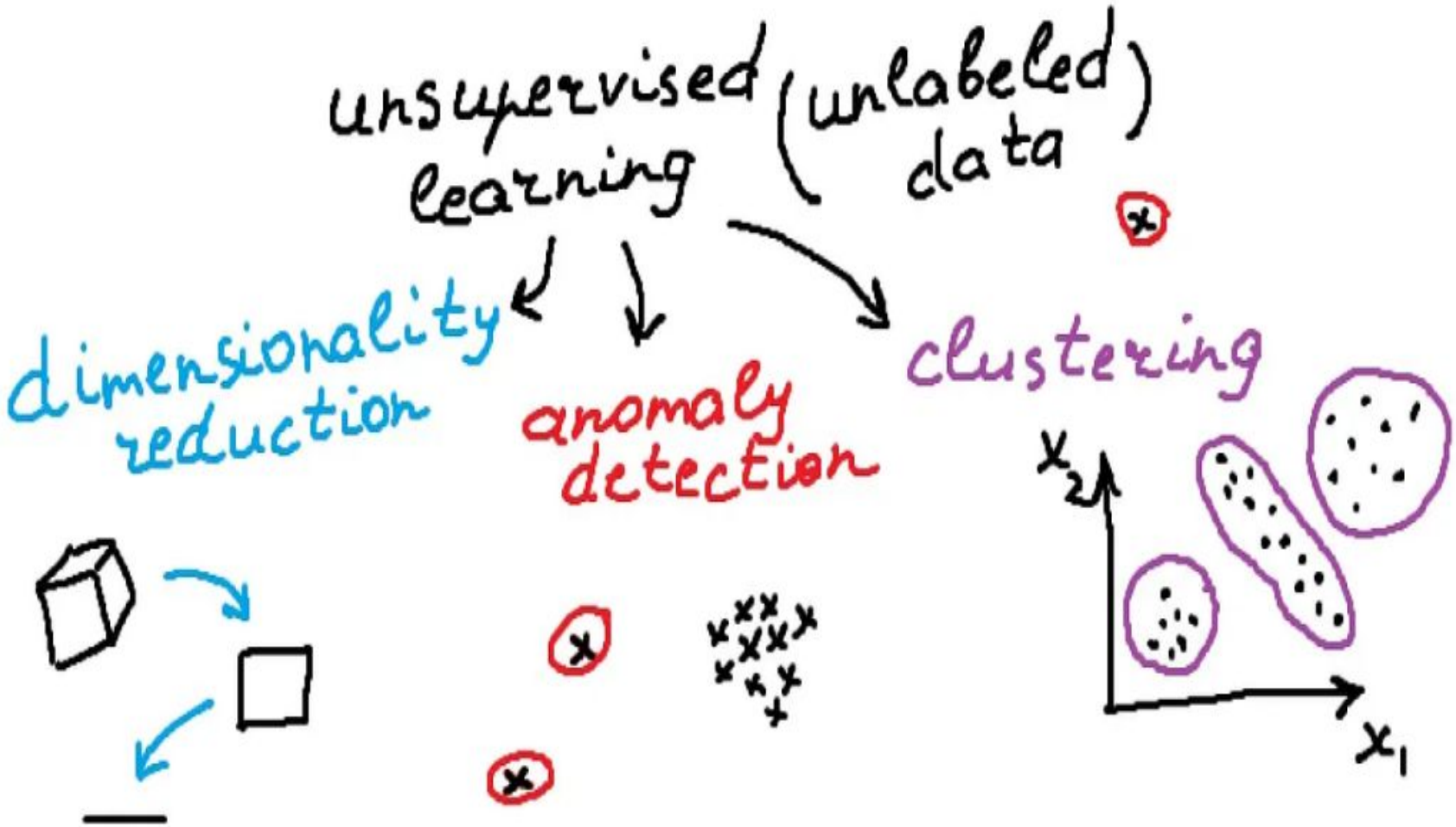
Examples:- clustering, dimensionality reduction, and anomaly detection

Example of Un Label data:-

Consider the following data regarding patients entering a clinic.

The data consists of the gender and age of the patients.

Gender	Age
M	48
M	67
F	53
M	49
F	34
M	21


unsupervised learning (unlabeled data)
dimensionality reduction
anomaly detection
clustering
x_2
x_1

Three of the most popular unsupervised learning tasks are:

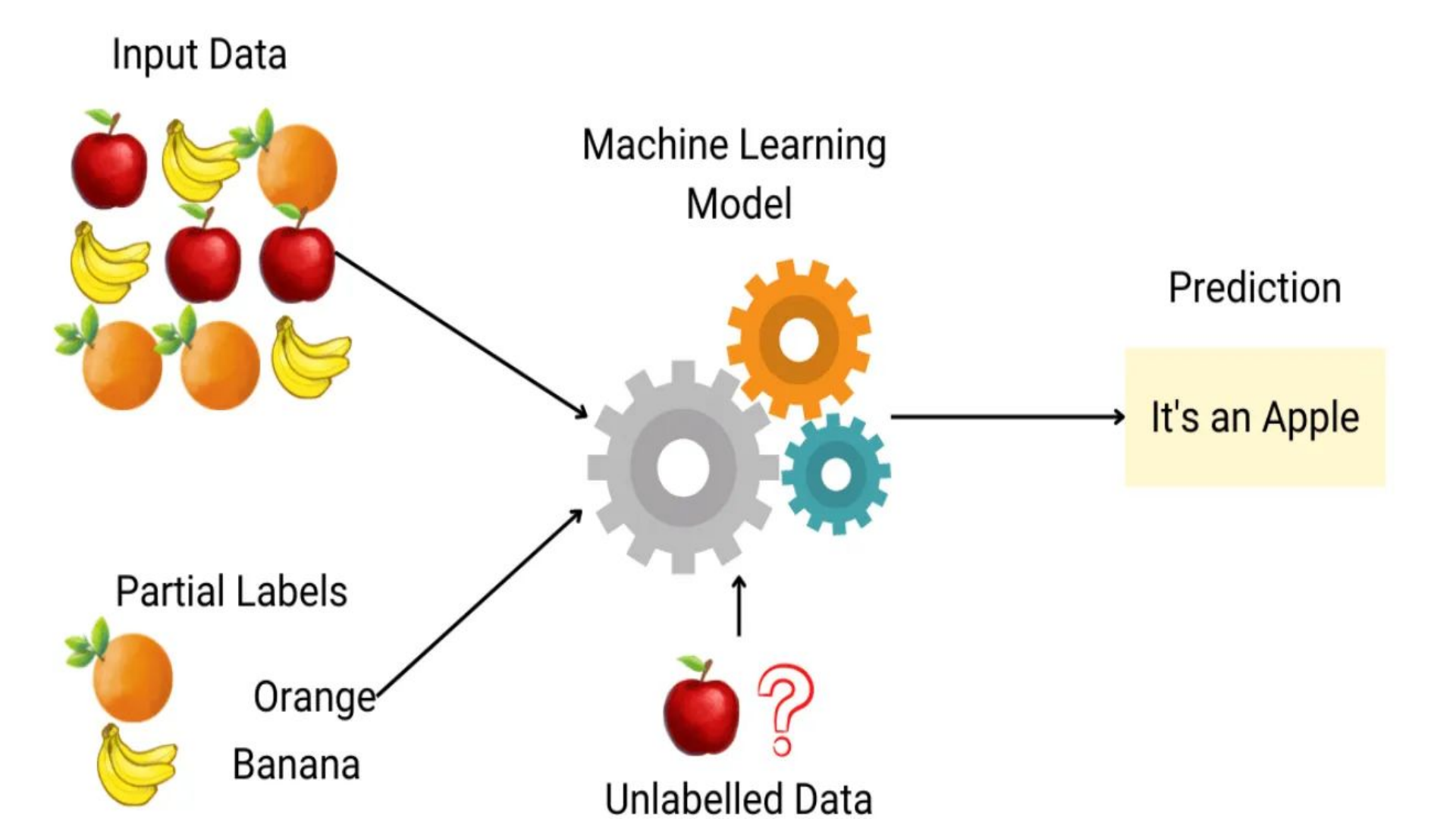
Dimensionality Reduction— the task of reducing the number of input features in a dataset.

Anomaly Detection— the task of detecting instances that are very different from the norm.

Clustering — the task of grouping similar instances into clusters.

3. Semi-supervised learning

Semi-supervised learning is a type of machine learning that combines the benefits of supervised and unsupervised learning. In semi-supervised learning, the algorithm is trained on a dataset that contains both labeled and unlabeled data.


Input Data
Machine Learning Model
Prediction
It's an Apple
Partial Labels
Orange
Banana
Unlabelled Data

Labeled data:- A small portion of the data is labeled, meaning that it has been annotated with the correct output or response. This labeled data is used to supervise the learning process, similar to supervised learning.

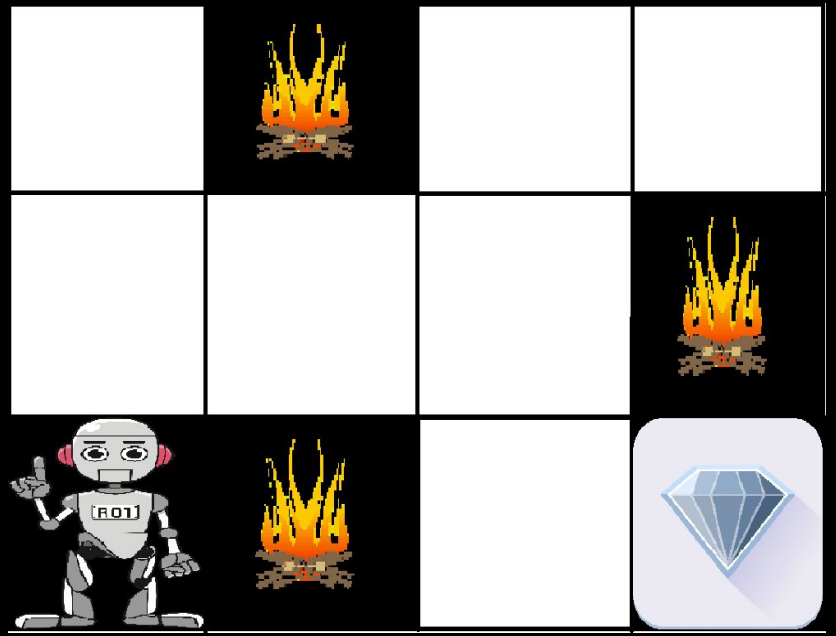
Unlabeled data:- The majority of the data is unlabeled, meaning that it does not have any annotations or correct outputs. This unlabeled data is used to provide additional information to the algorithm, similar to unsupervised learning.

4.Reinforcement learning (RL)

RL enables AI-based systems to take actions in a dynamic environment through trial and error to maximize the collective rewards based on the feedback generated for individual

Example: -

We have an agent and a reward, with many hurdles in between. The agent is supposed to find the best possible path to reach the reward.



The above image shows the robot, diamond, and fire. The goal of the robot is to get the reward that is the diamond and avoid the hurdles that are fired. The robot learns by trying all the possible paths and then choosing the path which gives him the reward with the least hurdles.

Each right step will give the robot a reward and each wrong step will subtract the reward of the robot. The total reward will be calculated when it reaches the final reward that is the diamond.