Supervised Learning

- Supervised learning is a type of machine learning where an algorithm is trained on labeled data.

- The goal of the algorithm is to learn a mapping from inputs to outputs that can then be used to predict the labels of new, unseen data.

- Examples :

    1. Email Spam Detection
    2. Credit Scoring
    3. Image Recognition

- Algorithms :

    1. Linear Regression
    2. Logistic Regression
    3. Support Vector Machines (SVM)

Unsupervised Learning

- Unsupervised Learning is a type of machine learning where the algorithm is trained on unlabeled data

- Unsupervised learning algorithms aim to discover patterns, relationships, and structures from the input data without any supervision or guidance on what those patterns should be.

- Examples :

    1. Customer Segmentation
    2. Anomaly Detection
    3. Document Clustering

- Algorithms :

    1. K-Means Clustering
    2. Hierarchical Clustering
    3. Principal Component Analysis (PCA)

Reinforcement Learning

- Reinforcement learning is a type of machine learning where an agent learns to make decisions by performing actions in an environment to maximize reward.

- The agent interacts with the environment in discrete time steps, making decisions based on the current state, receiving rewards, and observing the new state that results from the action

- Key Concepts :

    1. Agent
    2. Environment
    3. State
    4. Action
    5. Reward
    6. Policy
    7. Value Function

- Examples :

    1. Robotics
    2. Gaming
    3. Healthcare

- Algorithm :

    1. Q-Learning
    2. Deep Q-Learning
    3. Actor-Critic Method

Classification Vs Regression Vs Clustering

1. Purpose :
    - Classification : Categorize data into predefined classes or labels
    - Regression : Predicts continuous Values
    - Clustering : Groups similar data points together without predefined labels

2. Output :
    - Classification : Discrete labels
    - Regression : Continuous Values
    - Clustering : Segmentation

3. Examples :
    - Classification : Email filtering, image recognition etc
    - Regression : Stock market prediction, weather prediction etc
    - Clustering : Image compression, anomaly detection