

# ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

## DAY – 2

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### TYPES OF MACHINE LEARNING

There are several types of machine learning, each with special characteristics and applications. Some of the main types of machine learning algorithms are as follows:

1. Supervised Machine Learning
2. Unsupervised Machine Learning
3. Reinforcement Learning

Additionally, there is a more specific category called semi-supervised learning, which combines elements of both supervised and unsupervised learning.

#### 1. Supervised Machine Learning

Supervised learning is defined as when a model gets trained on a "Labelled Dataset". Labelled datasets have both input and output parameters. In Supervised Learning algorithms learn to map points between inputs and correct outputs. It has both training and validation datasets labelled.

There are two main categories of supervised learning that are mentioned below:

- Classification
- Regression

#### 2. Unsupervised Machine Learning

Unsupervised Learning Unsupervised learning is a type of machine learning technique in which an algorithm discovers patterns and relationships using unlabeled data. Unlike supervised learning, unsupervised learning doesn't involve providing the algorithm with labeled target outputs. The primary goal of Unsupervised learning is often to discover hidden patterns, similarities, or clusters within the data, which can then be used for various purposes, such as data exploration, visualization, dimensionality reduction, and more.

There are two main categories of unsupervised learning that are mentioned below:

- Clustering
- Association

#### 3. Reinforcement Machine Learning

Reinforcement machine learning algorithm is a learning method that interacts with the environment by producing actions and discovering errors. Trial, error, and delay are the most relevant characteristics of reinforcement learning. In this technique, the model keeps on

increasing its performance using Reward Feedback to learn the behavior or pattern. These algorithms are specific to a particular problem e.g. Google Self Driving car, AlphaGo where a bot competes with humans and even itself to get better and better performers in Go Game. Each time we feed in data, they learn and add the data to their knowledge which is training data. So, the more it learns the better it gets trained and hence experienced.

Here are some of most common reinforcement learning algorithms:

- **Q-learning:** Q-learning is a model-free RL algorithm that learns a Q-function, which maps states to actions. The Q-function estimates the expected reward of taking a particular action in a given state.
- **SARSA (State-Action-Reward-State-Action):** SARSA is another model-free RL algorithm that learns a Q-function. However, unlike Q-learning, SARSA updates the Q-function for the action that was actually taken, rather than the optimal action.
- **Deep Q-learning:** Deep Q-learning is a combination of Q-learning and deep learning. Deep Q-learning uses a neural network to represent the Q-function, which allows it to learn complex relationships between states and actions.

## Types of Reinforcement Machine Learning

There are two main types of reinforcement learning:

### Positive reinforcement

- Rewards the agent for taking a desired action.
- Encourages the agent to repeat the behavior.
- Examples: Giving a treat to a dog for sitting, providing a point in a game for a correct answer.

### Negative reinforcement

- Removes an undesirable stimulus to encourage a desired behavior.
- Discourages the agent from repeating the behavior.
- Examples: Turning off a loud buzzer when a lever is pressed, avoiding a penalty by completing a task.