Assignment: Machine Learning Basic

Questions:-

1. Supervised Machine learning with example?

2. Unsupervised machine learning with example?

3. Reinforcement learning with example ?

4. Classification vs regression vs clustering ?

Machine Learning:-

Machine Learning is nothing but it is a subset of AI (Artificial Intelligence). It's provide us stats tools to explore, visualize and analysis and perform prediction and other tasks with the help of data.

The kind of stats tools it can provide its can be statistical algorithms and it can be concepts that involve in some kind of algorithms to work on the database on that to make some amazing prediction.

If we talk about machine learning, there is 2 types of technique:-

(1) Supervised Machine learning

(2) Unsupervised Machine learning

**(1) Supervised Machine Learning with example:-**

In Supervised Machine learning, we solve 2 kind of problem statements:-

(a) Regression and

 (b) Classification

In supervised machine learning, we will be having a dataset, in that dataset we will be know what will be the output variable, what will be the target variable we will be knowing it in the case of Supervise machine learning. In Supervised machine learning based on some input we will be able to predict some kind of output.

Supervised Learning
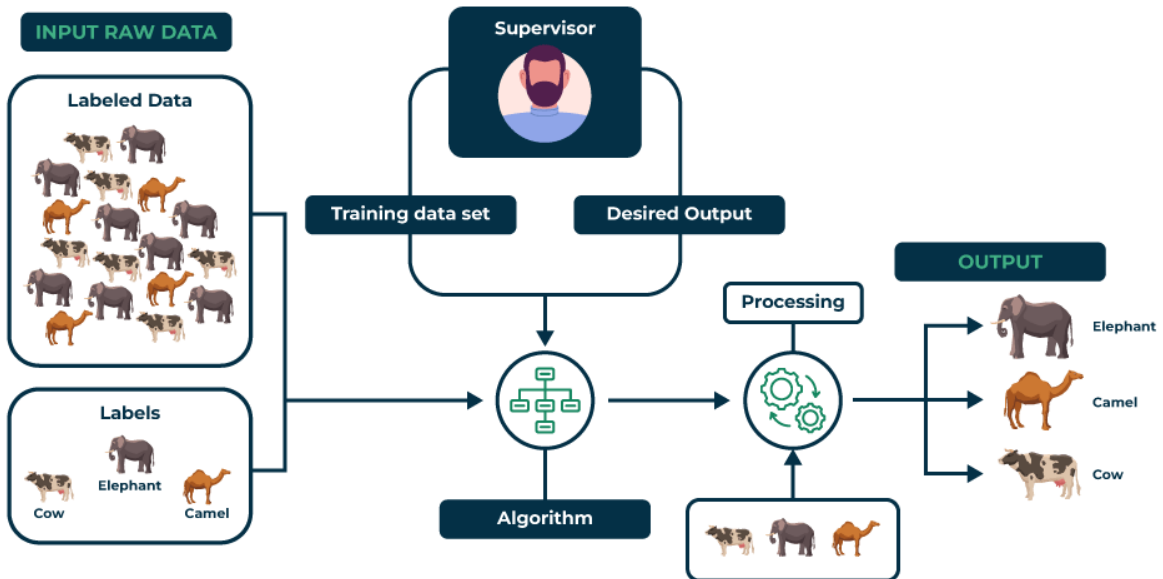
Below are the algorithms:-

(A) Regression :-

(i)   Linear regression

(ii)   Multi linear regression

(iii)   Polynomial regression

(iv)   SVR (Support vector machine

(v)   Decision tree

(vi)   Random Forest

(vii)   XgBoost

(viii)   Naive Bayes

(ix)   KNN

(B) Classification:-

(i)   Logistics regression

(ii)   SVM

(iii)   Decision Tree Classifier

(iv)   Random Forest Classifier

(v)   KNN

For Example:-

Degree	Experience	Salary
MTech	7	100k
MBA	2	70k
BE	5	40k

Here my main will be predict the salary, based on the 2 features that is **Degree and Experience**.

Salary is a continue features, so it is a regression problem statement, that is why this is supervise machine learning because, I have my output feature given which is **"Salary Column"**, I know what I need to predict. My **Machine learning** module will get train with all these data then later on whenever I will give my **Degree and Experience "Column"** to my module it will able to predict the "**Salary"** & this is my **Dependent feature**.

Independent feature means what are my input features the Column **(Degree   & Experience)** this is my **Independent features.**

Column **"salary"** will be my **Dependent features** because this column **"salary " value** changing based on that Column **(Degree   & Experience) values**. That is the region this is Column **"salary"** is a dependent features.

(2) Unsupervised Machine learning :-

In Unsupervised Machine Learning, we usually say this as clustering algorithms. We try to solve clustering algorithms over here.

In supervised machine learning algorithms, we will never knowing what is the output.

This output will be not given over there. There will be just feature just as **F1, F2 , F3 & F4**

We do not know what will be the output feature, best thing we can do with the unsupervised machine learning is that, we try to cluster similar kind of data points.

We try to find out similar kind of Data points in the form of **clusters**.

We have techniques like

(i)   DB Scan

(ii)   K-Means clustering

(iii)   Hierarchical clustering Etc.
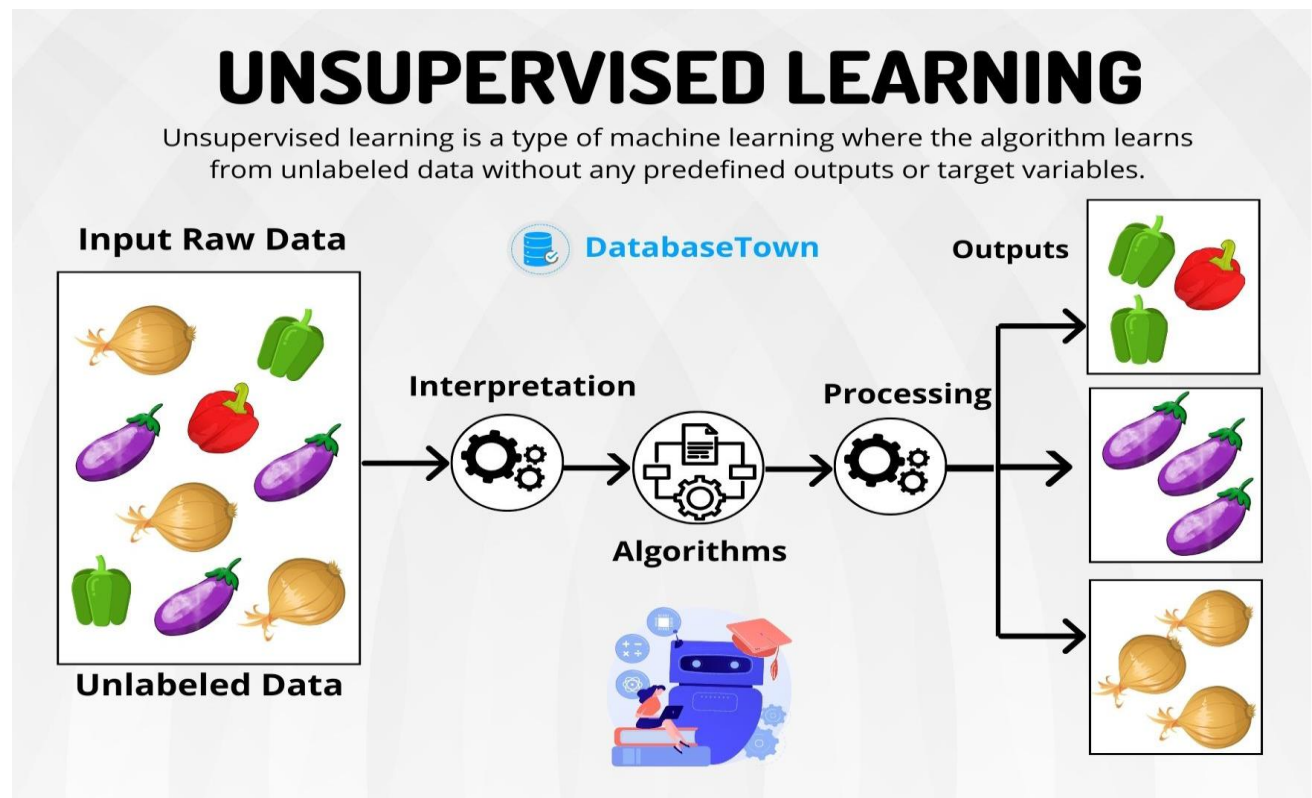
For Example :- ("Tesla Car")

Tesla's Autopilot system uses **unsupervised machine learning** to enhance the autonomous driving capabilities of its vehicles.

Specifically, Tesla's cars are equipped with a suite of sensors, including cameras, radar, and ultrasonic sensors, that continuously collect data about the vehicle's surroundings. This data is then sent back to Tesla's servers, where unsupervised machine learning algorithms are used to analyze the data.

The key unsupervised learning technique used by Tesla is called "**Anomaly Detection**". The algorithms analyze the sensor data to identify patterns and anomalies that may indicate potential hazards or driving situations that the **Autopilot system** needs to handle.

The algorithms may detect unusual traffic patterns, unexpected pedestrian movements or other anomalies that a human driver would typically notice and respond to. By identifying these anomalies in real-time, the Autopilot system can then take appropriate actions, such as adjusting the vehicle's speed, braking or steering, to safely navigate the situation.

Additionally, **Tesla's unsupervised learning** algorithms are used to continuously improve the Autopilot system's performance. As more data is collected from Tesla vehicles on the road, the algorithms can identify new patterns and anomalies and update the Autopilot system's decision-making models accordingly.

This allows the Autopilot system to adapt and become more robust over time, without the need for manual programming or intervention. The system can learn from the collective experiences of all Tesla vehicles on the road, making it more capable of handling a wide range of driving scenarios in real-time.

3. Reinforcement learning with example?

Reinforcement learning:-

They learn from the feedback of each action and self-discover the best processing paths to achieve final outcomes.

If I will say it in one-line sentences that means it **Learn from the mistakes.**
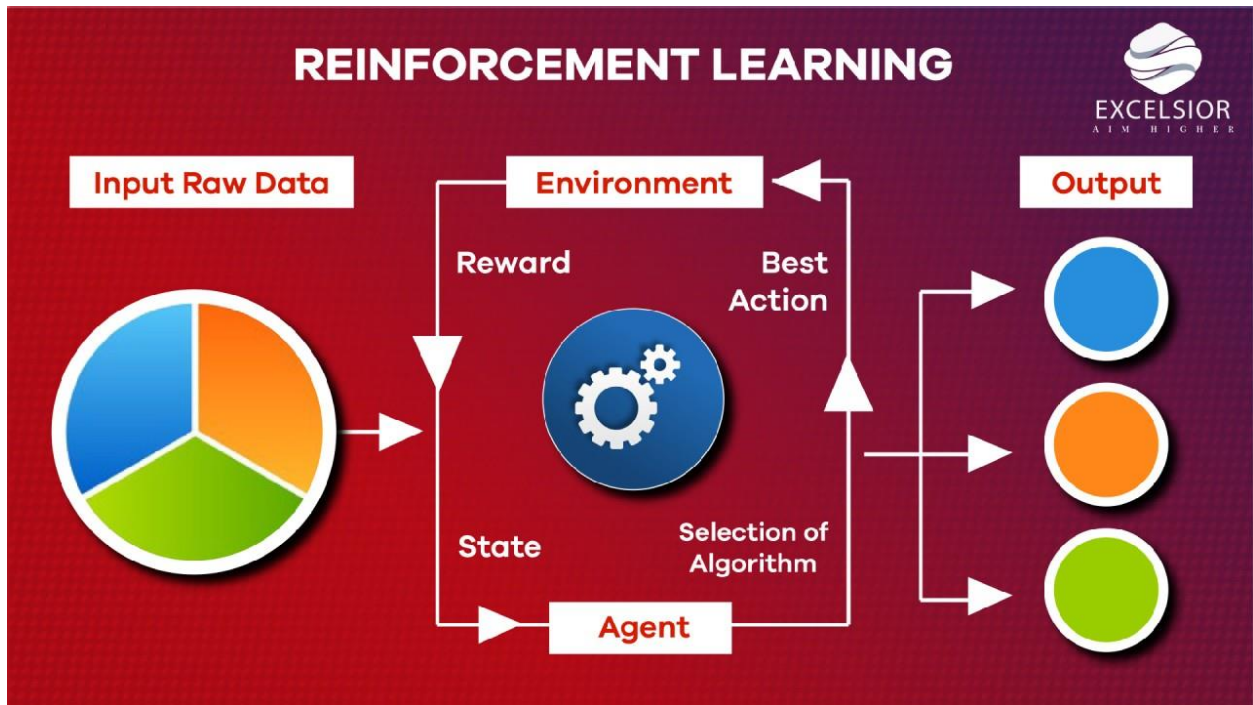
For Example in the Healthcare sector:-

Reinforcement learning is used in healthcare to optimize the treatment plans for patients based on their medical conditions. The system receives rewards or penalties based on the patient's outcomes, such as recovery. The goal is to maximize the reward and minimize the penalty.

4. Difference between Classification vs regression vs clustering?

Classification vs. Regression vs. Clustering

(A) Classification :-

Classification is a Machine Learning task that predicts categorical labels for given data.

Some real-world applications of classification :-

(i) Email Spam Filtering :- Classifying emails as spam or not spam to prevent unwanted messages from reaching users' inboxes.

(ii) Medical Diagnosis:- Classifying patients as having a certain disease or not based on medical test results and symptoms

(B) Regression :-

Regression is a Machine Learning task that predicts continuous numeric values for given data.

Some real-world applications of Regression :-

(i) House Price Prediction:

Estimating the price of a house based on features such as location, size, and number of bedrooms.

(ii) Weather Forecasting :

Predicting temperature, rainfall and other weather conditions.

(C) Clustering :-

Clustering is a machine learning technique that groups similar data points together based on their features, without using predefined labels.

Some real-world applications of Clustering :-

(i) Customer Segmentation:

Grouping customers based on purchasing behavior to tailor marketing strategies.

(ii) Healthcare:

Clustering patients with similar symptoms or medical histories to improve treatment plans and diagnosis.