TYPES OF MACHINE LEARNING

Machine Learning is the science of making computers learn and act like humans by feeding data and information without being explicitly programmed.

Machine learning algorithms are trained with training data. When new data comes in, they can make predictions and decisions accurately based on past data.

For example, whenever you ask Siri to do something, a powerful speech recognition converts the audio into its corresponding textual form. This is sent to the Apple servers for further processing where language processing algorithms are run to understand the user's intent. Then finally, Siri tells you the answer.

There are two types of machine learning:

1. Supervised Learning
2. Unsupervised Learning

Supervised and unsupervised learning:

In **Supervised Learning**, the machine learns under supervision. It contains a model that is able to predict with the help of a labelled dataset. A labelled dataset is one where you already know the target answer.

Supervised learning can be further divided into two types:

1. Classification
2. Regression

In **Unsupervised Learning**, the machine uses unlabelled data and learns on itself without any supervision. The machine tries to find a pattern in the unlabelled data and gives a response.

Unsupervised learning can be further grouped into types:

1. Clustering
2. Association

Supervised Learning	Unsupervised Learning
It uses known and labelled data as input	It uses unlabelled data as input
It has a feedback mechanism	It has no feedback mechanism
The most commonly used supervised learning algorithms are: • Decision tree • Logistic regression • Support vector machine	The most commonly used unsupervised learning algorithms are: • K-means clustering • Hierarchical clustering • Apriori algorithm

Regression, Classification and Clustering:

Classification - Supervised Learning

Classification is used when the output variable is categorical i.e. with 2 or more classes. For example, yes or no, male or female, true or false, etc.

In order to predict whether a mail is spam or not, we need to first teach the machine what a spam mail is. This is done based on a lot of spam filters - reviewing the content of the mail, reviewing the mail header, and then searching if it contains any false information. Certain keywords and blacklist filters that blackmails are used from already blacklisted spammers.

All of these features are used to score the mail and give it a spam score. The lower the total spam score of the email, the more likely that it is not a scam.

Based on the content, label, and the spam score of the new incoming mail, the algorithm decides whether it should land in the inbox or spam folder.

Regression - Supervised Learning

Regression is used when the output variable is a real or continuous value. In this case, there is a relationship between two or more variables i.e., a change in one variable is associated with a change in the other variable. For example, salary based on work experience or weight based on height, etc.

Let’s consider two variables - humidity and temperature. Here, ‘temperature’ is the independent variable and ‘humidity' is the dependent variable. If the temperature increases, then the humidity decreases.

These two variables are fed to the model and the machine learns the relationship between them. After the machine is trained, it can easily predict the humidity based on the given temperature.

Clustering - Unsupervised Learning

Clustering is the method of dividing the objects into clusters that are similar between them and are dissimilar to the objects belonging to another cluster. For example, finding out which customers made similar product purchases.

Suppose a telecom company wants to reduce its customer churn rate by providing personalized call and data plans. The behaviour of the customers is studied and the model segments the customers with similar traits. Several strategies are adopted to minimize churn rate and maximize profit through suitable promotions and campaigns.

On the right side of the image, you can see a graph where customers are grouped. Group A customers use more data and also have high call durations. Group B customers are heavy Internet users, while Group C customers have high call duration. So, Group B will be given more data benefit plants, while Group C will be given cheaper called call rate plans and group A will be given the benefit of both.

Artificial Neural Networks:

An Artificial Neural Network in the field of Artificial intelligence where it attempts to mimic the network of neurons makes up a human brain so that computers will have an option to understand things and make decisions in a human-like manner. The artificial neural network is designed by programming computers to behave simply like interconnected brain cells.

There are around 1000 billion neurons in the human brain. Each neuron has an association point somewhere in the range of 1,000 and 100,000. In the human brain, data is stored in such a manner as to be distributed,

and we can extract more than one piece of this data when necessary from our memory parallelly. We can say that the human brain is made up of incredibly amazing parallel processors.

We can understand the artificial neural network with an example, consider an example of a digital logic gate that takes an input and gives an output. "OR" gate, which takes two inputs. If one or both the inputs are "On," then we get "On" in output. If both the inputs are "Off," then we get "Off" in output. Here the output depends upon input. Our brain does not perform the same task. The outputs to inputs relationship keep changing because of the neurons in our brain, which are "learning."

Convolution Neural Networks :

A convolutional neural network (CNN or ConvNet), is a network architecture for deep learning which learns directly from data, eliminating the need for manual feature extraction.
CNNs are particularly useful for finding patterns in images to recognize objects, faces, and scenes. They can also be quite effective for classifying non-image data such as audio, time series, and signal data.

Applications that call for object recognition and computer vision such as self-driving vehicles and face-recognition applications rely heavily on CNNs.

CNNs provide an optimal architecture for uncovering and learning key features in image and time-series data. CNNs are a key technology in applications such as:

- **Medical Imaging**: CNNs can examine thousands of pathology reports to visually detect the presence or absence of cancer cells in images.
- **Audio Processing**: Keyword detection can be used in any device with a microphone to detect when a certain word or phrase is spoken - (‘Hey Siri!’). CNNs can accurately learn and detect the keyword while ignoring all other phrases regardless of the environment.

- **Stop Sign Detection**: Automated driving relies on CNNs to accurately detect the presence of a sign or other object and make decisions based on the output.
- **Synthetic Data Generation**: Using Generative Adversarial Networks (GANs), new images can be produced for use in deep learning applications including face recognition and automated driving.

FLASK:

Contents:

- Project Layout
- Application Setup
- Define and Access the Database
- Blueprints and Views
- Templates
- Static Files
- Blog Blueprint
- Make the Project Installable
- Test Coverage
- Deploy to Production
- Keep Developing!