

1. What is Machine Learning?

Machine learning is the branch of science that deals with the machine's ability to learn from existing data, then perform some task based on the learning, and use some performance indicators to measure how accurately the task is being performed.

For example: playing chess. The experience of playing many games of chess is the learning part. The task of playing chess and the probability that the program will win the next game is the performance indicator.

In general, any machine learning problem can be assigned to one of two broad classifications: Supervised learning and Unsupervised learning.

2. What is Supervised Learning?

Supervised learning is when you already know the label of the target variable. It is of two types: regression and classification. Regression is when the target variable is continuous and classification is when the target variable is in the form of categories or discrete values.

For Example:

- Regression: House Price prediction based on area, number of rooms, lawn, pool, etc.
- Classification: Predicting whether a person will be diabetic in the future or not based on bp, glucose, insulin, etc.

As you can see here, it is already known the target variable is the price in case of regression and whether the person is diabetic or not in case of classification. So we know what we want to predict.

3. What is a Model?

A machine learning model can be a mathematical representation of a real-world process. An ML model takes the training data as input and with the help of an ML algorithm, forms a mathematical expression that gives us an output.

For example, a **house price prediction model** will take the area, several rooms, lawns, pools, etc. as input and give the price of the house as output.

4. What do you mean by an algorithm?

An ML algorithm takes the training dataset to form a mathematical relationship between independent variables and dependent variables. The algorithm will give the best-fit mathematical expression based on available training data.

5. Why do we split the data into test and train data while building a supervised learning model?

The goal of machine learning is to predict well on new data drawn from a (hidden) true probability distribution. Unfortunately, the model we are building at present can't see the whole truth; the model can only sample from an available dataset. If a model fits the current examples well, how can we trust the model to make good predictions on never-before-seen examples?

One way is to divide your data set into two subsets:

- Training set: a subset to train a model.
- Test set: a subset to test the model.

Separating the data enables you to evaluate your model generalization capabilities and have an idea of how it would perform on unseen data. Good performance on the test set is a useful indicator of good performance on new data in general, assuming that:

- The samples were drawn independently and at random from the distribution to create the test set.
- The test set is large enough.

6. When and how do you bring in test data?

Initially, the dataset that is provided for analysis is split into train and test sets. The test set should be such that it is representative of the population on which the model is going to make predictions.

7. Why do we need to study the mathematics behind the algorithms when we can implement the algorithms using simple codes?

The supervised learning course is the first step in the introduction to modeling in your AI-ML journey. The mathematical content in the videos is covered to give a perception of how algorithms work at the backend and the hands-on videos are covered to demonstrate the implementation of the algorithms. The mathematical intuition behind the algorithms is helpful when you need to improve the performance of your model, in such situations knowing about hyperparameters and what parameters are affecting your model will give you an advantage. A deeper understanding of the algorithms increases the interpretability power of your model.