Machine Learning

It is a part of Artificial Intelligence (AI) that is about building a machine model that **learns** as the name suggests. It uses mathematical methods that leverage data to improve its performance on a set of tasks.

According to Tom Mitchel:

> A computer program is said to learn from an **experience (E)** with respect some class of **tasks (T)** and **performance measure (P)**, if its performance at tasks as measured by P, improves over the experience.

Lets break this down. There are three main components:

- Tasks - T

- Experience - E

- Performance measure - P

T represents the set of tasks assigned to the computer program, **E** represents the experience it gains from these tasks, and **P** represents its performance over the tasks. Better the value of P, better the algorithm used by the program.

Now, the computer program learns over the tasks if it can perform better with some experience. Just like how we learn some skill by practicing and experience.

Machine Learning (ML) can be divided into three parts, each talking about the different ways in which a machine can learn:

- Supervised learning

- Unsupervised learning

- Reinforcement learning

Lets look at the key differences between each of these:

	Supervised	Unsupervised	Reinforcement
What is it?	Presented with example inputs and outputs, called	Presented with inputs and no labels are given. The	The model has been presented with inputs, and it finds

	Supervised	Unsupervised	Reinforcement
	labels. This is done by a supervisor (us)	model finds the structure in the inputs provided.	the best way by trial and error method. The model rewards itself each time it does the job correct, and punishes when it goes wrong.
Goal	The goal is to find the best mapping between the input and output.	The goal is to find the structure in the inputs and generate accurate results.	The goal is to find a method that rewards the model the most (most accurate model)
Algorithms	Support-vector machines, Linear regression, Logistic regression, Naive Bayes, Linear discriminant analysis, Decision trees, K-Nearest neighbor algorithms, Neural networks	Clustering: k-means, hierarchial; Principal component analysis, Singular value decomposition	Q-Learning, Deep Q-Network, Dyna-Q, SARSA, Actor-critique algorithms etc.