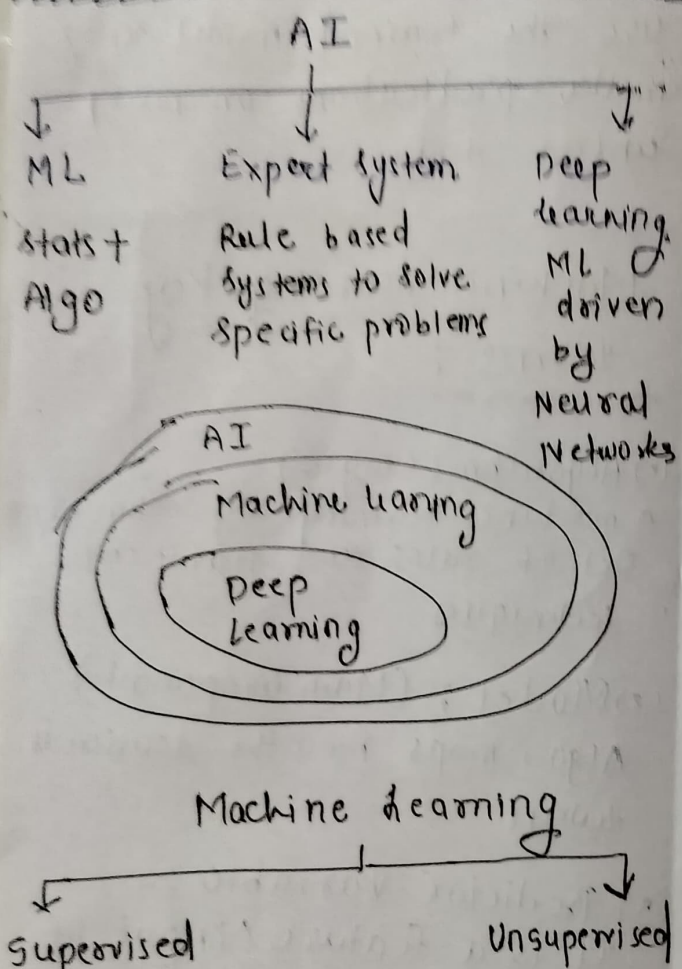
What is ML ?

Machine learning (ML) is a field of artificial intelligence (AI) that focuses on developing algorithms and models that enable computers to learn from data and make predictions or decisions without being explicitly programmed.



Supervised Machine learning :-

- Supervised learning is a machine learning method in which models are trained using labeled data.
- In supervised learning, models need to find the mapping function to map the input variable (X) with the output variable (Y)

$$Y = f(X)$$

- Supervised learning needs supervision to train the model which is similar to as a student learns things in the presence of a teacher.
- Supervised learning can be used for two types of problems classification & Regression

Unsupervised Machine Learning

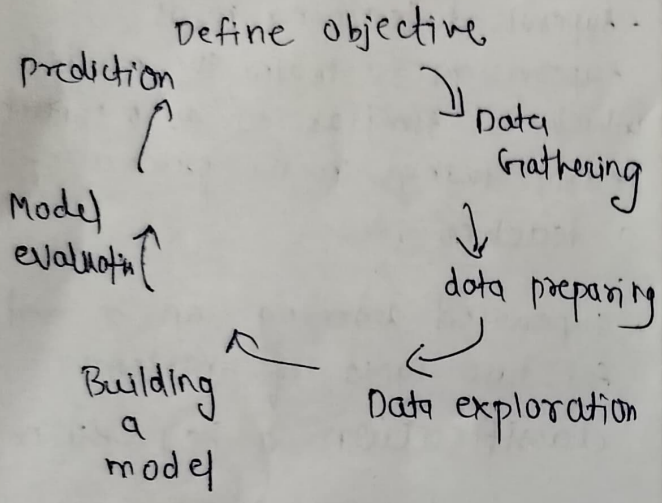
- unsupervised learning is another machine learning method in which patterns inferred from the unlabeled input data.
- The goal of unsupervised learning is to find the structure and patterns from the input data
- Unsupervised learning can be used for two types of problem — clustering & Association

Need of Machine Learning ?

- increase in data generation
- improve decision making
- uncover patterns & trends in data
- solve complex problems

Machine Learning Process

Cycle of ML



(1) Define objective :-
clearly state what you want the computer to learn or predict

(2) Data Gathering :-
Collect relevant information or examples that the computer will use to learn

(3) Preparing Data :-
organize & clean the collected data so it is ready for the computer to understand

(4) Data exploration :-
Investigate the dataset to understand patterns, trends, and potential issues

(5) Building a model :-
Create a computer program that learns from the prepared data to make predications

(6) Model Evaluation :-
Assess how well the model performs, comparing its predications to actual outcomes

(7) Predication :-
Use the trained model to make predications on new, unseen data

Machine learning key terms :

(1) Algorithm : (logic)
A machine learning algorithm is a set of rules and statistical techniques

(2) Model : (Main component)
Algo. maps how the decision is taken

(3) Predictor Variable :-
It is a feature / input of the data that can be used to predict the output

(4) Response variable :- It is the feature or the output variable that needs to be predicted by using the predictor variables.

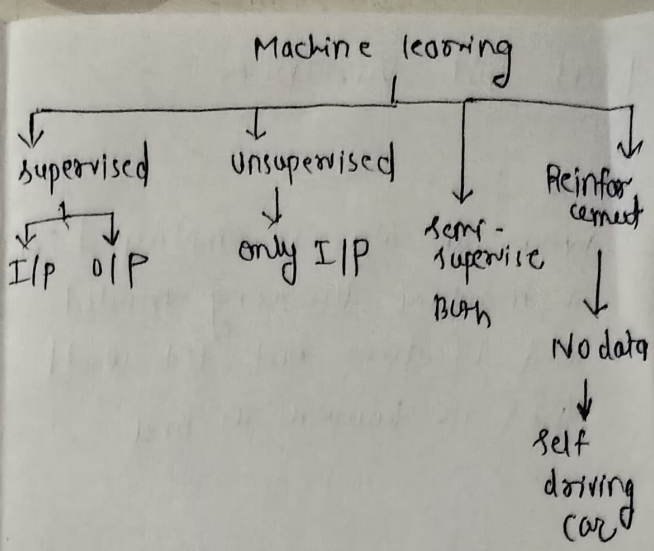
(7) Training Data :-
The machine learning model is built using the training data

(8) Testing Data :-
After the model is trained, it must be tested to evaluate how accurately it can predict an outcome.

Independent variable - predictor

Dependent variable - Response

ML Applications :-



Supervised
↳ Regression — (1) linear regression
Target value is numeric — (2) Multiple linear regression

↳ classification — Logistic
Target value is categorial data — Support vector
K N N
Random forest

Bias and Variance

Bias :-

When an algo is employed in a machine learning model and it does not fit well, this is known as bia

It is diff. between predicate value & actual value

Training data

Variance :-

The term "variance" refers to the degree of change that may be expected in the estimation of target function as a result using multiple sets,

Test Data

Error difference