Steps for making a Machine learning application

→ ⓐ Data collection

ⓑ Data cleaning

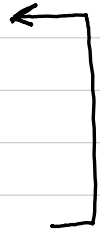
ⓒ Data Analysis

ⓓ Training

ⓔ Testing

ⓕ Parameter Tuning

ⓖ Deployment



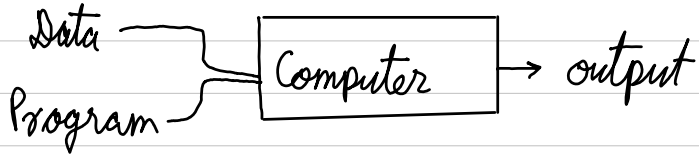
① What is ML?

→ ⓐ Machine learning is a discipline of AI that provides machines the ability to automatically learn from given data.

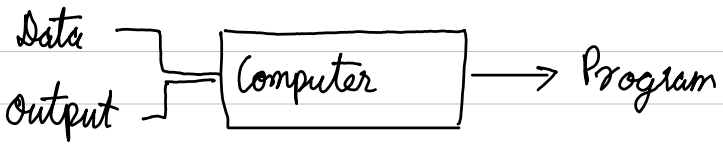
ⓑ Machine (computer) identifies patterns and makes predictions

ⓒ "Field of study that gives computers the capability to learn without being explicitly programmed"

ⓓ It imitates the way that humans learn — gradually improving the accuracy

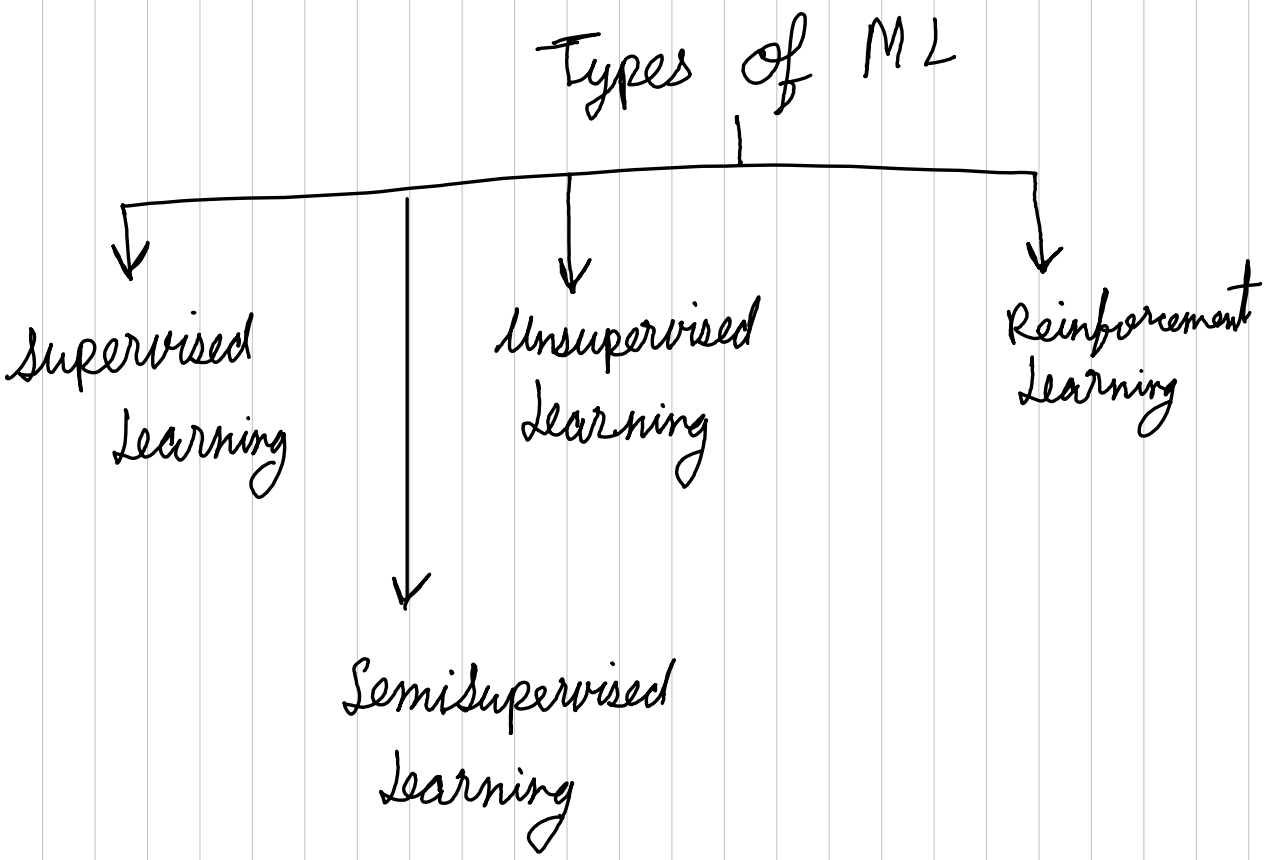


Traditional Programming



Machine Learning

② Types of ML


Types of ML
Supervised Learning
Unsupervised Learning
Reinforcement Learning
Semisupervised Learning

(Q4) Explain Supervised learning

→ (a) dataset is labelled

(b) We know what is the expected output

(c) Types → (a) classification
(b) Regression

(Q5) Explain Unsupervised learning

→ (a) Unlabelled dataset

(b) Machine finds the association

(c) Types → (a) Clustering
(b) Association

(Q6) Explain Semi-Supervised learning

→ (a) Uses limited set of labelled sample data

(b) Then functions like Unsupervised

Q7 Reinforcement learning

→ (a) Uses technique of exploration exploitation

(b) Positive reward encourages particular sequence while negative reward penalizes the algorithm

(c) Feedback based process

(d) Learning is done based on the experiences gained by the agent

Q8 AI vs ML

AI	ML
Allows a Machine to simulate human intelligence	Allows machine to learn autonomously
Intelligent systems to perform complex tasks	Build machines that learn
Logic & decision trees, Reasoning	ML uses stastical models to learn & self correct
Putting our intelligence into machine	Making Machine learn on its own

(Q9) ML vs D.S.

Data science	Machine Learning
Extraction of information from data	Learning information from data
Extract insights & their visualization	Build models to do work
Predictions are made by humans from analyzed data	Predictions made by machines

(Q10) ML vs DL

Deep learning	Machine learning
Time consuming	Lesser time requirement
Computationally expensive	Lesser computation required
May not be explainable	More explainable than DL

Introduction to RL

RL makes decisions based on learning from past experiances

It is a feedback based technique where the agent learns how to behave by performing actions and checking their results

Reward desired behaviour and punish bad behaviour

Hit and trail practise

Direct interaction between agent and environment

Solve difficult problems using control optimization and decision making can be solved using RL

Agent interacts with environment, observes the state or environment, selects actions and recieves rewards or penalties based on the actions. Over time, agent learns to take actions that maximize the award.

Learning & Planning RL

Two fundamental problems in sequential decision making

1) Learning
   - Environment initially unknown
   - Agent interacts with the environment
   - Agent improves its policy

2) Planning
   - Environment is initially known
   - Agent performs computation with the model
   - Agent improves its policy
   - deliberation, reasoning, introspection

Exploration & Exploitation RL

RL works on Exploration & Exploitation

Exploration → find out more about the environment

Dont care about getting rewards

eg trying a new restaurant

Exploitation → Maximize reward

eg going to your favourite restaurant

RL

Advantages →
1. Versatility
2. Adaptability
3. Efficiency

Disadvantages →
1. Need a simulatable environment
2. Reward design difficult

Application →
1. Robotics
2. Game player (chess, go)
3. Petrollum refinery parameter controller