MACHINE LEARNING REVISION NOTES.

---×---

Introduction and what is ML?

① ⇒ Machine learning is a subset of Artificial Intelligence, which focuses mainly on designing of systems, thereby allowing them to learn and make prediction based on some experience which is data in case of machines.

⇒ Rather than explicitly programmed for each situation, machines can make decisions based on data.
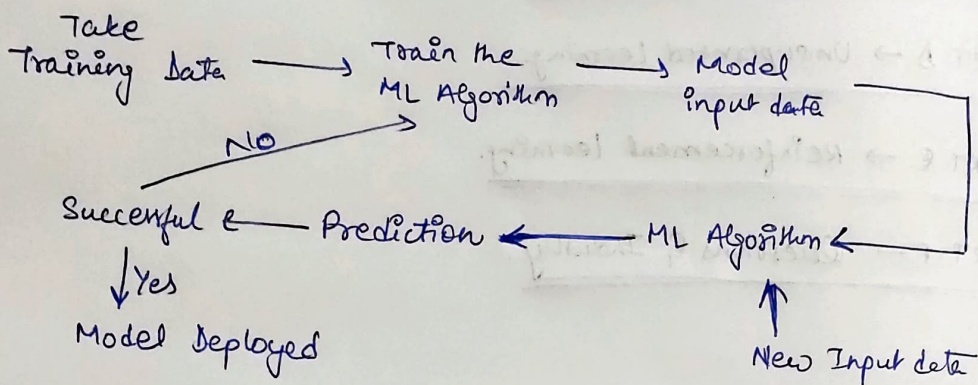
② AI VS ML VS DL

AI → Technique which enables machines to mimic human behaviour.

ML → Subset of AI, uses statistical methods to enable machines to improve with experience.

DL → Subset of ML, makes computation of neural networks feasible

③ **How does ML works?**

Take Training Data ⟶ Train the ML Algorithm ⟶ Model input data

NO ↗

Successful ⟵ Prediction ⟵ ML Algorithm ⟵

↓ Yes

Model Deployed

↑ New Input data

④ **Types**

1) Supervised, (Textbook & Answers). ⎤
2) Unsupervised. (Only Textbook). ⎬ Example of an exam.
3) Reinforcement. (Nothing). ⎦

⤳ **Supervised** ⟶ Algorithm learns from a predefined labeled dataset.

Eg:—1) Cortana, Voice.

2) Biometric devices.

3) Specially useful in banking sector.
(Fintech).
⤷ credit worthness
⤷ when client will pay.

4) Retail
⤷ To see which products customer buy together.

» **Unsupervised learning**

→ Only input provided, no output.
Goal is to learn more about the data.
& detect patterns. (or form clusters.

Examples:

Watching football match first time:

1) Same Jersey, same cluster, etc.

2) Those who stay back defenders → 1 clusters
attackers another cluster, etc.

3) Goal keeper uses hand → one cluster
players don't → one cluster.

» In banking sector → To classify customers based on
their behaviour.

Retail → Recommend products to customers based on past
purchase.

→ **Reinforcement learning**

→ About interaction b/n 2 elements.
Learning agent & the environment.

Learning agent ⟍ → By exploration (trial & error)
learns by
& gives output by ⟍ → By exploitation (knowledge from environment).

→ Based on output (reward given by environment) learning agent
modifies it's learning.

Examples : → Retail → Reduce excess stock by dynamic pricing.

Banking → Supervised can predict future sales, stock prices.
RL learning will tell what action to take.
(buy, hold
NLP → summarization.   or sell)

⑤ AI vs ML vs DL (Extra points)

AI

a) AI term was first coined in 1956.
But has gained popularity now, bcz now we have data
& storage that can contain it.

b) Tesla Self driving car and Apple Siri are biggest examples.

ML

c) Machine learning came into existence in late 80s.

$$\boxed{(Stats) + (Comp\ Science) + (Neuro\ Sci)}$$

d) Snapchat and Netflix.

DL

e) Kind of machine learning inspired by functionality of our
brain cells (neurons).   (ANN)
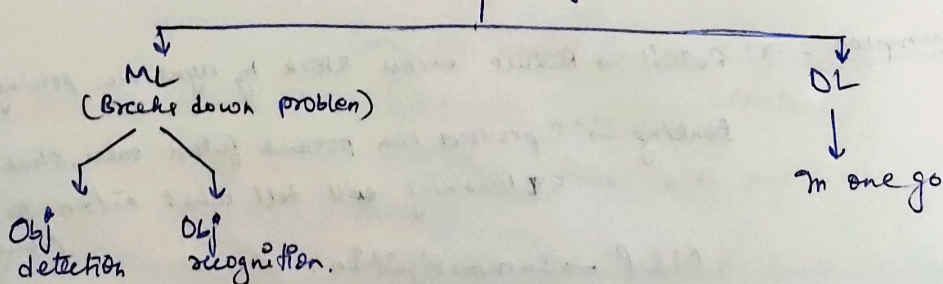
ML vs DL

f) Finds features also itself and classifies, unlike machine
learning.

g) Deep learning requires large amt of data and complex
hardware then ML. DL takes more time.

Example: Truck & car detection in
                              image.

```
                    |
        ┌───────────┴───────────────────────┐
        ↓                                    ↓
       ML                                    DL
  (Breaks down problem)                      │
        ┌──────┐                             ↓
        ↓      ↓                          in one go
      Obj     Obj
   detection  recognition.
```

⑥ Jupyter

a) like a booklet for analysts, recording process, etc. Initially called ipynb (iPython book)

Julia + Python → Jupyter

b) Recommended being downloaded using Anaconda.

c) Refer working and packages in documentation. (jupyter.org).

d) Extra tools → code mirror, security password, can be given

---

⑦ Machine learning (Algorithm Choosing)

Type a) Classification Algorithm.

Q → Is the person male or a female?
Is this email spam or not?

Eg :- Speech recognition, handwriting recognition
biometric identification.

Type b) Anomaly detection Algo

Q → Detection of unusual things happening.
Is there a fraud or Am I being hacked?

Eg :- Strange patterns in traffic network, intrusion
detection, health monitoring (MRI scan).

Type c) Clustering algorithm.

Q → What type of customers buy this product?
→ Grouping elements based on condition.

Eg:- Clustering customers into segments by companies.
for better maintainance.

Type d) Regression Algorithm

Q → What is the market value of this house?
Is it going to rain tomorrow?

Eg:- Stock price prediction.

Bonus

Iris dataset → 'Hello world' dataset in world of machine learning.

→ 150 observation of Iris flower.
5 columns, 4 attributes, 5th column not a attribute.