21-09-2025

Agenda: ML-I

why ml exist?

→ Traditional prog

if customer age > 60 : Senior discount

if sales < 1000 : no special off

→ rules, hard coding

Example: shop selling clothes.

decide: customer will buy a winter jacket when they enter the store

temp : 17°C customer_wore_jacket: True/False

age : 30

custom_visited_the_store_before: True/False

```
if temp < 20°C :
    if not customer_wore_jacket :
        if customer_visited :
            print("customer will buy a jacket")
        else :
            print("
```

Target: True / False

(2) statistics

Data → EDA → True → SDA →
False → EDA →

→ Action / Decision backed by Data / Analysis.

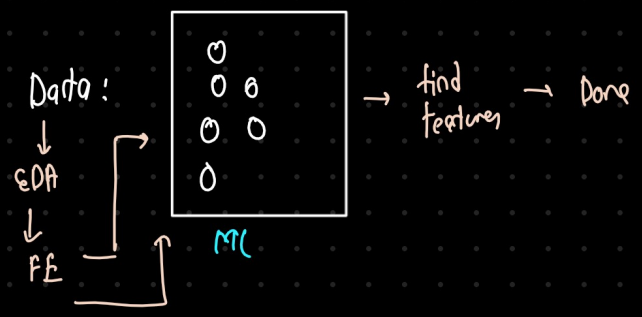
prob: +5 features

→ temp < 20°C

(3) ML → 1950

1958 - neural net → $1,000

→ Amount of Data ↑
→ computation power expense ↓



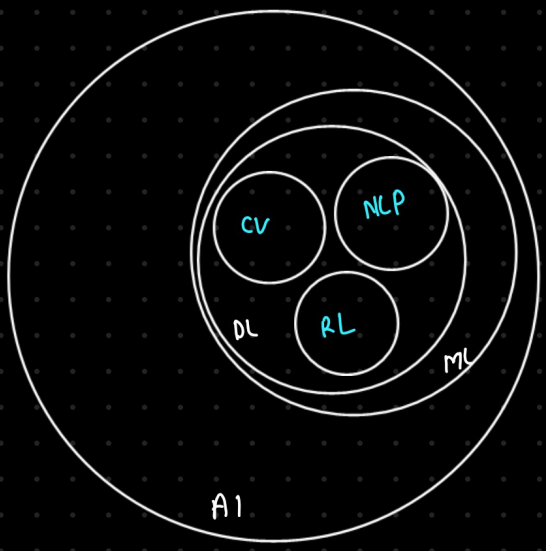
Artificial Intelligence :~~=~~ → Human Intelligence

System that can perform task that typically require Human Intelligence.

→ ML → planning → {chatgpt, copilot, gemini}
→ rule based → logic →

ML → subset of AI. Systems that improve performance on some task by learning the data.
→ systems that can solve tasks without explicitly programmed for every case.

DL → subset of ML. uses neural networks, inspired by human brain.



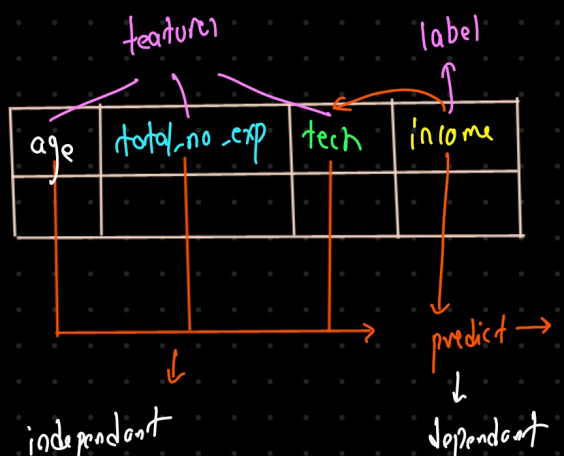
Machine Learning

- Supervised Learning
- Unsupervised learning
- Reinforcement learning

member ⟷ supervisor

Features & Target → ML
Question Answer

Features → Input features → Independent variable
Target → labels → known output
↘ ground truth
↘ Dependent variable.



Q: Given data, predict answer

→ Humidity, Month, etc ⟶ Tomorrow's weather / Temp ⟶ 22°C

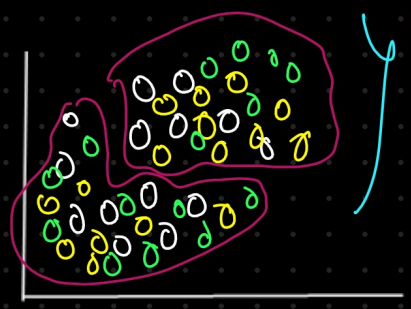
Unsupervised learning

→ find pattern (structure) → group

Features ⟶ ML ⟶ groups

Q. Given data, segment into group

Humidity, Month ⟶ winter / summer / rainy



→ group into 2 category

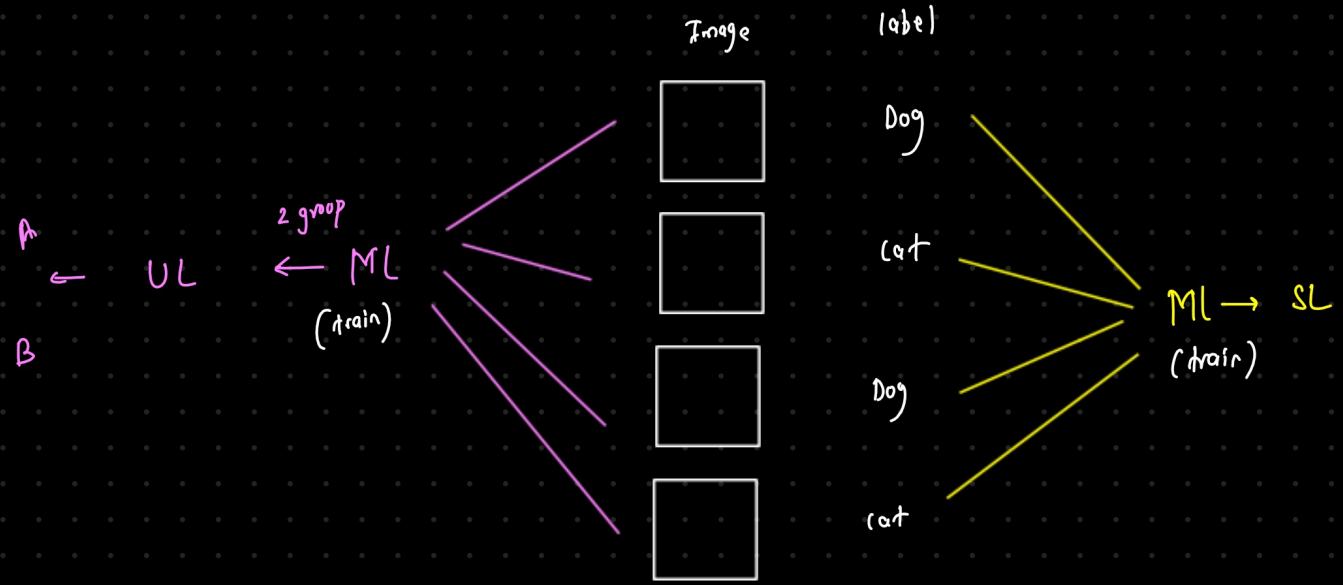
A, B

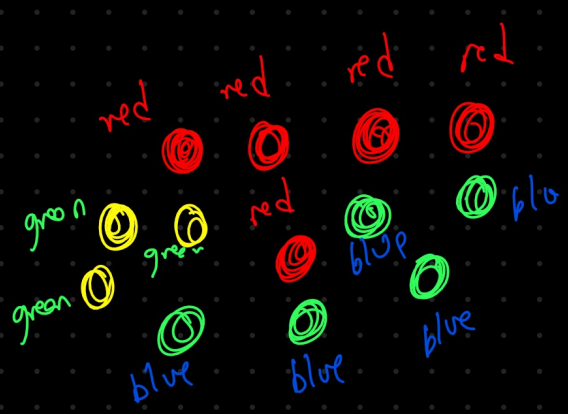
Height, weight, Age ⟶ BMI

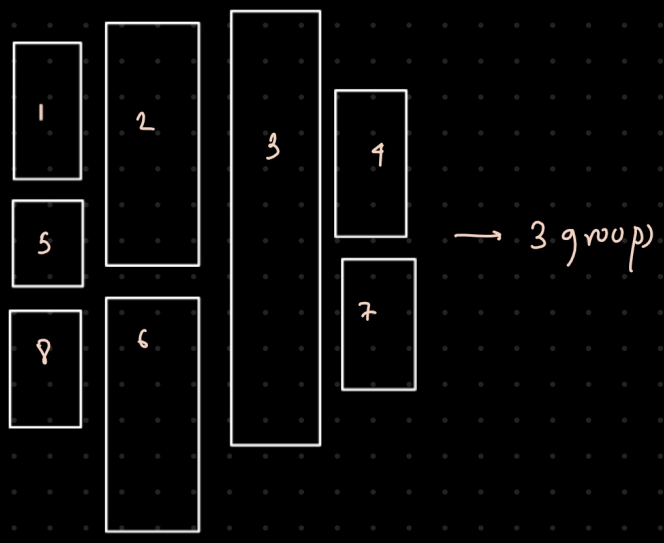
Features

Target ⟶ Supervised learning

ML → group → obese / not obese







→ 3 group

→ green

A – 3
B – 2, 6
C – 1, 5, 4, 8, 7

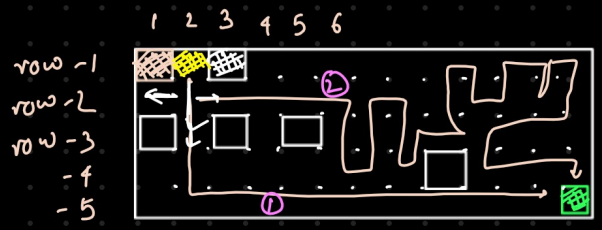
– 5
– 1, 8, 4, 7
→ 2, 3, 6

Reinforcement learning (complex)

→ Agent ≠ Agent in Agentic AI
↳ RL Agenda

→ Autonomous car (Tesla)
→ Robotics
→ chess game
→ optimization

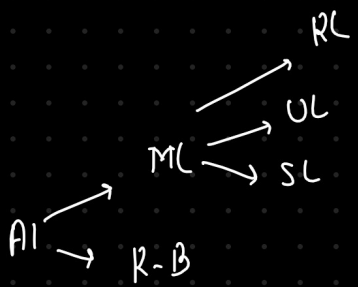
→ Agent taken action, get reward / penalty based on the action



Agent → 1, 2 → yes
1, 3 → dead / exist blockage

→ 1, 2 → yes, yes
2, 2 → yes, yes

reward
penalty



Machine learning prep :

Data spliting :

Study material ① same 10 question → exam → exact question — Perf exact

Book → subject A → chapters (1-10) → [1-9] → 10 question → exam → perf poor
diff ②

study material → ML →
practice material → Test (Evaluation)

---

data [1000 rows] → ML
↓ 30 random
→ Test (Evaluation) →

---

data [1000 rows] → 800 rows → ML → Training data / set
→ 200 rows → Test → correct measurment of actual performance in real world

Testing data / set

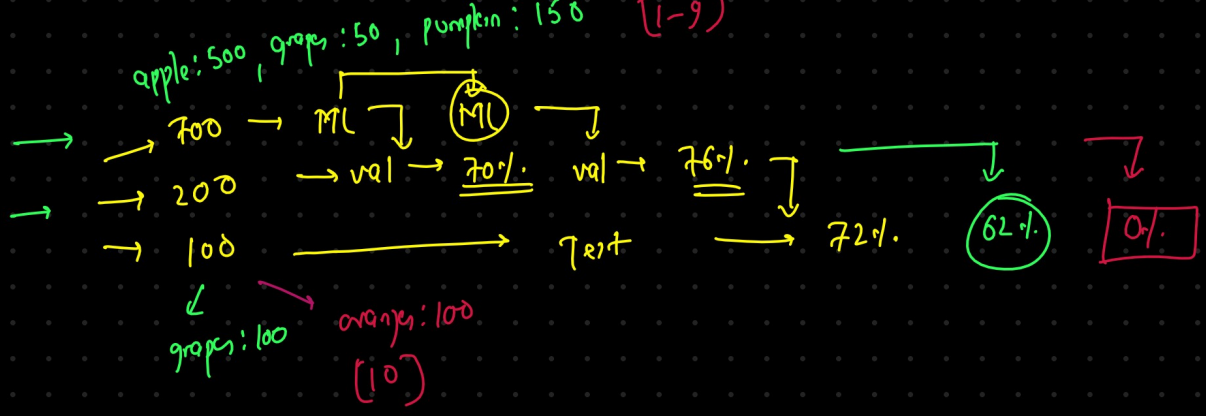
Train - Test set

teach student, test student

Teach student, validate their learning by weekly test & improve, Test student

data [1000] → 700 rows → study material → Train set
→ 200 rows → weekly test → validation set
→ 100 rows → Final exam → Test set

(1) Train, test
(2) Train, val, test



Train	70 – 80 %.	data > 3000
Test	20 – 30 %.	

Train	~~60~~	95	90	data == 100
Test	40	5	10	

Train	70	80	90
val	20	10	5
Test	10	10	5

why ML ?

- Traditional prog
- stats & Traditional prog
- ML

what is AI ? Types ?

- rule based, logic ... etc

what is ML ? → subset of AI

what is DL ? → subset of ML

ML & types of learning :

- → supervised
- → unsupervised
- → Reinforcement

ML prep :

- → data split prep
  - → Train, test
  - → Train, val, test