Types of Machine Learning

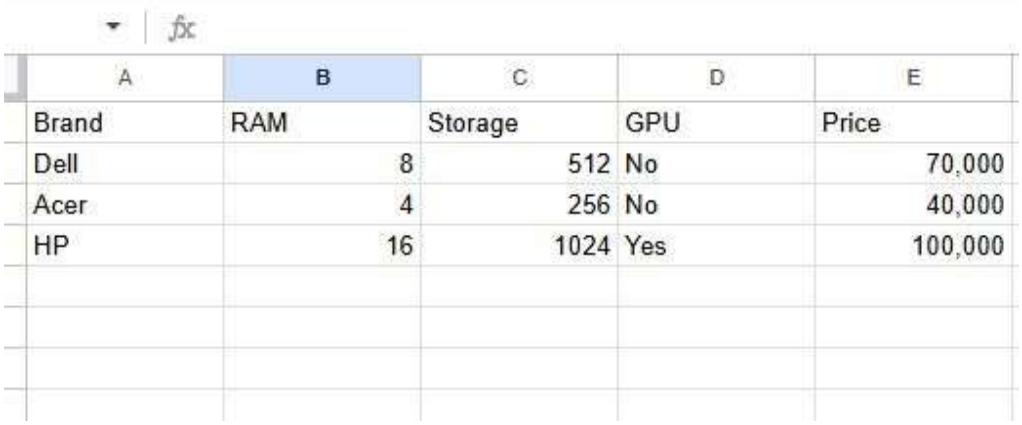
There are four types of machine Learning.

1. Supervised Learning
2. Unsupervised Learning
3. Reinforcement Learning
4. Semi Supervised Learning

Supervised Learning – The model learns from **labeled data.**

Supervised Machine Learning (ML) learns from examples where we already know the correct answer.

- *Example:*



	A	B	C	D	E
	Brand	RAM	Storage	GPU	Price
	Dell	8	512	No	70,000
	Acer	4	256	No	40,000
	HP	16	1024	Yes	100,000

Example:

Brand	**RAM**	**Storage**	**GPU**	**Prediction**
Acer	**8**	**512**	**Yes**	**110,000**

A	B	C	D
Gender	Grade in 12	is_bachlour_pass	Job
Male	3.6	Yes	Yes
Male	3.54	No	Yes
Male	3	Yes	No
Female	2.57	No	Yes
Female	3.65	Yes	No
Female	3.23	No	Yes

Example:

Gender	Grade in 12	is_bachlour_pass	Prediction
Male	3.99	No	Yes

Application of Supervised Learning:

Spam Email Detection
What it does: Checks if an email is spam or not.

House Price Prediction
What it does: Predicts the price of a house based on its size and location.

Weather Prediction
What it does: Predicts tomorrow's temperature based on past weather data.

Online Shopping Recommendations
What it does: Suggests products based on your past searches.

Sentiment Analysis
What it does: Detects if a comment is positive or negative.

Loan Approval in Banks
What it does: Predicts if a person should get a loan or not based on past loan history.

Unsupervised Learning – The model finds patterns in **unlabeled data.**

Unsupervised Machine Learning (ML) **finds hidden patterns** in data **without labels** (no correct answers provided).

- *Example:*

A	B	C	D
Gender	Age	Salary	Monthly Expenses
Male	28	40,000	Rs.20,000
Female	24	20,000	Rs. 9000
Male	34	80,000	Rs.45,000
Female	21	10,000	Rs.6000
Male	54	38000	Rs.20,000

Application of Unsupervised Learning:

Customer Grouping in Shopping Apps (Amazon, Daraz)

- **What it does:** Groups customers based on their shopping habits.
- **Example:**
  - One group buys **electronics** 💻
  - Another buys **clothes** 👕
  - The app shows different ads to each group!
-

YouTube Video Recommendations

- **What it does:** Groups people with similar interests and recommends videos.
- **Example:** If you and another person both watch **cooking videos**, YouTube will suggest the same recipes to both of you! 🍔🍕

Music Playlist Suggestions (Spotify, Apple Music)

- **What it does:** Groups songs based on music style.
- **Example:** If you listen to **soft music at night**, Spotify will **suggest similar relaxing songs** 🎶.

Market Basket Analysis (Supermarkets, Online Stores)

- **What it does:** Finds which items are frequently bought together.
- **Example:** If many people buy **bread + butter**, the store **places them close together** to boost sales.

Anomaly Detection in Banking (Fraud Detection)

- **What it does:** Detects unusual spending patterns.
- **Example:** If a user **suddenly makes a huge transaction in another country**, the bank **flags it as suspicious**.

Social Media Friend Suggestions (Facebook, Instagram)

- **What it does:** Finds people with similar connections.
- **Example:** Facebook suggests **"People You May Know"** based on common friends, even without knowing their names!

Reinforcement Learning – Reinforcement Learning (RL) teaches an **AI agent** to make decisions by **trial and error**, receiving rewards or penalties..

- *Example:*

You watch a tech video about **"AI in 2025"**.

YouTube's AI **recommends** similar AI-related videos.

If you **click and watch**, the AI gets a **reward** and learns that you like AI content.

If you **ignore or dislike**, the AI **adjusts** and suggests different topics.

Application of Reinforcement Learning

YouTube Video Recommendations

- **What it does:** Recommends videos based on your past behavior.
- **Example:**
    - If you **watch videos for a long time**, YouTube **rewards** you by suggesting similar videos.
    - If you **skip videos quickly**, YouTube **penalizes** and shows fewer similar ones.

Self-Driving Cars

- **What it does:** Learns how to drive safely by trial and error.
- **Example:**
    - A car learns to **avoid obstacles** and follow the **correct lanes**.
    - It gets **rewarded** for staying on track and **penalized** for mistakes like running a red light. 🚗

Robot Learning to Walk

- **What it does:** Teaches robots to walk by rewarding them for stable steps.
- **Example:**
    - A robot gets **rewarded** when it takes a **step forward** and **penalized** if it falls.
    - Over time, it **learns** to walk without falling! 🤖

Personalized Ads (Facebook, Google Ads)

- **What it does:** Learns which ads to show based on user interaction.
- **Example:**
    - If you **click on an ad** for shoes, the system gets a **reward** and shows you more ads for shoes.
    - If you **ignore ads**, the system **learns** to show you different types of ads.

Semi-Supervised Learning – A mix of **labeled** and **unlabeled** data. The model learns from a small amount of labeled data and improves itself using a large amount of unlabeled data.

- *Example:* Google Photos recognizing people in images. Initially, you tag a few faces (labeled data), and then it automatically recognizes other faces (unlabeled data).

  Initially, you label a few pictures of your friend.

  Over time, the app **automatically groups other images** of the same person without asking you!

Application of Semi-Supervised Learning

Google Photos Face Recognition

- **What it does:** Recognizes people's faces after labeling just a few photos.
- **Example:**
  - You tag a **few pictures** of your friend.
  - Google Photos **automatically identifies** them in **new photos** using **unlabeled data**.

Customer Behavior Analysis (E-commerce, Shopping Apps)

- **What it does:** Groups customers by behavior using some labeled and many unlabeled behaviors.
- **Example:**
  - You label **a few customers** who bought **high-end gadgets**.
  - The system **automatically groups** other customers who behave similarly (but who haven't been labeled yet).

Image Tagging on Social Media (Facebook, Instagram)

- **What it does:** Automatically tags people in photos after a few labeled ones.
- **Example:**
  - You tag **a few friends** in **photos**.
  - Facebook or Instagram **automatically recognizes and tags** them in future photos.