Machine Learning

Machine Learning is a field of computer science that uses **statistical techniques** to give computer systems the ability to **learn from data** without being explicitly programmed.

- **Machine Learning is a branch of Artificial Intelligence (AI)** that allows computers to learn from data without being explicitly programmed for each task.
  Means-> **ML AI ka part hai**, jisme computer data se khud seekhta hai bina har step ko manually code kiye.

- **ML uses algorithms** that try to find patterns or rules in data and then use those patterns to make predictions or decisions on new data.
  Means-> **Algorithms use hote hain** jo data se pattern samajh ke naye data par prediction karte hain.

- **ML reduces the need for manual programming**, because the system "learns" rules from the data instead of being told exactly what to do.
  Means->**Manual coding ki zarurat kam ho jaati hai**, kyunki model rules khud seekh leta hai.

- **The more data you have, the better the model can learn** — in general, more data leads to better performance.
  Means-> Zyada data = Better learning. Data important hota hai model ke accuracy ke liye.

☑ Main Difference:

Feature	Traditional Programming	Machine Learning
Approach	Rules are written by the programmer	Rules are learned from data
Adaptability	Hard to adapt to new patterns	Learns and improves over time
Input	Data + Rules → Output	Data + Output (Labels) → Model → Prediction
Example (Spam Filter)	Manually coded rules for detecting spam	Learns spam patterns from example emails

Traditional Programming

Data ——→
Program ——→ **Computer** ——→ Output

Machine Learning

Data ——→
Output ——→ **Computer** ——→ Program

AI VS ML VS DL

- Artificial intelligence->

  ->**Definition:** AI is the broadest concept. It means making machines smart enough to do tasks that normally need human intelligence — like thinking, learning, problem-solving, and decision-making.

  ->**Goal:** To create systems that can mimic human behavior.

  Examples: Chess-playing bots, voice assistants, self-driving cars.

- Machine Learning->

  Definition: ML is a **subset of AI**. It means giving machines the ability to **learn from**

data and improve performance over time without being explicitly programmed.
Goal: To let systems **learn from experience (data)**.
Examples: Email spam filters, Netflix recommendations, fraud detection.
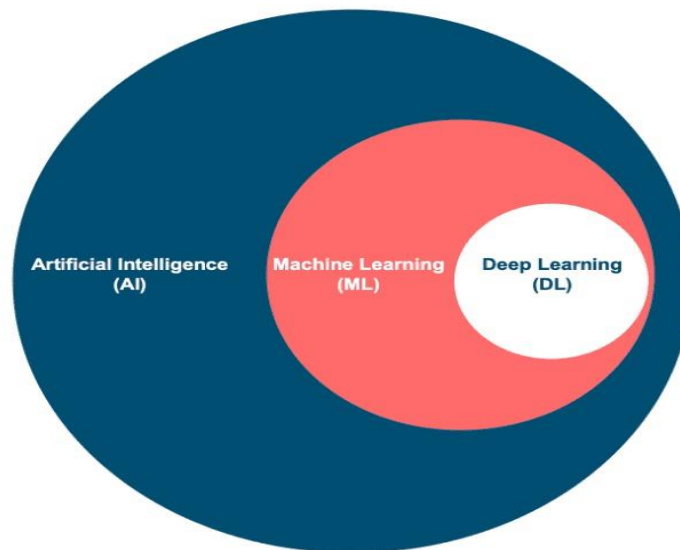
- ## Deep Learning->

   Definition: DL is a **subset of ML**. It uses complex algorithms called **neural networks** (inspired by the human brain) to learn from large amounts of data.
   Goal: To handle **very complex tasks** like image recognition, speech understanding, etc.
   Examples: Face recognition in Facebook, Google Translate voice input, self-driving car's vision system.

Feature	Artificial Intelligence (AI)	Machine Learning (ML)	Deep Learning (DL)
Scope	Broad (includes everything)	Subset of AI	Subset of ML
Learning Method	May or may not use learning	Learns from data	Uses neural networks to learn
Data Requirement	Can work with less data	Needs more data	Needs **lots of data**
Examples	Chatbots, Smart Assistants	Spam filter, Product suggestions	Face recognition, Self-driving

Diagram

Types Of Machine Learning

Basis of nature of Input

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On the Basis of
Nature of
Input
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- Supervised Learning
- Unsupervised Learning
- Semi-Supervised Learning
- Reinforcement Learning