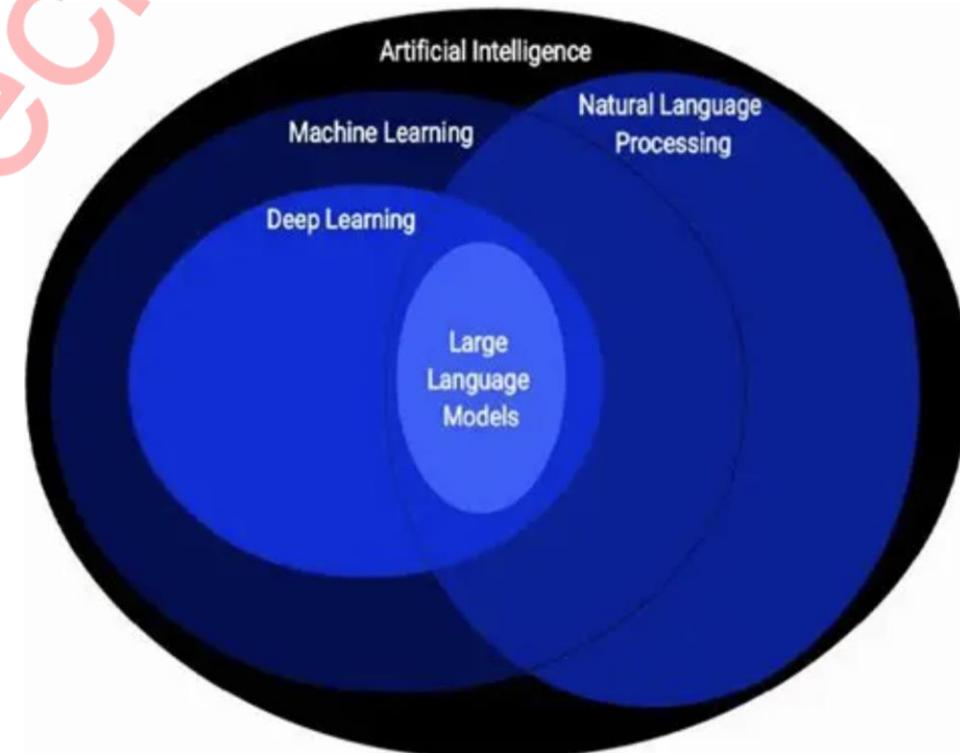


1. ARTIFICIAL INTELLIGENCE HIERARCHY

Artificial Intelligence focuses on building systems capable of tasks that typically require human intelligence such as learning, reasoning and decision-making.

- Artificial Intelligence (AI): Broad field of intelligent systems.
- Machine Learning (ML): Systems learn from data instead of explicit rules.
- Deep Learning (DL): Uses multi-layer neural networks to model complex patterns.
- Large Language Models (LLM): Process and understand language. They learn patterns, grammar and context from vast amounts of text data, enabling them to perform tasks.



2. ML VS TRADITIONAL PROGRAMMING

Traditional Programming:

Humans write explicit rules (IF-THEN statements) to process inputs and produce outputs.

Machine Learning: The system learns rules from data. You provide examples(data + answers) and the model figures out the logic.

Example: Spam Filter

- Traditional: Rules like "if email contains free money, mark as spam."
- ML: Train on of labelled emails to learn what spam looks like.

- What: ML = Algorithms that learn from data to make predictions or decisions.
- Why: Handles complexity, adapts to new data, scales to large datasets.
- Where: Finance Healthcare credit scoring, fraud detection diagnostics, medical imaging
- When: When rules are too complex, data is large or constantly changing.
- How: Supervised Learning (with labels) Unsupervised Learning (no labels)
Reinforcement Learning (trial & error) Regression, Classification, Clustering,
Deep Learning

3. THE 5 W'S OF MACHINE LEARNING

4. ML APPROACHES

1. Supervised Learning:

- Regression Predict continuous values (e.g. house prices)
- Classification Predict categories (e.g. disease vs no disease)

2. Unsupervised Learning:

- Clustering Group similar data (e.g. customer segments)

3. Reinforcement Learning:

- Learns by trial and error using rewards (e.g. robotics, game AI)

4. Deep Learning:

- Neural Networks CNNs Layers of artificial neurons Great for image recognition (e.g. tumor detection)
- RNNs Good for sequences (e.g. speech, time series)

5. REAL-WORLD EXAMPLES

Finance:

- Credit scoring using XGBoost (classification)
- Fraud detection using anomaly detection

Healthcare:

- Tumor detection in MRI scans using CNNs
- Predictive diagnostics using classification models