

Week 1 – What is Artificial Intelligence?

- AI = the ability of a machine to mimic human cognitive functions.
- Types of AI:
 1. Narrow AI: designed for a specific task (e.g., Siri, recommendation systems).
 2. General AI: can perform any intellectual task a human can do (still theoretical).
 3. Super AI: beyond human intelligence (not yet developed).
- Key Fields of AI:
 - Machine Learning (ML): systems that learn from data.
 - Natural Language Processing (NLP): understanding human language.
 - Computer Vision: interpreting images and videos.
 - Robotics: physical agents acting in the real world.
- History:
 - 1956: Term "AI" coined at Dartmouth Conference.
 - Turing Test: A machine passes if it can imitate human responses.
- Applications:
 - Virtual assistants
 - Spam filtering
 - Facial recognition
 - Autonomous vehicles

Note: AI \neq consciousness. Current AI does not "understand", it processes data.

Week 2 – Introduction to Machine Learning (ML)

- ML is a subset of AI that enables systems to learn patterns from data and make decisions without being explicitly programmed.

- Types of Machine Learning:

1. Supervised Learning: learns from labeled data (e.g., regression, classification).
2. Unsupervised Learning: finds patterns in unlabeled data (e.g., clustering).
3. Reinforcement Learning: learns via rewards and penalties by interacting with an environment.

- Common Algorithms:

- Linear Regression
- Decision Trees
- K-Nearest Neighbors
- Neural Networks

- Example: Linear Regression

- Used to predict a continuous value based on input features.

- Formula:

$$y = mx + b$$

where:

y = predicted value m = slope of the line

x = input variable b = intercept (bias)

- Training Process:

- Feed the model with training data.
- Calculate the error (e.g., mean squared error).
- Optimize parameters to minimize error (e.g., using gradient descent).

Note: In supervised learning, it's important to split the dataset into training and test sets.