# INTRODUCTION TO MACHINE LEARNING

DEFINITION, TYPES, AND APPLICATIONS

# WHAT IS MACHINE LEARNING?

- Branch of Artificial Intelligence (AI).
- Enables computers to learn patterns from data.
- Makes predictions or decisions without explicit programming.
- Improves automatically as more data is provided.

# KEY COMPONENTS OF MACHINE LEARNING

- Data: Input examples for training.
- Features (X): Variables describing the data.
- Target (Y): Outcome to predict.
- Model: Mathematical function mapping inputs to outputs.
- Training: Adjusting parameters to minimize errors.
- Prediction/Inference: Using the model on new data.

# TYPES OF MACHINE LEARNING

- Supervised Learning: Learns from labeled data (input-output pairs).
- Unsupervised Learning: Works with unlabeled data, finds hidden patterns.
- Reinforcement Learning: Learns via interaction and feedback from environment.

# EXAMPLES OF MACHINE LEARNING

- Supervised: Predicting house prices, spam email detection.
- Unsupervised: Customer segmentation, anomaly detection.
- Reinforcement: Self-driving cars, game-playing AI.

# APPLICATIONS OF MACHINE LEARNING

- Predictive analytics: stock prices, sales forecasts.
- Healthcare: disease prediction, drug discovery.
- Natural Language Processing: chatbots, translators.
- Computer Vision: face recognition, medical imaging.
- Recommendation Systems: Netflix, Amazon, YouTube.

# SUMMARY

- Machine Learning = Data + Algorithms + Experience.
- It improves performance automatically over time.
- Covers supervised, unsupervised, and reinforcement learning approaches.