Machine Learning (ML) - Overview

Machine Learning is a branch of Artificial Intelligence (AI) that focuses on building systems that can learn from data and improve over time without being explicitly programmed.

Types of Machine Learning:

1. Supervised Learning:
   - Learns from labeled data (input-output pairs)
   - Examples: Linear Regression, Decision Trees, Support Vector Machines

2. Unsupervised Learning:
   - Learns from unlabeled data (finds hidden patterns)
   - Examples: K-Means Clustering, PCA, Hierarchical Clustering

3. Reinforcement Learning:
   - Learns by interacting with an environment and receiving rewards or penalties
   - Examples: Q-Learning, Deep Q Networks

Common Applications:

- Image recognition
- Natural Language Processing (NLP)
- Predictive analytics
- Recommendation systems
- Fraud detection

Popular ML Libraries:

- Scikit-learn

- TensorFlow

- PyTorch

- XGBoost

Key Concepts:

- Features and Labels

- Training and Testing datasets

- Overfitting and Underfitting

- Evaluation Metrics (Accuracy, Precision, Recall, F1 Score)

Machine Learning is a foundational technology behind modern AI applications.