Introduction to Machine Learning

This course covers the fundamentals of machine learning. Machine learning is a subset of artificial intelligence that enables computers to learn from data without being explicitly programmed. It focuses on developing algorithms that can access data and use it to learn for themselves.

Key Topics Covered:
- Supervised Learning
- Unsupervised Learning
- Neural Networks
- Deep Learning

Supervised Learning

Supervised learning is a type of machine learning where the algorithm learns from labeled training data. The algorithm tries to learn the mapping function from inputs to outputs.

Common Algorithms:
- Linear Regression: Predicts continuous values
- Logistic Regression: Binary classification
- Decision Trees: Tree-based classification
- Random Forests: Ensemble of decision trees
- Support Vector Machines (SVM): Classification with margins

Applications include spam detection, image recognition, and predictive analytics.

Neural Networks

Neural networks are computing systems inspired by biological neural networks. They consist of interconnected nodes (neurons) organized in layers.

Architecture Components:
- Input Layer: Receives the input data
- Hidden Layers: Process information
- Output Layer: Produces the final result

Activation Functions:
- ReLU (Rectified Linear Unit)
- Sigmoid
- Tanh

Neural networks are the foundation of deep learning.