

Machine Learning Fundamentals

Machine learning is a subset of artificial intelligence that focuses on algorithms and statistical models that enable computers to perform tasks without explicit instructions. Instead, these systems learn and improve from experience.

There are three main types of machine learning: supervised learning, unsupervised learning, and reinforcement learning. Supervised learning uses labeled training data to learn a mapping from inputs to outputs. Unsupervised learning finds hidden patterns in data without labeled examples. Reinforcement learning trains agents to make decisions by rewarding good actions and penalizing bad ones.

Neural networks are a popular machine learning approach inspired by biological neural networks. They consist of interconnected nodes called neurons that process and transmit information. Deep learning uses neural networks with multiple hidden layers to learn complex patterns in data.

Common applications of machine learning include image recognition, natural language processing, recommendation systems, fraud detection, and autonomous vehicles. These applications have transformed industries and continue to drive innovation in technology.

The machine learning workflow typically involves data collection, preprocessing, model selection, training, evaluation, and deployment. Data quality is crucial for model performance, and proper evaluation helps ensure models generalize well to new data.