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Machine Learning:

Machine learning is a subset of artificial intelligence (AI) that focuses on the development of algorithms and models that enable computer systems to learn and make predictions or decisions without being explicitly programmed to do so. In other words, machine learning algorithms allow computers to analyze and interpret data, discover patterns, and improve their performance on a task through experience and data-driven learning rather than relying on explicit instructions.

Machine learning has a wide range of applications across various domains, including natural language processing, computer vision, healthcare, finance, recommendation systems, and more. It has the potential to automate tasks, extract valuable insights from data, and improve decision-making processes in numerous industries.

Type of Machine Learning	Description	Use Cases	Examples
Supervised Learning	Supervised learning is a type of machine learning where the algorithm learns from labeled data, with a clear input-output mapping. It is used for classification and regression tasks.	- Image classification - Spam email detection - Predicting house prices	- Linear Regression - Logistic Regression - Support Vector Machines (SVM)
Unsupervised Learning	Unsupervised learning deals with unlabeled data and aims to find patterns, structure, or relationships within the data. It is used for clustering and dimensionality reduction tasks.	- Customer segmentation - Anomaly detection - Topic modeling	- K-Means Clustering - Principal Component Analysis (PCA) - Hierarchical Clustering
Reinforcement Learning	Reinforcement learning is a type of machine learning where an agent interacts with an environment and learns to make decisions by receiving rewards or	- Game playing (e.g., AlphaGo) - Autonomous robotics - Recommendation	- Deep Q-Networks (DQN) - Proximal Policy Optimization

	punishments. It's used for sequential decision-making tasks.	systems	(PPO) - Monte Carlo Methods
Semi-Supervised Learning	Semi-supervised learning combines elements of both supervised and unsupervised learning. It uses a small amount of labeled data along with a larger amount of unlabeled data to improve model performance.	- Sentiment analysis with limited labeled data - Medical diagnosis with scarce labeled samples	- Label Propagation - Self-training - Co-training