Supervised VS Unsupervised

Difference Between Supervised and Unsupervised Learning

Supervised and Unsupervised Learning are two main types of Machine Learning. Below is a structured comparison:

Feature	Supervised Learning	Unsupervised Learning
Definition	Learns from labeled data (input-output pairs).	Learns from unlabeled data, finding patterns.
Type of Data	Labeled data (input X and target Y).	Unlabeled data (only input X, no target).
Main Objective	Predict or classify new data based on learned relationships.	Discover hidden patterns, structures, or groups in data.
Example Algorithms	Linear Regression, Logistic Regression, Decision Trees, Random Forest, SVM, Neural Networks.	K-Means Clustering, Hierarchical Clustering, PCA, Autoencoders.
Output Type	Discrete (classification) or continuous (regression).	Groups (clusters) or reduced dimensions (patterns).
Real-World Use Cases	Spam detection, fraud detection, medical diagnosis, sentiment analysis.	Customer segmentation, anomaly detection, topic modeling.
Training Complexity	Higher due to labeled data requirements.	Lower as it does not require labeled data.
Accuracy	Easier to measure using metrics like accuracy, MSE, or F1-score.	Harder to measure as there is no predefined output.

Key Takeaways

✅ **Supervised Learning** is used when labels are available and the goal is prediction or classification.

✅ **Unsupervised Learning** is used when the goal is to find hidden patterns in data without labeled outcomes.