

Machine Learning

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Machine Learning

Machine learning is a subset of artificial intelligence that gives systems the ability to learn and make decisions based on data.

Types of ML

1. **Supervised Learning** - Trains model using Labeled Data - Prediction(Regression)/Classification

Task	Input Example	Output (Label)
Email Spam Detection	Email text	"Spam" or "Not Spam"
House Price Prediction	Size, location, age of house	Price in dollars

1. **Unsupervised Learning** - Trains model using Unlabeled Data - Patterns/Segmentation/Clustering

Domain	Use Case	Description
Retail / E-commerce	Customer Segmentation	Group customers by behavior for personalized marketing
	Market Basket Analysis	Find products often bought together
	Product Recommendation	Suggest items based on similar customer behavior

3. **Reinforcement Learning** - Auto Learning Process by interacting with an environment . Learn by trial and error .
Receives Rewards/Penalties for actions

Domain	Use Case	Description
Games	AlphaGo, Chess AI	Agents learn to win by playing millions of games
Robotics	Robot Arm Control	Learn to pick and place objects through trial and error

Algorithms Across Different Categories

Supervised Learning

1. Regressions Algorithms - Linear Regression, Polynomial Regression, Ridge/Lasso Regression
2. Classification Algorithms - Logistic Regression, Support Vector Machines, K-Nearest Neighbours (kNNs), Decision Trees and Random Forest, Naïve Bayes

Unsupervised Learning

1. Clustering Algorithms - K-Means Clustering, DBSCAN
2. Dimensionality Reduction - PCA, t-SNE

Reinforcement Learning

1. Q-Learning
2. DQN

Deep Learning Algorithms

1. ANN
2. CNN
3. RNN

Generative AI

Agentic AI

Machine Learning Process

1. Data Collection
 - a. Importing the libraries
 - b. Loading the datasets
 - c. Segregate the data into IV matrix and DV matrix
2. Data Cleaning
 - a. Impute missing values
 - b. Discard Irrelevant data points
3. Feature Selection/Engineering
4. Encoding the categorical data
 - a. Dependent variable (DV)
 - b. Independent Variables (IV)
5. Splitting the data into TRAINING and TEST sets
6. Feature Scaling
7. Model Selection
8. Model Training
9. Model Evaluation
10. Model Optimization (Hyperparameter tuning)
11. Model Deployment

