Machine Learning Basics

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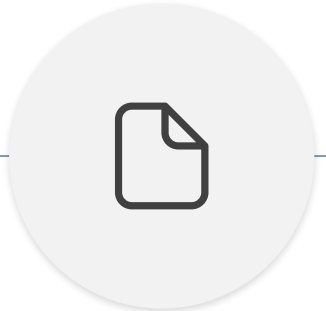
What is Machine Learning?

Introduction

Machine learning is a subset of artificial intelligence (AI) that enables computers to learn and make decisions from data without being explicitly programmed for every task.



Think of machine learning like teaching a child to recognize animals by showing them hundreds of pictures labeled "cat" or "dog."

ML algorithms learn patterns from data to make predictions or decisions.

02

Core Concept: The Learning Process

Learning Process Overview

Input Data → Algorithm → Model → Predictions

Feed data to an algorithm

Algorithm **finds patterns** in the data

Creates a **model** based on these patterns

Model makes **predictions** on new, unseen data

03

Three Main Types of Machine Learning

Supervised Learning

01

What it is: Learning with examples (labeled data)

02

Example: Showing the computer 1000 emails labeled "spam" or "not spam"

03

Goal: Predict labels for new emails

04

Common uses: Email filtering, medical diagnosis, price prediction

Definition and Examples

Unsupervised Learning

01

What it is: Finding hidden patterns in unlabeled data

02

Example: Analyzing customer data to group similar customers

03

Goal: Discover structures or relationships in data

04

Common uses: Customer segmentation, recommendation systems

Definition and Examples

Reinforcement Learning

01

What it is: Learning through trial and error with rewards/penalties

02

Example: Teaching a computer to play chess by rewarding wins and penalizing losses

03

Goal: Learn optimal actions to maximize rewards

04

Common uses: Game playing, robotics, autonomous vehicles

Definition and Examples

04

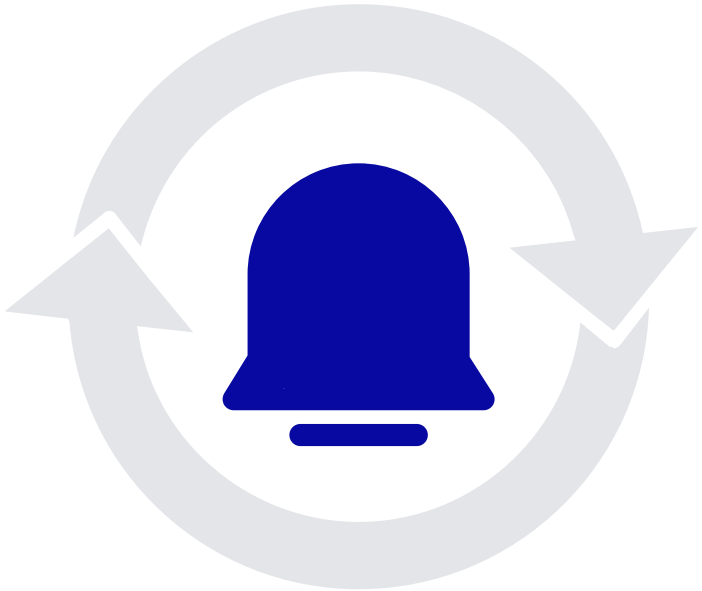
Key Machine Learning Algorithms (Simplified)

Algorithms Overview

Types of Algorithms

Linear Regression: Draws the best line through data points to predict numerical values

Neural Networks: Mimics how brain neurons work, great for complex patterns



Decision Trees: Creates a series of yes/no questions to make decisions

K- Means: Groups similar data points together automatically

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The Machine Learning Workflow

Workflow Steps

Detailed Steps

1. **Collect Data:** Gather relevant information
2. **Clean Data:** Remove errors and inconsistencies
3. **Choose Algorithm:** Select the best method for your problem
4. **Train Model:** Let the algorithm learn from your data
5. **Test Model:** Check how well it performs on new data
6. **Deploy Model:** Use it to make real- world predictions

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Real-World Applications We Use Daily

Application Examples

Specific Uses

01

Netflix recommendations: Suggests movies based on your viewing history

02

Google Search: Ranks web pages based on relevance

03

Smartphone cameras: Automatically focuses and enhances photos

04

Voice assistants: Understands and responds to speech

05

Online shopping: Shows products you're likely to buy

07

Key Takeaway

Conclusion

01

Machine learning is essentially **pattern recognition at scale**.

02

It's about finding meaningful relationships in data that humans might miss, then using those patterns to make intelligent predictions or decisions automatically.

03

The beauty of ML is that once trained, these systems can process vast amounts of information instantly and continuously improve their performance as they encounter more data.

Thanks

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