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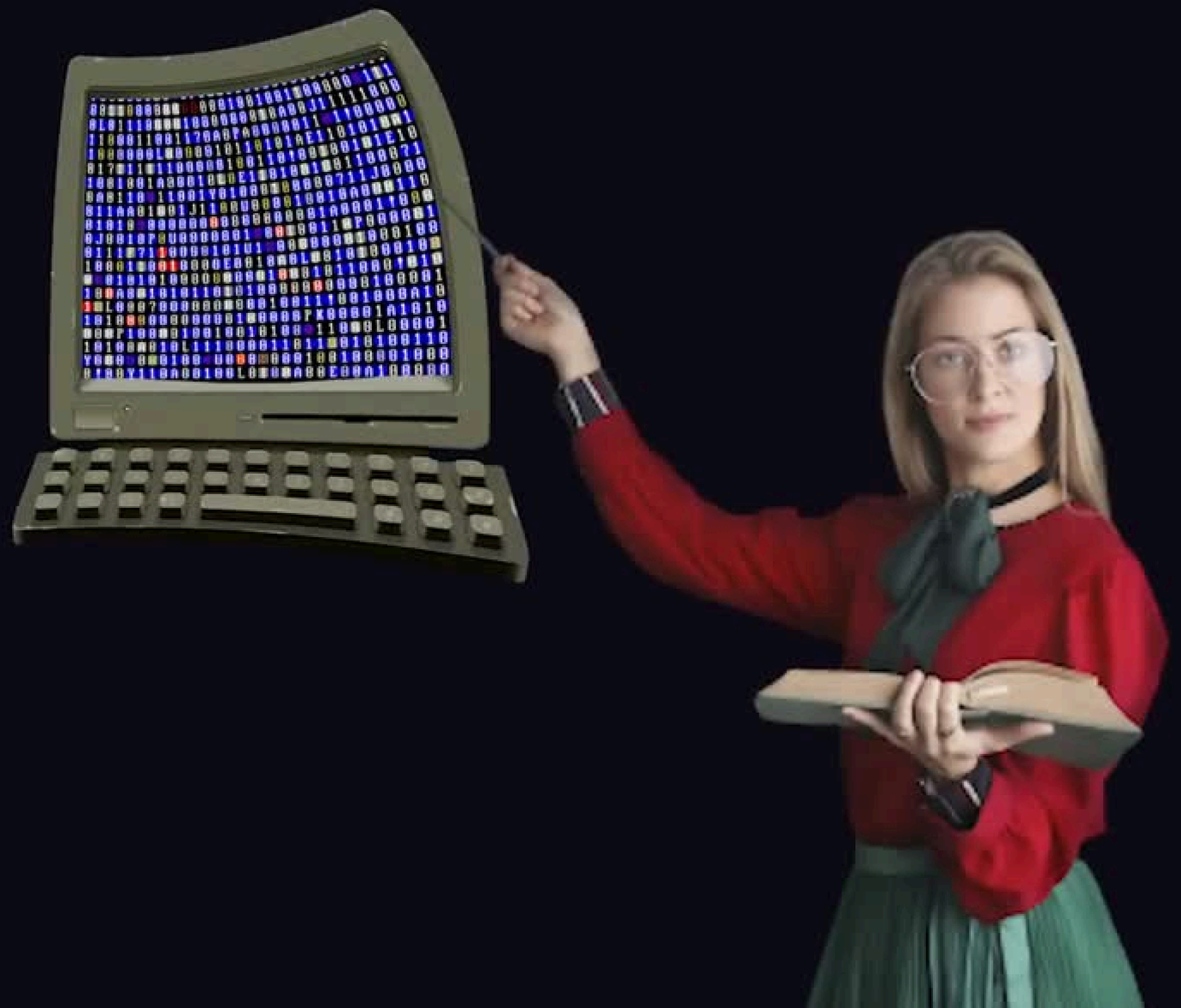
WEBNEP PRESENTS

AI IN Nutshell

by Gaurav Rizal & Dipesh Bhandari

Day 02: How AI Actually Learns

What is Machine Learning ?



Foundational Terminology

The Vocabulary of the Future: Master the lingo before you build the magic.

01

Algorithm

A set of rules or instructions used to train a model and process data to make decisions.

02

Model

The output of an algorithm after being trained on a dataset; learned relationship between inputs and outputs.

03

Dataset

collection of data points used to train, test, and validate machine learning systems

04

Inference

The process of using a trained model to make predictions on new, unseen data

05

Features

The input variables or individual properties of the data used for training (e.g., house size, location).

06

Label (Target):

The specific output or value the model is trying to predict (e.g., house price).

Foundational Terminology

The Vocabulary of the Future: Master the lingo before you build the magic.

01

Observation (Example)

A single row or instance in a dataset containing specific feature values.

02

Structured Data

Data organized into a fixed format like tables with rows and columns.

03

Unstructured Data:

Data not easily put into tables, such as images, audio, or text

04

Training

The process where a model learns patterns from data by adjusting its internal variables.

05

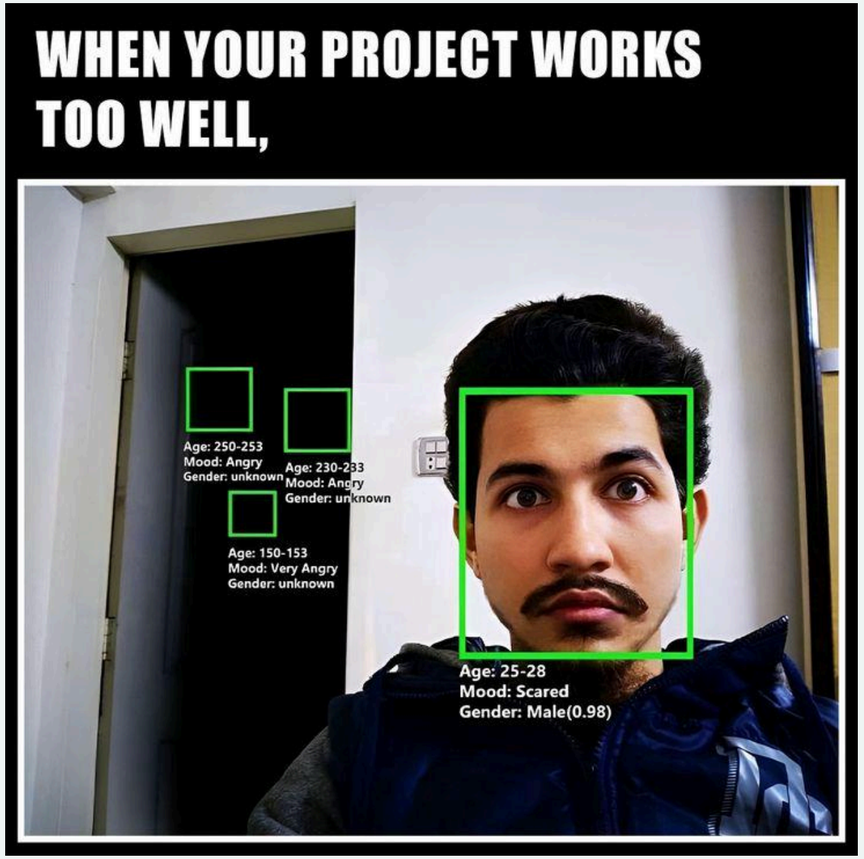
Epoch

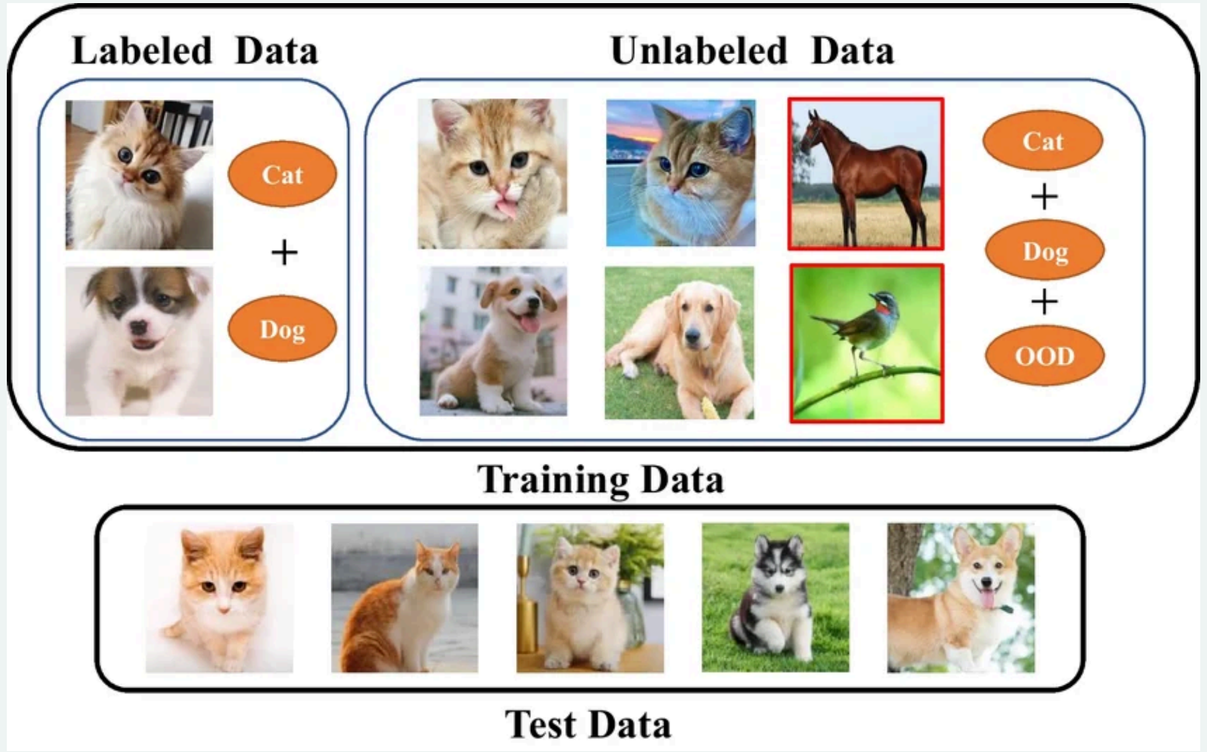
One complete pass of the entire training dataset through the model.

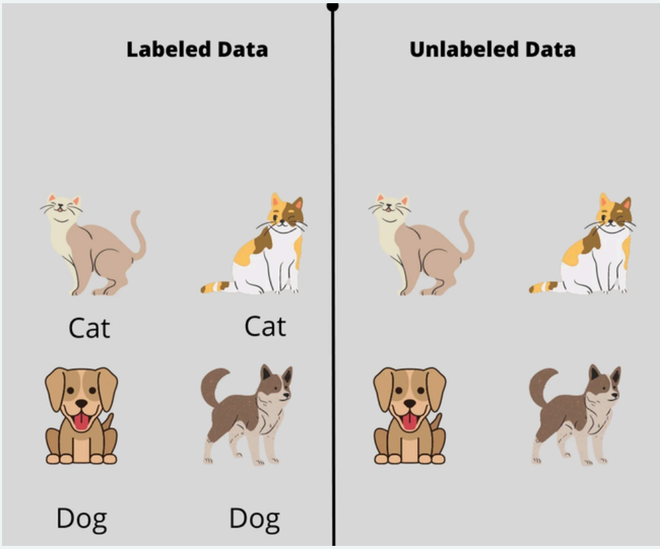
06

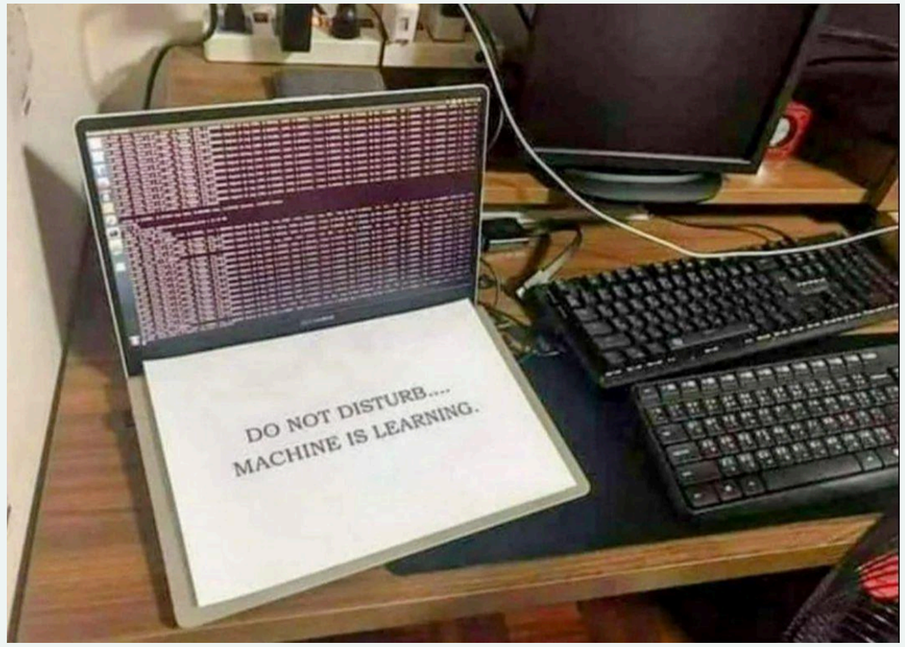
Accuracy

The percentage of correct predictions out of the total number of predictions.

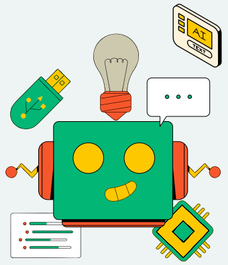

WHEN YOUR PROJECT WORKS TOO WELL,
Age: 250-253
Mood: Angry
Gender: unknown
Age: 230-233
Mood: Angry
Gender: unknown
Age: 150-153
Mood: Very Angry
Gender: unknown
Age: 25-28
Mood: Scared
Gender: Male(0.98)


Labeled Data
Unlabeled Data
Cat
+
Dog
Cat
+
Dog
+
OOD
Training Data
Test Data


Labeled Data
Unlabeled Data
Cat
Cat
Dog
Dog


DO NOT DISTURB....
MACHINE IS LEARNING.

WHAT IS MACHINE LEARNING?

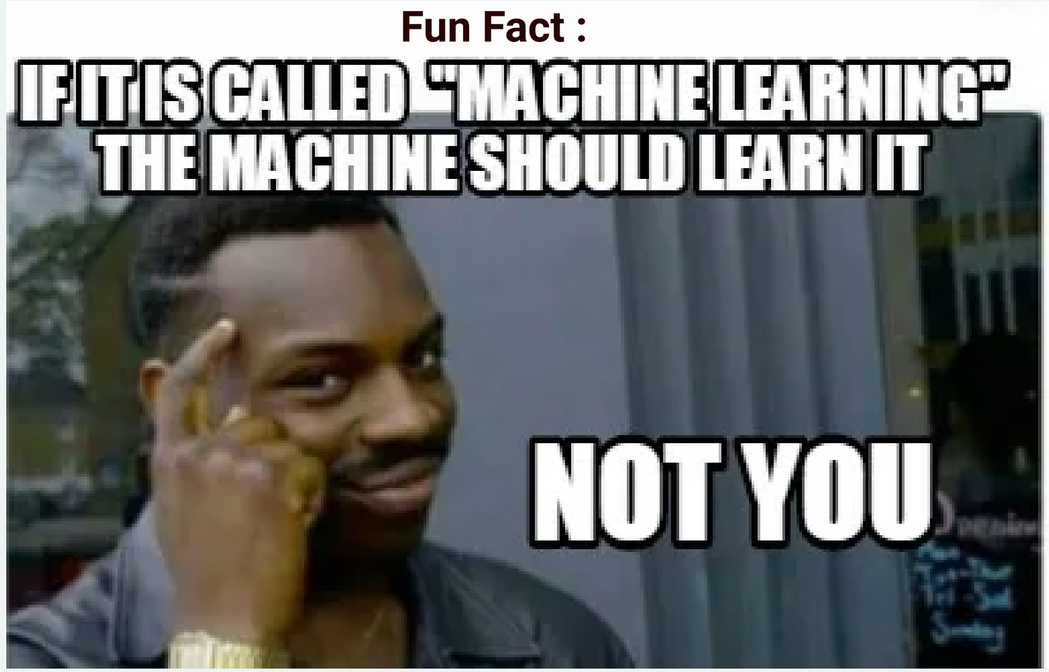


Machine Learning is a part of AI where computers learn from data and improve their performance without being explicitly programmed.

Key Points

- Learns from data (examples), not fixed rules
- Finds patterns and uses them to make decisions
- Improves automatically with more data
- Used for prediction, classification, recommendation

Fun Fact :



Simple Idea

Input data → Learn patterns → Give output (prediction)

THE MACHINE LEARNING LIFECYCLE MAP

A complete journey from raw data to deployment

STEP 01

Define the Problem

Clearly identify what the model is intended to solve or predict.

STEP 02

Collect the Data

Gather structured or unstructured data from reliable sources.

STEP 03

Prepare the Data

Clean, normalize, and transform the data for processing.

STEP 04

Build the Model

Train a predictive model using appropriate algorithms.

STEP 05

Evaluate the Model

Use test data and multiple metrics to measure performance.

STEP 06

Deploy and Monitor

Launch the model and continuously observe how it behaves in real-world conditions.

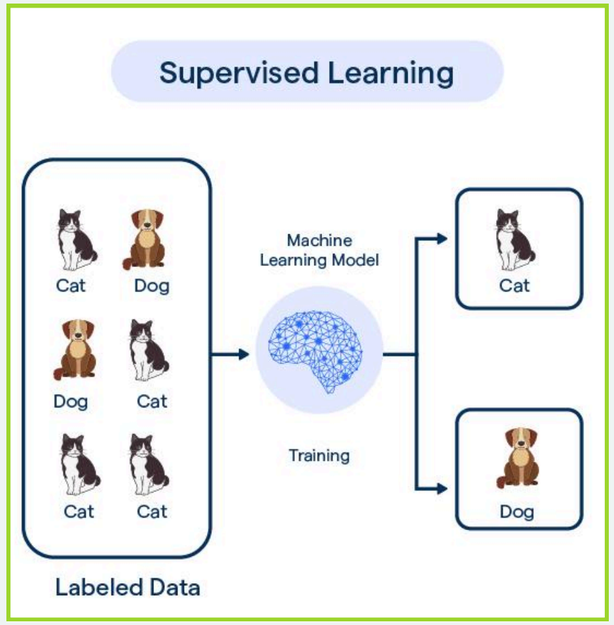
TYPES OF MACHINE LEARNING?

1. Supervised Learning

2. Unsupervised Learning

3. Reinforcement Learning

SUPERVISED LEARNING



Idea: Learn from labeled data (with answers)

How it works:

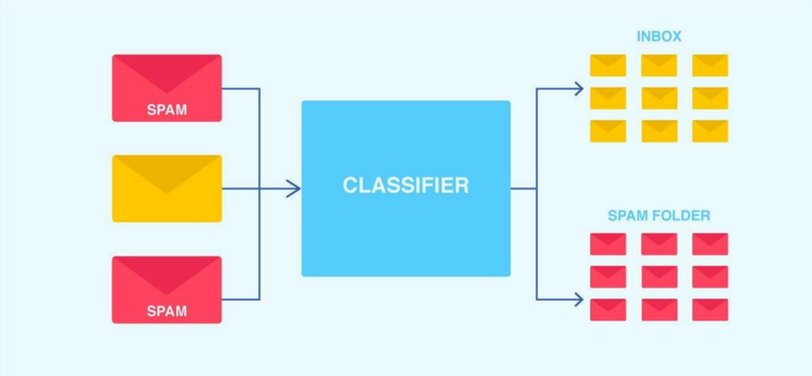
- Input + Correct Output → Model learns mapping

Examples:

- Spam vs Not Spam
- Cat vs Dog image classification

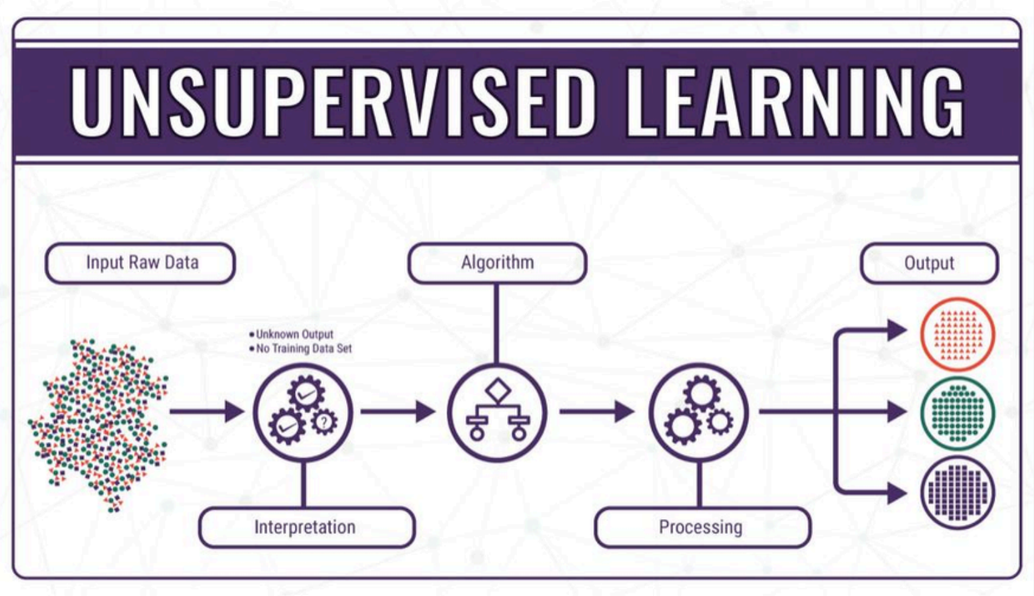
Use for:

- Prediction & classification



Task	Input Data	Output Prediction
Email classification	Text of email	Spam or Not Spam
Disease diagnosis	Patient medical record	Disease category
Loan approval	Financial history	Approve or Reject

UNSUPERVISED LEARNING



Idea: Learn from unlabeled data (no answers given)

How it works:

- Model finds hidden patterns or groups

Examples:

- Customer segmentation
- Grouping similar users

Use for:

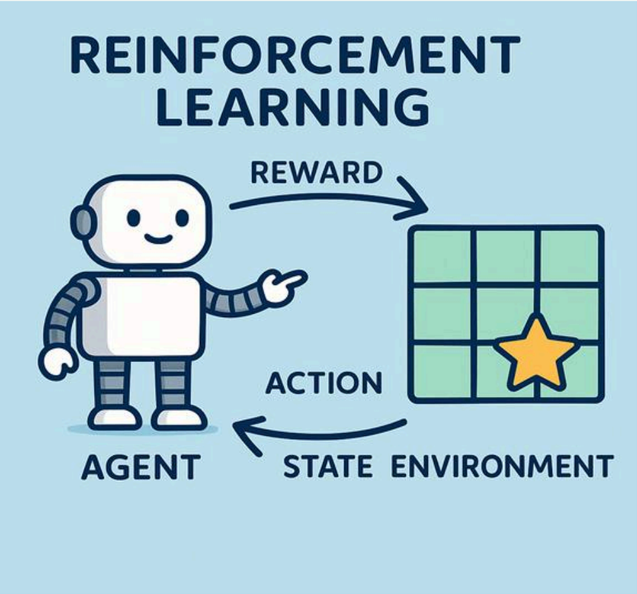
- Clustering & pattern discovery

01 **Clustering**

Grouping data points based on their similarities. Examples include k-means clustering and hierarchical clustering.

You give it raw data and say "Group this." It finds patterns you didn't even notice.

REINFORCEMENT LEARNING



Idea: Learn by trial and error with rewards

How it works:

- Action → Reward/Penalty → Improve decisions

Examples:

- Game AI (like chess, racing)
- Robot learning tasks

Use for:

- Decision making & control systems

01 Reward Function

The agent receives rewards for desired actions and penalties for undesirable ones.

02 Policy

The agent's strategy for selecting actions based on its learned values and the current state of the environment.

03 Exploration

The agent explores the environment, trying different actions and observing their consequences.

04 Value Function

The agent estimates the expected reward for taking a particular action in a given state.

⚖️ Quick Comparison

Type	Data	Learning Style	Example
Supervised	Labeled	Learn from answers	Spam filter
Unsupervised	Unlabeled	Find patterns	Customer groups
Reinforcement	Reward-based	Trial & error	Game AI

Supervised = Learn with answers
Unsupervised = Find patterns
Reinforcement = Learn by reward

SIMPLE SUMMARY

You Are the AI

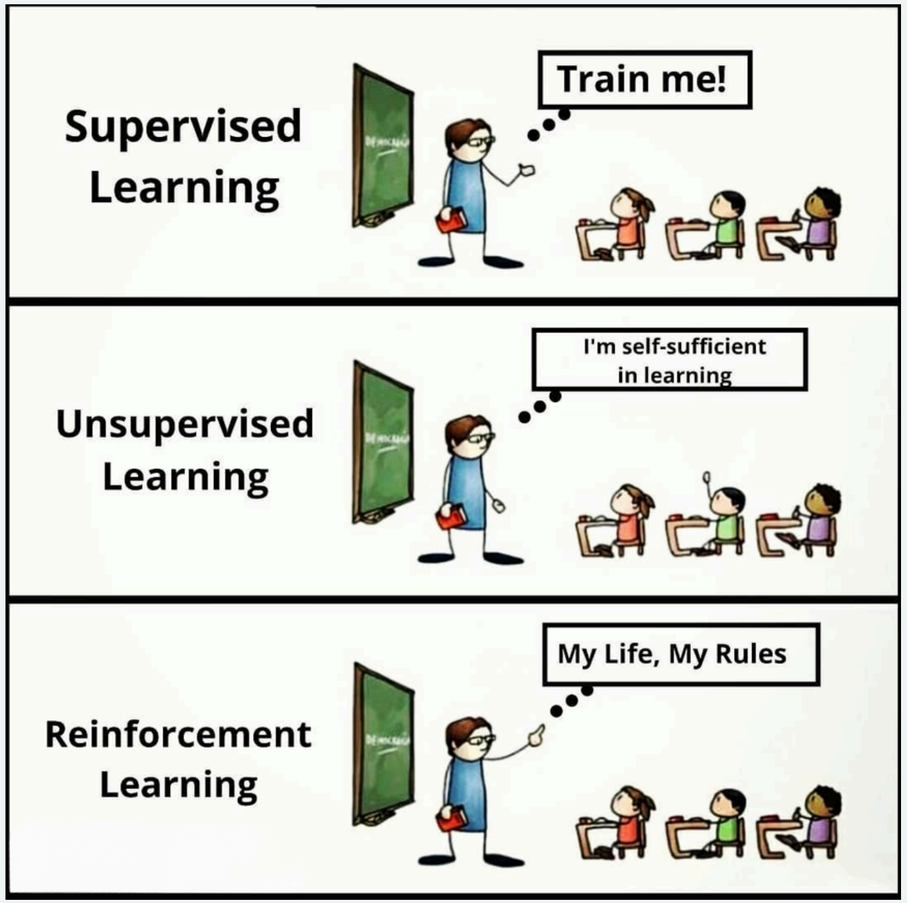
1. The capital of Nepal is kathmandu

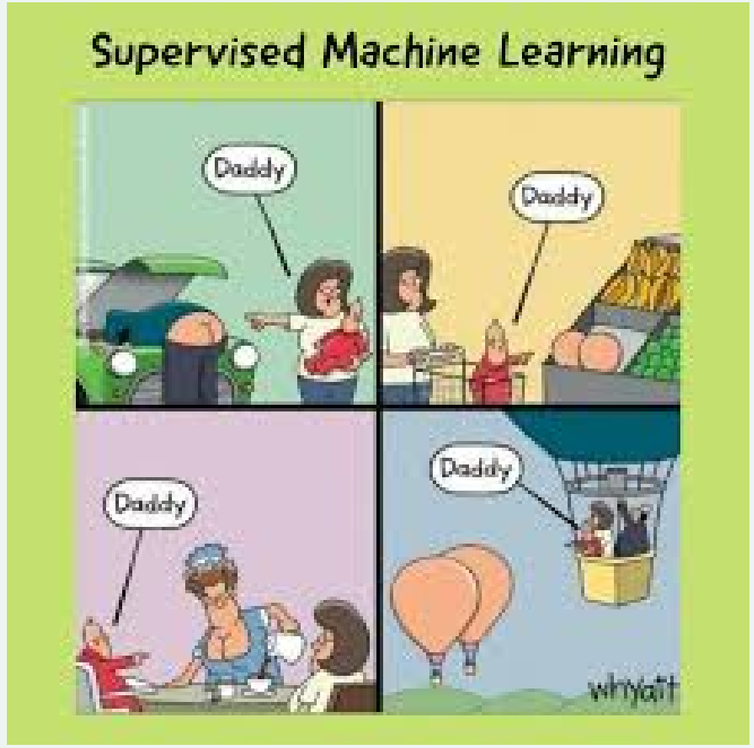
ChatGPT does same thing but using probability

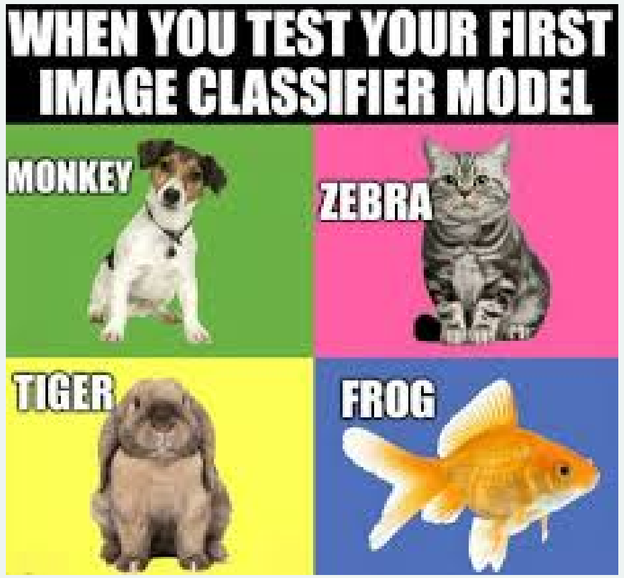
Patterns:

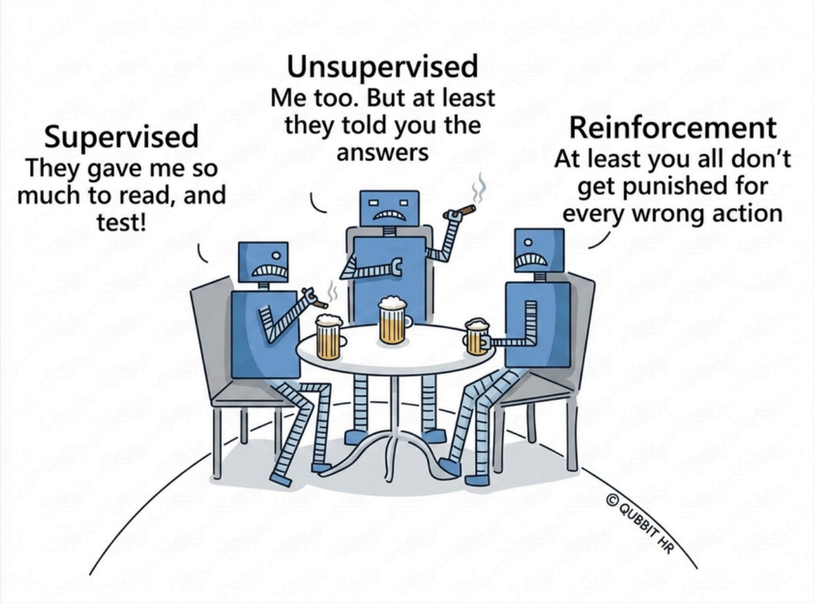
1. Apple → Fruit
2. Banana → Fruit
3. Car → ? vehicle

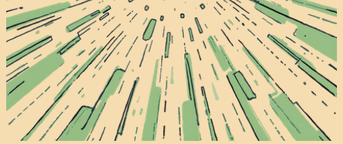
This is Supervised Learning

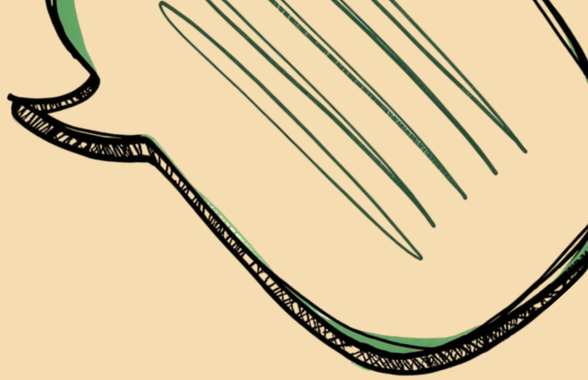

Supervised Learning
Train me!
Unsupervised Learning
I'm self-sufficient in learning
Reinforcement Learning
My Life, My Rules


Supervised Machine Learning
Daddy
Daddy
Daddy
Daddy
whyatt


WHEN YOU TEST YOUR FIRST IMAGE CLASSIFIER MODEL
MONKEY
ZEBRA
TIGER
FROG

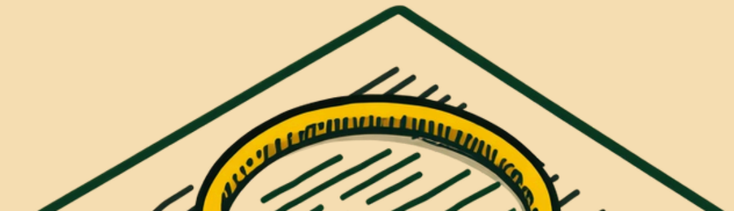

Supervised
They gave me so much to read, and test!
Unsupervised
Me too. But at least they told you the answers
Reinforcement
At least you all don't get punished for every wrong action
© QUBBIT HR

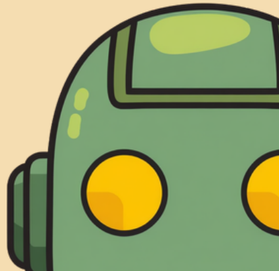




How ChatGPT Works

A Simple Explanation





THE 3-STEP PROCESS BEHIND AI RESPONSES

01

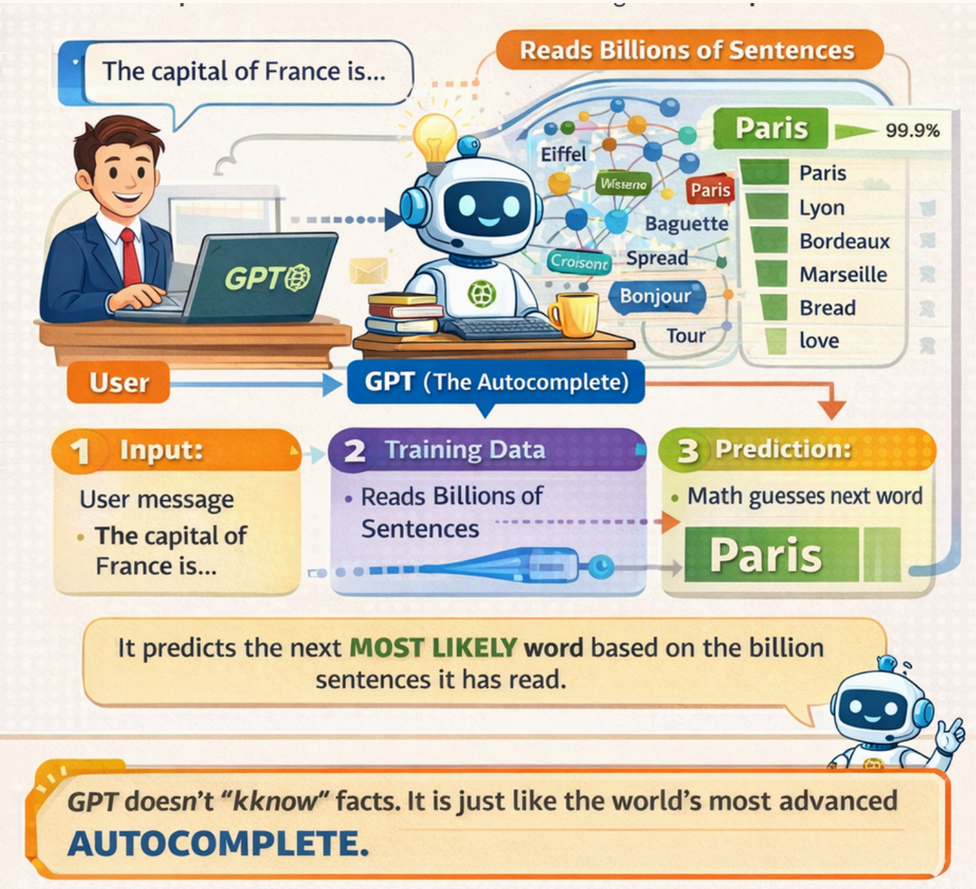
Reads your message and breaks it into small pieces called tokens - these are the building blocks the AI uses to understand your input.

02

Uses patterns learned from huge amounts of text data to understand context and meaning behind your words.

03

Predicts the next most likely word step by step, combining predictions to form a complete, coherent answer.



WHAT IS VECTOR EMBEDDING

Vector embeddings are a way to turn words, sentences, or images into numbers so computers can understand them.

Key Points

Text is converted into a list of numbers (vector)
Similar meanings have similar vectors
Helps AI compare things using math
Works for text, images, audio

Simple Idea

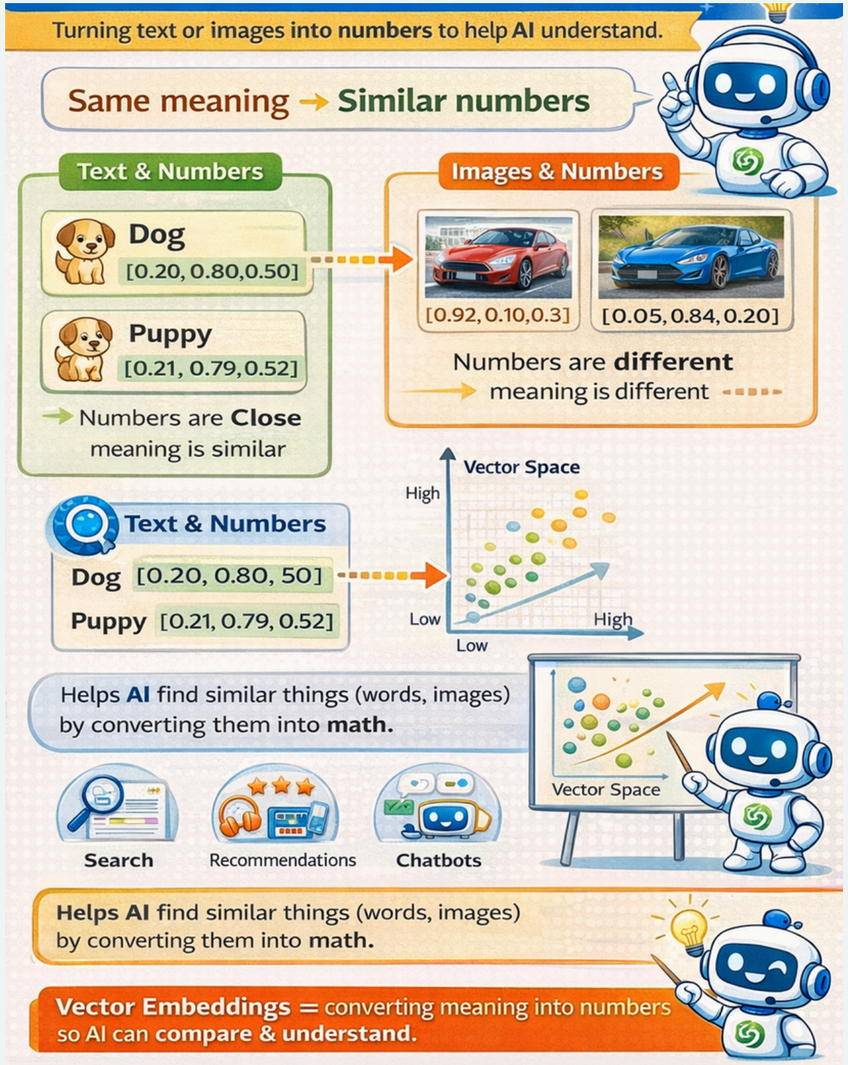
"Same meaning → similar numbers"

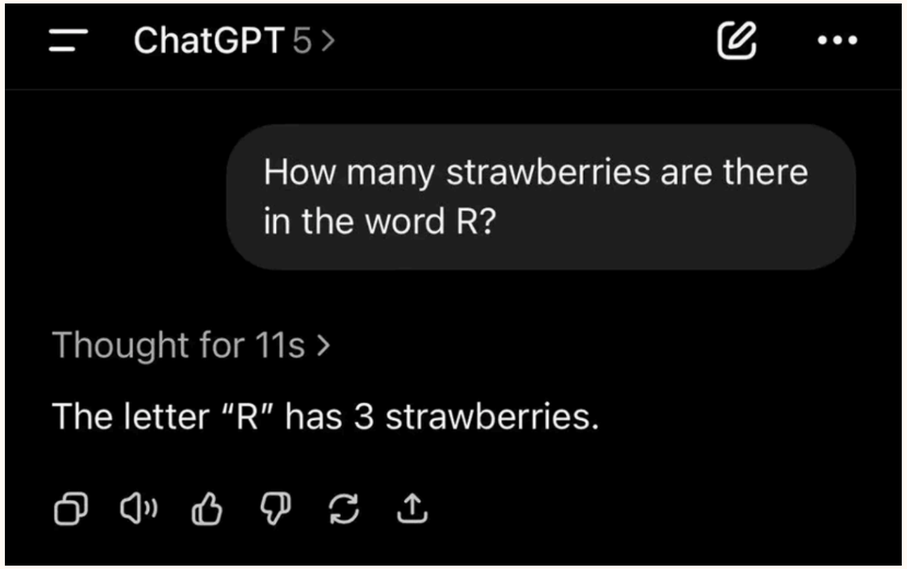
Why it's useful

Search (Google-like results)
Recommendations
Chatbots understanding meaning
AI answering questions

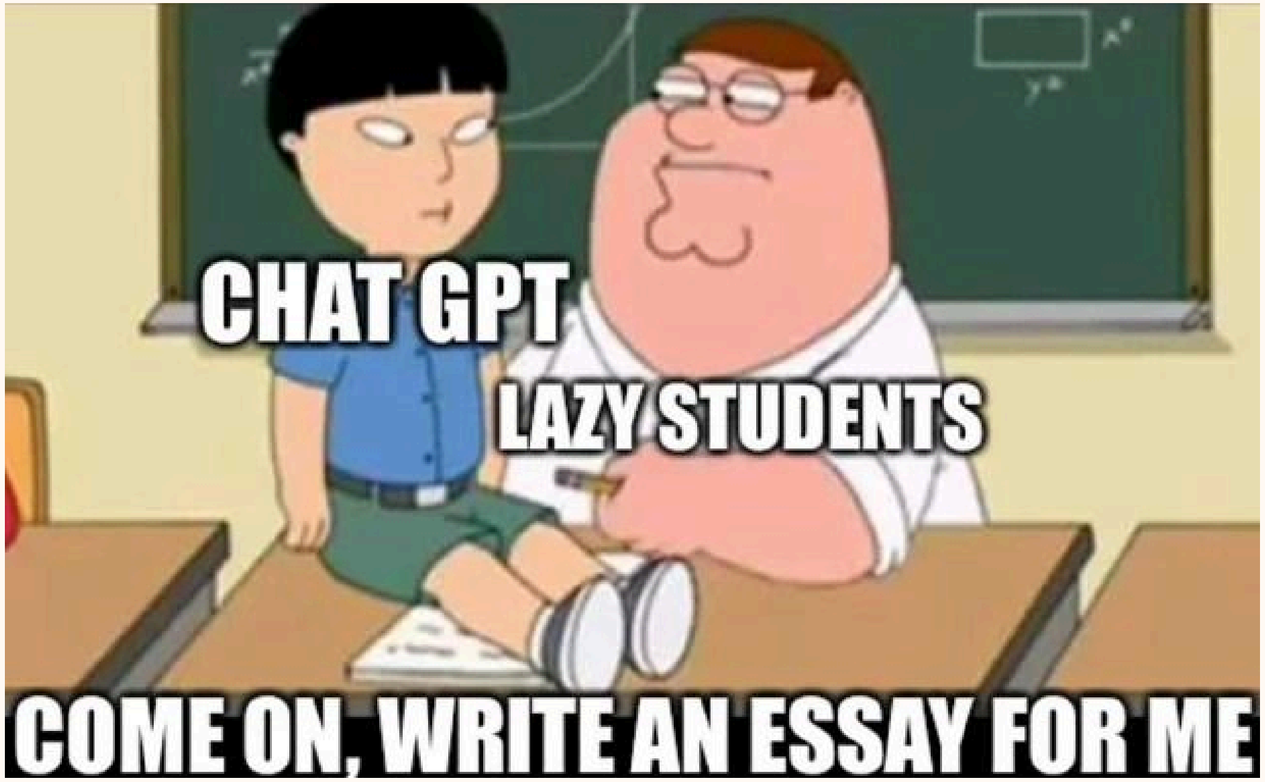
Example

"Dog" → [0.2, 0.8, 0.5]
"Puppy" → [0.21, 0.79, 0.52]
Very close → meaning is similar

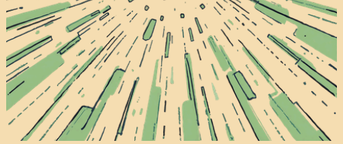


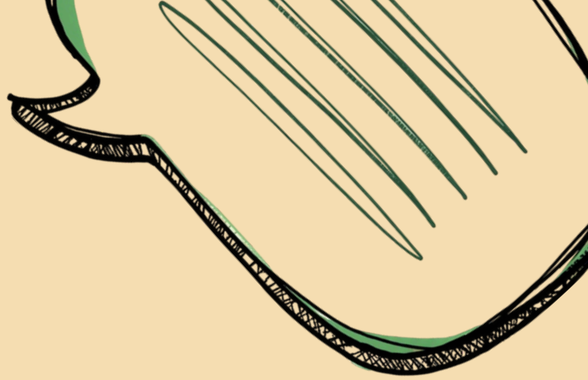

ChatGPT 5
How many strawberries are there in the word R?
Thought for 11s
The letter “R” has 3 strawberries.

CHATGPT
ME
GOOGLE


CHAT GPT
LAZY STUDENTS
COME ON, WRITE AN ESSAY FOR ME

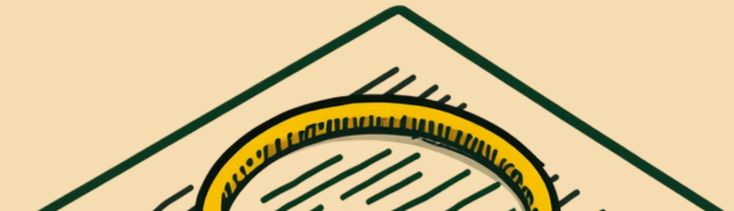
Me when I keep getting bugs even though I updated the prompt with "Make no mistakes":

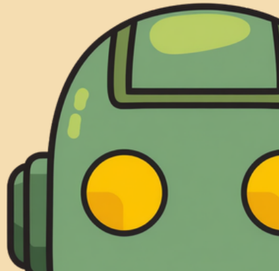




How Sazam Works

A Simple Explanation





Shazam: How does it know that song?

What is Shazam?

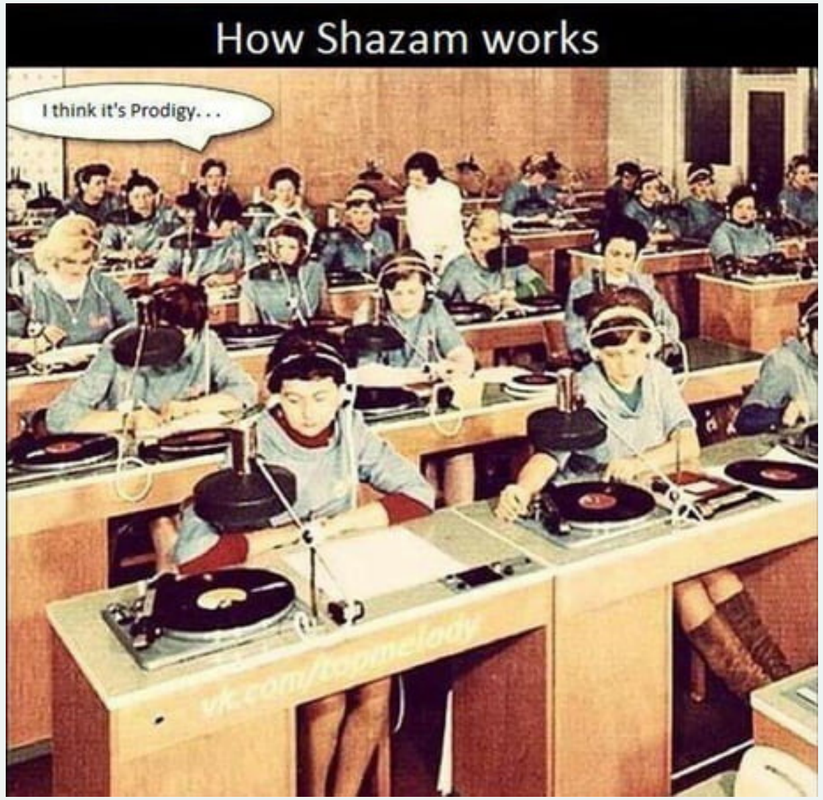
Shazam is a mobile app that helps you identify songs instantly.

How it works (simple)

1. Listens to a short part of the music
2. Converts sound into a digital pattern (fingerprint)
3. Matches it with its huge database
4. Shows you the song name, artist, and details

How DJ's listen to other DJ's in the club...

"Bro, what's that track you played? I can't Shazam it!"


How Shazam works
I think it's Prodigy...

THAT ONE SONG YOU DON'T KNOW THE NAME TO
SHAZAM
imgflip.com

When you hear an absolute banger of a song but you can't Shazam it in time:
my disappointment is immeasurable and my day is ruined

EXAMPLES

AI is not magic it's just data + patterns + prediction.

www.https://quickdraw.withgoogle.com

It's not looking for a 'perfect' drawing; it's looking for the path your mouse took. It has seen 50 million drawings of cats, so it knows the pattern

wwwthispersondoesnotexist.com

In a GAN, the AI isn't just following instructions. It's competing against itself to reach perfection. This is why AI can now 'dream' up art, music, and even deepfake videos

“Design Your Own AI”

Task:If you could build an AI for your school or home, what would it do?

You must write:

- What problem it solves
- What data it needs
- One risk or limitation

Start small today… and you might build something big tomorrow.