

<https://mco.dev/IntroAI.pdf>

# Intro to Artificial Intelligence

**What a well informed person should know**

Marc Cohen

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# Logistics

- 2 sessions x 3 hours (Oct 30, Nov 6)
- Format: lectures, demos, and discussions
- Ten minute break every hour
- Videos: [Welcome to City Lit](#), [Safety at City Lit](#)
- My email: [Marc.Cohen@citylit.ac.uk](mailto:Marc.Cohen@citylit.ac.uk) (reach out any time)
- IT Support: [ItHelpDesk@citylit.ac.uk](mailto:ItHelpDesk@citylit.ac.uk)

# *About Marc*

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I'm an American software engineer based in London. My mission is building tools, tutorials, and online courses to help make computing, mathematics, and data science more accessible and more inclusive.

I have an MEng degree in Computer Science from Cornell, a BA in Mathematics from Rutgers, and over 40 years of experience as a software developer and engineering manager at Bell Labs, Lucent Technologies, and Google.

# Prerequisites

- **You are human (bots not allowed)**
- **You are curious about AI and want to learn more**
- **No technical knowledge required**
- **No programming required**
- **No maths required**

# Goals

- **Understand what AI is and how it works**
- **Learn a little about the history of AI**
- **Gain a sense of what AI can do for you**
- **Appreciate some of the risks and pitfalls**
- **Be able to have an intelligent conversation about AI**

# Non-Goals

- Deep dive into technology or maths
- Definitively answer profound ethical and societal questions
- Predict the future

# Table of Contents

- A Personal Story
- Definitions
- AI History
- Mechanics
- What can AI do for you?
- Ethics
- The Future



Photo by Domenico Loia on [Unsplash](#)

# A Personal Story

## Part 1 - AI as a service

# I've experienced a few changes

- **high level programming languages**
- **portable operating systems**
- **personal computers**
- **the internet and the world wide web**
- **search engines (esp. Google)**
- **mobile phones**
- **smart phones**
- **cloud computing**
- **the data science boom**
- **the AI revolution**

# August 2016

## Option 1 - Interactive Trivia Quiz Challenge Game

Inspired by [quizup](#) but a PWA rather than a native app and used as a way to illustrate backend design principles. We'll build this app in steps and highlight important lessons as they arise in the design process.

### Requirements

- Usage flow
  - Visit site ([quizr.io](#))
  - Anonymous mode works out of the box
    - Ability to do quiz challenges with random other users but no user profile, no persistence of results, no leaderboard, no history
  - Establish a user profile
  - Challenge random or selected opponent to real time trivia challenge
  - Challenger selects subject, responder accepts or rejects (repeat until agreement)
  - Quiz conducted in real time using webRTC data (with optional video)
  - Results are persistent
  - Leaderboards maintained
  - Questions are accessed dynamically via network (caching is not particularly helpful because real time contents won't work while offline)
- Utilize an [open trivia question database](#)
- Implemented as a PWA
- Both a hosted service and an open source code example
- FE uses either react or Angular 2 (TBD)
- Use to illustrate state of the art back end capabilities

### App Stages

1. FE - UI starts with anonymous mode only.
2. Add successive features by implementing an API (REST or gRPC). With each step, highlight options and considerations in choosing backend technology
  - a. sign in and user profile management

**March 2023**

**Wouldn't it be  
cool to have a  
free quiz game  
for everyone  
powered by AI?**

# **A Personal Story**

## **Part 2 - AI as code completion**

sentiment.ts

write\_sql.go

parse\_expenses.py

addresses.rb

```
1 #!/usr/bin/env ts-node
2
3 import { fetch } from "fetch-h2";
4
5 // Determine whether the sentiment of text is positive
6 // Use a web service
7 async function isPositive(text: string): Promise<boolean> {
8   const response = await fetch(`http://text-processing.com/api/sentiment/`, {
9     method: "POST",
10    body: `text=${text}`,
11    headers: {
12      "Content-Type": "application/x-www-form-urlencoded",
13    },
14  });
15  const json = await response.json();
16  return json.label === "pos";
17}
```



**quizaic**

(pronounced like **mosaic**)

# Let's play!

The screenshot shows the Quizaic app interface. At the top, there is a navigation bar with the Quizaic logo and the text "AI Powered Infinitrivia". On the right side of the bar is a circular profile picture of a man wearing a green cap. Below the navigation bar is a vertical sidebar containing five menu items: "Home" (selected), "Browse", "Create", "Play", and "About". The main content area features a large blue banner with the "Quizaic" logo in white and red. Below the banner, the text "AI Powered Infinitrivia" is displayed in a large, bold, blue font. A detailed description follows: "Quizaic leverages the power of generative AI to create and play unlimited trivia quizzes and online surveys. Quizaic is a demonstration app to illustrate what's possible with the combination of Google Cloud services, Flutter, and Vertex AI. Quizaic is not an official Google product and should not be used for commercial purposes."

Quizaic

AI Powered Infinitrivia

AI Powered Infinitrivia

Quizaic leverages the power of generative AI to create and play unlimited trivia quizzes and online surveys. Quizaic is a demonstration app to illustrate what's possible with the combination of Google Cloud services, Flutter, and Vertex AI. Quizaic is not an official Google product and should not be used for commercial purposes.

# Early Prompt

Generate a {num\_questions} multiple choice quiz questions based on category {topic}.

Generate a {num\_questions} multiple choice quiz questions **in Swedish** based on category {topic}.

Generate a {num\_questions} multiple choice quiz questions based on category {topic} **in Swedish**.

# Current Prompt

You are a trivia expert.  
Generate a set of multiple choice quiz questions.

Category: {topic}

Quiz difficulty level: {difficulty}

Number of questions: {num\_questions}

Number of responses per question: {num\_answers}

Quiz language: {language}

RULES:

- Accuracy is critical.
- Each question must have exactly one correct response, selected from the responses array.
- Output should be limited to a json array of questions, each of which is an object containing quoted keys "question", "responses", and "correct".
- Don't return anything other than the json document.

OUTPUT:

# A Personal Story

## Part 3 - AI as coding agent

# Introducing vibe coding in Google AI Studio

Oct 26, 2025

3 min read

We're making it faster and more intuitive than ever to turn your vision into a working, AI-powered app with vibe coding in AI Studio.



Ammaar Reshi

Product and Design Lead,  
Google AI Studio



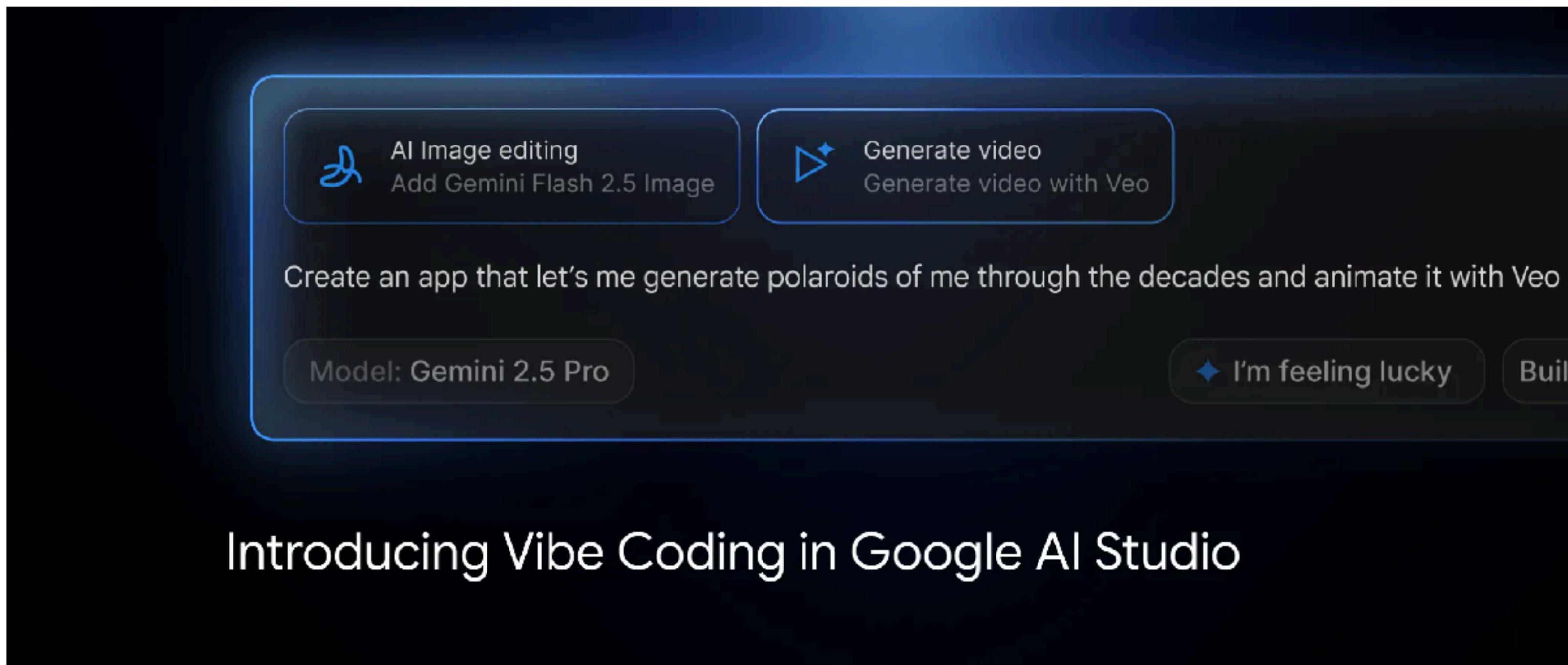
Kat Kampf

Product Manager, Google AI  
Studio



Read AI-generated summary

Share



# Google AI Studio

< Build

Start

Gallery

Your apps

FAQ

Recently viewed

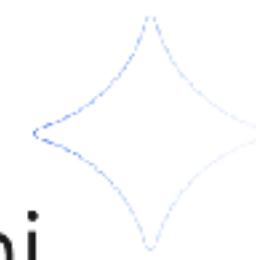
React Hello World

Zenith AI Meditation

React Hello World



## Build your ideas with Gemini



Describe your idea

⚙️ Model: Gemini 2.5 Pro



I'm feeling lucky

Build ←

## Supercharge your apps with AI



### Nano banana powered app

Add powerful photo editing to your app. Allow users to add objects, remove backgrounds, or change a photo's style just by typing.



### Create conversational voice apps

Use the Gemini Live API to give your app a voice and make your own conversational experiences.



### Animate images with Veo

Bring images to life with Veo 3. Let users upload a product photo and turn it into a dynamic video ad, or animate a character's portrait.



### Use Google Search data

Connect your app to real-time Google Search results. Build an agent that can discuss current events, cite recent news, or fact-check information.



### Use Google Maps data

Connect your app to real-time Google Maps data. Build an agent that can pull information about places, routes, or directions.



### Generate images with a prompt

Generate high-quality images from a text prompt. Create blog post heroes, concept art, or unique assets in your application.



### Gemini intelligence in your app

Embed Gemini in your app to complete all sorts of tasks - analyze content, make edits, and more.



### AI powered chatbot

Add a context-aware chatbot to your app. Give your users a support agent that remembers the conversation, perfect for multi-step bookings or troubleshooting.

Google AI models may make mistakes, so double-check outputs.

➡️ Get API key

⚙️ Settings

marcacohen@gmail....

# Definitions

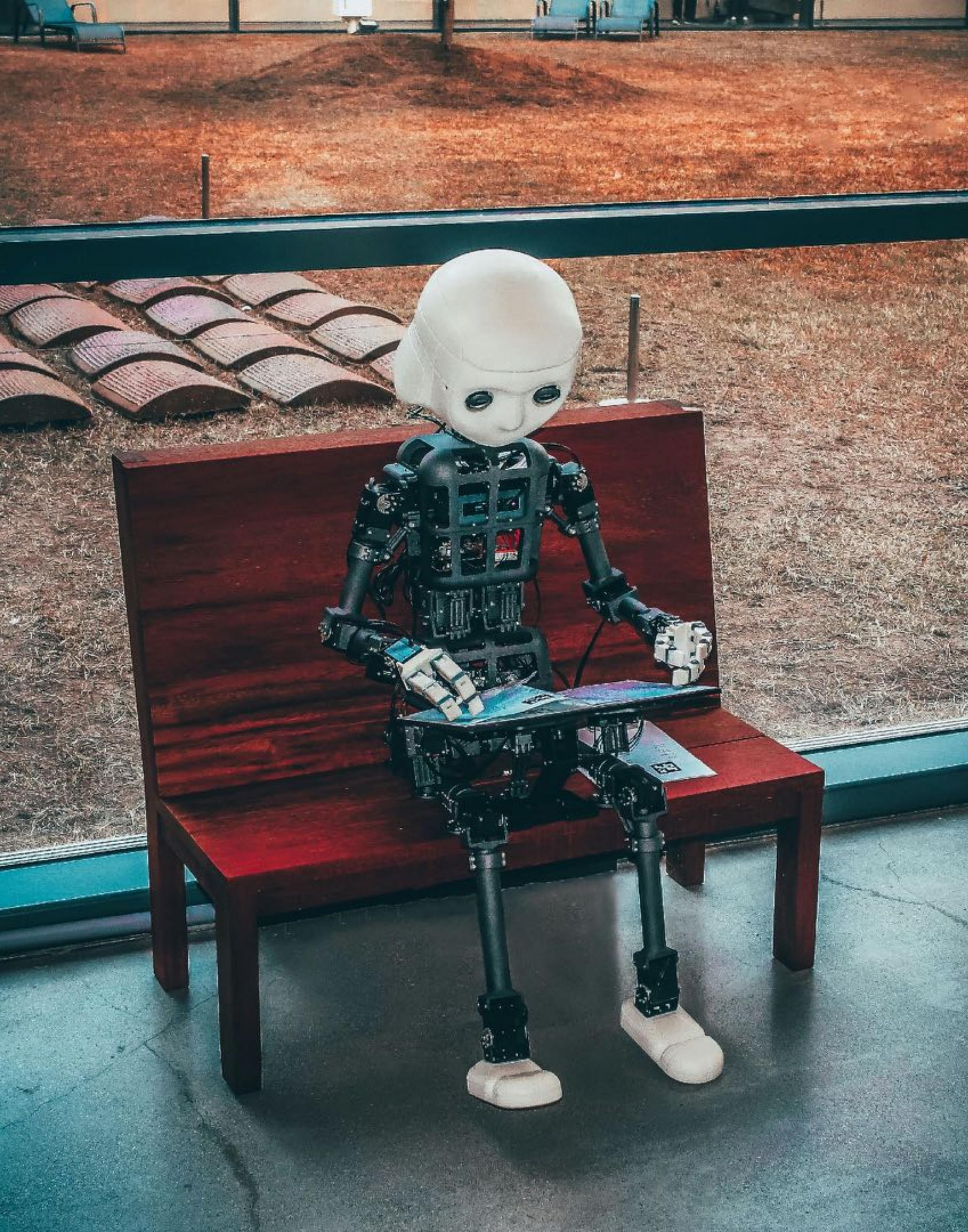
- **Artificial Intelligence**
- **Machine Learning**
- **Neural Network**
- **Deep Learning**
- **Generative AI**

mal~anto: malantaue mizer  
estis tute en mal~o<sup>2</sup>; elmeti  
mal~on<sup>2</sup>; mal~o min kaptas  
malgrasiĝintan vizaĝon de n  
Rilata al mal~o: fajro de ma  
krio<sup>2</sup>. **mal~igi.** Senigi je ~o  
ne plu konservas ~on: sen~o  
treni sen~an ekzistadon<sup>2</sup>. **se**  
io sen~a.

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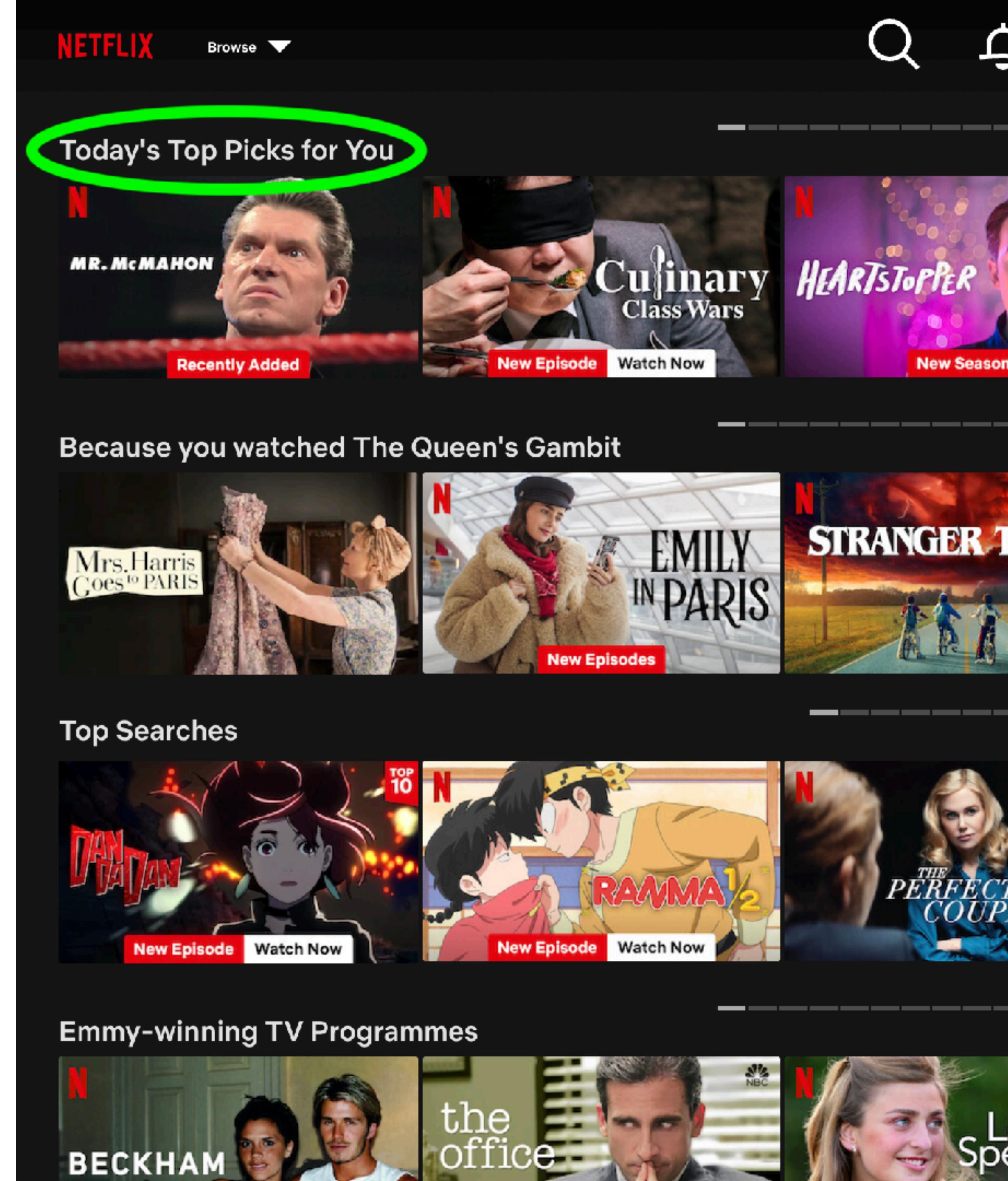
# Definition: Artificial Intelligence

The creation of algorithms and systems capable of performing tasks that typically require human cognition, such as learning, reasoning, perception, decision-making, and natural language processing.



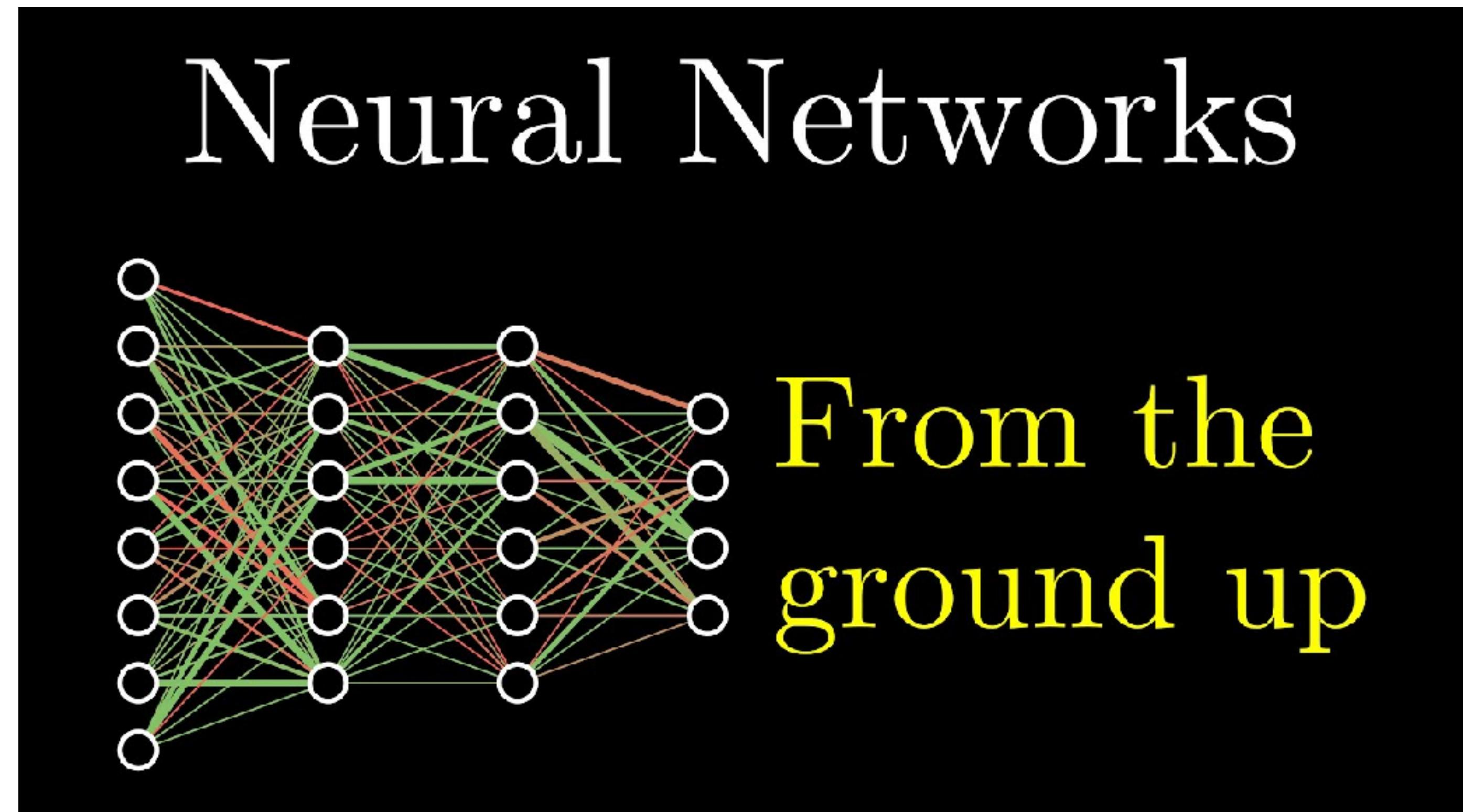
# Definition: Machine Learning

The use and development of computer systems that are able to learn and adapt without following explicit instructions, by using algorithms and statistical models to analyze and draw inferences from patterns in data.



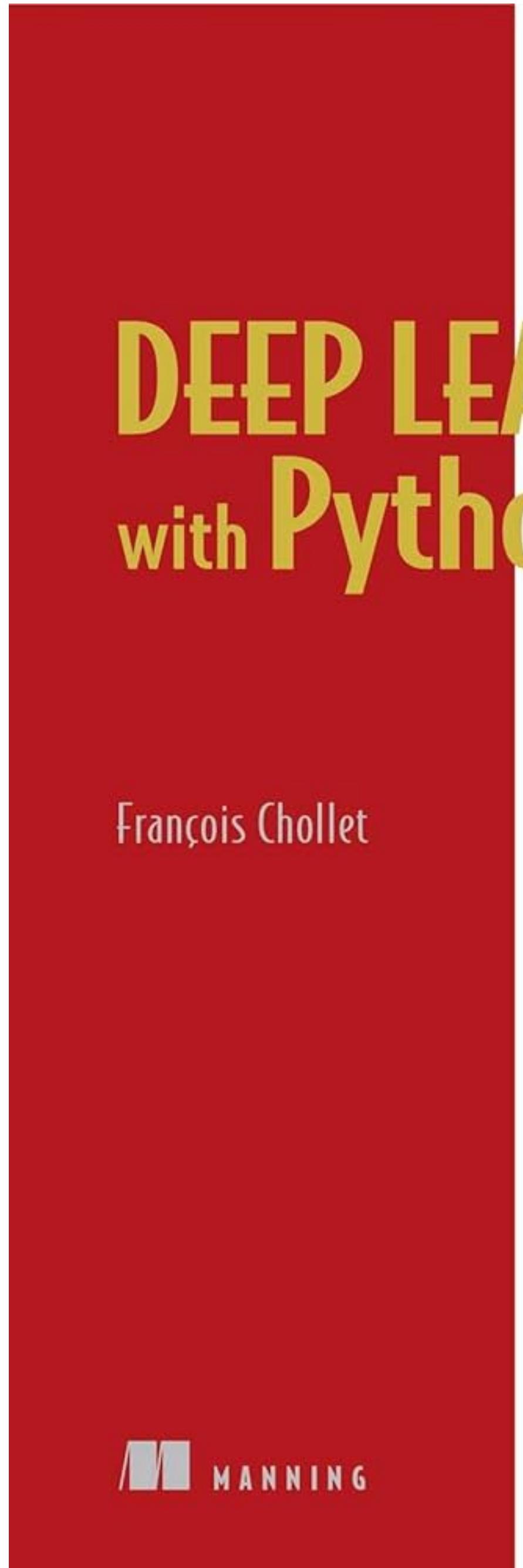
# Definition: Neural Networks

A machine learning (ML) technique that uses a network of interconnected layers of nodes to process data in a way that bears some resemblance to the human brain.



# Definition: Deep Learning

A type of machine learning that uses multi-layer neural networks to train computers to process data and make human-like decisions. Deep learning systems learn from large amounts of data, including images, text, audio, and video to recognize patterns, make predictions, and automate tasks.



# Definition: Generative AI

Deep-learning models  
that can generate high-  
quality text, images,  
video, and other  
content based on the  
data they were trained  
on.



**Artificial  
Intelligence**

**Machine  
Learning**

**Neural  
Networks**

**Deep  
Learning**

**Generative  
AI**

# Artificial Intelligence

Machine Learning

Deep Learning

1950's

1960's

1970's

1980's

1990's

2000's

2010's



# AI History

# How did we get here?

- Founders
- Timeline



# Ada Lovelace

**Ada Lovelace (1815–1852)** worked with Charles Babbage on his design for the Analytical Engine, a mechanical general-purpose computer that was never built. In her famous notes, she described how such a machine could manipulate symbols according to rules — not just numbers — and even envisioned it creating music or art. This foresight is often seen as a conceptual precursor to artificial intelligence, since she recognized the potential for machines to process abstract patterns beyond calculation.



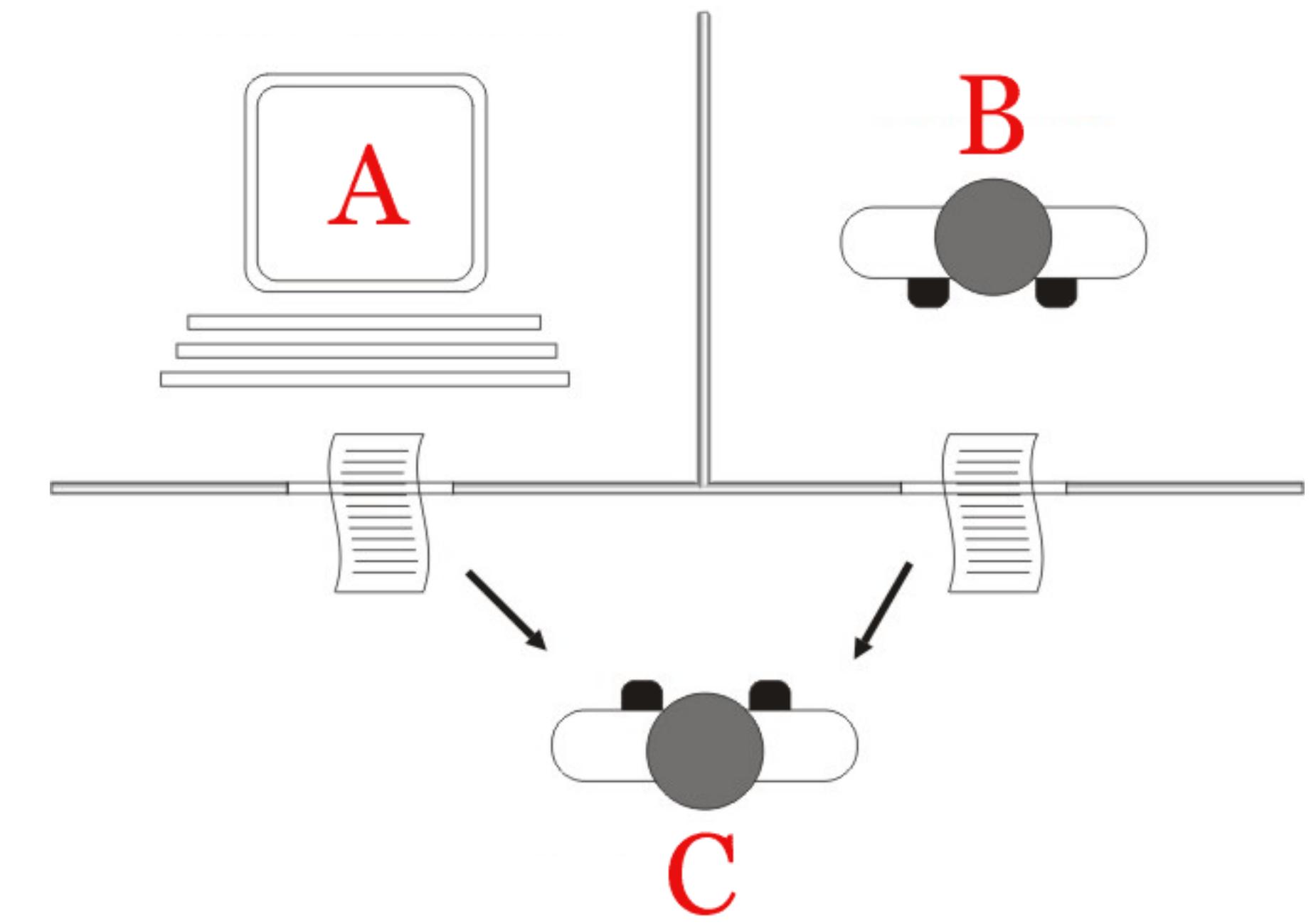
# Alan Turing

**Alan Turing (1912–1954)** laid the theoretical foundations of computer science with his concept of the “universal machine,” showing that a single device could simulate any other computational process. In his 1950 paper “*Computing Machinery and Intelligence*,” he proposed the Imitation Game (now called the Turing Test) as a way to consider machine intelligence. His ideas established core questions about whether and how machines could think, making him one of the intellectual founders of artificial intelligence.



# The Turing Test (1950)

If a machine could carry on a conversation that was indistinguishable from a conversation with a human being, then it was reasonable to say that the machine was "thinking". This was the first serious proposal about how humanity might achieve artificial intelligence.



By Juan Alberto Sánchez Margallo - File:Test\_de\_Turing.jpg, CC BY 2.5

# How Did You Do On The AI Art Turing Test?

...

NOV 20, 2024



Share

...

Last month, I challenged 11,000 people to classify fifty pictures as either human art or AI-generated images.

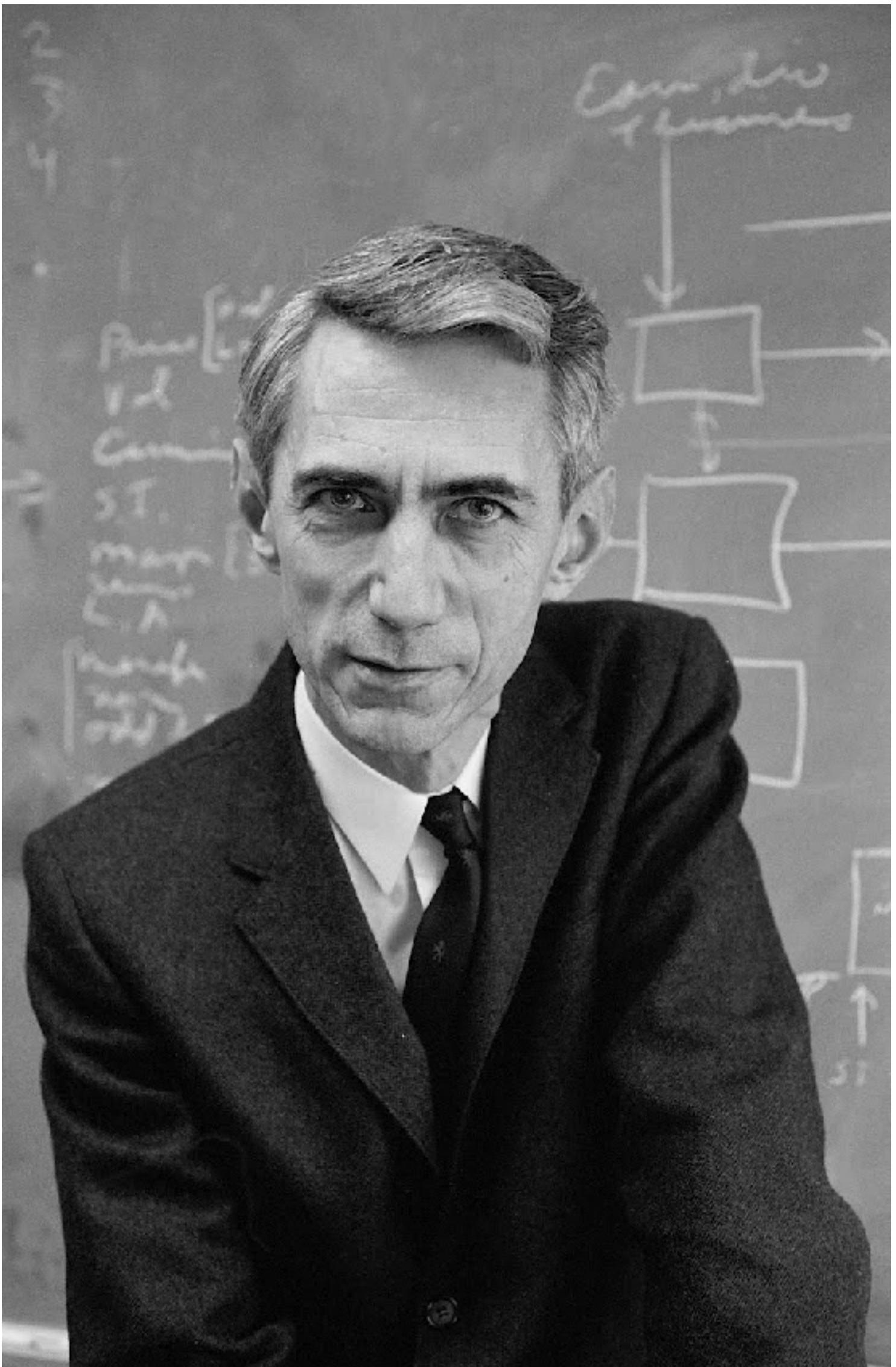
I originally planned five human and five AI pictures in each of four styles: Renaissance, 19th Century, Abstract/Modern, and Digital, for a total of forty. After receiving many exceptionally good submissions from local AI artists, I fudged a little and made it fifty. The final set included paintings by Domenichino, Gauguin, Basquiat, and others, plus a host of digital artists and AI hobbyists.



One of these two pretty hillsides is by one of history's greatest artists. The other is soulless AI slop. Can you tell which is which?

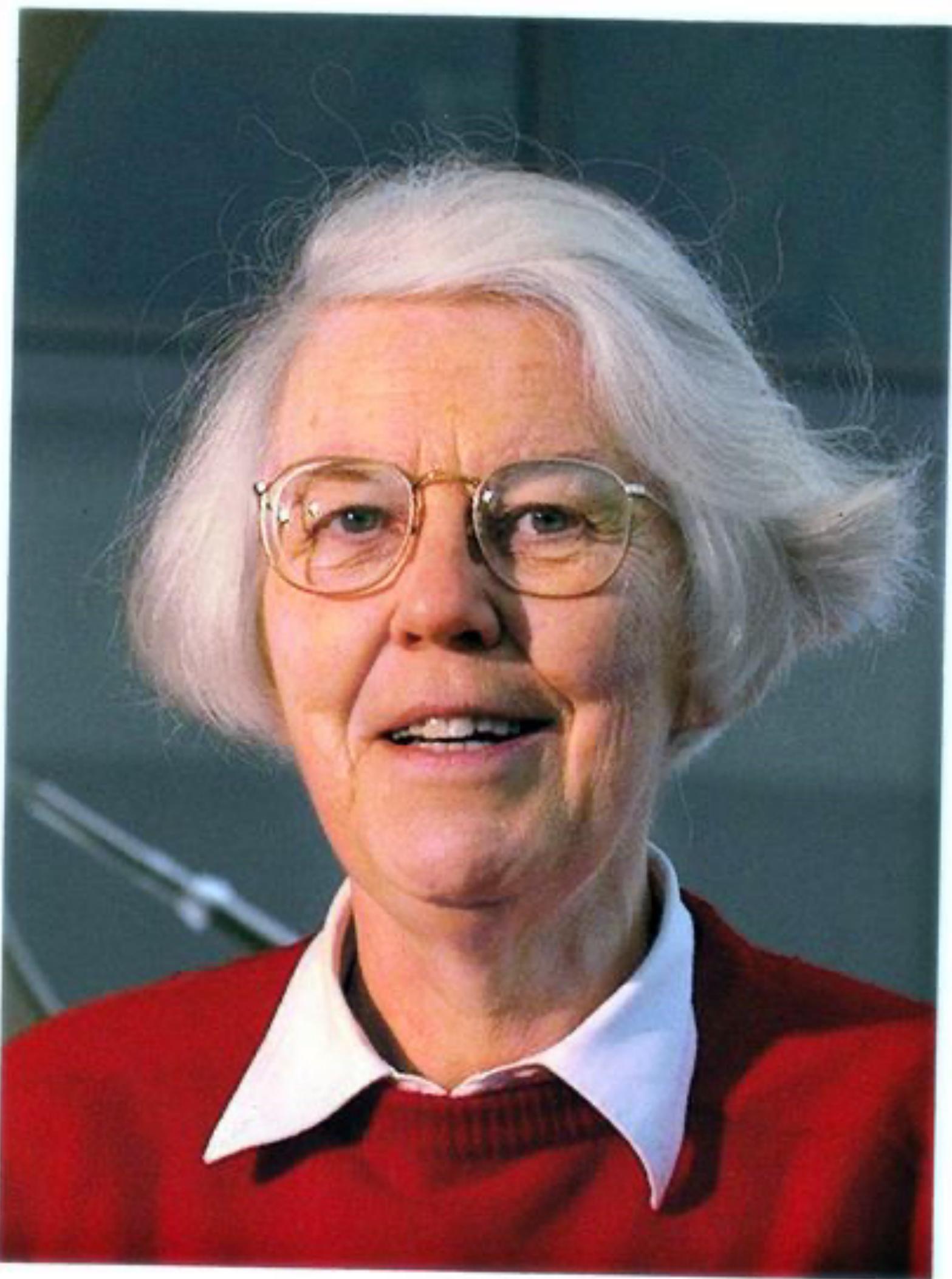
# Claude Shannon

**Claude Shannon (1916–2001)**, often called the “father of information theory,” laid the groundwork for modern digital communication and data processing. His 1948 paper defined concepts like *bits* and *entropy*, enabling the mathematical treatment of information and uncertainty. While not an AI researcher per se, his theories on communication and symbolic processing directly influenced early artificial intelligence, machine learning, and pattern recognition.



# Karen Spärck Jones

**Karen Spärck Jones (1935–2007)** was a pioneering computer scientist in natural language processing and information retrieval. She introduced the concept of *inverse document frequency (IDF)*, which, combined with term frequency, became the foundation of modern search engines. Her work made it possible for computers to rank documents by relevance, a breakthrough that continues to underpin AI-driven search and text analysis today.



# Geoffrey Hinton

**Geoffrey Hinton (b. 1947)** is widely known as the “godfather of deep learning” for his pioneering work on artificial neural networks. He helped popularize the backpropagation algorithm in the 1980s and later co-developed deep belief networks, showing how multiple layers of representations could be learned. His group’s success with *AlexNet* in the 2012 ImageNet competition demonstrated the power of deep learning, sparking today’s revolution in computer vision, natural language processing, and generative AI.



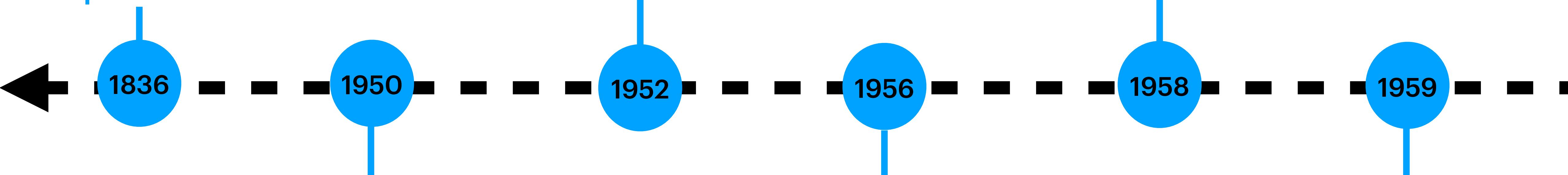
# Demis Hassabis

**Demis Hassabis (b. 1976)** is the co-founder and CEO of DeepMind, a leading AI research company acquired by Google in 2014. Trained as both a neuroscientist and computer scientist, he pushed for biologically inspired approaches to AI, leading to breakthroughs such as **AlphaGo**, the first system to defeat a world champion in Go, and **AlphaFold**, which solved the decades-old protein folding problem. His leadership has made DeepMind central to advancing deep reinforcement learning and AI for scientific discovery.



# AI Development Timeline

Charles Babbage & Ada Lovelace design the Analytical Engine, an early mechanical general-purpose computer.



Alan Turing publishes "Computing Machinery and Intelligence," introducing the Turing Test.

Arthur Samuel developed a program to play checkers, which is the first to ever learn the game independently.

John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon organize the Dartmouth Conference, coining the term "Artificial Intelligence."

John McCarthy created LISP, the first programming language for AI research, which is still in popular use to this day.

Arthur Samuel created the term "machine learning" in a speech about teaching machines to play chess better than the humans who programmed them.

# AI Development Timeline

Edward Feigenbaum and Joshua Lederberg created the first “expert system” to replicate the decision-making abilities of human experts.

1965

1965

Joseph Weizenbaum created the first “chatterbot” (later shortened to chatbot), ELIZA, a mock psychotherapist, that used natural language processing (NLP) to converse with humans.

The first AI winter begins as funding and interest decline due to unmet expectations.

1972

1974

Marvin Minsky and Seymour Papert publish Perceptrons, highlighting limitations in neural networks.

1980

David Rumelhart, Geoffrey Hinton, and Ronald Williams publish the backpropagation algorithm, revitalizing neural networks.

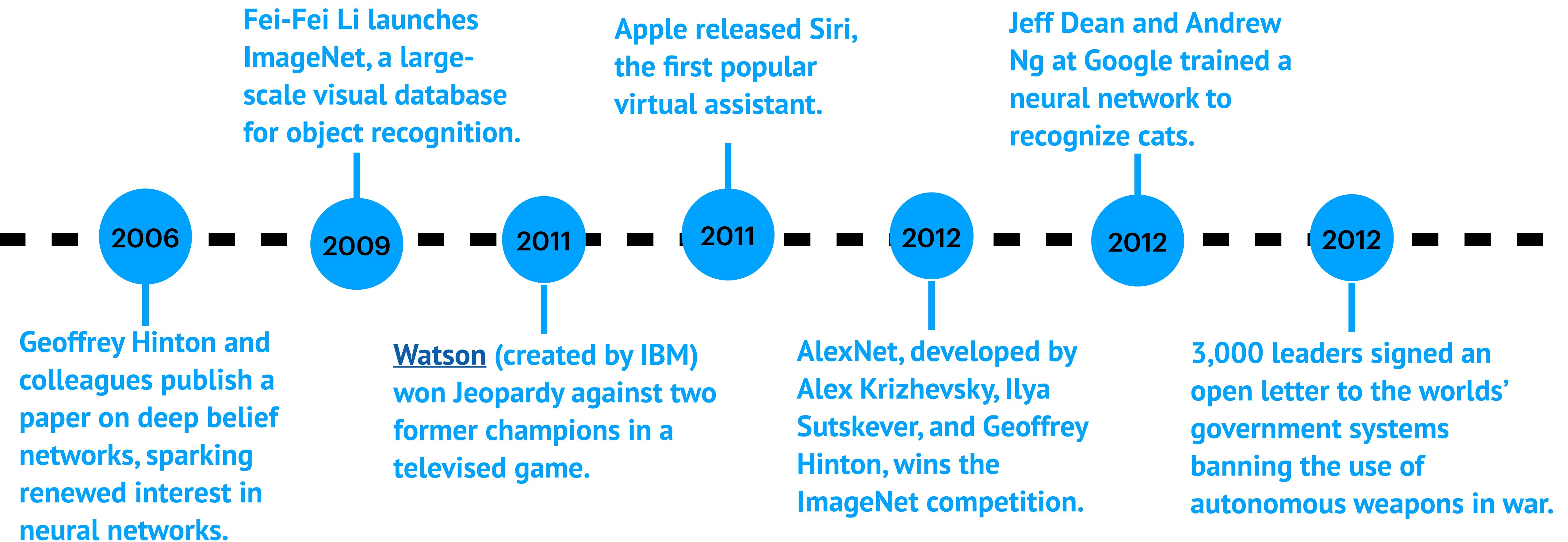
The resurgence of AI interest due to expert systems like MYCIN (medical diagnosis) and DENDRAL (chemical analysis).

IBM's Deep Blue defeats world chess champion Garry Kasparov.

1986

1997

# AI Development Timeline



# AI Development Timeline

DeepMind's AlphaGo defeats professional Go player Lee Sedol.

2015

2017

2017

2018

2020

2020

2022

2024

Two Facebook chatbots converse and learn how to negotiate and developed their own shorthand language, completely autonomously.

Google publishes “Attention is all you need”, unveiling the Transformer.

Chinese Alibaba beat humans on Stanford reading and comprehension test.

OpenAI releases GPT-3, a powerful language model with 175 billion parameters.

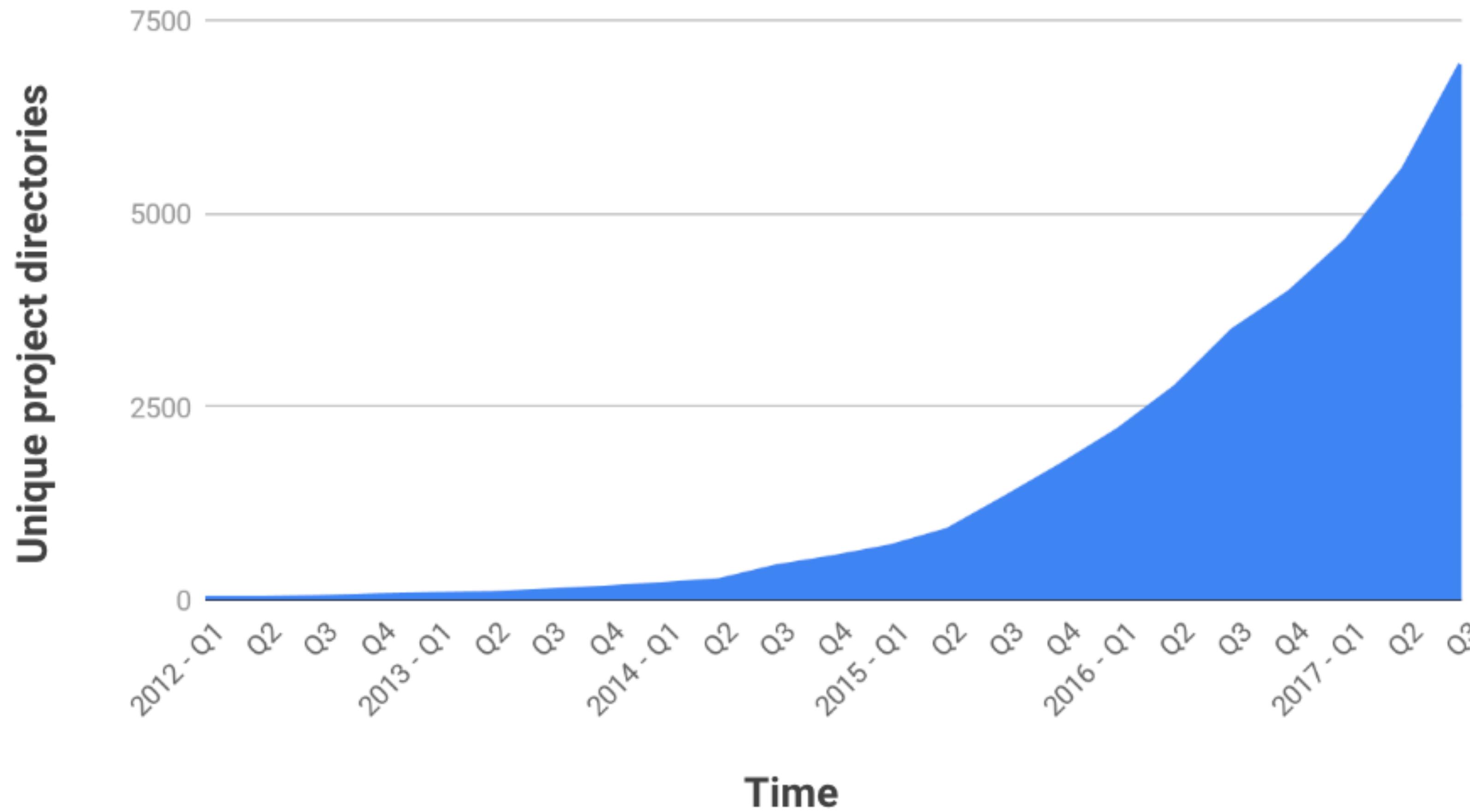
Generative AI goes mainstream with ChatGPT

Open source AI era begins

DeepMind's AlphaFold makes significant progress in protein folding.

# Use of Deep Learning at Google

source directories containing deep learning models



# Google's AI Awakening

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人間とテクノロジーの未来を探求しています。HUMANITY AND TECHNOLOGY

Nov 11, 2016 · 5 min read



You seem to have made it into a  
neural network Try the beginning  
with The Great Gatsby Google  
Translate

ニューラルネット化したらしいGoogle翻訳でThe Great Gatsby冒頭  
を試してみる：

原文：In my younger and more vulnerable years my father gave me some  
advice that I've been turning over in my mind ever since.

“Whenever you feel like criticizing any one,” he told me, “just remember  
that all the people in this world haven't had the advantages that you've  
had.”

google：私の若くて傷つきやすい年の頃、私の父は私が私の心の中でそれ  
以来変わってきたアドバイスを私にくれました。

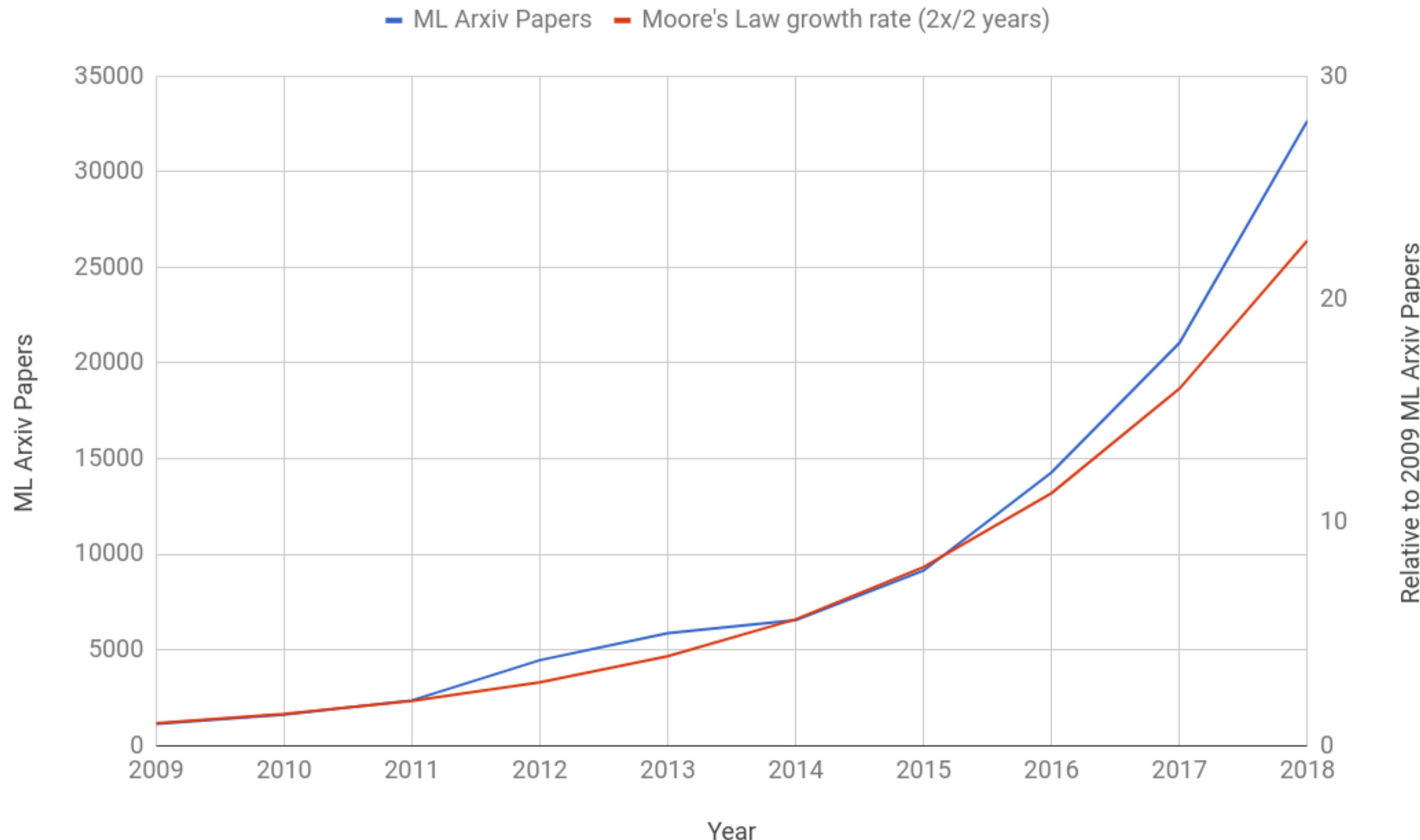
「誰かを批判する気持ちがあるときはいつでも、彼は私に言いました。  
「この世界のすべての人々はあなたが持っていた優位性を持っていないこ  
とを覚えておいてください。

FEATURE

## The Great A.I. Awakening

How Google used artificial intelligence to transform Google  
Translate, one of its more popular services — and how  
machine learning is poised to reinvent computing itself.

# Industry Adoption



# THE KURZWEIL CURVE

*Moore's Law is just the beginning: The power of technology will keep growing exponentially, says Kurzweil. By 2050, you'll be able to buy a device with the computational capacity of all mankind for the price of a nice refrigerator today.*

## Computer performance

Plotted by number of calculations per second per \$1,000

Years by which, according to  
Kurzweil, \$1,000 of computation  
will equal (or has already equaled)  
the intelligence of ...

... all human brains

... one human brain

... one mouse brain

... one insect brain

Kurzweil's  
projected  
trend line

• – COMPUTER TYPE

Hollerith Tabulator  
Bell Calculator Model I  
Univac I

Apple Mac II

1900 1925 1950 1975 2001 '10 '23 2050 2075

$10^{40}$

$10^{30}$

$10^{20}$

$10^{10}$

1

$10^{-10}$

SOURCE: DATA FROM RAY KURZWEIL

# **Nvidia Is Now Worth \$5 Trillion as It Consolidates Power in A.I. Boom**

The A.I. chip maker has become a linchpin in the Trump administration's trade negotiations in Asia.



Listen to this article · 9:05 min [Learn more](#)



Share full article



Link



233



“Spending on data centers, which are filled with the company’s chips, accounted for 92 percent of the country’s gross domestic product growth in the first half of the year...”



Source: Factset. Keith Collins/The New York Times

# Why did everything change so quickly?

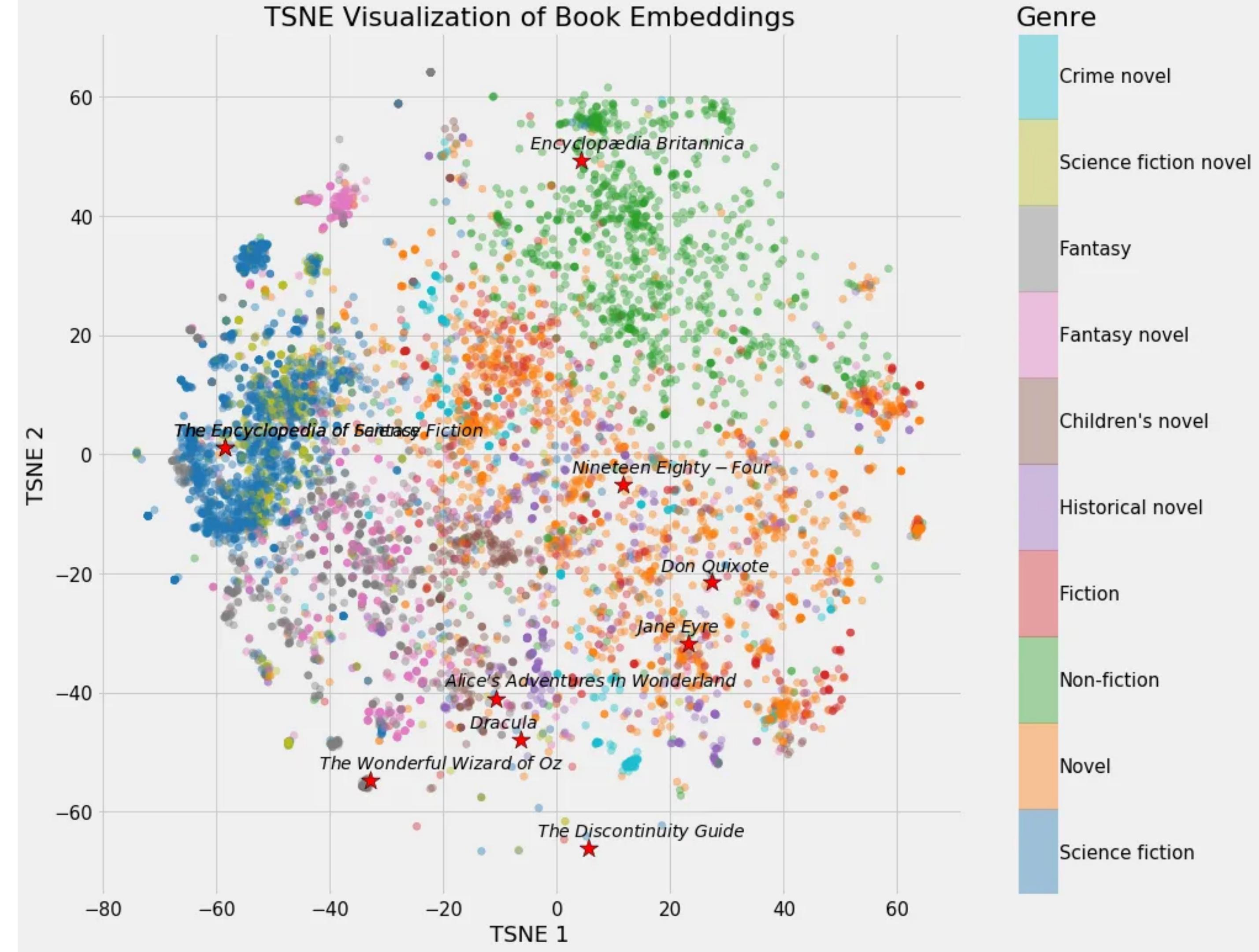
## A perfect storm:

- Moore's Law
- GPUs
- Cloud Computing
- Data abundance
- Github + Open Source
- New & improved techniques
- Transformers



# Mechanics

# How does AI work?



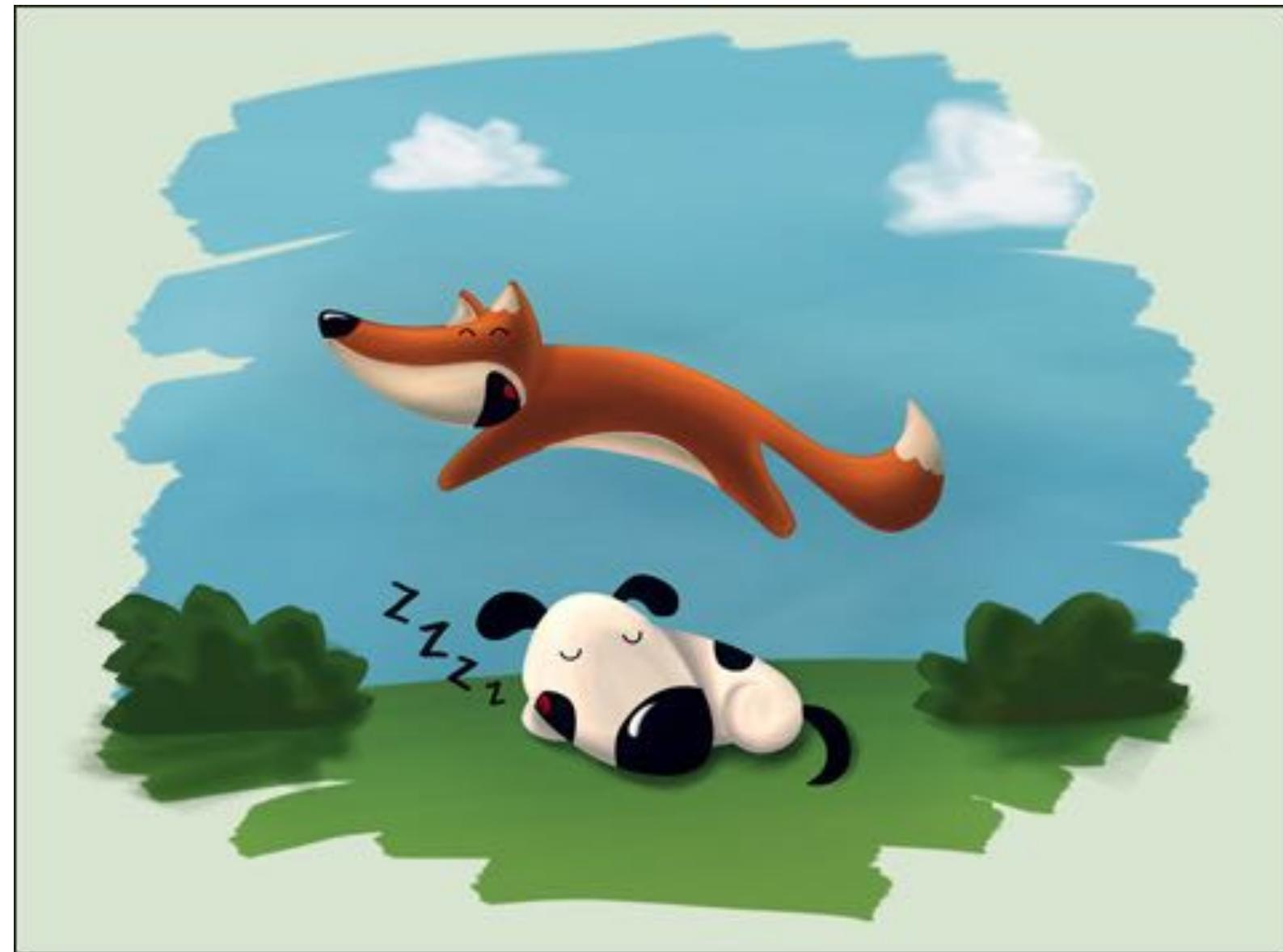
# Puppy vs. Muffin



**Not so easy**



**“The brown quick fox jumps over the lazy dog.”**



# English Adjective Order

1. Quantity or number
2. Quality or opinion
3. Size
4. Age
5. Shape
6. Colour
7. Proper adjective
8. Purpose or qualifier

**Machine learning is  
learning from rules  
*\*plus experience\****

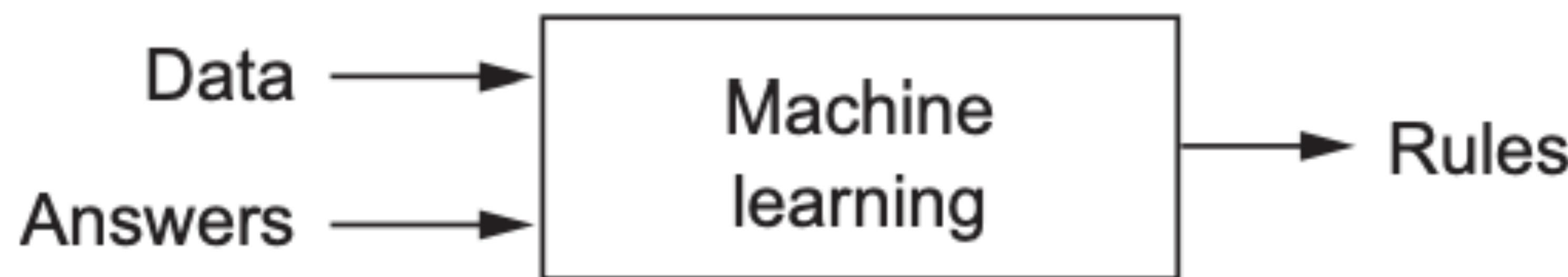
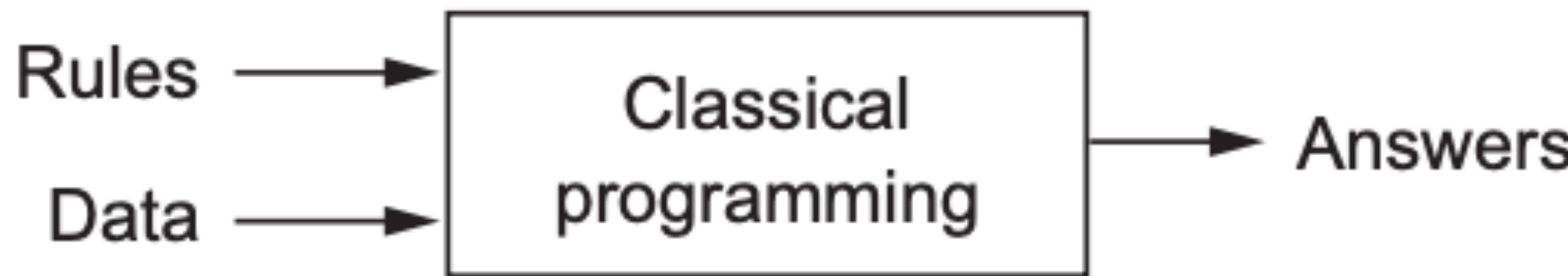


**“Instead of trying to produce a program to simulate the adult mind, why not rather try to produce one which simulates the child’s mind?”**

- Alan Turing, 1950

**This is the main idea behind Machine Learning**

# Paradigm Shift



# Types of Machine Learning

## Supervised Learning

- labeled data
- learn relationships

Examples:

- spam detection
- image classification

## Unsupervised Learning

- unlabeled data
- find data structure

Examples:

- customer segmentation
- anomaly detection

## Reinforcement Learning

- reward based
- find optimal strategy

Examples:

- game playing
- autonomous driving

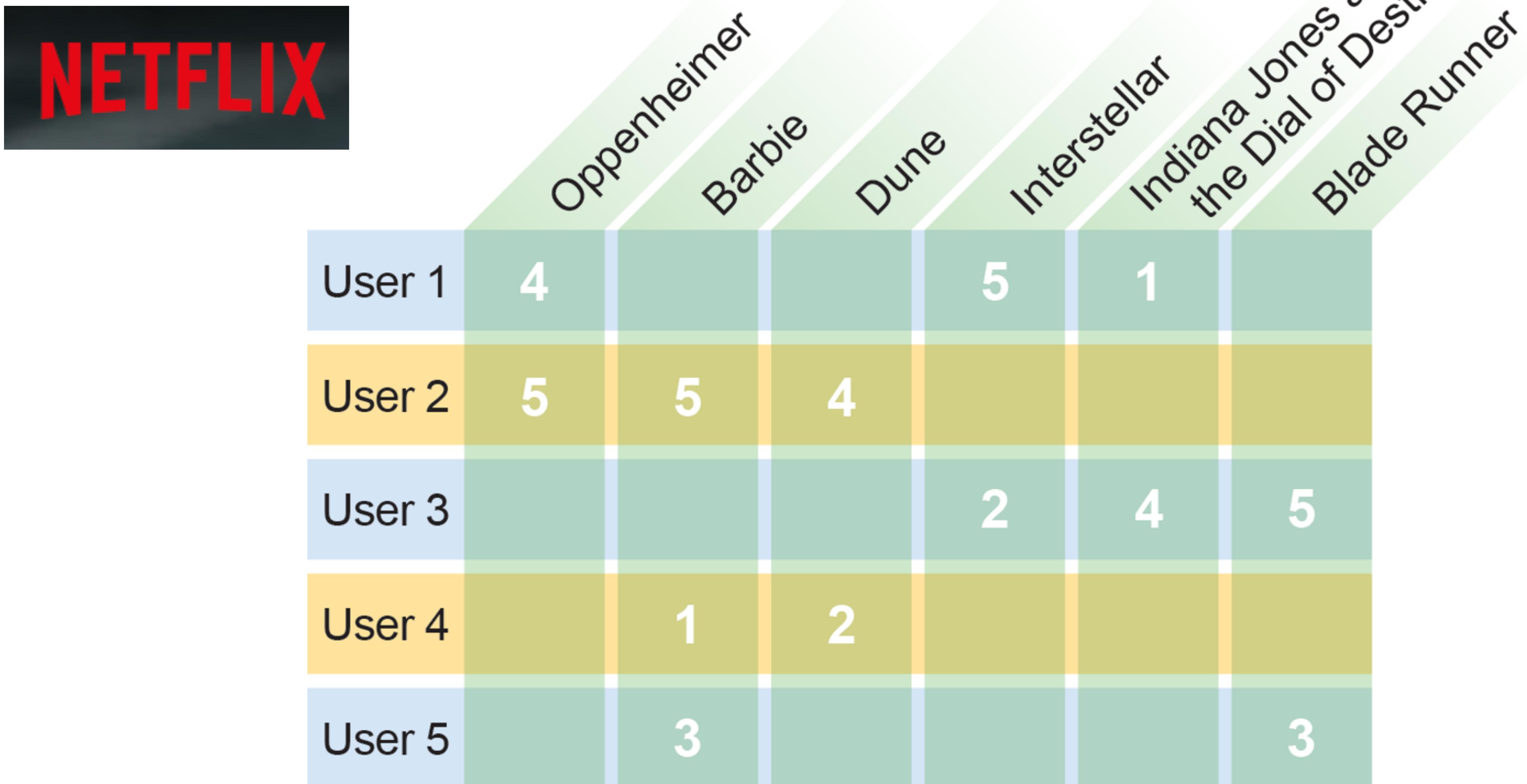
# Supervised Learning

## Cats vs. Dogs



- **2009 - world's most advanced computer can't tell a cat from a dog**
- **2012 - solved by Google \*but\* required 16,000 computers!**
- **2015 - Microsoft, Google beat humans at image recognition**
- **2019 - AI beats Stanford radiologists in chest X-ray diagnostics competition**

# Unsupervised Learning



# Cloud of similarities

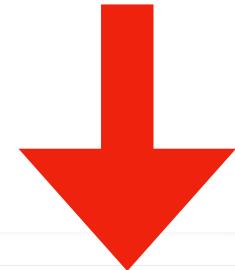


# Reinforcement Learning



# Types of Machine Learning

We'll focus on this category



## Supervised Learning

- labeled data
- learn relationships

Examples:

- spam detection
- image classification

## Unsupervised Learning

- unlabeled data
- find data structure

Examples:

- customer segmentation
- anomaly detection

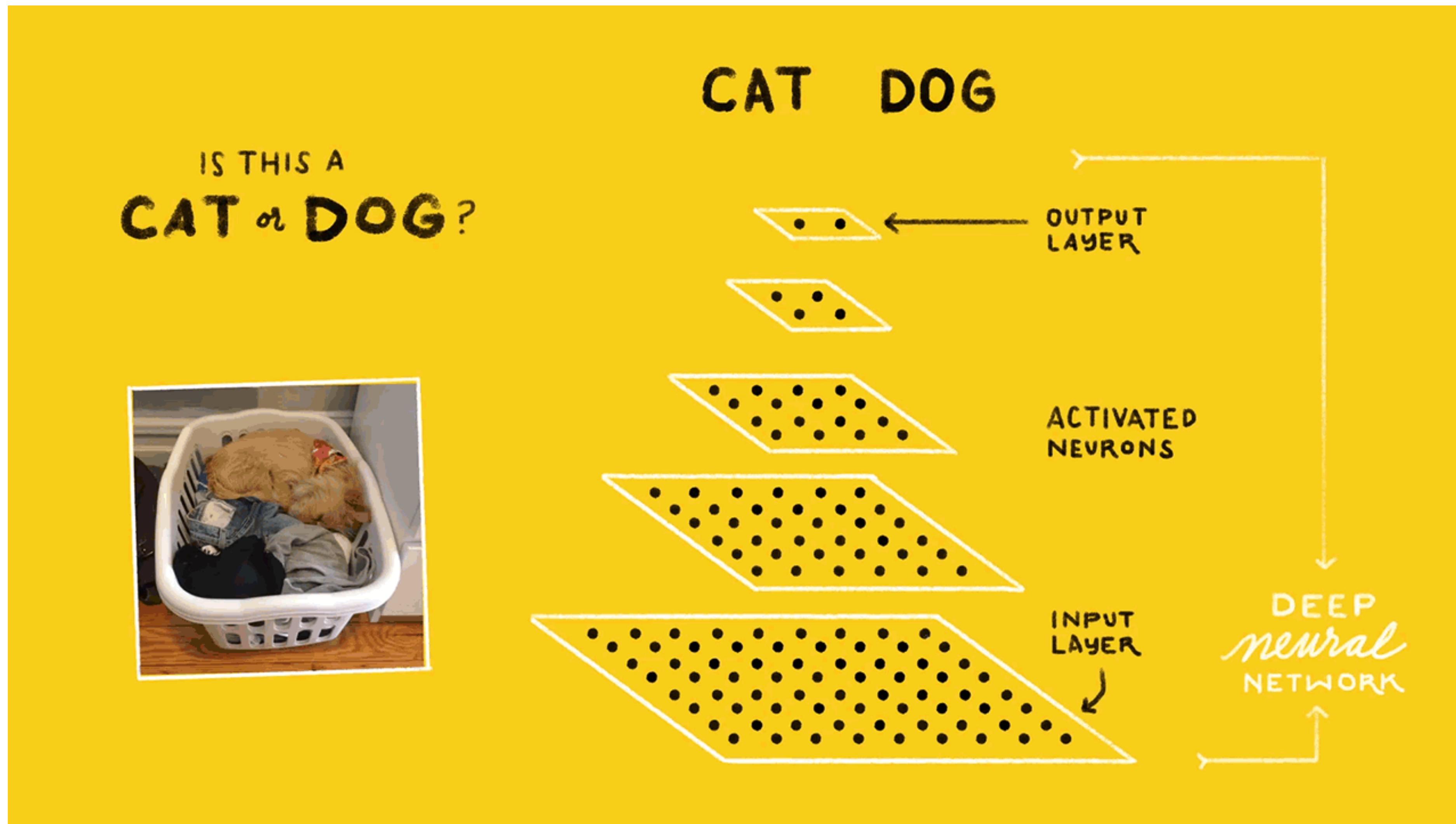
## Reinforcement Learning

- reward based
- find optimal strategy

Examples:

- game playing
- autonomous driving

# Neural Networks



# Which digit is this?



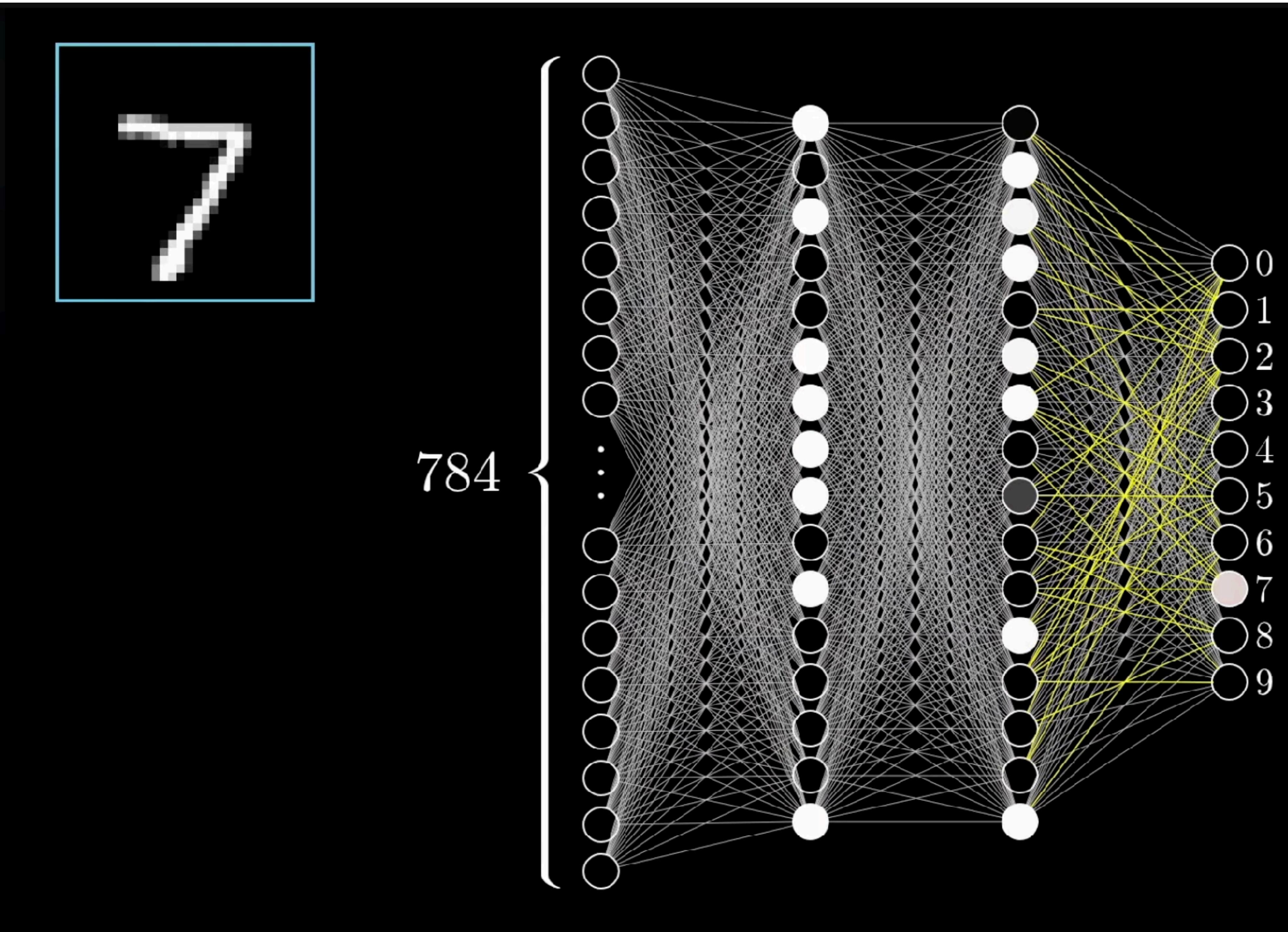
# The MNIST Challenge

training digits and their labels	
9	9
1	1
0	0
3	1
1	1
6	6
6	5
5	0
0	5
7	7
2	2
5	5
8	8
4	4
9	9
9	9
7	7
0	0
0	0
4	4
9	9
4	4

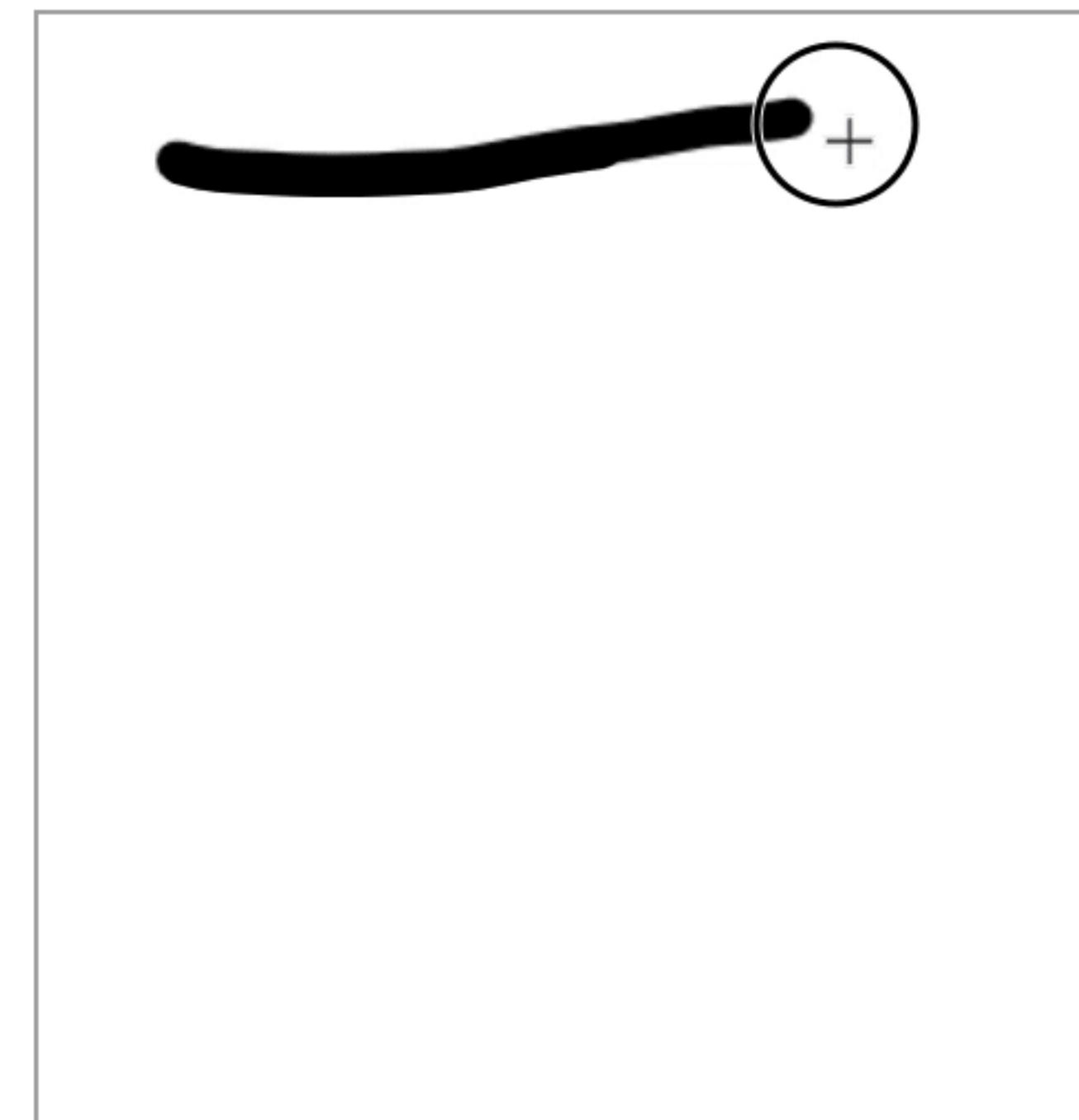
validation digits and their labels	
7	7
2	2
1	1
0	0
4	4
1	1
4	4
9	9
5	5
9	0
0	6
6	9
9	0
1	1
5	5
9	9
7	7
3	3
4	4
9	9
6	6
4	5

**2:40 - 5:30**



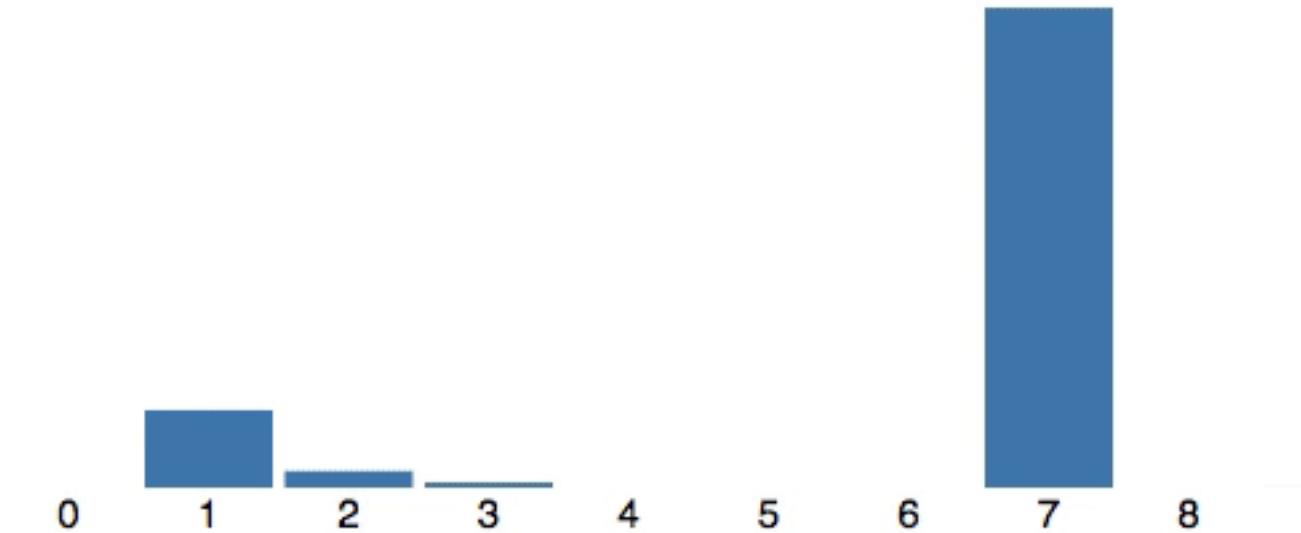
# TensorFlow.js + MNIST

Draw a digit by hand and have it classified in real time, as you draw, by a machine learning model trained against the [MNIST](#) dataset. The model used for this page is a convolutional neural network (CNN) built using Keras/TensorFlow on a Google Tensor Processing Unit (TPU). It's explained in depth and is available for you to build for yourself at [bit.ly/mco-mnist-lab](https://bit.ly/mco-mnist-lab).



Draw a single digit (0-9) in the empty box.

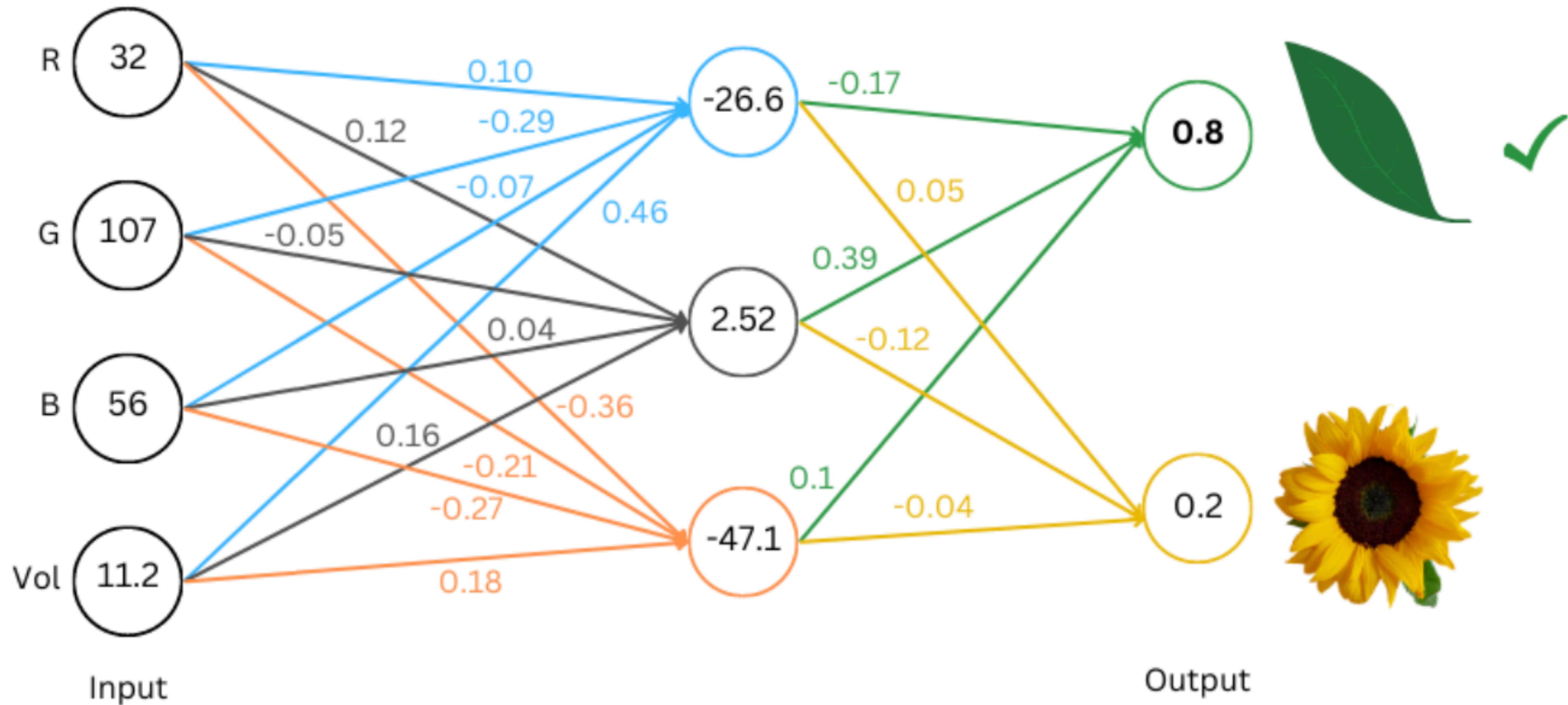
Clear



Made with ❤ by [Marc](#).

# Training

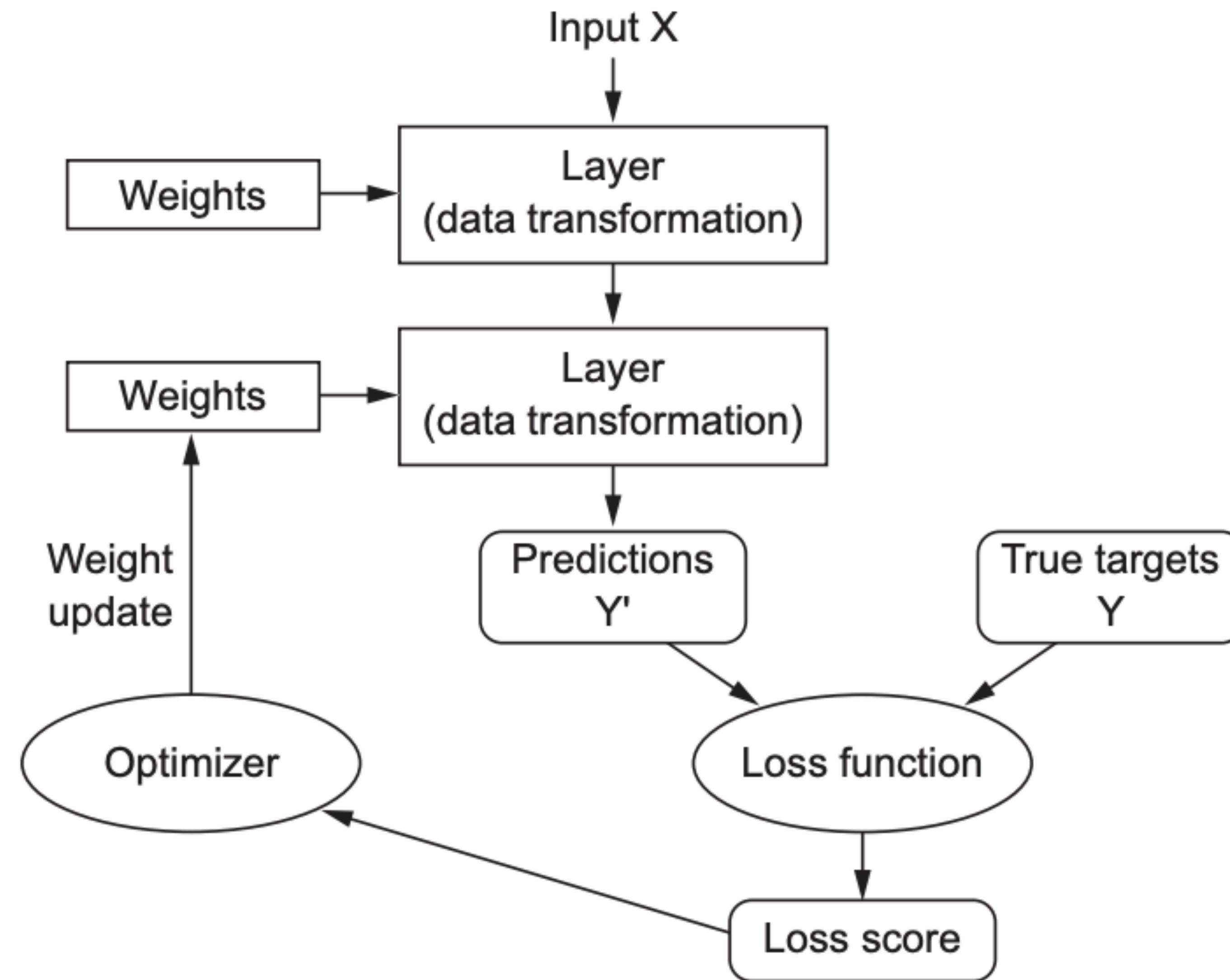


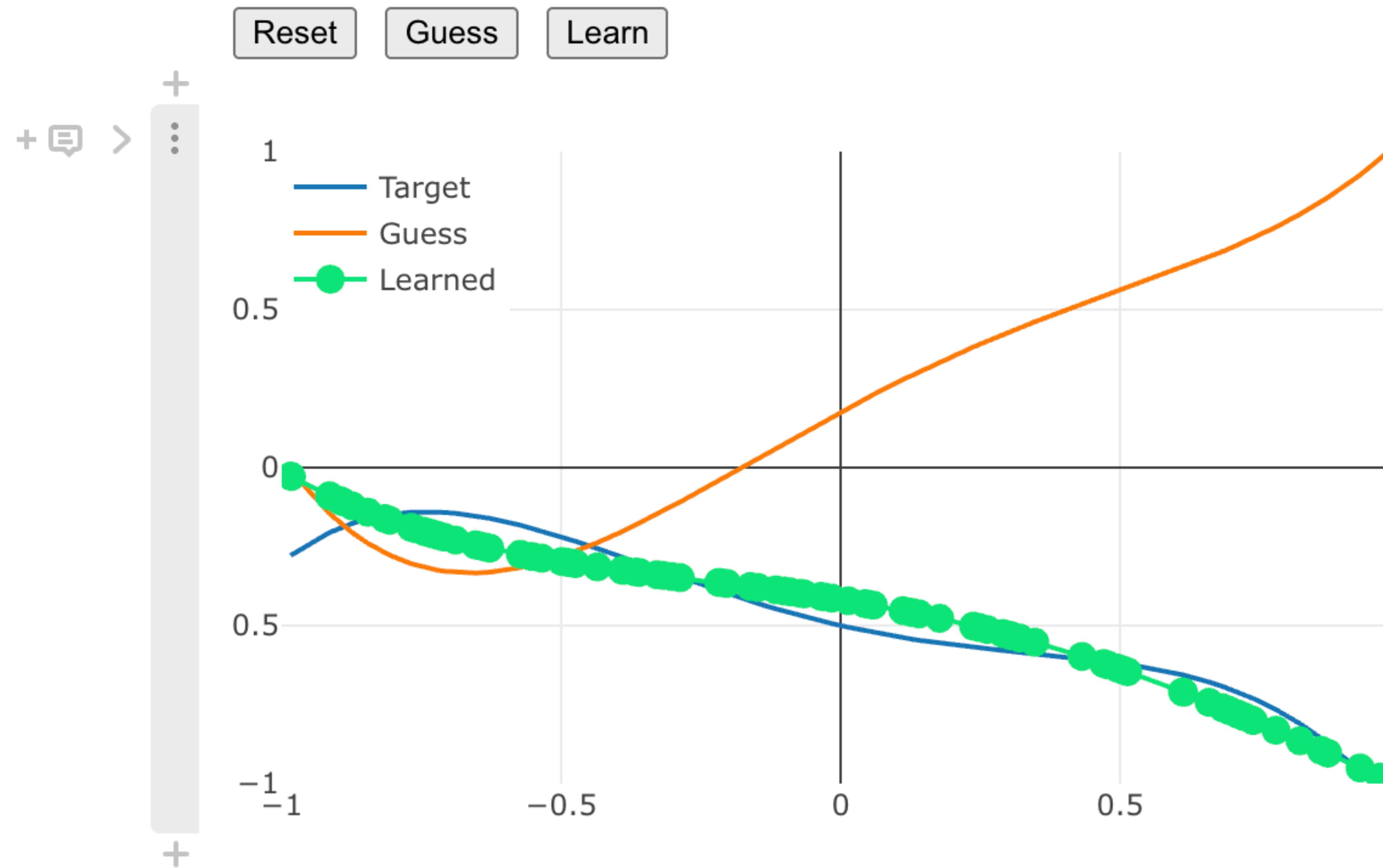


Blue circle like so:  $(32 * 0.10) + (107 * -0.29) + (56 * -0.07) + (11.2 * 0.46) = - 26.6$

Orange circle like so:  $(32 * -0.36) + (107 * -0.21) + (56 * -0.27) + (11.2 * 0.18) = - 47.1$

# The Training Process





Iteration = 100, Loss = 0.0053158

# Let's train a classifier!

[mco.fyi/classifier](https://mco.fyi/classifier)

The screenshot shows a Jupyter Notebook interface. At the top, there is a toolbar with a 'CO' logo, a file named 'mco\_classifier.ipynb', and various icons for file operations like star, cloud, and share. Below the toolbar is a menu bar with 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', and 'Help'. To the right of the menu is a 'Share' button, a 'Gemini' status indicator, and a user profile icon. The main area contains a code cell with the title 'Intro to AI: Train a Simple Classifier'. The cell content includes a welcome message, a description of the goal (exploring AI programming), and a note about no prior background knowledge required. Below this, a section titled '1. What is AI?' lists several bullet points explaining what AI is and how it works.

CO mco\_classifier.ipynb ⭐ ☁

File Edit View Insert Runtime Tools Help

Commands + Code + Text ▶ Run all Reconnect ^

Share Gemini

Intro to AI: Train a Simple Classifier

Welcome!

In this notebook, we'll explore **what it feels like to "program" an AI** — in the simplest possible way.

You don't need any background in math or coding. Just follow along, run the code cells, and observe what happens.

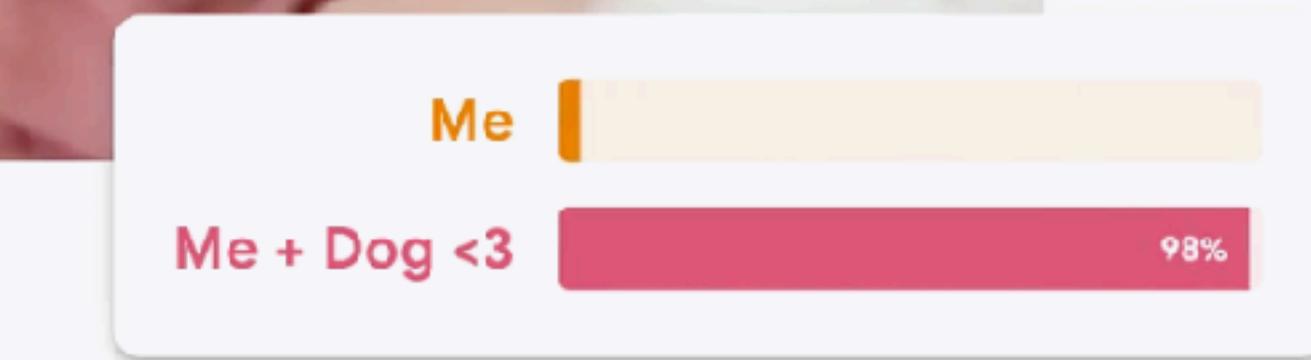
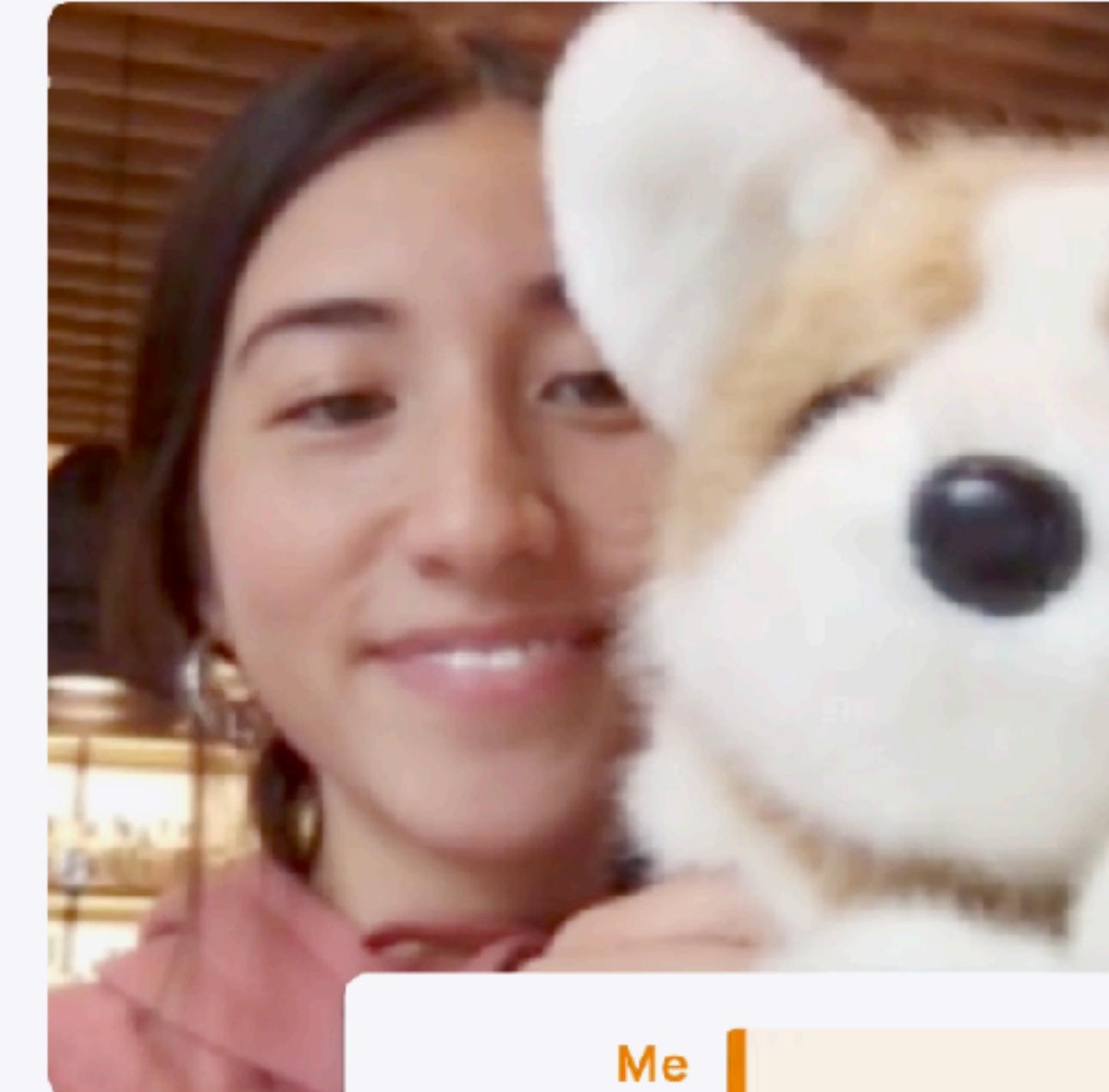
## 1. What is AI?

- **Artificial Intelligence (AI)** is when computers learn from data and make decisions or predictions.
- Today, we'll see how an AI can:
  1. Learn from **examples** (training data).
  2. Make **predictions** on new cases.
  3. Show us how well it did.

# Teachable Machine

**Train a computer to recognize your own images, sounds, & poses.**

A fast, easy way to create machine learning models for your sites, apps, and more – no expertise or coding required.



[Get Started](#)



ml5



p5.js



Coral



node



js



TensorFlow.js



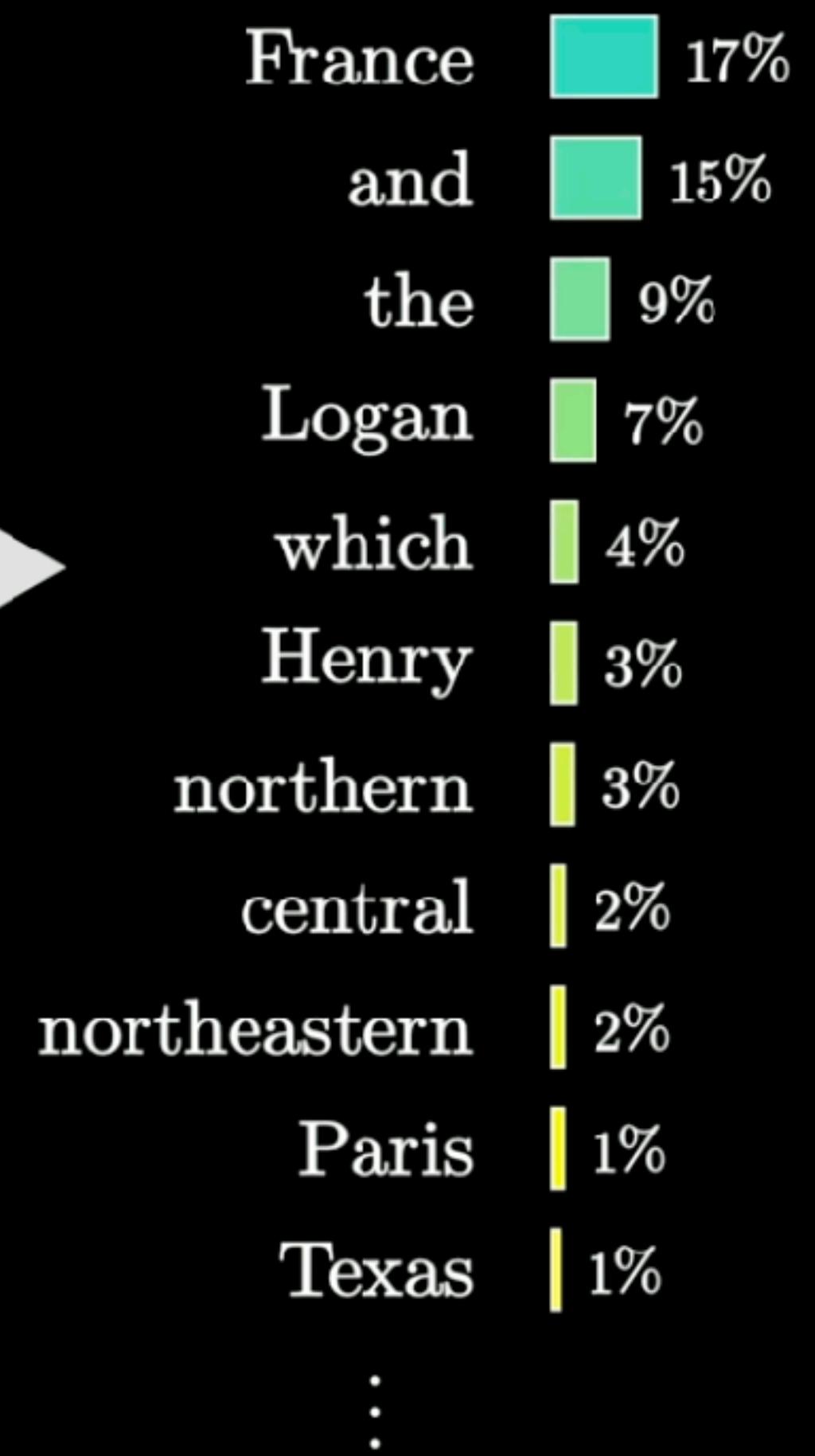
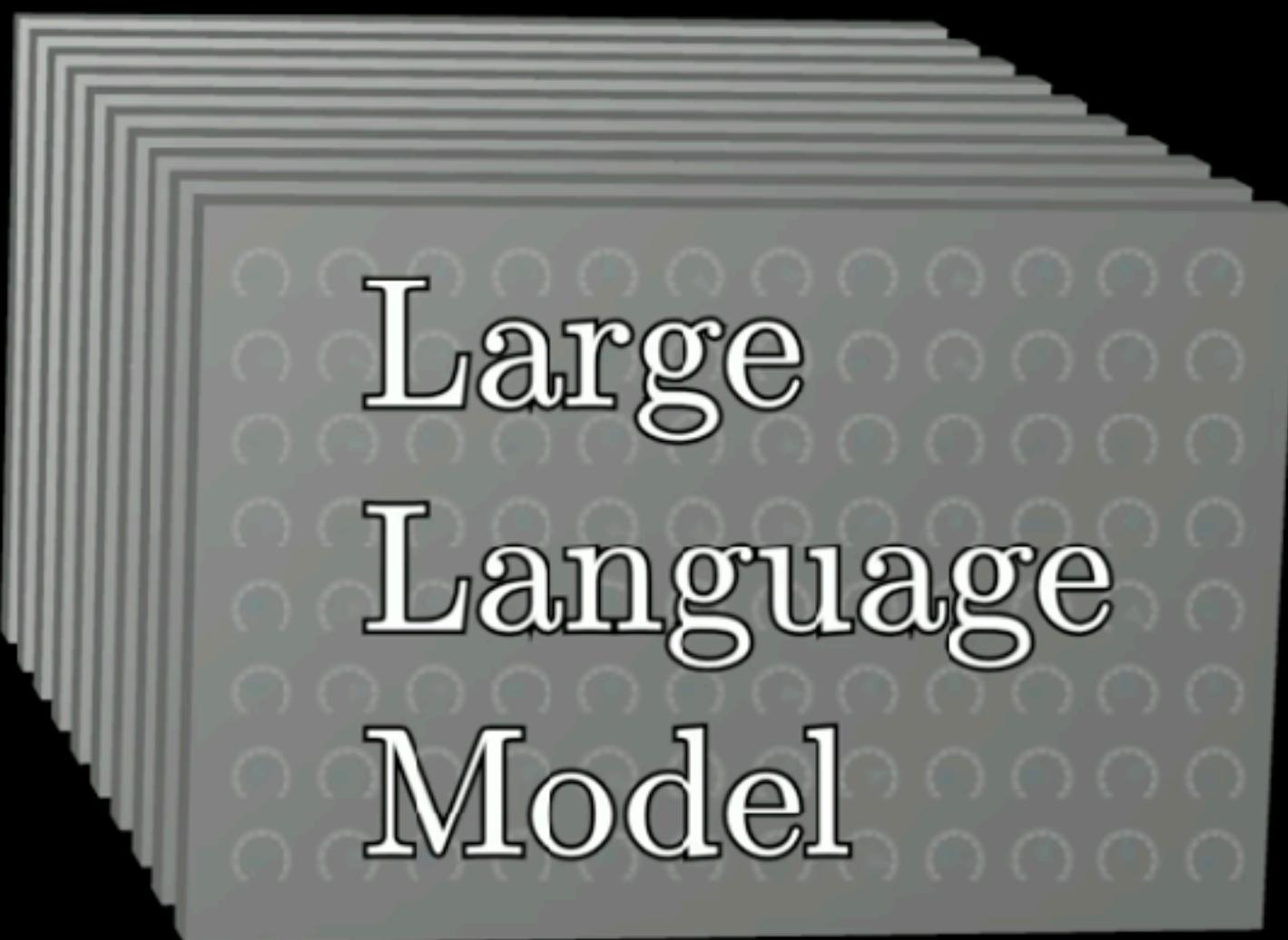
TensorFlow.js



ARDUINO

Paris is a city in \_\_\_\_\_

0:00 - 3:10

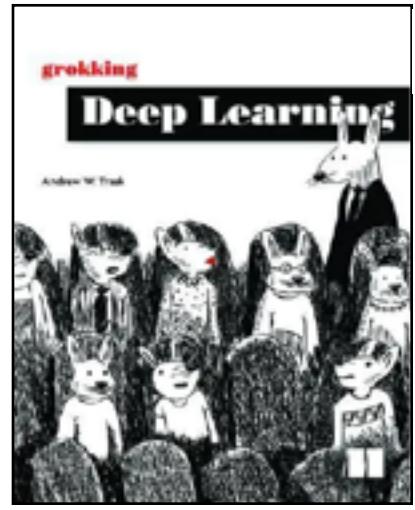


# **Embeddings**

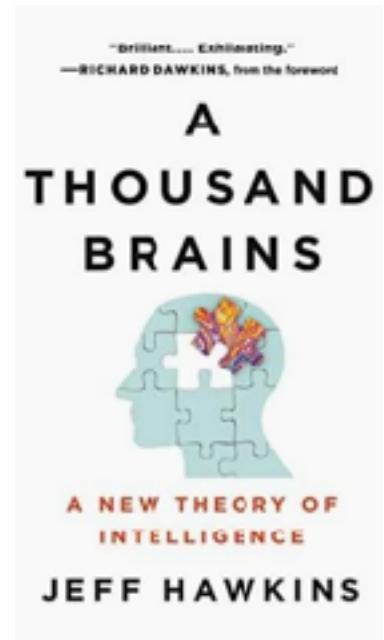
**(The secret sauce of deep learning)**

# Recommending AI Books

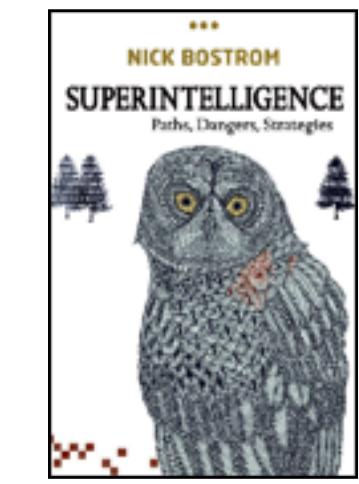
**Beginner**



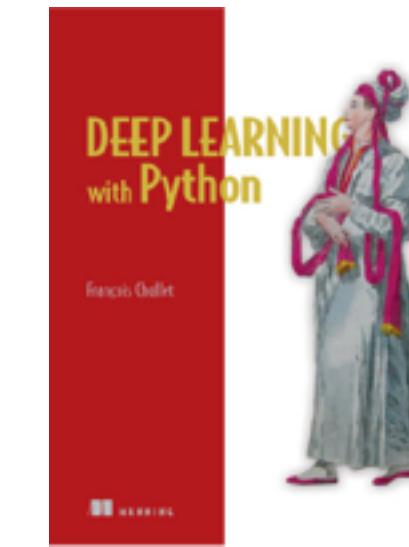
[ -5 ]



[ -3 ]



[ 2 ]

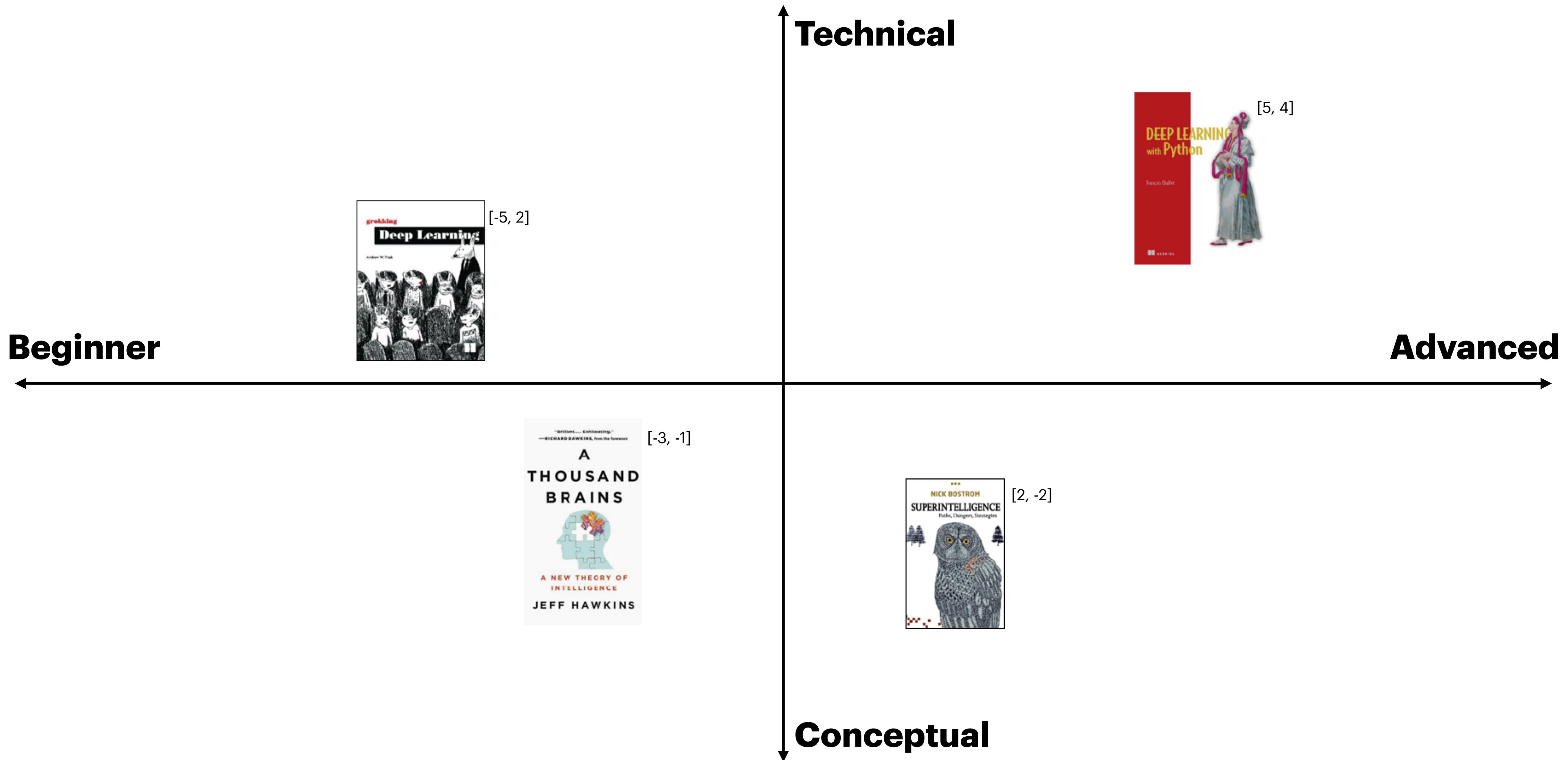


[ 5 ]

**Advanced**



# Better: 2-D Coordinate System



# Even better: use N-dimensions

- Neural networks are able to “embed” data (words, images, video, audio) into N-dimensional vector space.
- Similar objects get embedded in similar locations in N-space.
- This gives us the ability to do semantic search, i.e., find things that have similar meaning.

# Embeddings In Action

←

🔍 dog in water X

✓ Sat, May 15, 2021

▼

# Embeddings Example

*projector.tensorflow.org*

**What can AI do for you?**

“But ChatGPT Said...”

<https://stopcitingai.com/>

You've been sent here because you  
cited **AI** as a source to try and  
prove something.

**Discussion topic:  
How are you using AI?**

# Answering Questions

What can I help with?

0 Message ChatGPT



Create image

Summarize text

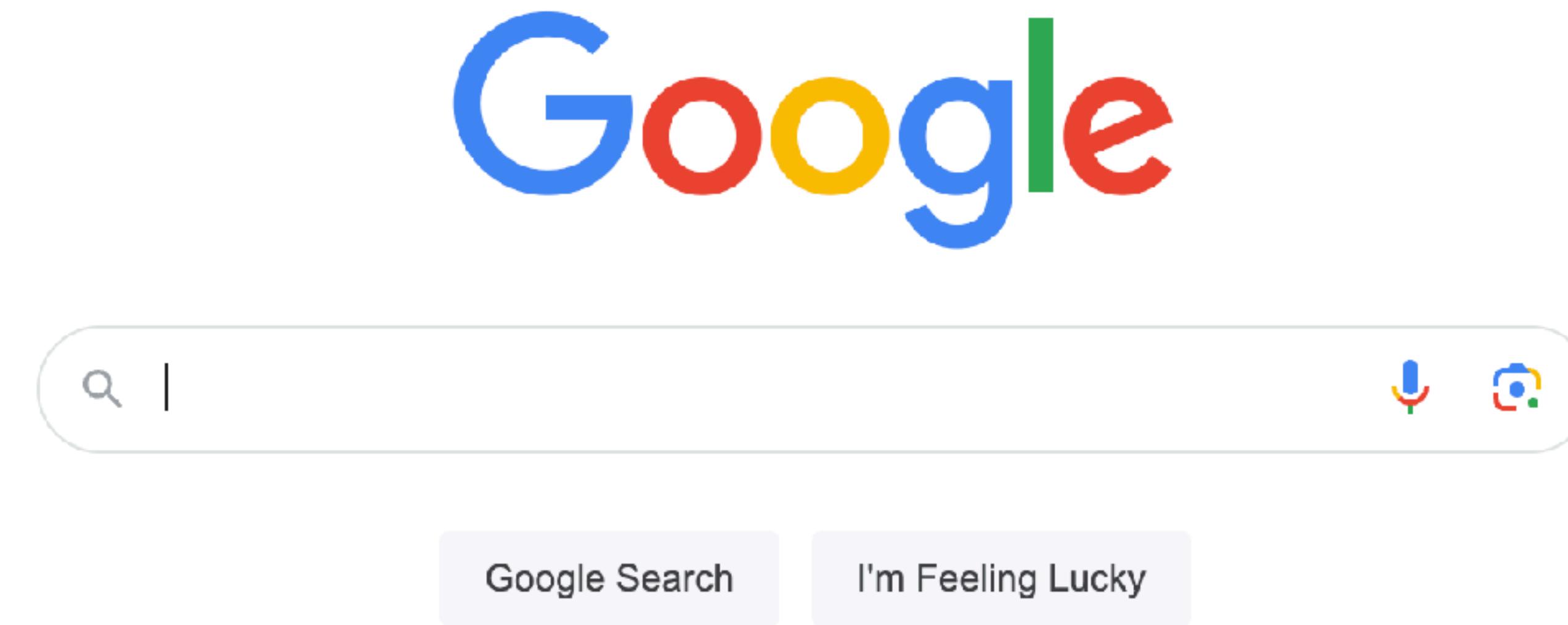
Brainstorm

Code

Make a plan

More

# Does that look familiar?



[All](#) [Images](#) [Videos](#) [Web](#) [News](#) [Books](#) [Maps](#) [More](#)[Tools](#)

### AI Overview

A transformer is a neural network architecture that processes sequential data by learning relationships between elements. Transformers are used in many machine learning applications, including natural language processing (NLP), speech recognition, and computer vision. [🔗](#)

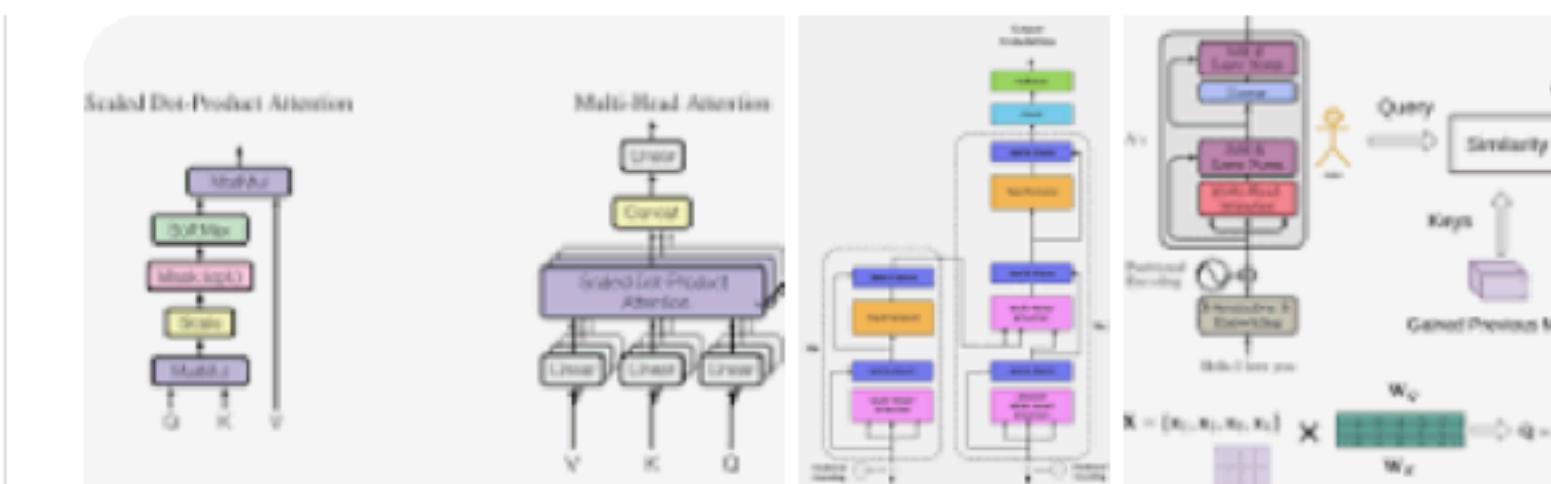
[Learn more](#)

### How transformers work

1. Transformers learn context by tracking relationships between elements in a sequence. [🔗](#)

[Show more](#) ▾

Transformers are a type of neural network architecture that transforms or changes an input sequence into an output sequence. They do this by learning context and tracking relationships between sequence components.



# *How Chinese A.I. Start-Up DeepSeek Is Competing With Silicon Valley Giants*

The company built a cheaper, competitive chatbot with fewer high-end computer chips than U.S. behemoths like Google and OpenAI, showing the limits of chip export control.



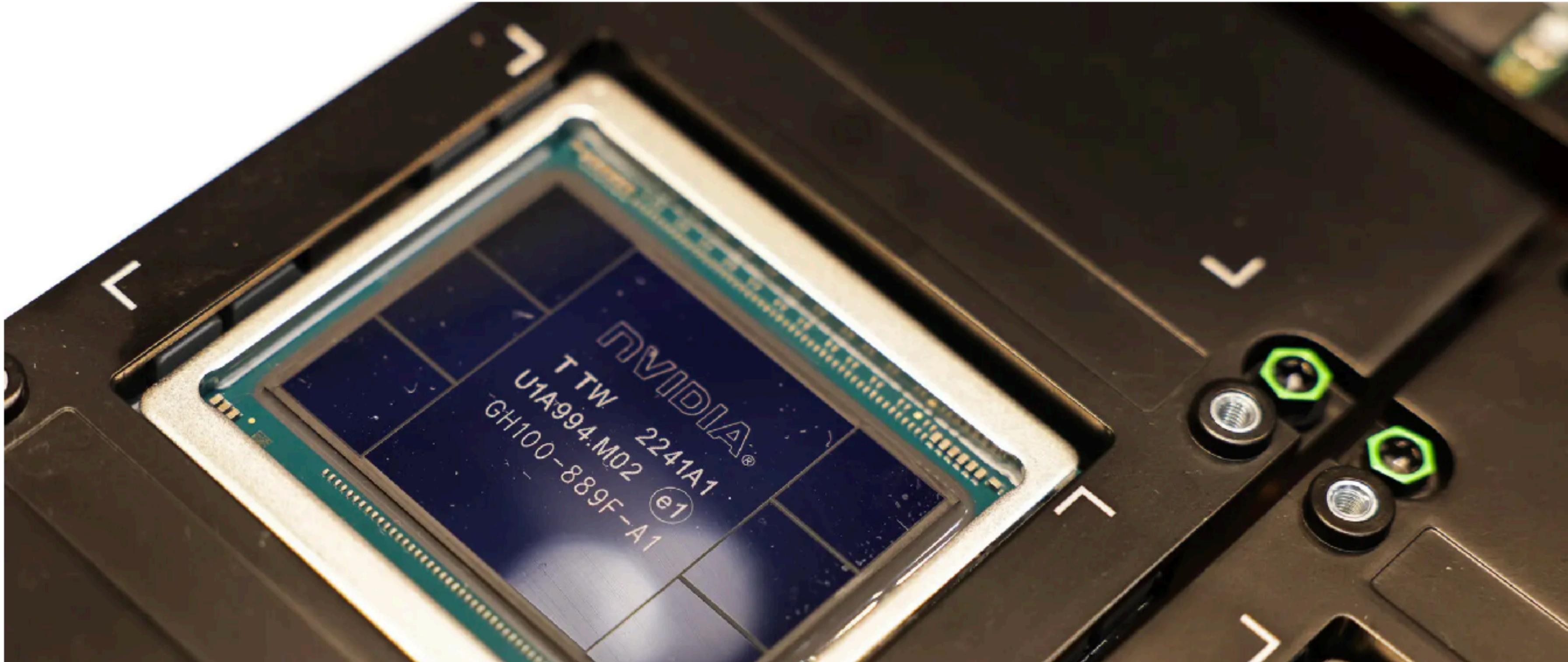
Listen to this article · 8:27 min [Learn more](#)



Share full article



204



- released Jan 2025
- comparable to OpenAI's o1
- reinforcement learning
- distillation

## Abstract

We introduce our first-generation reasoning models, DeepSeek-R1-Zero and DeepSeek-R1. DeepSeek-R1-Zero, a model trained via large-scale reinforcement learning (RL) without supervised fine-tuning (SFT) as a preliminary step, demonstrates remarkable reasoning capabilities. Through RL, DeepSeek-R1-Zero naturally emerges with numerous powerful and intriguing reasoning behaviors. However, it encounters challenges such as poor readability, and language mixing. To address these issues and further enhance reasoning performance, we introduce DeepSeek-R1, which incorporates multi-stage training and cold-start data before RL. DeepSeek-R1 achieves performance comparable to OpenAI-o1-1217 on reasoning tasks. To support the research community, we open-source DeepSeek-R1-Zero, DeepSeek-R1, and six dense models (1.5B, 7B, 8B, 14B, 32B, 70B) distilled from DeepSeek-R1 based on Qwen and Llama.

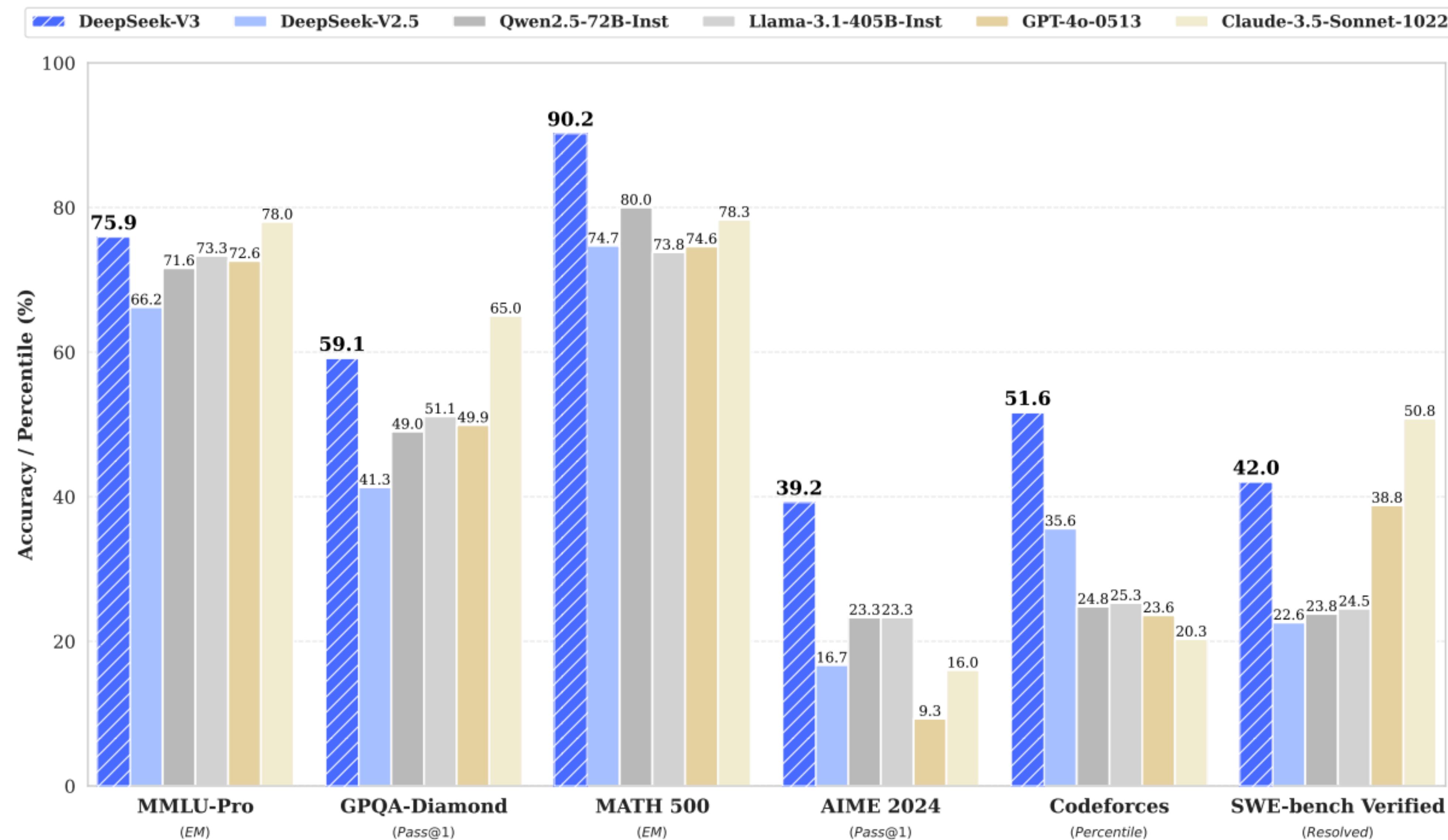
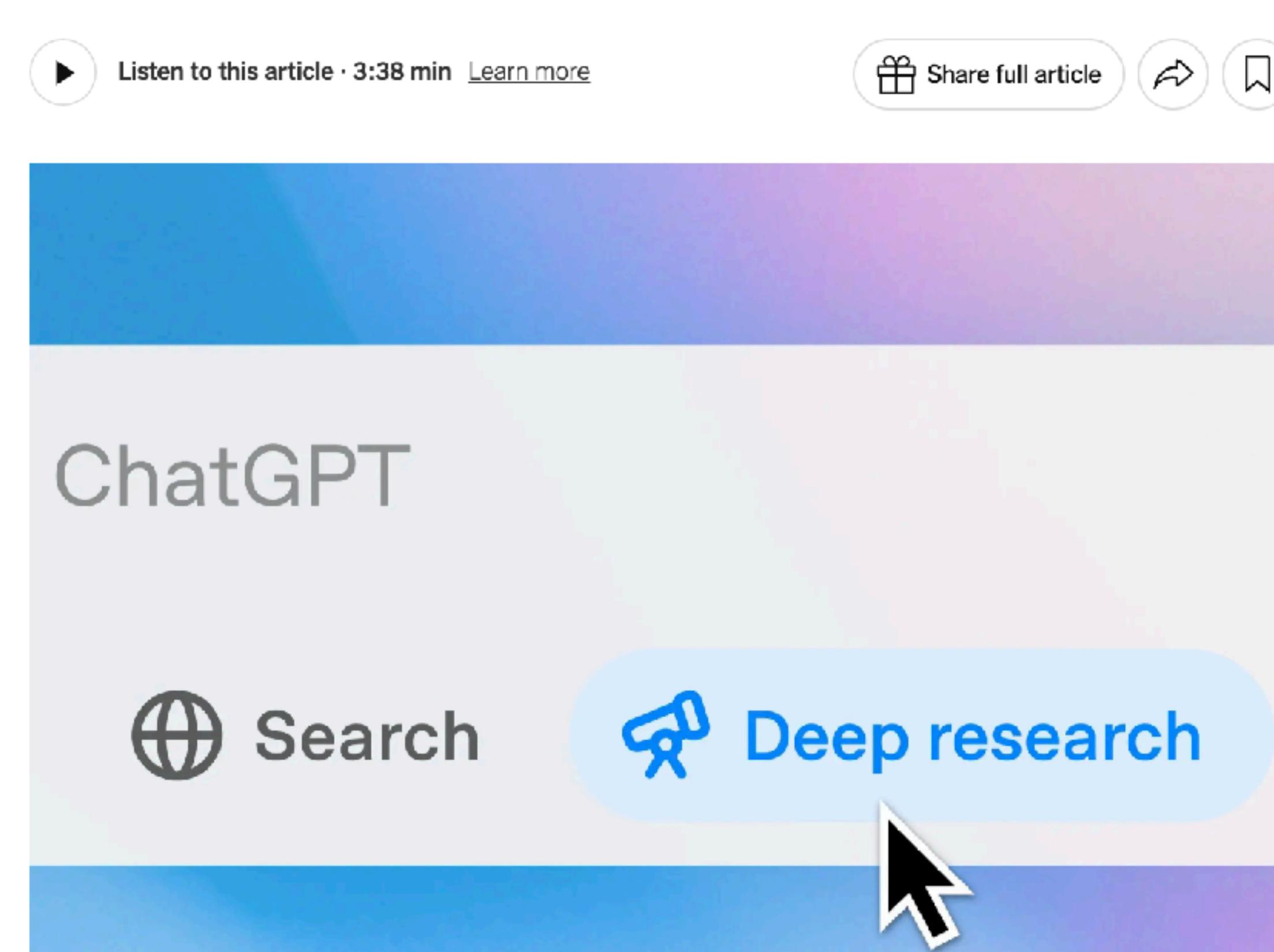


Figure 1 | Benchmark performance of DeepSeek-V3 and its counterparts.

# *OpenAI Unveils A.I. Tool That Can Do Research Online*

The tool, called Deep Research, arrives days after OpenAI released another one, which shops for groceries and books restaurant reservations.



# Generating Text

## A Student's Guide to Writing with ChatGPT



# Text to Software

The screenshot shows a software development environment with a dark theme. At the top, there's a navigation bar with icons for home, shortly, search, and a green 'Run' button. Below the navigation bar is a tab bar with 'Webview', 'utils.py', 'app.py', 'Assistant' (which is selected), 'Agent', and a '+' icon. A sidebar on the left contains various icons for file operations like copy, paste, and search.

In the main area, there's a chat window titled 'python url shortener web app project'. A message from a user (represented by a profile picture of a person with glasses) reads:

Using Python, I'd like to build a web app that lets me administer bit.ly style short links. It should have a database for storing short links, a web server for redirecting short links to the associated destination, a home page for viewing current short links with some simple analytics, and an admin page for creating, modifying, or deleting short links.

This message was sent '1 hour ago'.

The 'Assistant' bot responds with:

Absolutely! Let me propose what we'll build for you.

The assistant then provides a detailed proposal:

I'll help you create a URL shortener web application using Flask. The MVP will include URL shortening, basic analytics, and an admin interface with in-memory storage. Would you like to proceed with the implementation?

• Build the initial prototype

Basic Email/Password Authentication   Bootstrap   ⓘ

• PostgreSQL database integration

• Enhanced analytics dashboard

At the bottom right of the proposal, there's a green checkmark icon followed by the text 'mcodev approved the plan'.

## Puzzmo Blog

# 6 Weeks of Claude Code

Jul 30, 2025 - Orta Therox

It is wild to think that it has been only a handful of weeks.

Claude Code has considerably changed my relationship to writing and maintaining code at scale. I still write code at the same level of quality, but I feel like I have a new freedom of expression which is hard to fully articulate.

Claude Code has decoupled myself from writing every line of code, I still consider myself fully responsible for everything I ship to Puzzmo, but the ability to instantly create a whole scene instead of going line by line, word by word is incredibly powerful.

# Text to Image - Midjourney

Midjourney

What will you imagine?

Explore

Random Hot Top Day Likes

Create

Organize

Personalize New!

Chat

- General Chaos
- Prompt Craft
- Daily Theme
- Newbies

Tasks

Help

Updates

Light Mode

Search

# Welcome



(queue to 8:40)

# Text to Music

**udio** BETA

A submarine crew discovering an underwater civilization, orchestral, cinematic

Home Create Library Following Updates More

SongoftheSpheres

**Walking Alone**

Prompt: soul blues, soul/pop, soul and r&b, soul music, soulful, hip hop rap, hip hop, r&b/soul/pop, r&b/rap, alternative r&b, bittersweet, sentimental, uplift

male vocalist hip hop pop rap passionate boastful introspective bitter  
pop melodic sentimental r&b rap melancholic love uplifting son

Create Share

Attribution

Gamahea = Udio.com/creators/songofthespheres | <https://GamaheaMusic.com>

Description

Just a little self-burn here, it was needed. Shame it cost SO MANY credits to make. Enjoy.

110 Credits

# Video Summarization - Gemini

Gemini ▾

Try Gemini Advanced



Gemini was just updated. [See update](#)



summarize this video: [https://www.youtube.com/watch?v=UvObKRaxZ\\_Q](https://www.youtube.com/watch?v=UvObKRaxZ_Q)

Regenerate draft



YouTube ▾

This video is about the privacy threats of artificial intelligence (AI).

AI is being used to collect and track people's data. This data is then used for targeted advertising, identity theft, and other malicious purposes. The Biden Administration has recently unveiled a blueprint for an AI Bill of Rights to protect people's personal data and limit surveillance.

Cybersecurity analyst Julio Rivera believes that AI poses a serious threat to privacy. He says that people are living online and opting into data collection without realizing the risks. He also says that the government is collecting data on people's conversations and monitoring their homes.

The AI Bill of Rights has five core principles: safe and effective systems, prevention of algorithmic discrimination, data privacy, proper notice and explanation, and alternative options. Rivera believes that the bill is a good start but that it needs to be implemented carefully. He also warns that AI will continue to evolve and that there will be new threats to privacy in the years ahead.

by

# Audio Summarization - NotebookLM

Deepseek V3

Sources

+ Add source

Select all sources

2412.19437v1.pdf

Chat

Deepseek V3

1 source

DeepSeek-V3 is a large, open-source Mixture-of-Experts language model focusing on training efficiency and strong performance. Innovations include a novel load balancing strategy that avoids performance degradation, and a Multi-Token Prediction objective which improves model accuracy. The model leverages a mixed-precision framework with FP8 training and optimizations for communication and memory usage. Evaluations show DeepSeek-V3 achieves state-of-the-art results, particularly in code and math, while maintaining competitive performance with closed-source models. The authors also performed ablation studies to justify and analyze their design choices.

Save to note

Add note

Audio Overview

Briefing doc

Start typing...

1 source

How does Deepseek V3's architecture, training, and post-training co

Share

Settings

Studio

Audio Overview

Generating conversation...  
This may take a few minutes. No need to stick around!

Notes

+ Add note

Study guide

Briefing doc

FAQ

Timeline

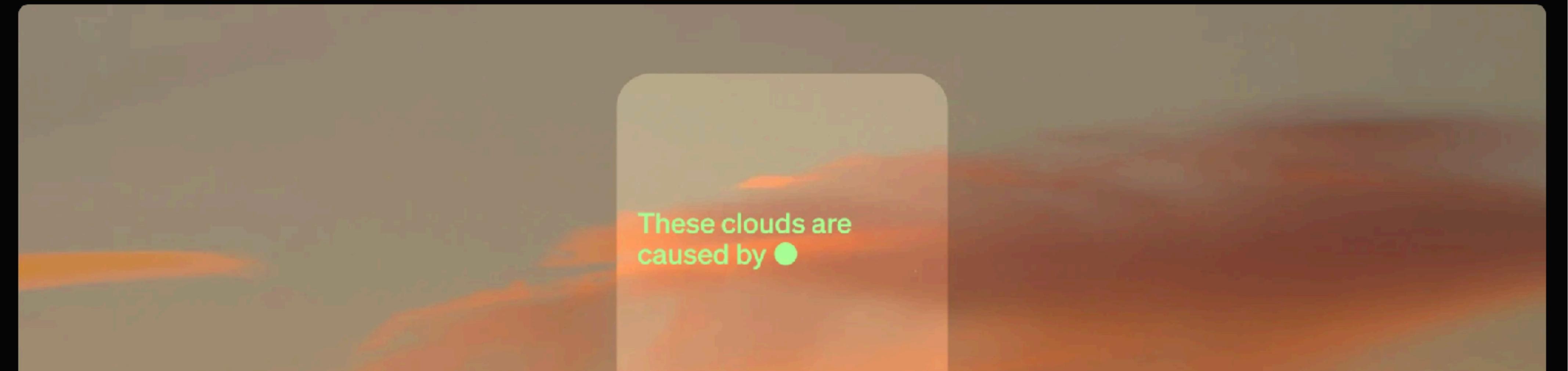
Saved notes will appear here  
Save a chat message to create a new note, or click Add note above.

NotebookLM can be inaccurate; please double check its responses.

# Speech to Speech

September 25, 2023

## ChatGPT can now see, hear, and speak

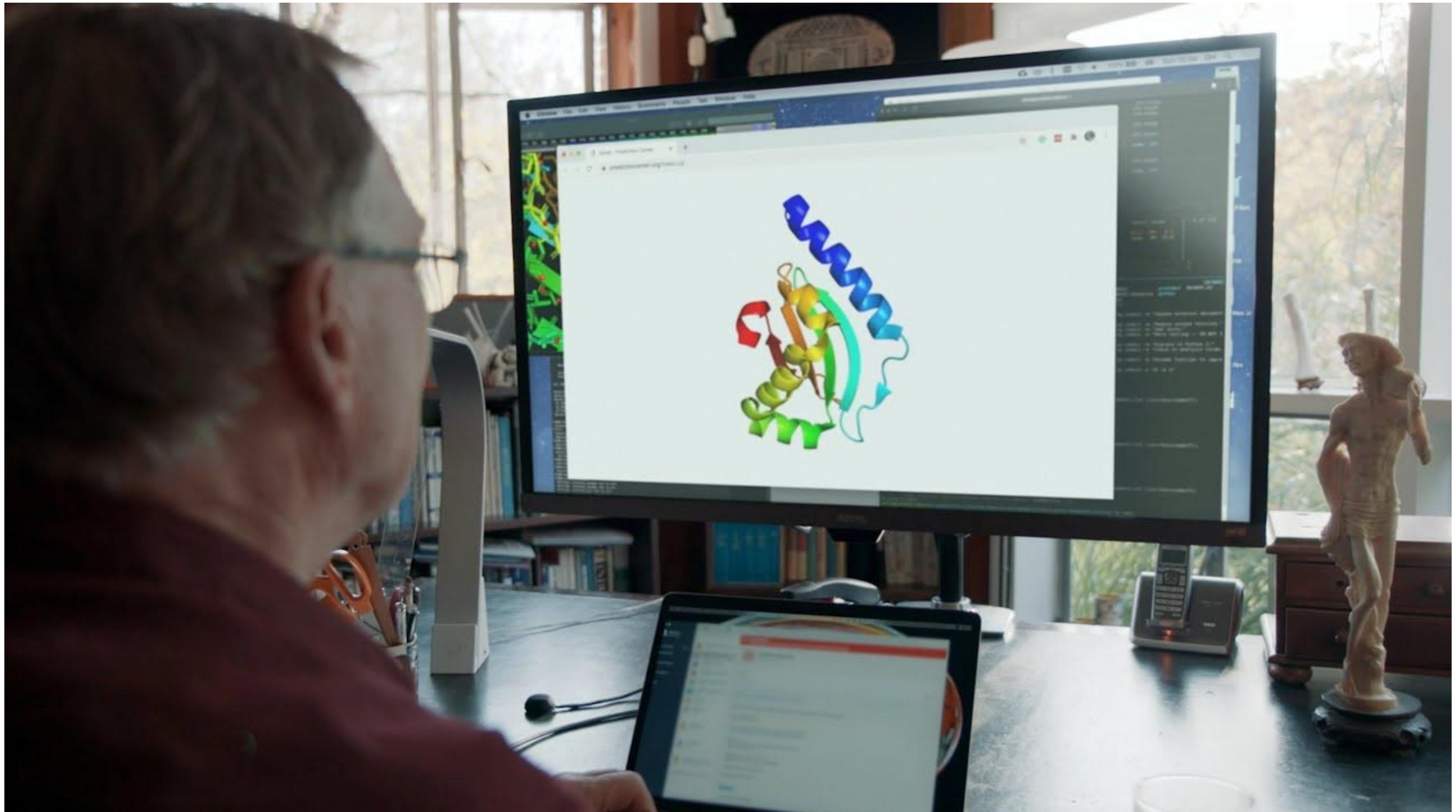


# AlphaGo



0:00 - 2:00

# AlphaFold





Social Sciences - Article

# AI Tutoring Outperforms Active Learning

Gregory Kestin\*, Kelly Miller\*, Anna Klales, Timothy Milbourne, and 1 more

This is a preprint; it has not been peer reviewed by a journal.

<https://doi.org/10.21203/rs.3.rs-4243877/v1>

This work is licensed under a CC BY 4.0 License

## Education

### Abstract

Advances in generative artificial intelligence (GAI) show great potential for improving education. Yet little is known about how this new technology should be used and how effective it can be. Here we report a randomized, controlled study measuring college students' learning and their perceptions when content is presented through an AI-powered tutor compared with an active learning class.

The AI tutor was developed with the same pedagogical best practices as the lectures. We find that students learn more than twice as much in less time when using an AI tutor, compared with the active learning class. They also feel more engaged and more motivated. These findings offer empirical evidence for the efficacy of a widely accessible AI-powered pedagogy in significantly enhancing learning outcomes, presenting a compelling case for its broad adoption in learning environments.

# Khanmigo



# Medicine

- Improved disease screening
- Enhanced diagnostic imaging
- Drug discovery and development
- Medical document transcription
- Predictive modeling

CHIEF achieved nearly 94 percent accuracy in cancer detection and significantly outperformed current AI approaches across 15 datasets containing 11 cancer types.

# *A.I. Chatbots Defeated Doctors at Diagnosing Illness*

A small study found ChatGPT outdid human physicians when assessing medical case histories, even when those doctors were using a chatbot.

# Ethics

## Using AI Safely



**Discussion topic:  
What are some of your concerns about AI?**

# Here's my short list...

- **Privacy**
- **Bias**
- **Misinformation**
- **Military**
- **Employment**
- **Environment**
- **Copyright**
- **Society**

# Privacy

- “**If you’re not paying for it, you’re the product**”.
- **Your AI interactions are being used just like your web searches.**
- **How many times have you read the terms & conditions?**
- **Facial recognition is widely used in the UK without your consent.**
- **Legislators and companies are working on regulation but progress is much slower than technological advances.**
- **New privacy threats are emerging every day.**
- **IMO, companies cannot be trusted to self-govern.**

# Bias

- This revolution is built by mostly young, college educated, white men living in Northern California.
- ML models are a direct reflection of their training data.
- AI propagates unconscious bias.

A father and his son are in a car accident.  
The father dies. The son is rushed to the ER.  
The attending surgeon looks at the boy and says,  
“I can't operate on this boy. He's my son!”  
How can this be?

# Misinformation

- **It's easier than ever to lie.**
- **Deepfakes are a particularly alarming development.**
- **This poses serious threats to democracy and is increasingly being weaponized.**
- **Education is critically important.**
- **Can we use AI to counter these threats?**
- **Example: fullfact.org**
- **Why are efforts like Full Fact so underfunded?**

# Military

- **AI is being used to process battlefield data, target individuals, and make real time decisions.**
- **AI is beginning to be used in autonomous weapons.**
- **Companies cannot be trusted to self-govern.**
- **Example: Google's Project Nimbus**
- **Somehow doesn't contradict Google's AI Principles**

# Employment

- **Will most employees become obsolete?**
- **Innovation has always done this but AI takes it to a new level.**
- **There will undoubtedly be massive job losses, but also many new opportunities.**
- **Knowing how to leverage AI will be one of those opportunities.**
- **Example: software engineers => systems engineers**
- **People will be need to operate at a higher level of abstraction**

“As an employee, you're not paid to '*know x*', or '*write programs*', you're paid to be useful.” - Ian Miell

# The Anthropic Economic Index

Feb 10, 2025 • 9 min read

[Read the paper](#)

# *Should You Still Learn to Code in an A.I. World?*

Coding boot camps once looked like the golden ticket to an economically secure future. But as that promise fades, what should you do? Keep learning, until further notice.



Listen to this article · 12:01 min [Learn more](#)



Share full article



# Programmers are modern-day computers

February 3, 2025 • 2 min read



Programming as we know it is in a process of dying out.

Most haven't come to terms with it yet.

I was inspired to write this after reading an article titled [AI is Creating a Generation of Illiterate Programmers](#), which claimed AI is making developers worse at their craft.

Yes, some of your programming skills will deteriorate due to AI.

It doesn't matter.

Those are the very skills that are going to become a lot less relevant, for the precise reason that, now, the machine can do those things.

**Department of Data**

# 1 in 4 programming jobs have vanished. What happened?

A big jump in unemployment for programmers since 2022 may be the first sign that artificial intelligence is taking human jobs.

Today at 6:00 a.m. EDT

9 min             30

# Environment

- Carbon footprint of training one deep learning model same as the lifetime emission of 5 cars.
- Computation required to train the most advanced AI models doubles every 3.4 months.
- Globally, AI-related infrastructure consumes six times more water than Denmark.
- Chips that power AI require rare earth elements, mined in environmentally destructive ways.

The Washington Post logo: Democracy Dies in Darkness

Business   Economy   Economic Policy   Personal Finance   Work   Technology   Business of Climate

## Amazon doubles down on nuclear energy with deal for small reactors

The cloud computing and retail giant signed a deal to buy electricity generated by small modular nuclear reactors.

3 min   315

# Copyright

- **How will it work in the AI era?**
- **AI companies are getting a free ride.**
- **Did you get your ChatGPT royalty check for your blog articles?**
- **My opinion: companies should have to license everything they train with.**

## *The Times Sues OpenAI and Microsoft Over A.I. Use of Copyrighted Work*

Millions of articles from The New York Times were used to train chatbots that now compete with it, the lawsuit said.



404

SIGN IN

SUBSCRIBE

OPENAI

# OpenAI Furious DeepSeek Might Have Stolen All the Data OpenAI Stole From Us



JASON KOEBLER · JAN 29, 2025 AT 9:43 AM

OpenAI shocked that an AI company would train on someone else's data without permission or compensation.

# Society

## *She Is in Love With ChatGPT*

A 28-year-old woman with a busy social life spends hours on end talking to her A.I. boyfriend for advice and consolation. And yes, they do have sex.



# The Future

## Where is all this going?



Photo by [Mathilda Khoo](#) on [Unsplash](#)

# Benchmarking Intelligence

- **Benchmarks are comparative tests.**
- **Narrow skills (math, code, Q&A)**
- **Broad tasks (agents with tools)**
- **Scores ≠ general intelligence; they're just capability snapshots.**

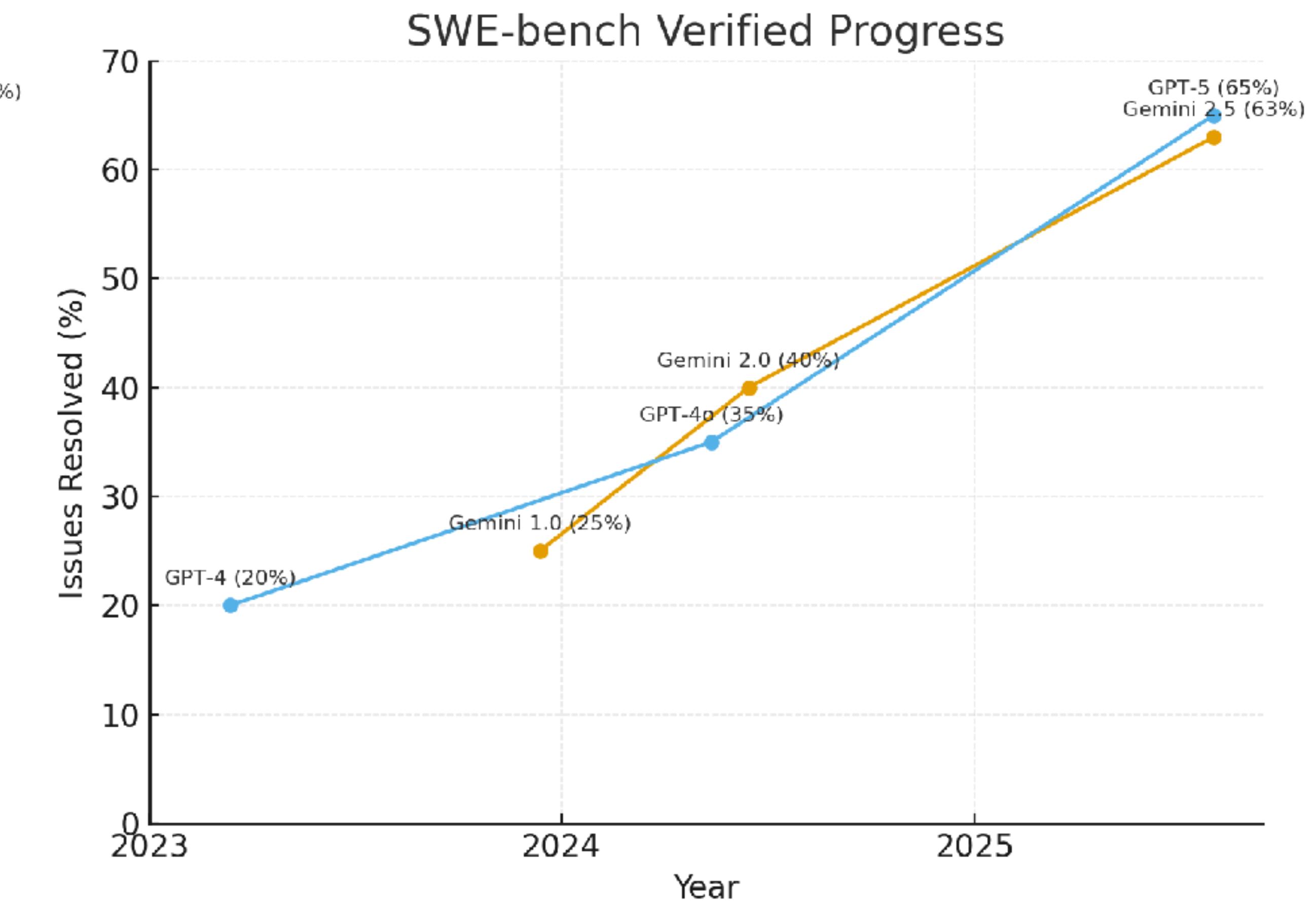
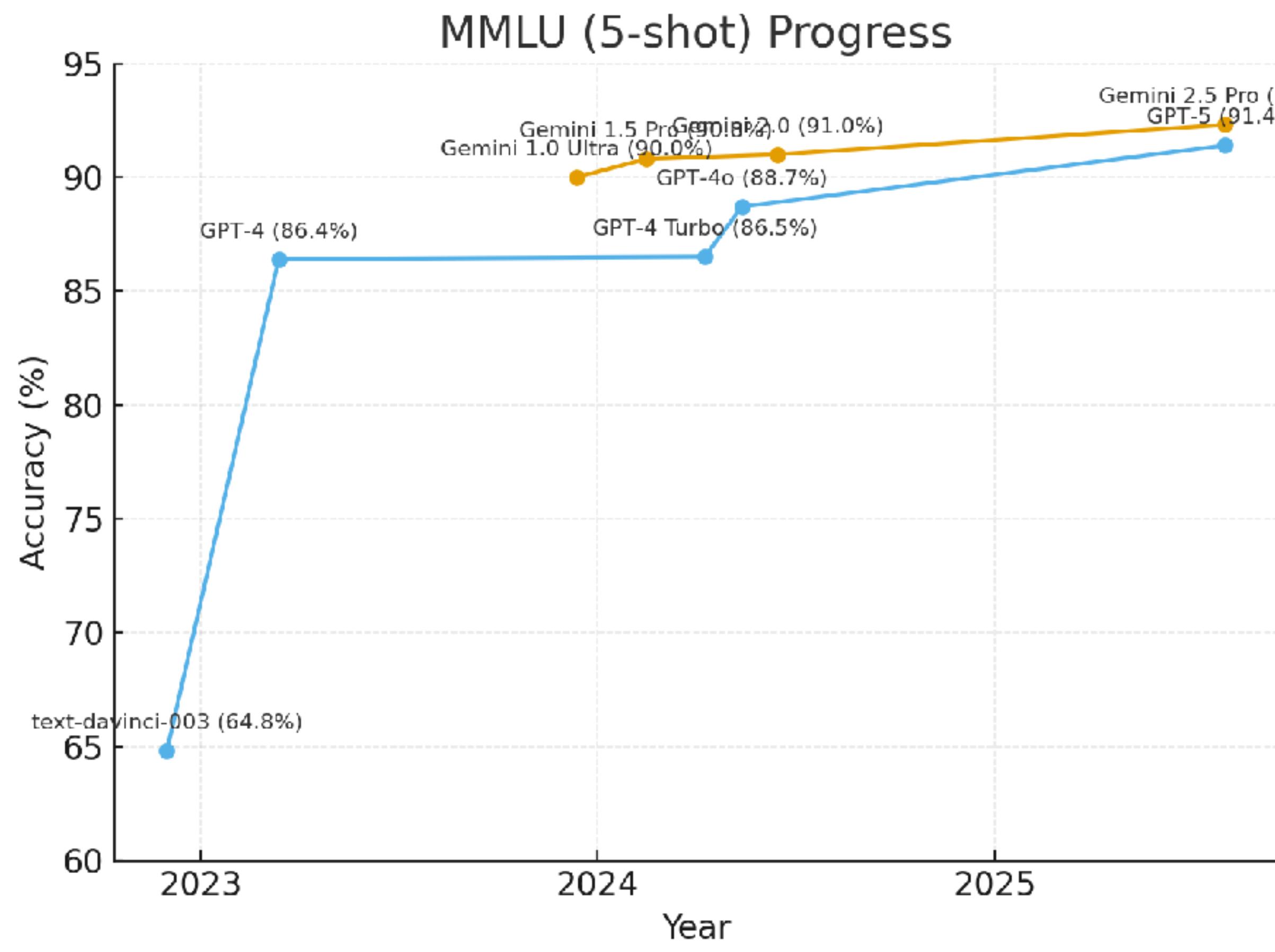
# Benchmarks

- [Chatbot Arena](#)
- [GPQA](#)
- [SWE-bench](#)
- [GAIA](#)
- [MMMU](#)

# What's improving/lagging?

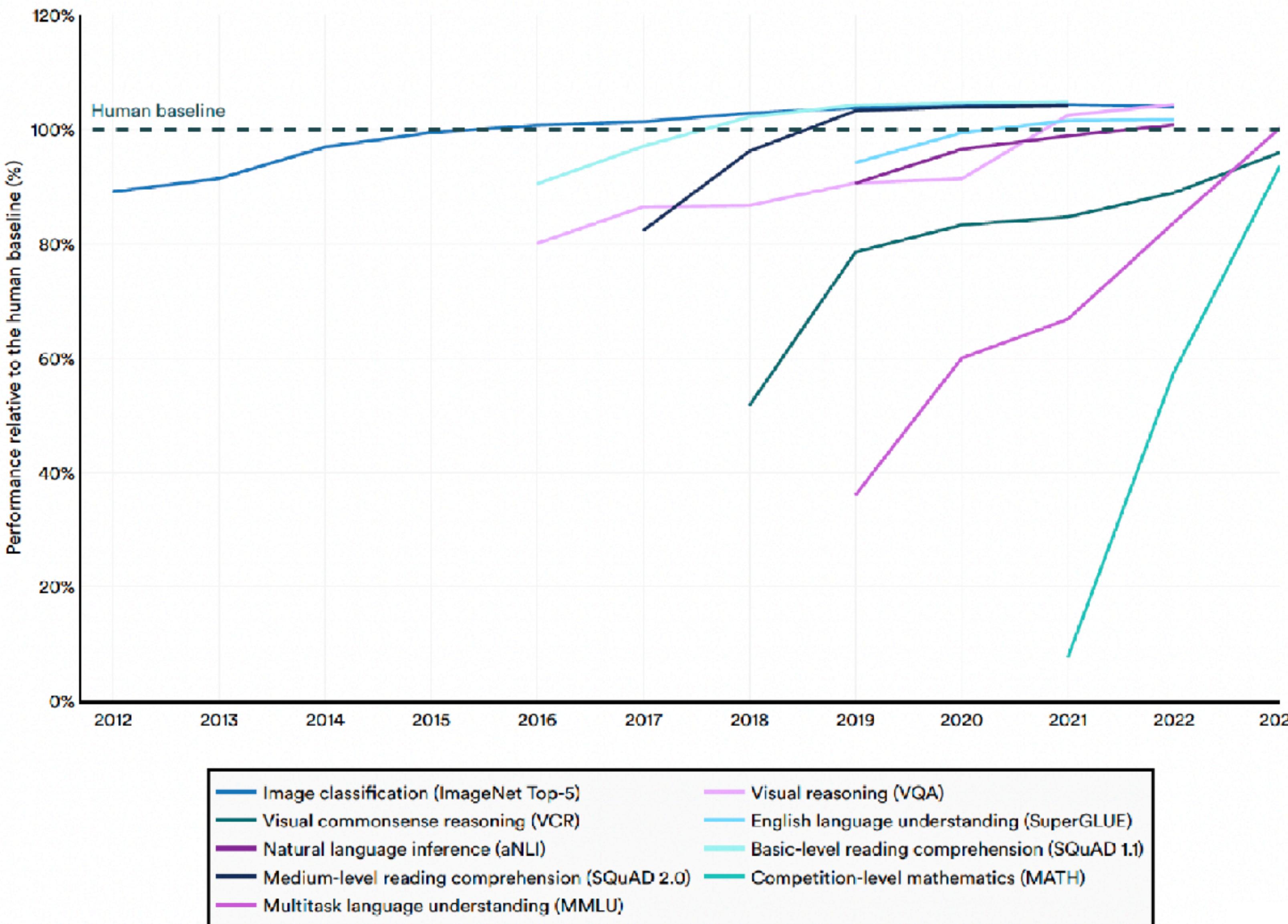
- Math/logic and code: steep gains
- Open-ended, multi-tool tasks: improving but brittle
- Multimodal academic exams: capable, still sensitive to prompts

## OpenAI vs Gemini: Knowledge vs Coding Benchmarks (2022→2025)



—●— Gemini    —●— OpenAI

## Select AI Index Technical Performance Benchmarks vs. Human Performance



# So where is this going?

- **The AI revolution is in peak hype, but it will clearly have deep, long lasting impacts on society.**
- **Separating the value from the hype is a critical skill.**
- **Smart people will rethink how they can add value in the new world.**
- **Superintelligence is coming, sooner than predicted.**
- **When we get there, all bets are off.**
- **If you could talk to God, what would you ask?**

# Four Questions

- 1. Are language models intelligent?**
- 2. Can humans be trusted with this tool?**
- 3. Is AI a net good for society?**
- 4. Are we doomed?**

# My Answers

## 1. Are language models intelligent?

- Are we that different from LLMs?
- Turing paraphrased: intelligence is as intelligence does.

## 2. Can humans be trusted with this tool?

- Clearly not. Our track record for deploying technology responsibly is not great.
- But stopping the train is unrealistic.

## 3. Is AI a net good for society?

- All tools are neutral. It's how we use them that matters.
- Nothing new about humans using tools for bad purposes.
- We've been on this path for a while (internet, smart phones, social media).
- We need more regulation. It's not moving in that direction.

## 4. Are we doomed?

- Probably.

**“There are very few examples of more intelligent things being controlled by less intelligent things”**

**- Geoff Hinton**

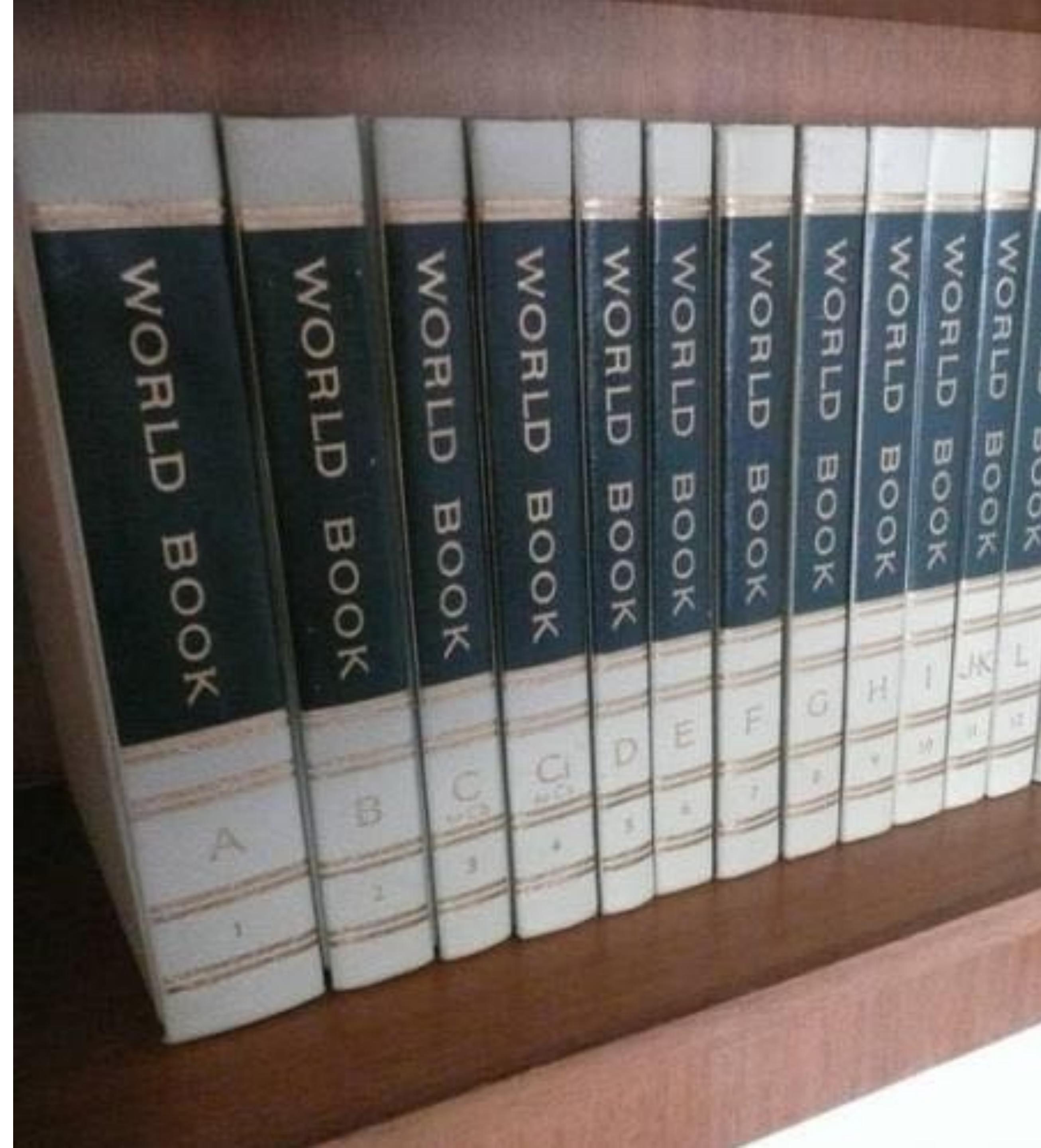
# Navigating Change

- advanced programming languages
- portable operating systems
- Moore's Law
- PC proliferation
- the internet
- the web
- smart phones
- the cloud
- data science boom
- ML & AI

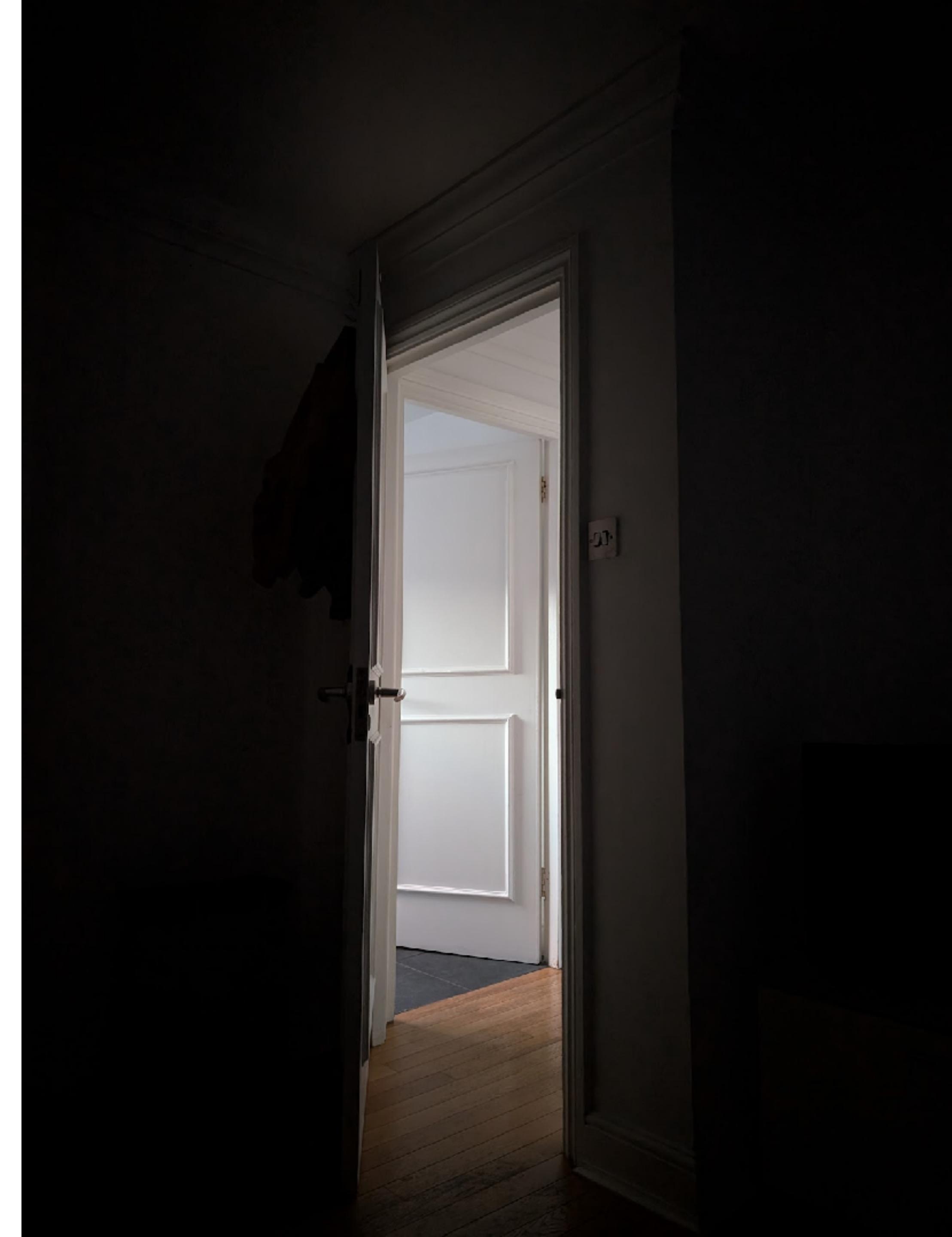
A close-up photograph of a black dog's face, looking slightly upwards and to the left. The dog has dark eyes and a visible nose. In the upper left corner, a person's arm and hand are partially visible, wearing a light-colored sleeve and holding a small, colorful object with blue, red, and yellow edges. The background is a plain, light-colored wall.

Ok, but how?

**Stay curious**

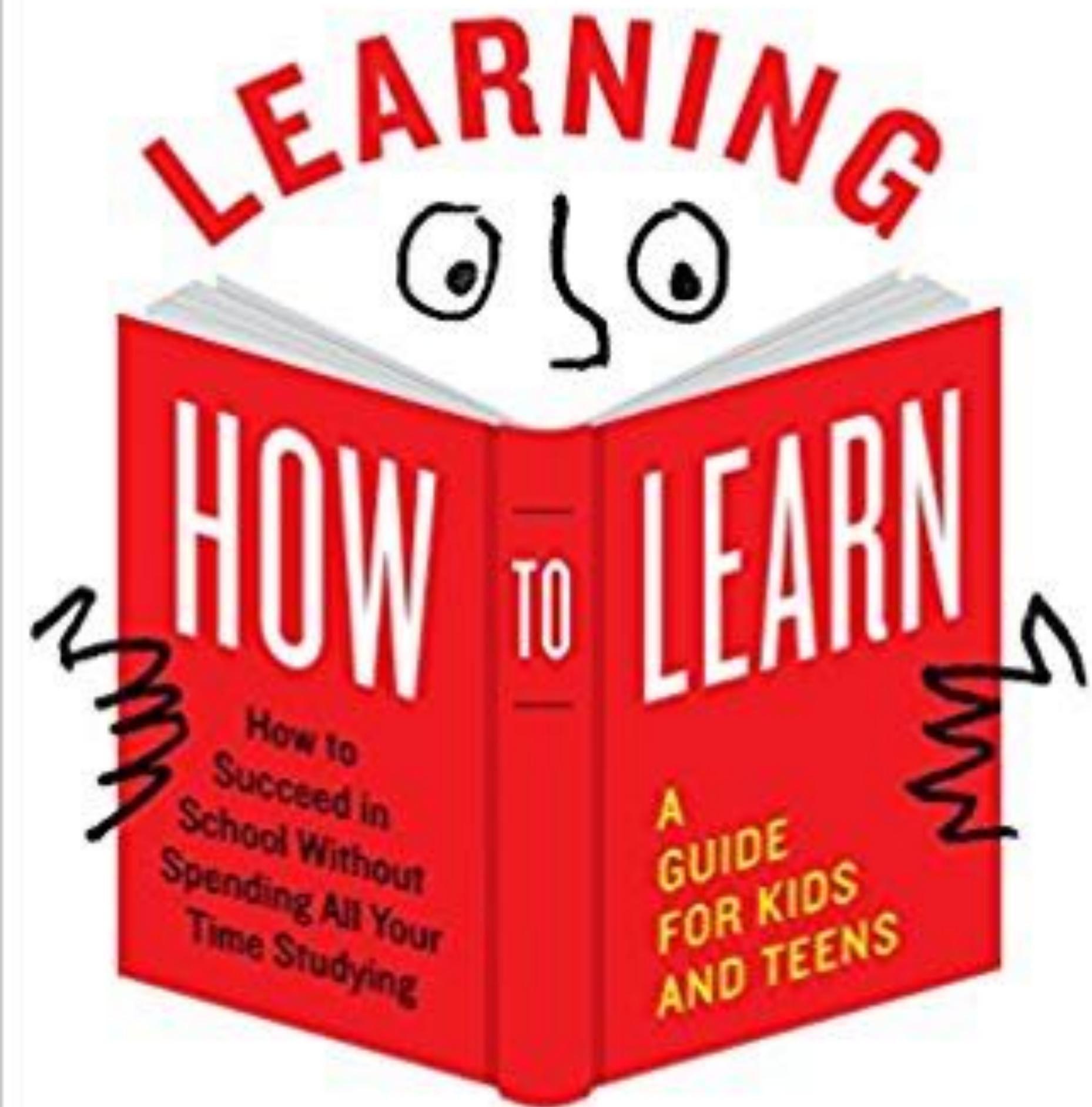


**Be open to opportunity**



# Be a lifelong learner

From the bestselling author of *A Mind for Numbers* and  
the creators of the popular online course Learning How to Learn



BARBARA OAKLEY, PhD, AND  
TERRENCE SEJNOWSKI, PhD,  
WITH ALISTAIR McCONVILLE

# Be intentional (make plans)



Photo by [Glenn Carstens-Peters](#) on [Unsplash](#)

# Slides

[mco.dev/introAI.pdf](http://mco.dev/introAI.pdf)

# This is for everyone

