

Understanding Artificial Intelligence

What a well informed person should know

Marc Cohen

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Welcome



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

- **Gain a conceptual understanding of how AI “works”**
- **Find out about the state of the art in AI**
- **Consider the ethical issues raised by AI**
- **Think critically about AI in your life and in the world**
- **Help you prepare for the continuing revolution**

Non-Goals

- **Deep dive into technology or maths**
- **Definitively answer difficult ethical or societal questions**
- **Predict the future**

Agenda

- [My Fave AI App](#)
- [Definitions](#)
- [History](#)
- [Mechanics](#)
- [State of the Art](#)
- [Ethics](#)
- [The Future](#)



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

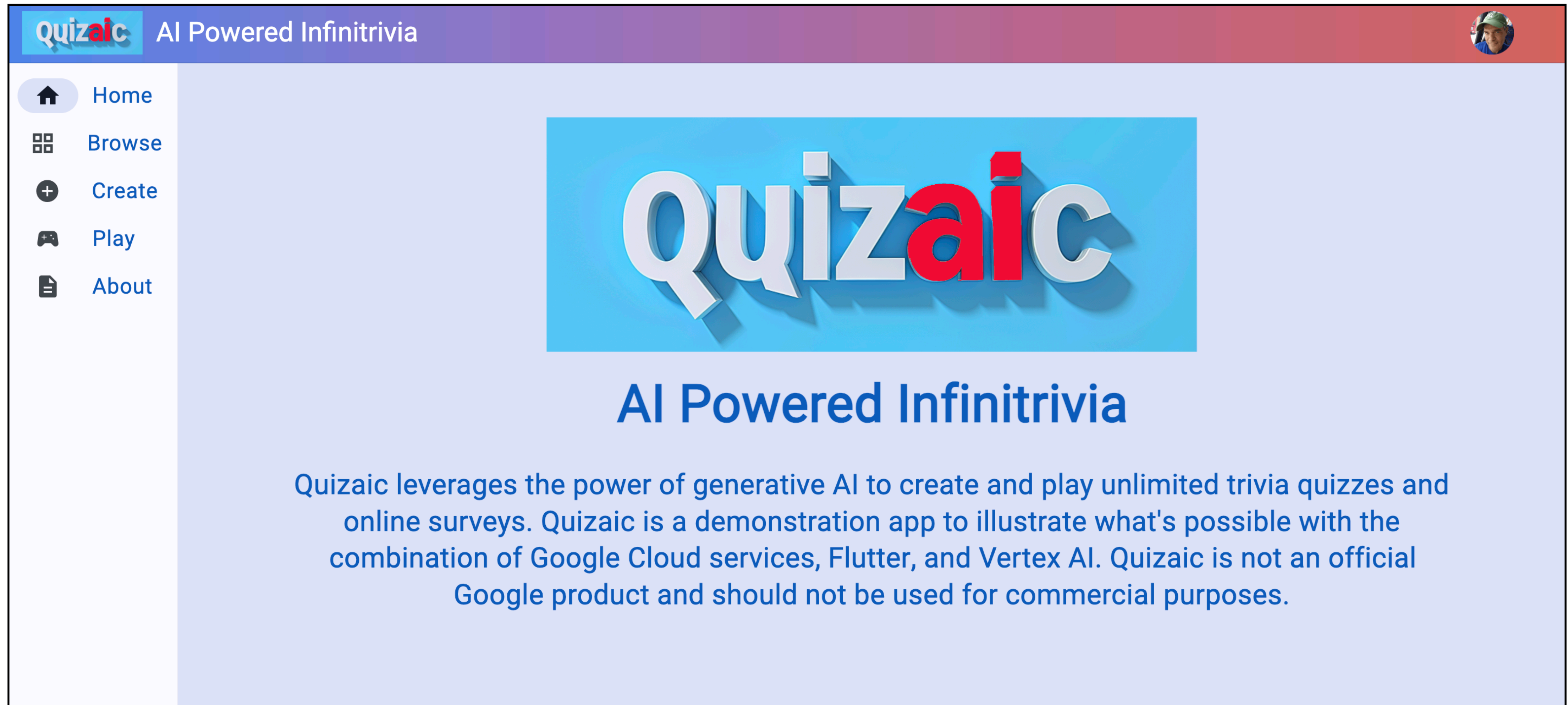
**Wouldn't it be
cool to have a
free quiz game
for everyone
powered by AI?**

The logo for 'Quizaiic' is displayed in a 3D, blocky font. The letters 'q', 'u', 'i', 'z', and 'c' are white, while the letters 'a', 'i', and 'i' are red. The text is set against a light blue rectangular background with a subtle circular pattern. The entire logo is centered on a solid blue background.

Quizaiic

(pronounced like mosaic)

Let's play!



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}

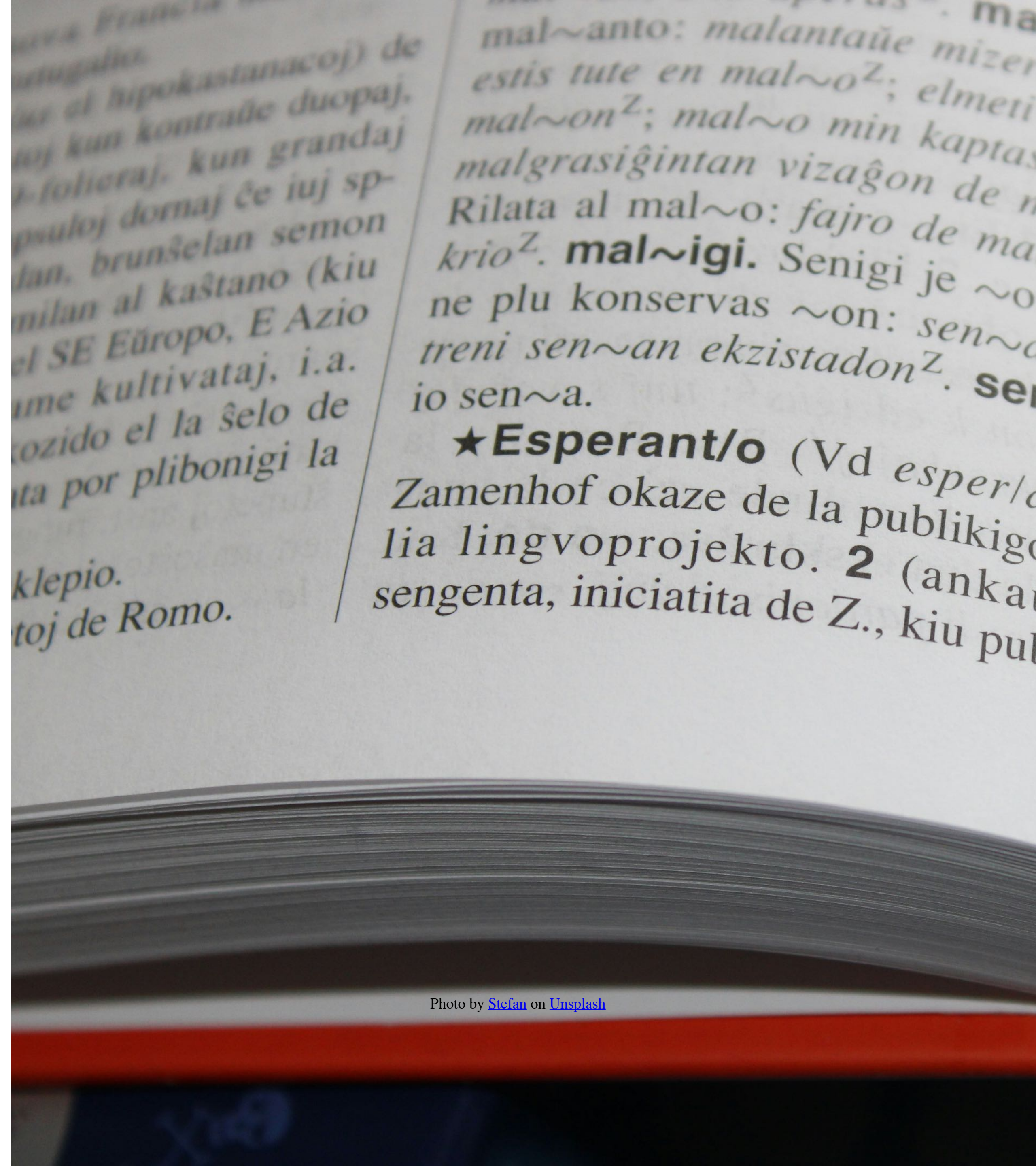
RULES:

- 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:

Definitions

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



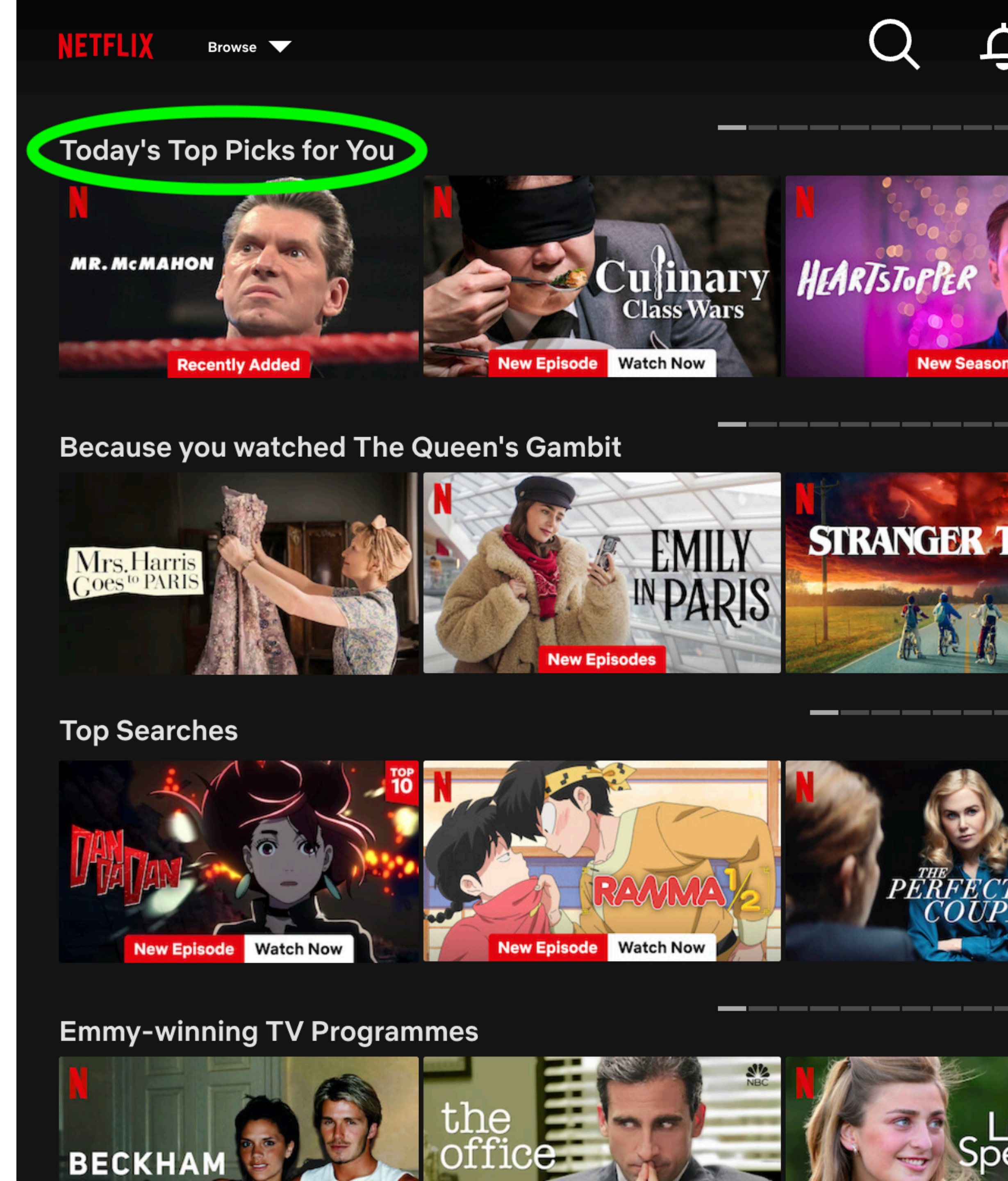
Definition: Artificial Intelligence

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.



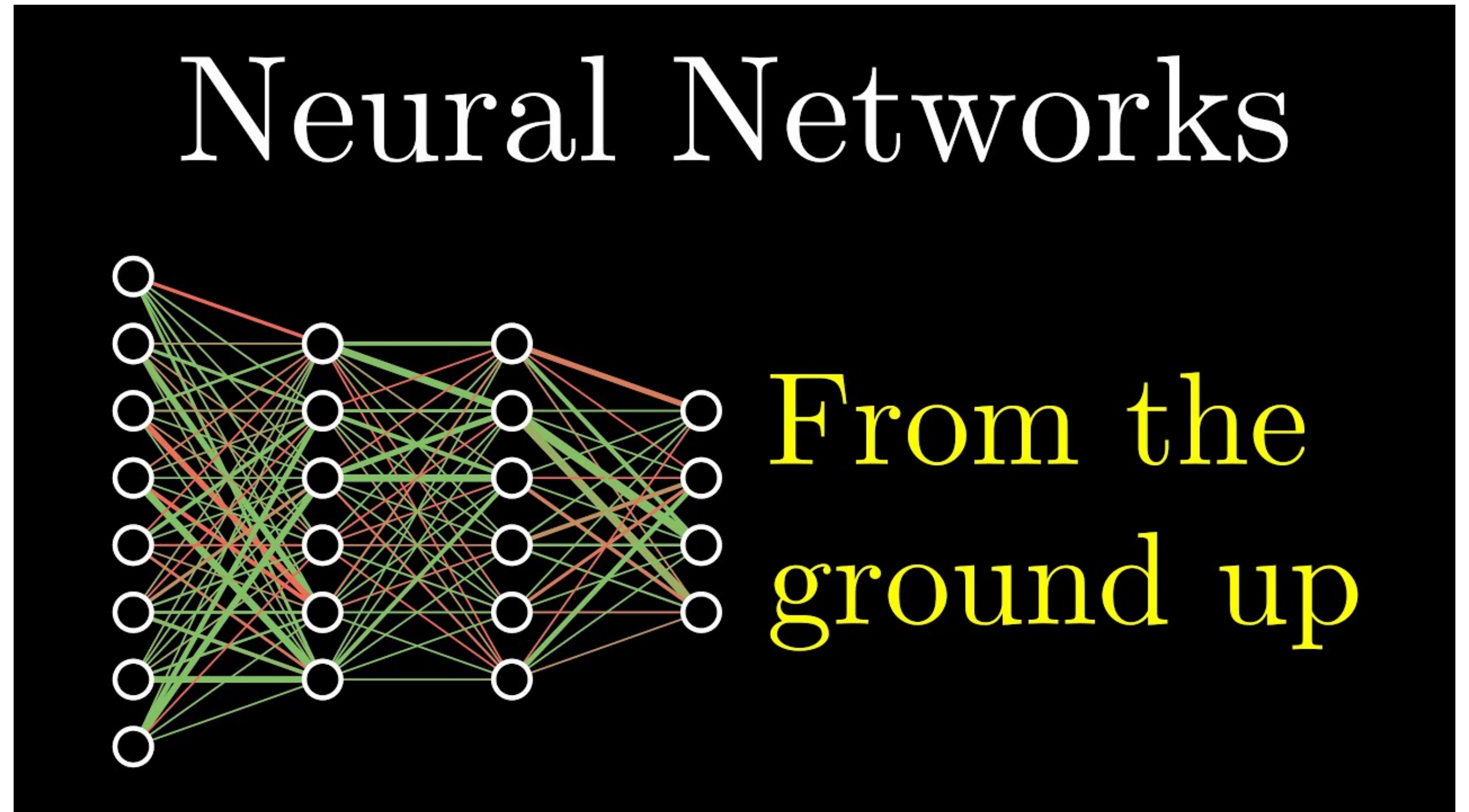
Definition: Machine Learning

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.



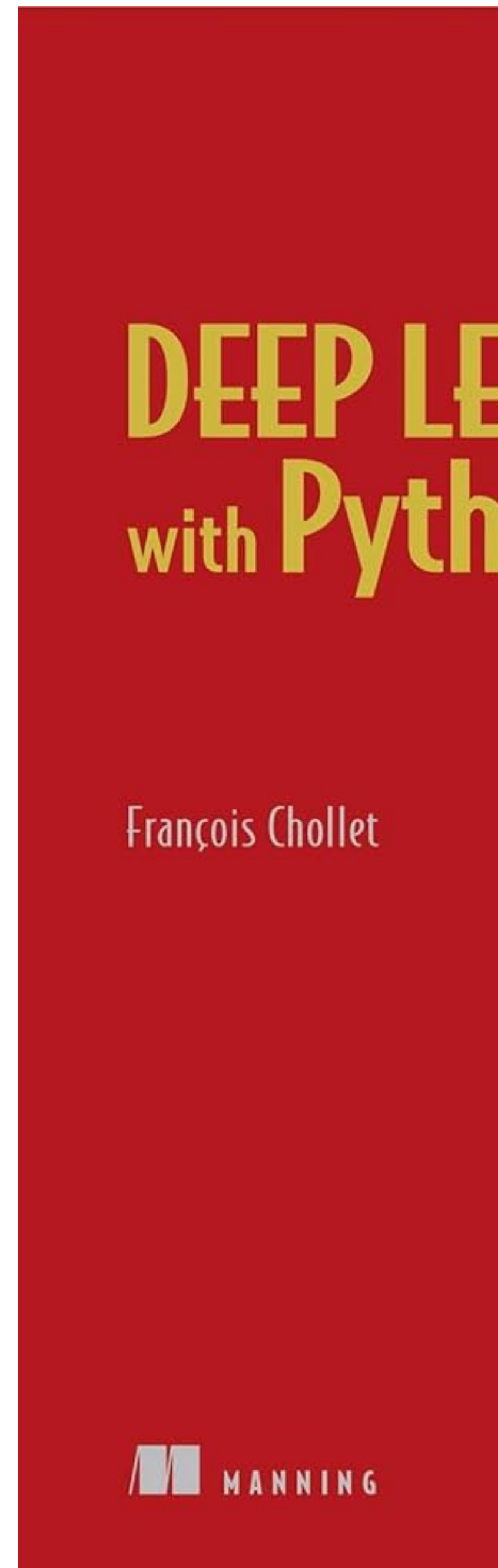
Definition: Neural Networks

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

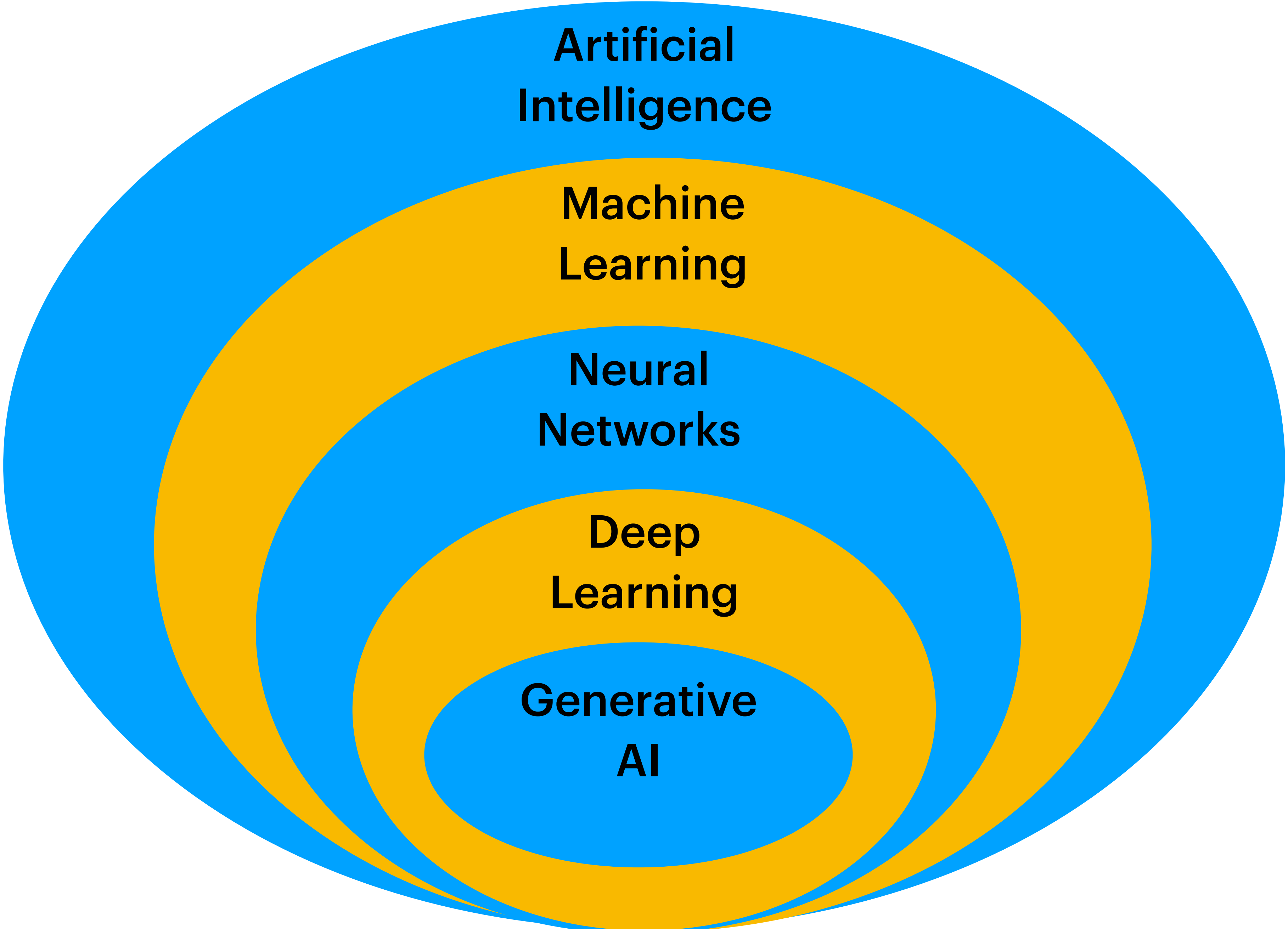
A type of machine learning that uses multi-layer neural networks to train computers to process data and make human-like decisions. Deep learning systems learn from large amounts of data, including images, text, audio, and video to recognize patterns, make predictions, and automate tasks.



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

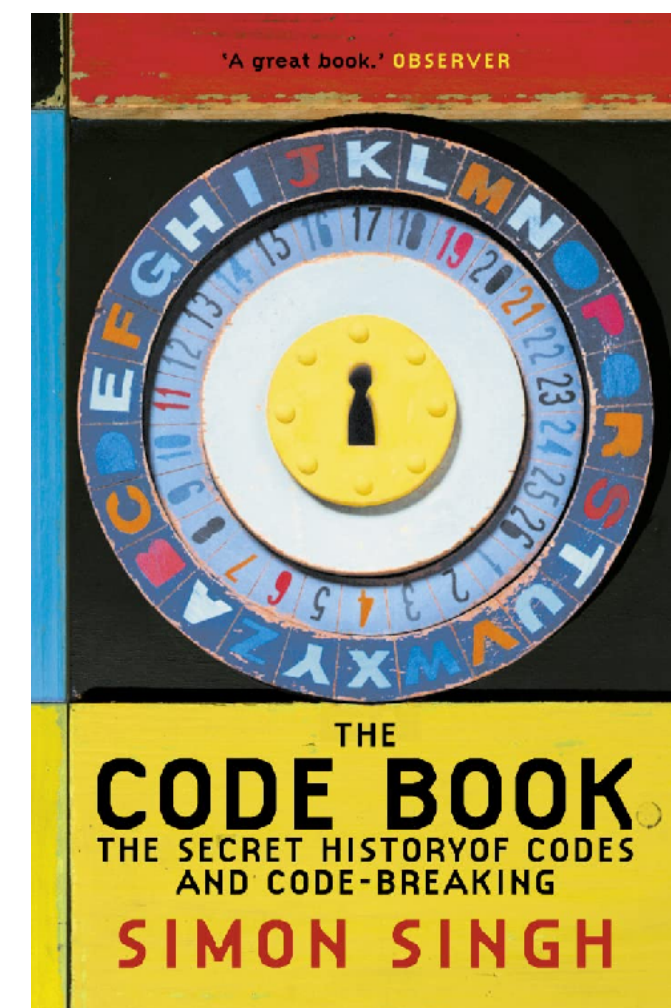
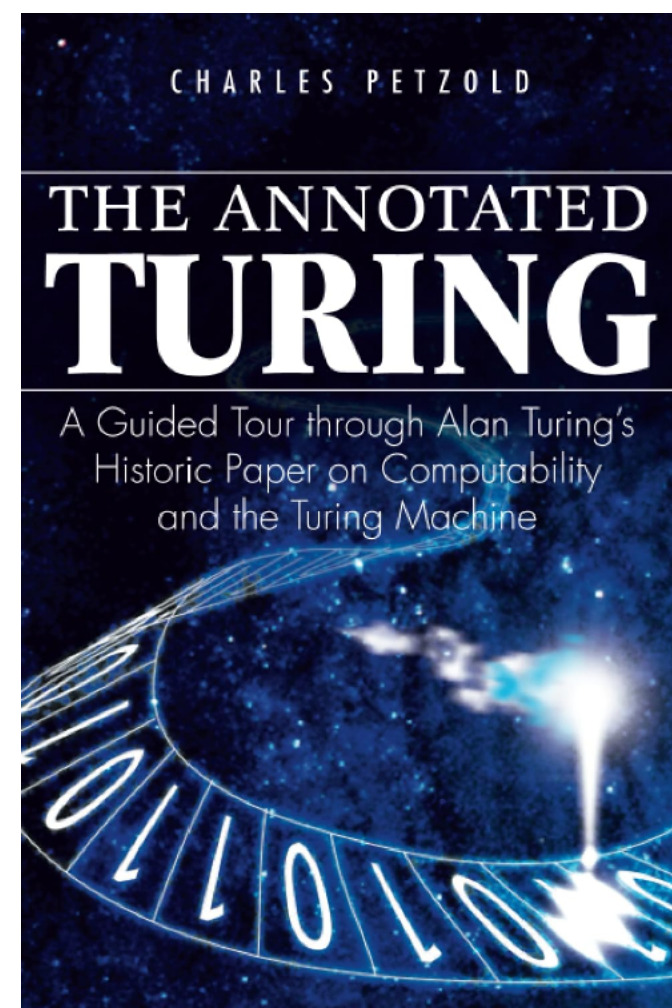
1990's

2000's

2010's

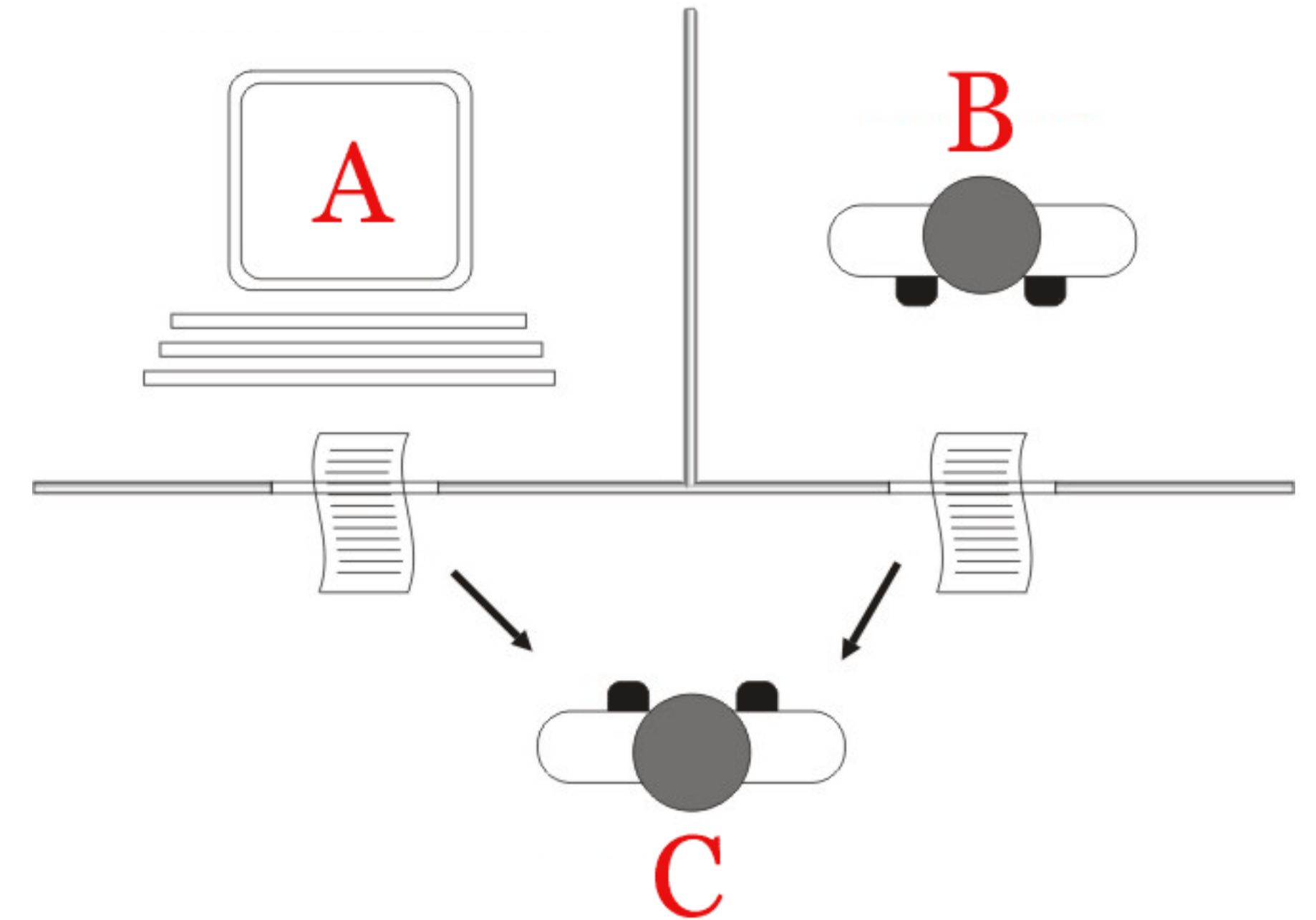
Alan Turing

A Turing Machine is a theoretical construct that captures the essence of abstract symbol manipulation, i.e. computing. This invention inspired the founding of Computer Science and started the discussion about the possibility of thinking machines.



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

We'll conduct our own Turing Test later!

Claude Shannon

- **Invented digital computer design**
 - **World's Greatest Master's Thesis!**
- **Father of Information Theory**
- **Mathematical definition of communication**
- **First appearance of the word "bit"**
- **Designed the first chess computer**



Geoffrey Hinton

**ROMANES
LECTURES** SINCE
1892
IDEAS OF DISTINCTION



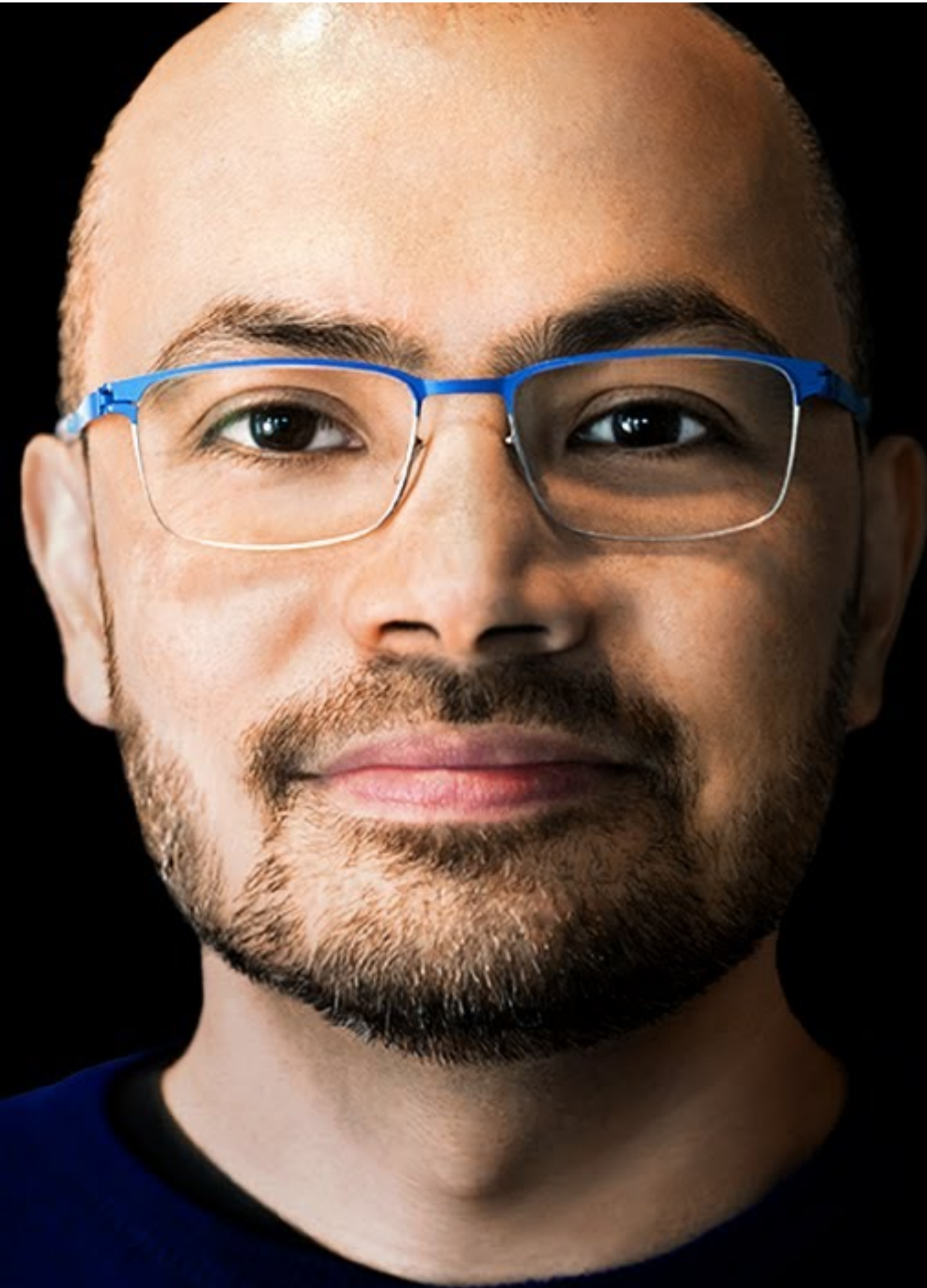
Demis Hassabis

Demis
Hassabis

#299

Lex

Fridman



AI Development Timeline

Charles Babbage designs the Analytical Engine, an early mechanical general-purpose computer.

1836

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

1952

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

1958

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

1950

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

1956

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

1959

AI Development Timeline

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

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.

1965

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

1972

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

1974

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

1980

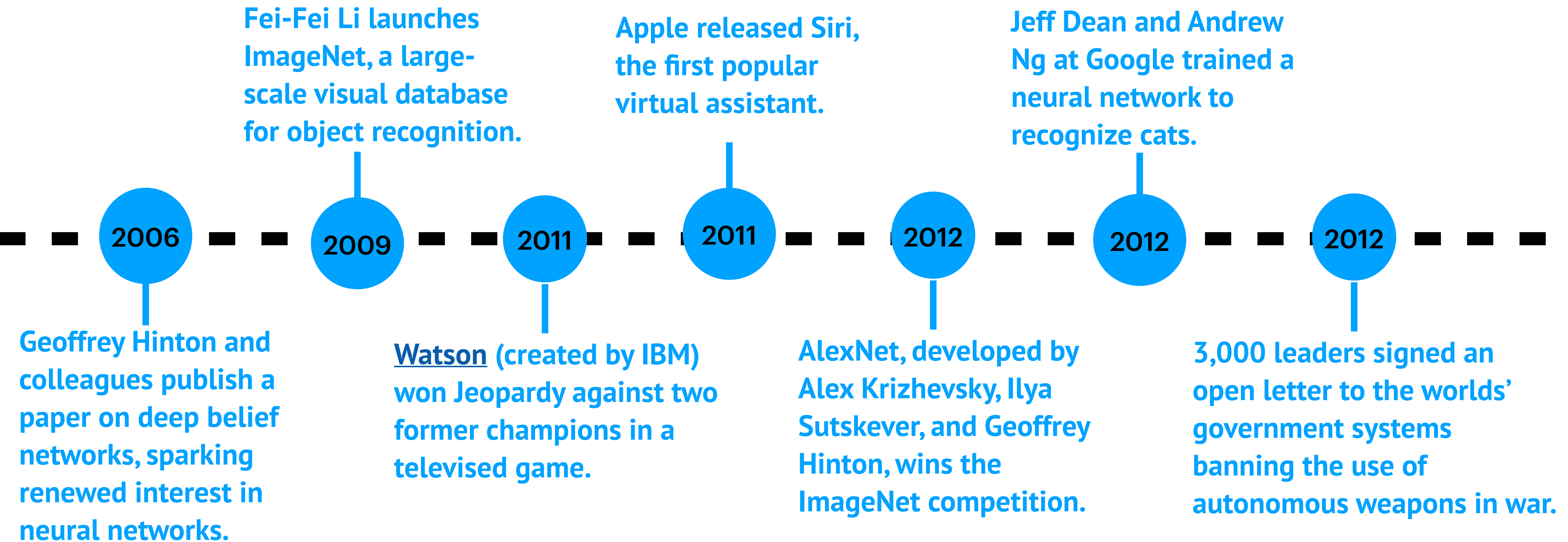
David Rumelhart, Geoffrey Hinton, and Ronald Williams publish the backpropagation algorithm, revitalizing neural networks.

1986

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

1997

AI Development Timeline



AI Development Timeline

DeepMind's AlphaGo defeats professional Go player Lee Sedol.

2015

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

2017

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

2017

Chinese Alibaba beat humans on Stanford reading and comprehension test.

2018

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

2020

DeepMind's AlphaFold makes significant progress in protein folding.

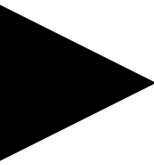
2020

Generative AI goes mainstream with ChatGPT

2022

Open source AI era begins

2024



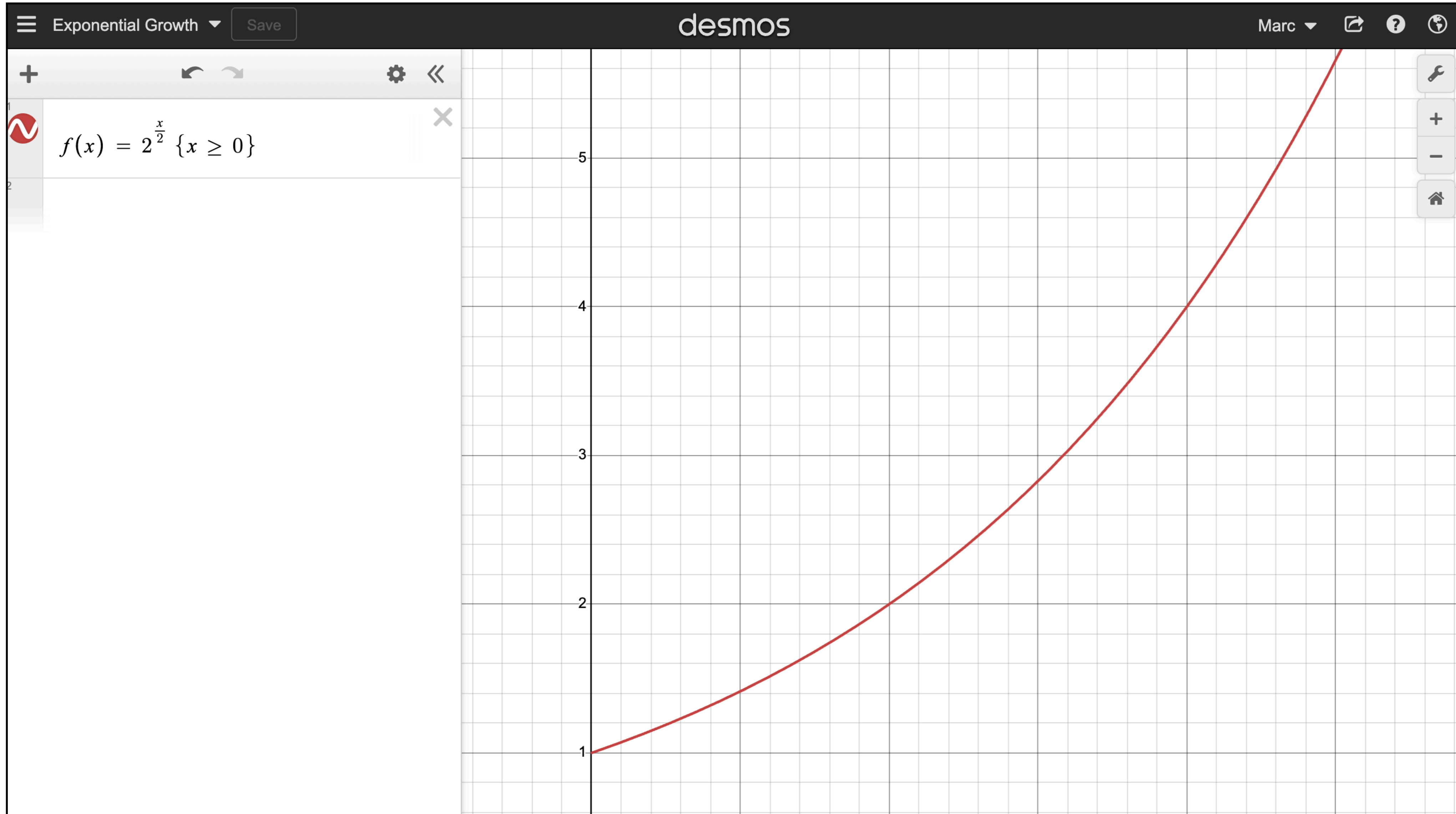
Why did everything change so quickly?

A perfect storm:

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



Exponential Growth



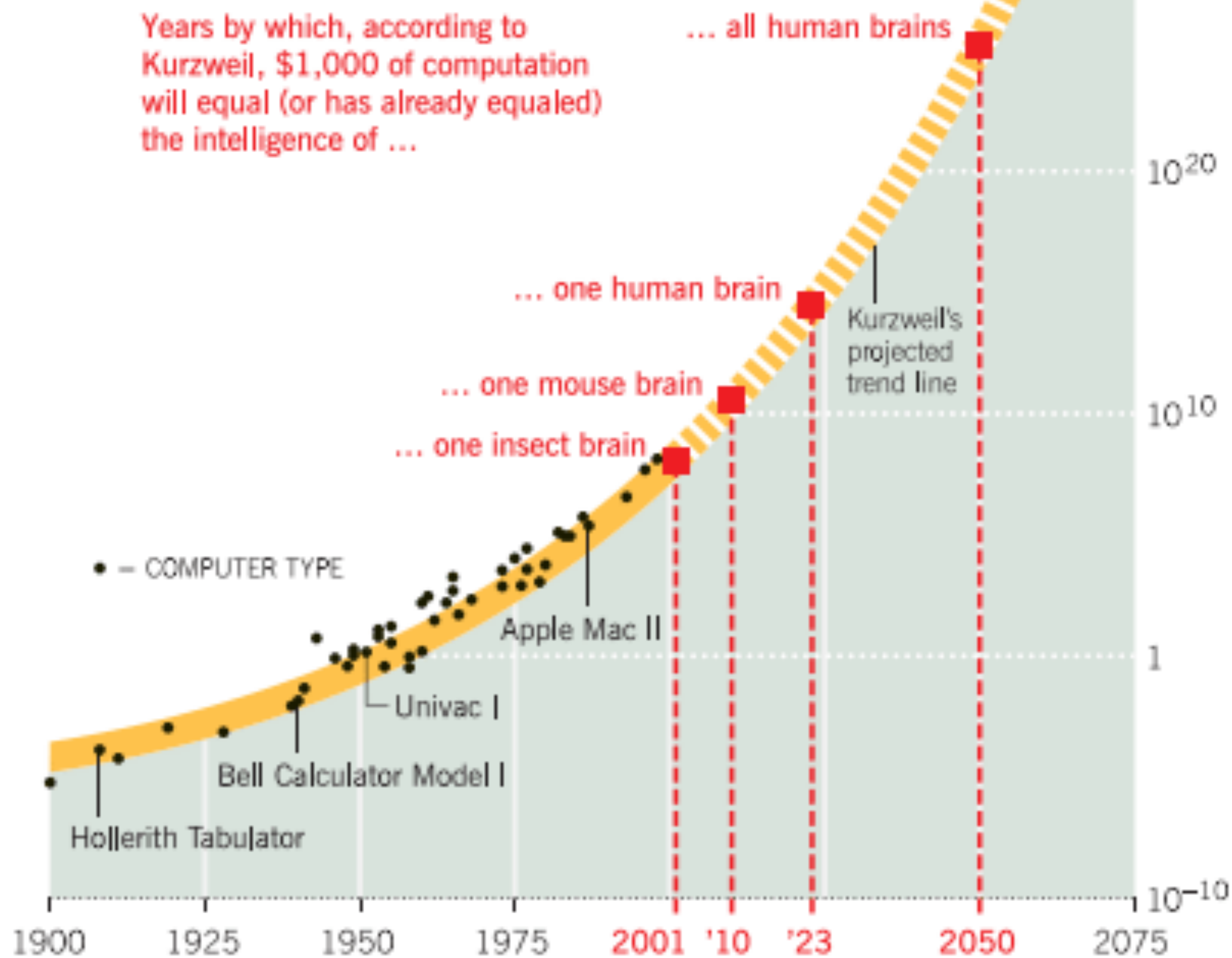
THE KURZWEIL CURVE

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

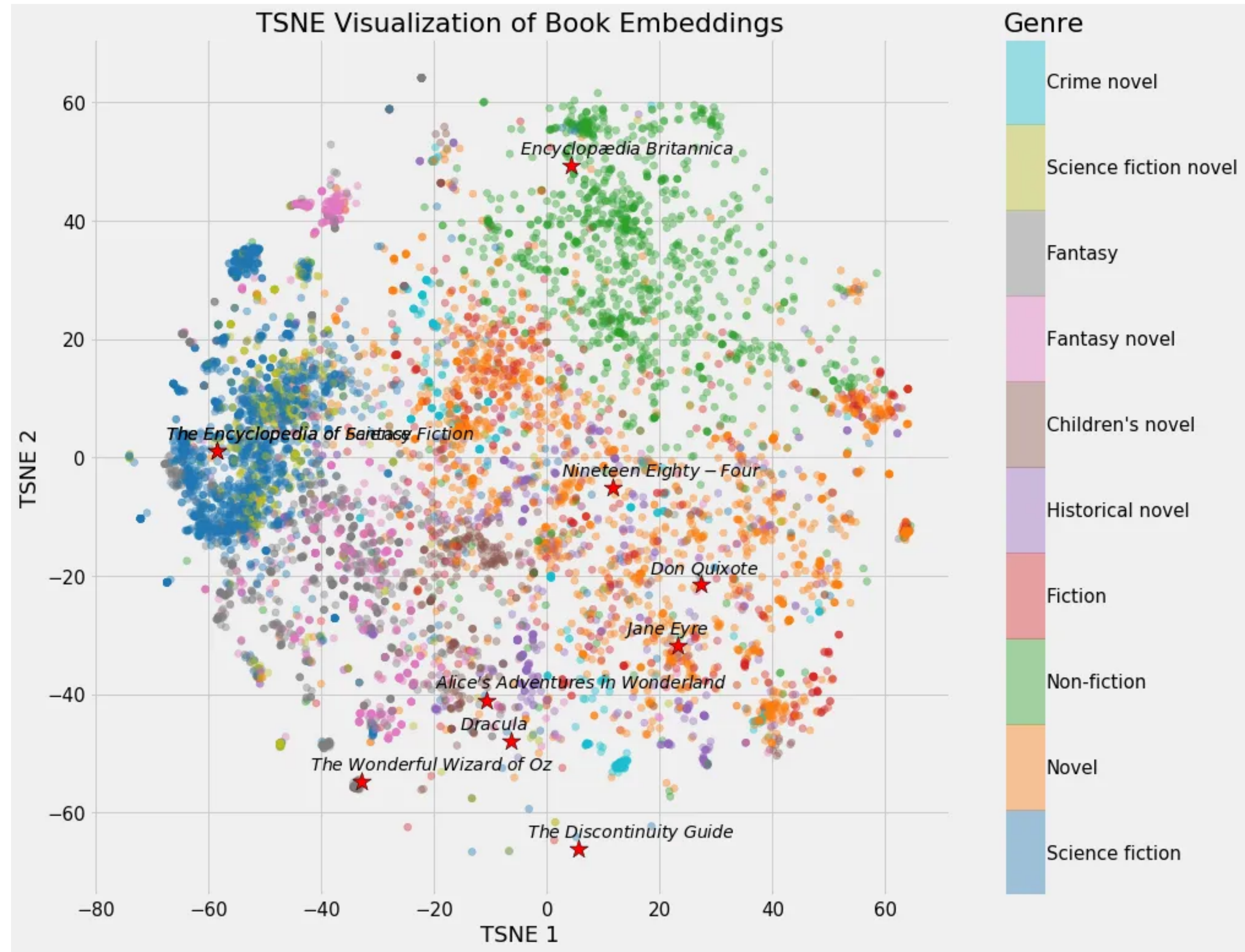
Years by which, according to Kurzweil, \$1,000 of computation will equal (or has already equaled) the intelligence of ...



SOURCE: DATA FROM RAY KURZWEIL

Mechanics

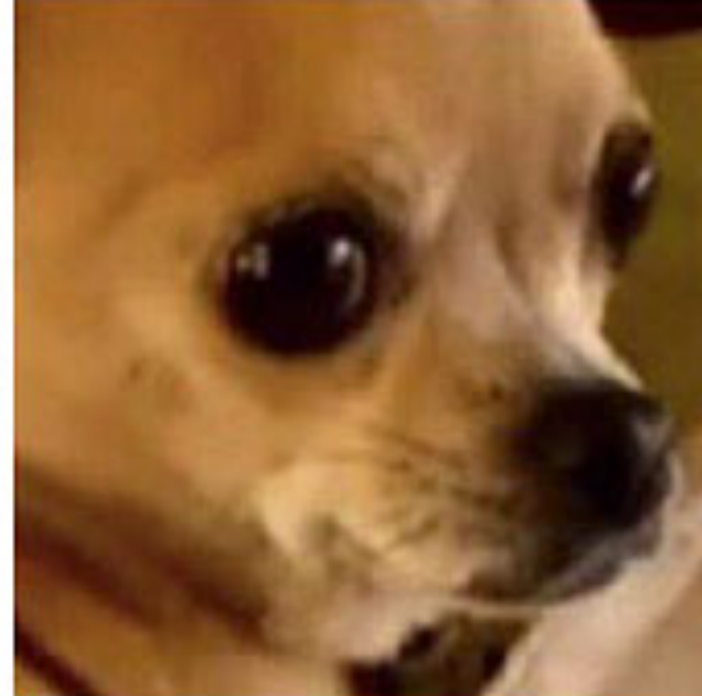
How does AI work?



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***

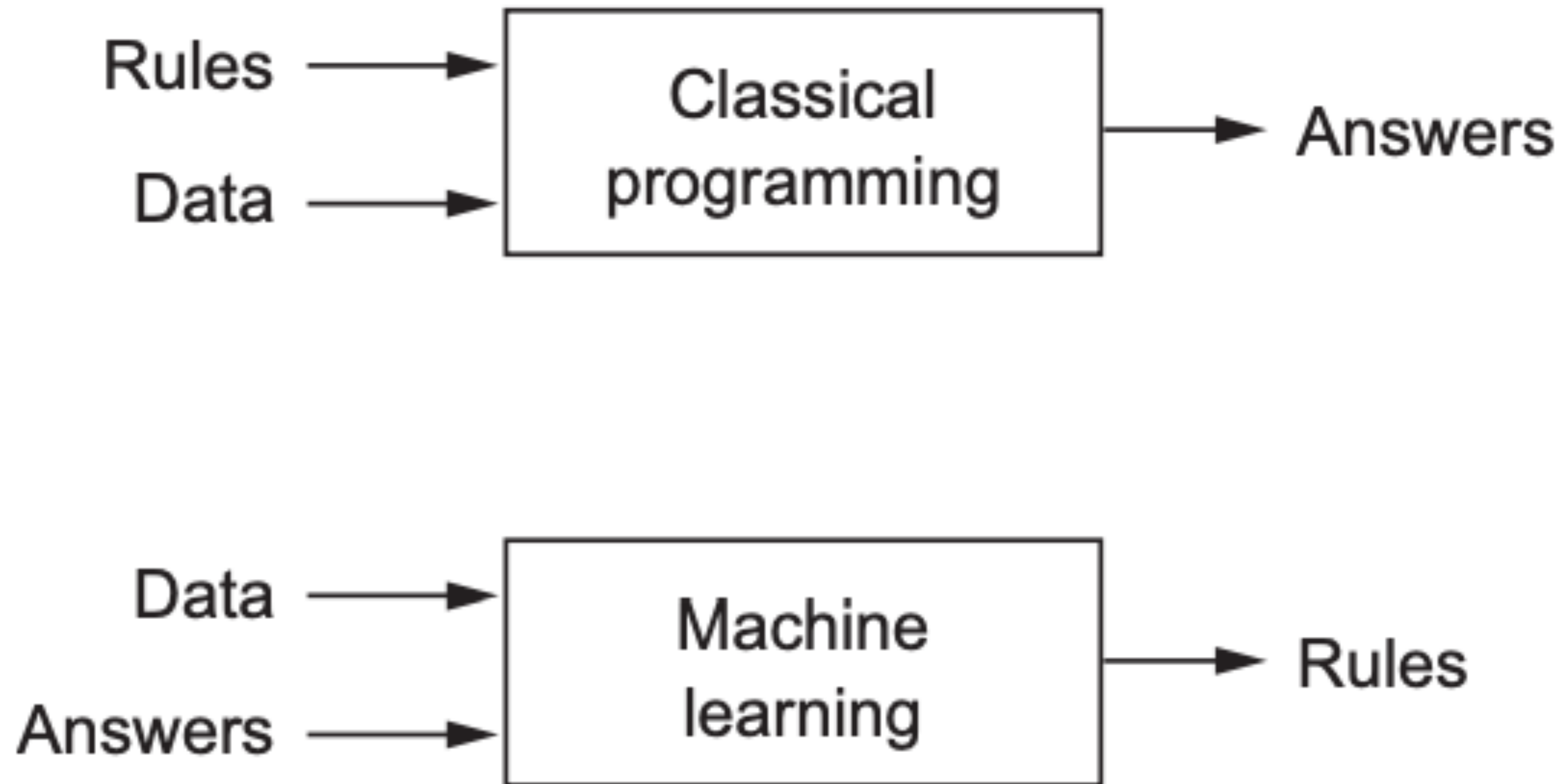


“Instead of trying to produce a program to simulate the adult mind, why not rather try to produce one which simulates the child’s mind?”

- 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 Example

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 Example



	Oppenheimer	Barbie	Dune	Interstellar	Indiana Jones and the Dial of Destiny	Blade Runner
User 1	4			5	1	
User 2	5	5	4			
User 3				2	4	5
User 4		1	2			
User 5		3				3

Cloud of similarities

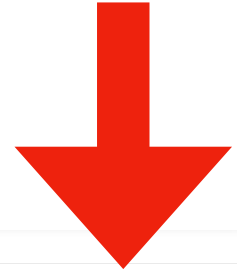


Reinforcement Learning Example



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

Google's AI Awakening

[Sign in / Sign up](#)



Jun Rekimoto : 暦本純一 [Follow](#)

人間とテクノロジーの未来を探求しています。

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。



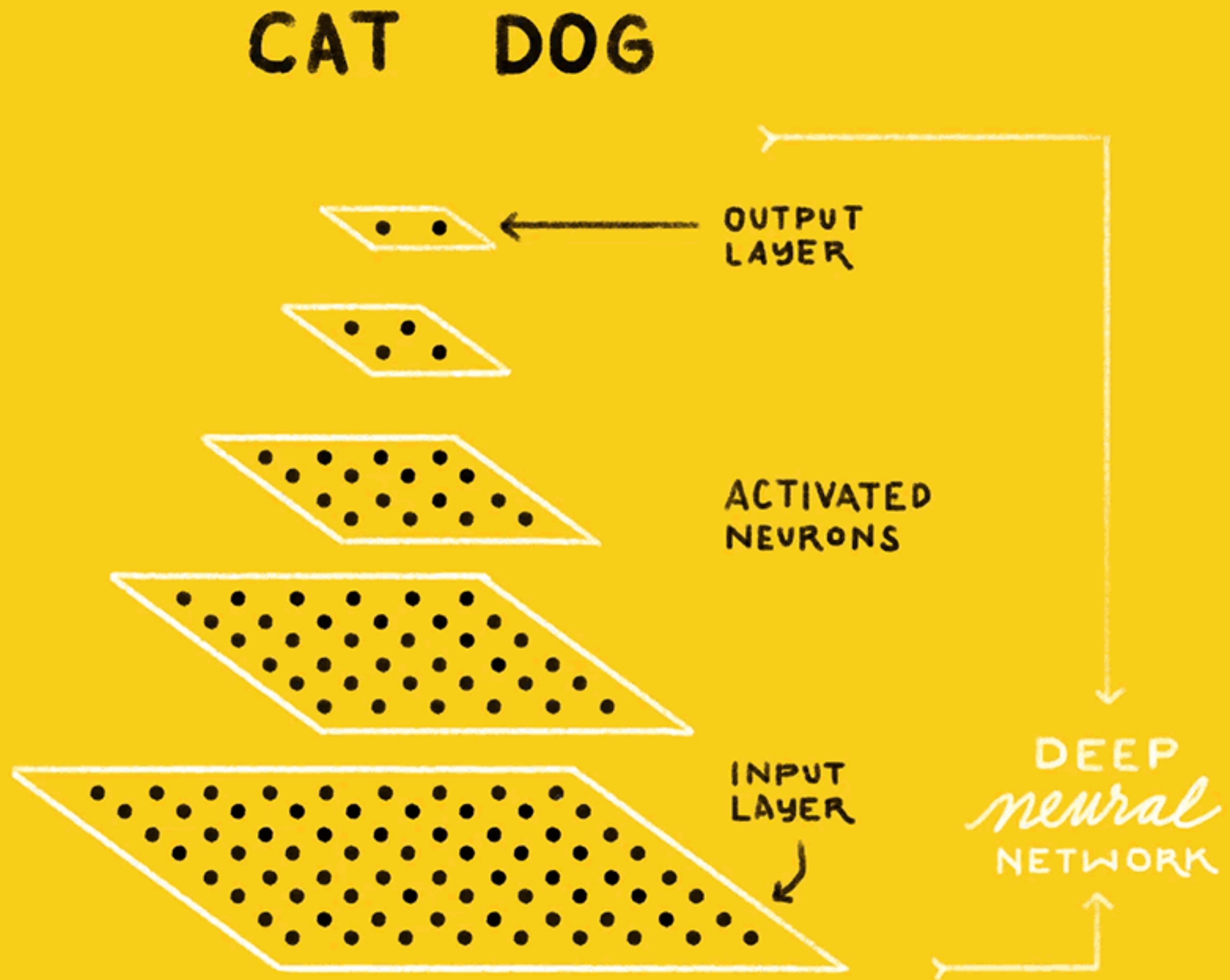
FEATURE

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.

Neural Networks

IS THIS A
CAT or **DOG**?

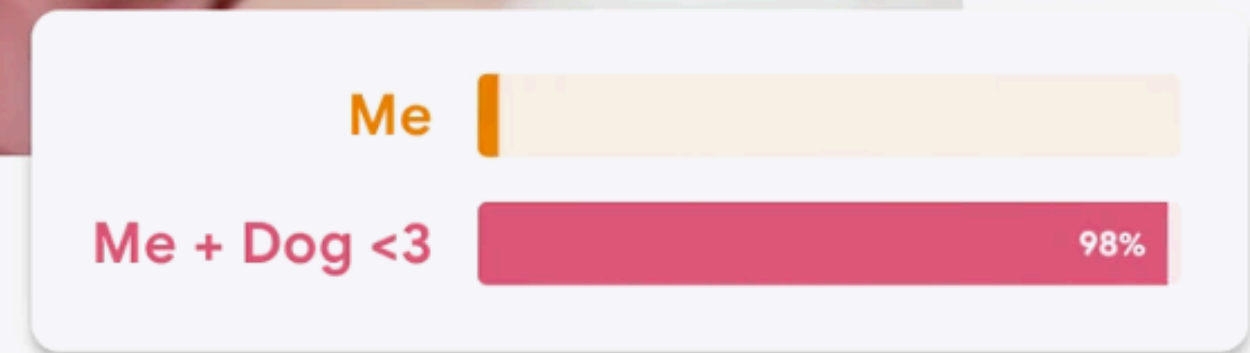
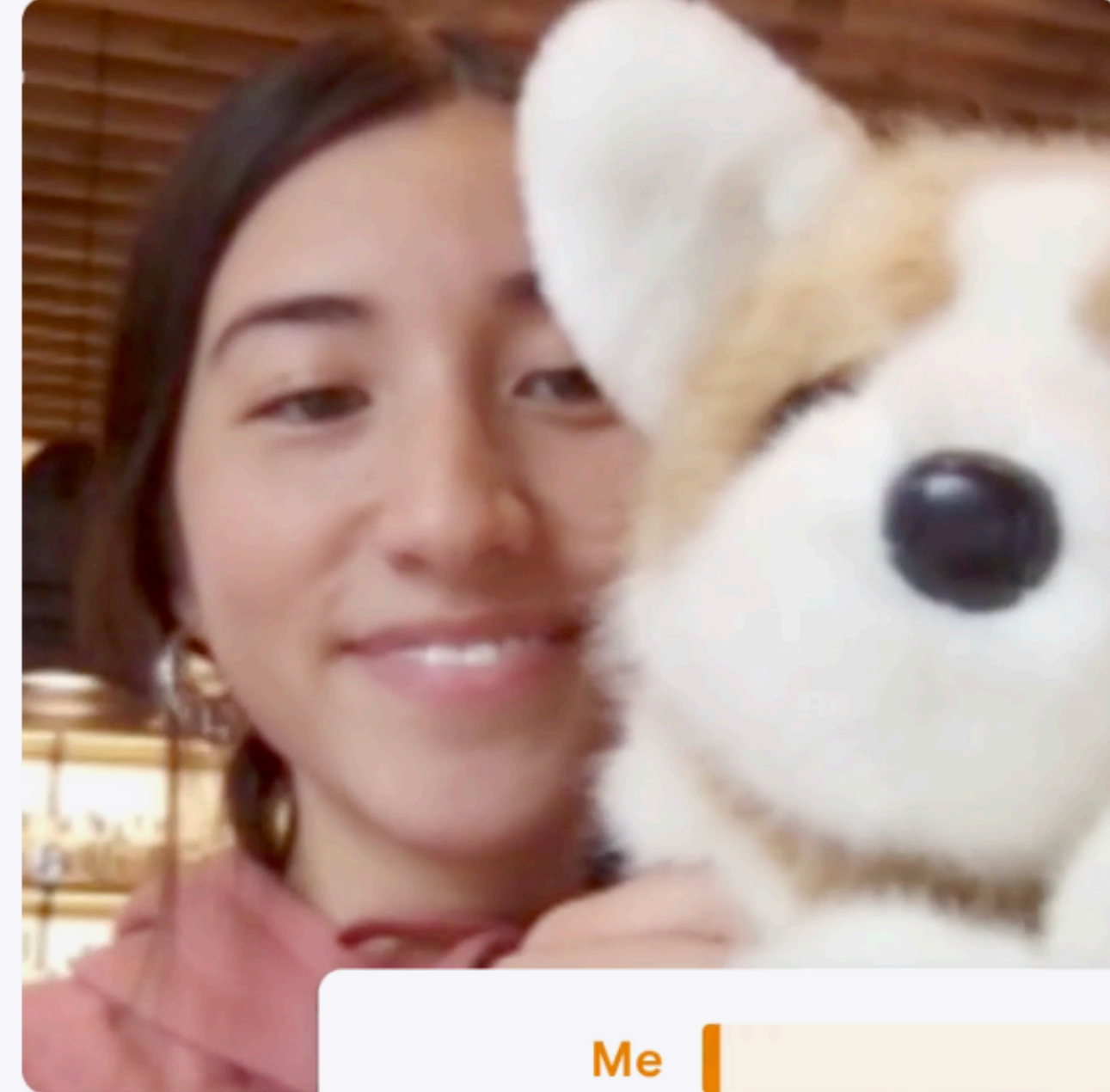


Teachable Machine

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](#)



Demo: Quick, Draw

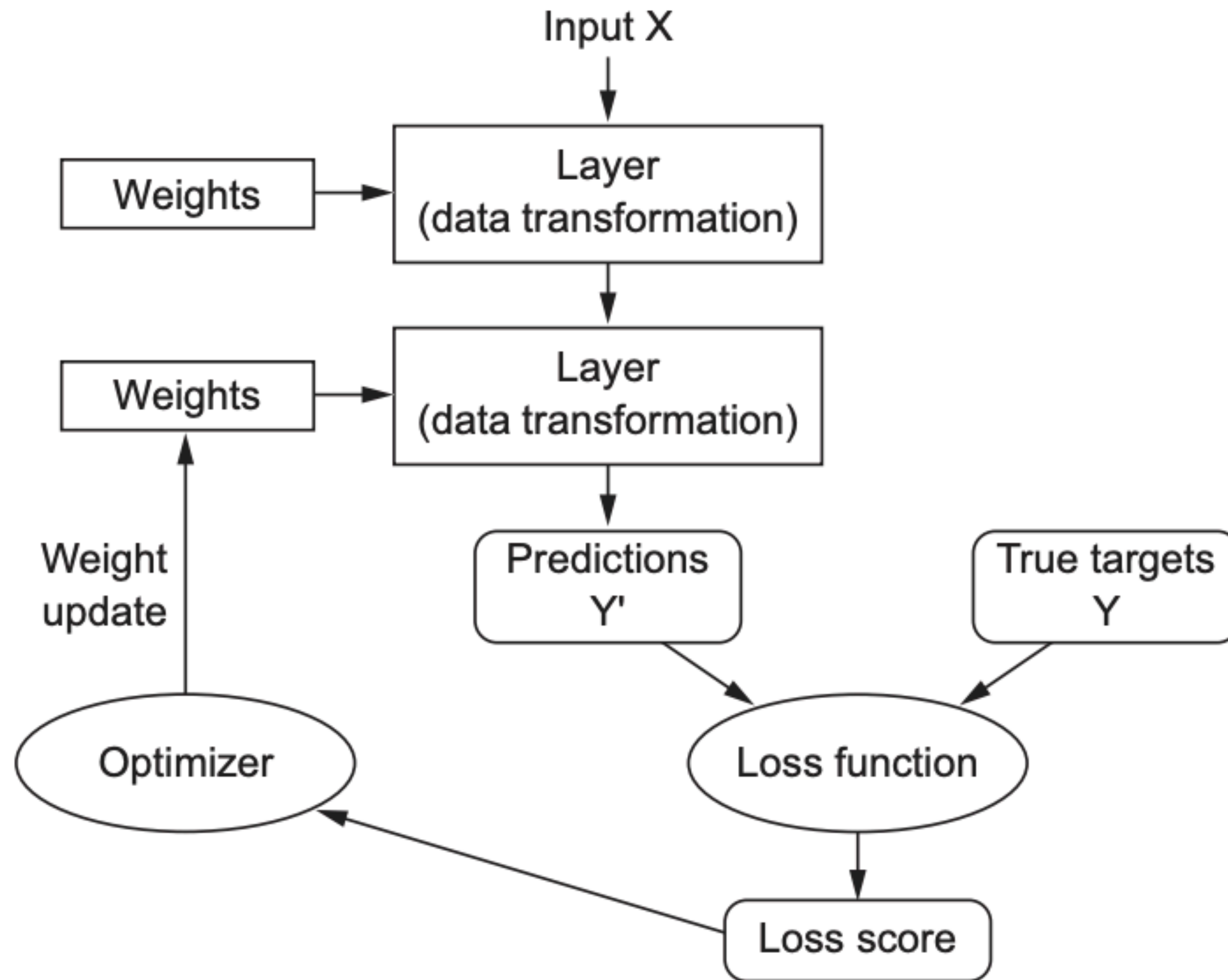


Can a neural network learn to recognize doodling?

Help teach it by adding your drawings to the [world's largest doodling data set](#), shared publicly to help with machine learning research.

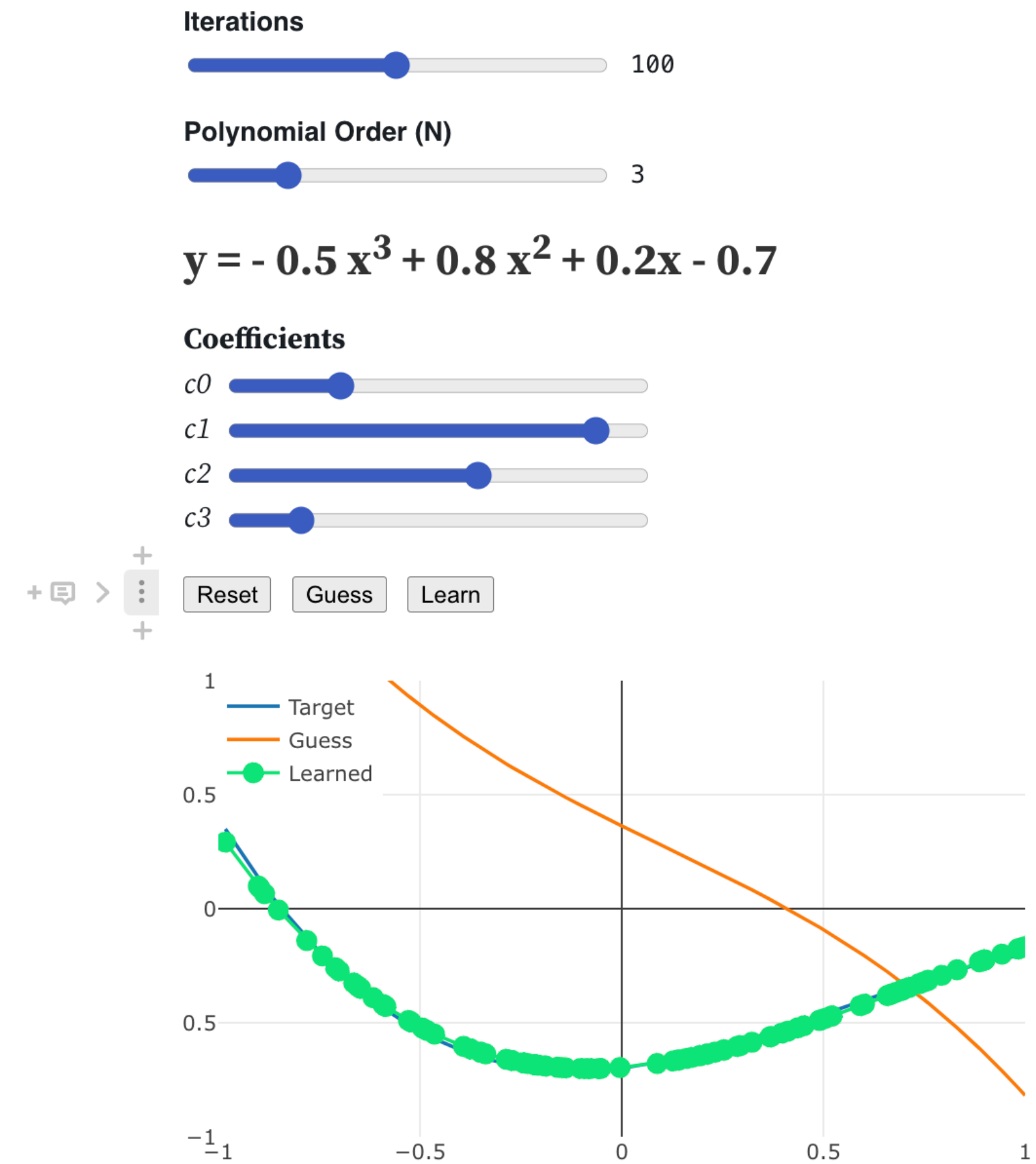
Let's Draw!

Inside a Neural Network



Neural Network Training

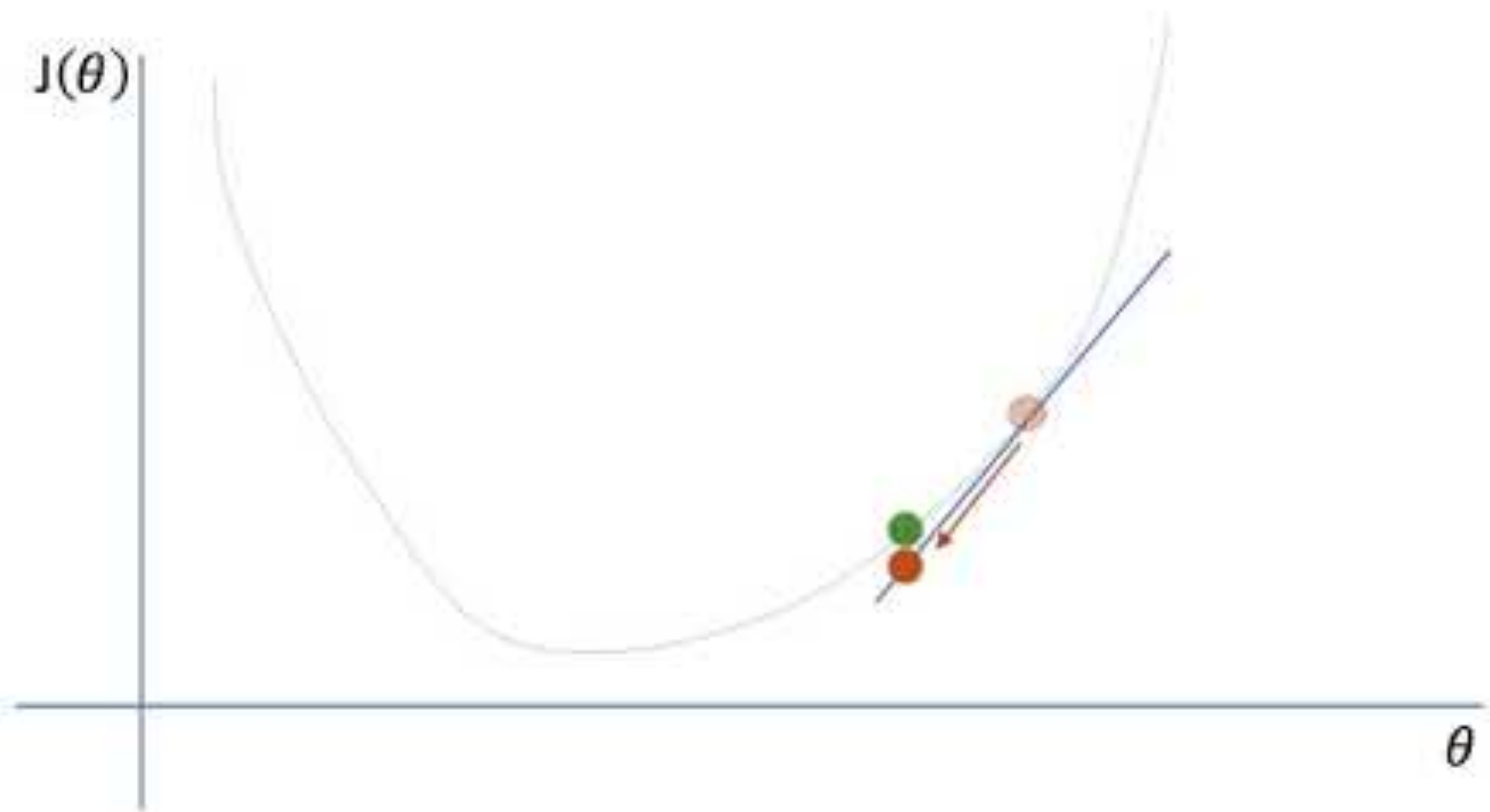
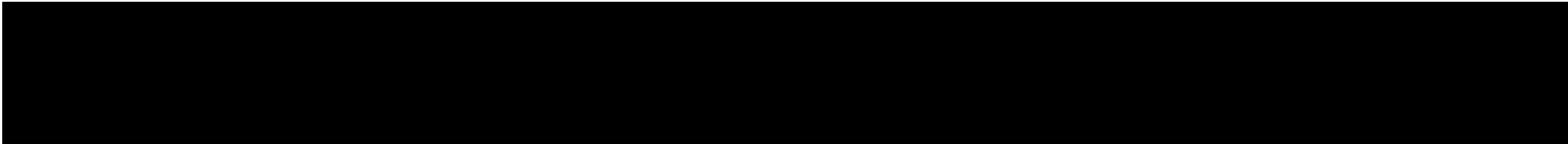
- guess values
- improve guess
- repeat until “close enough”



Iteration = 100, Loss = 0.00031277

Coefficient	Target	Predicted
Coefficient 0	-0.5	-0.38080
Coefficient 1	0.8	0.78087
Coefficient 2	0.2	0.12938
Coefficient 3	-0.7	-0.69594

As you can see, the learned polynomial starts out following the initial curve, and fairly quickly moves to minimize the error between it and the target polynomial. The green dots you see are reminding you that we're using a discrete set of points to perform these calculations (the number of which you can vary in the appendix).



The MNIST Challenge

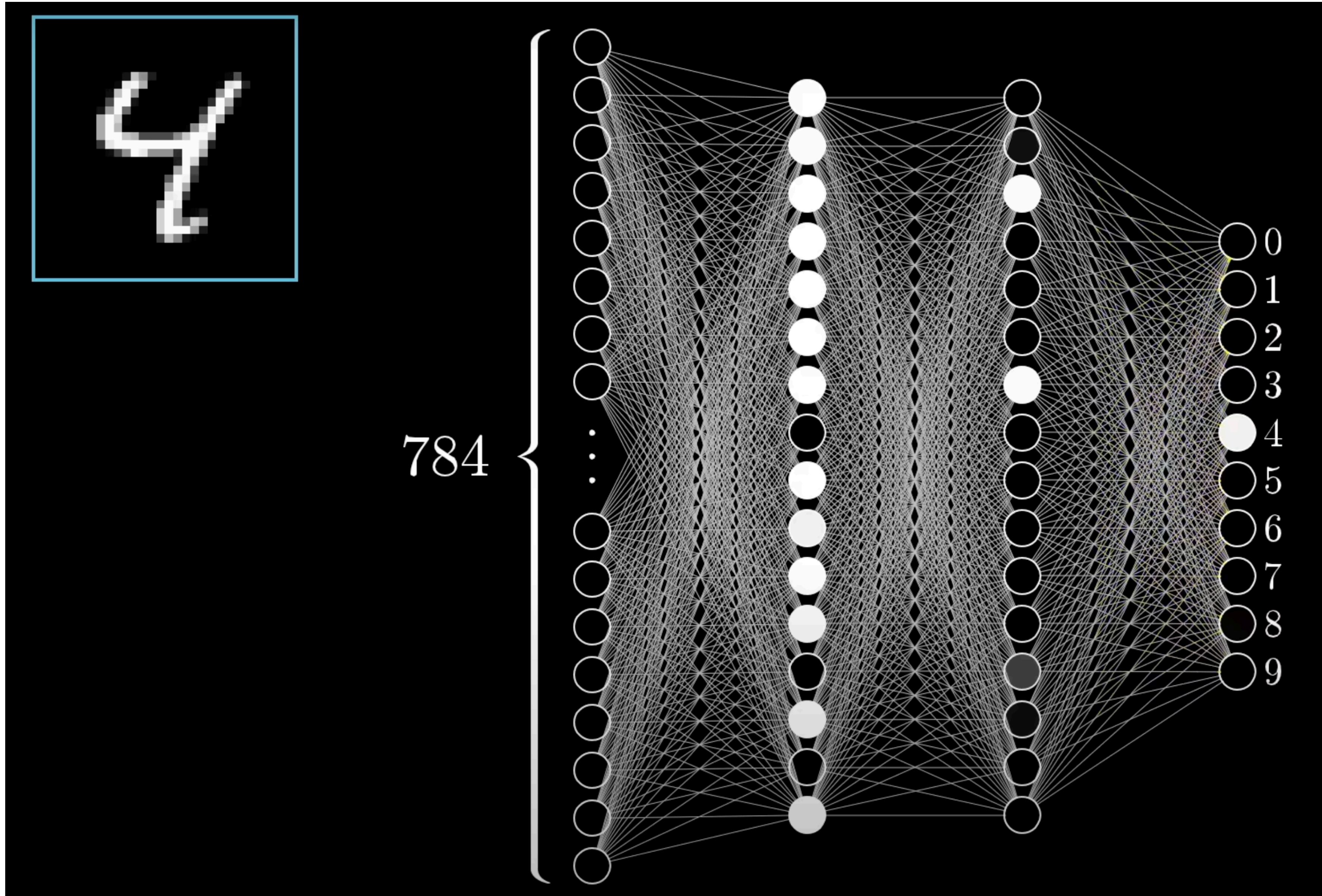
training digits and their labels

9	1	0	3	1	1	6	6	5	0	5	7	2	5	8	4	9	9	7	0	0	4	9	4
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

validation digits and their labels

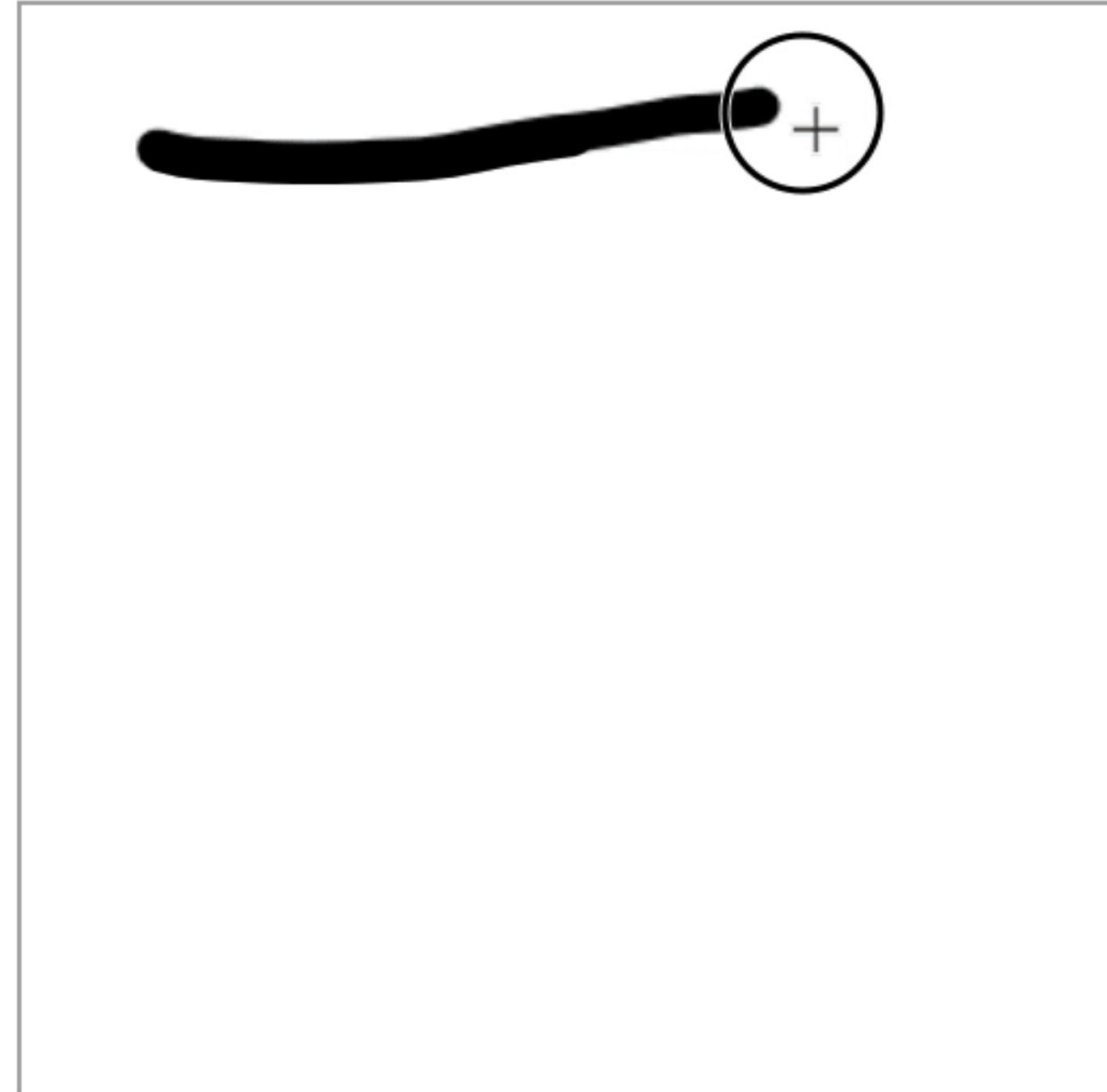
7	2	1	0	4	1	4	9	5	9	0	6	9	0	1	5	9	7	3	4	9	6	6	5
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

What's Happening



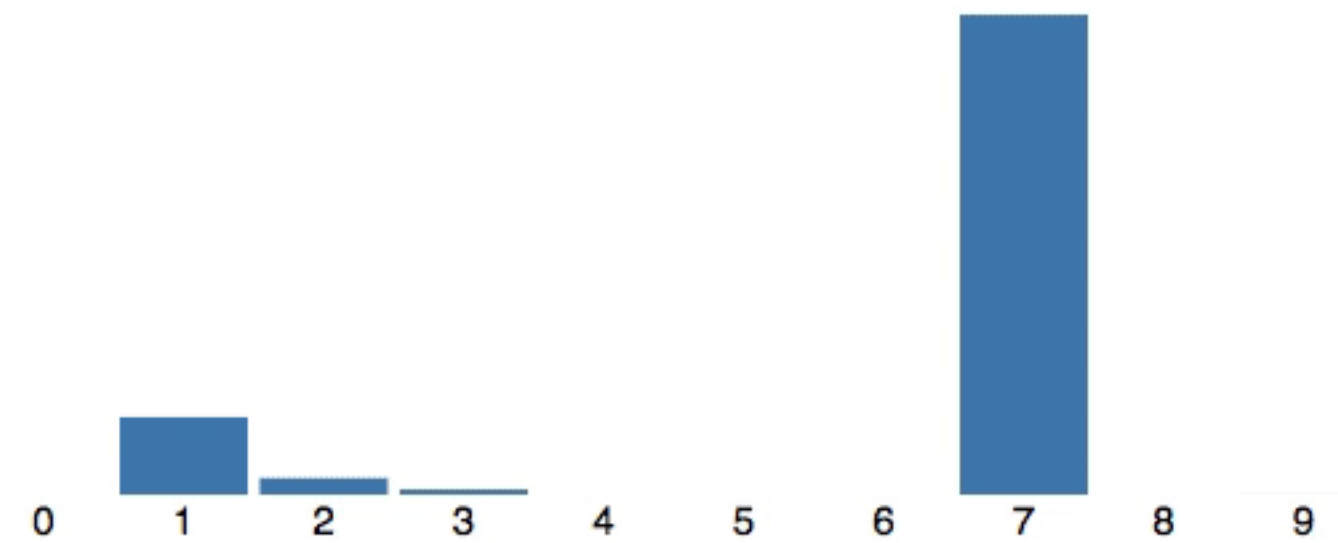
TensorFlow.js + MNIST

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.



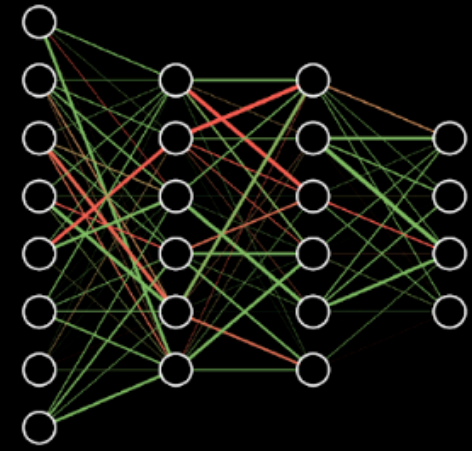
Draw a single digit (0-9) in the empty box.

Clear



Made with ❤️ by [Marc](#).

Neural Networks



Neural networks

3Blue1Brown · Course

7 videos · Updated today

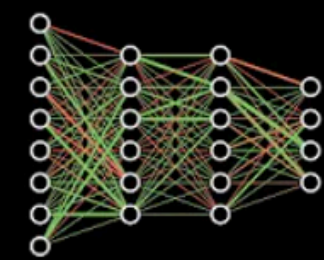


▶ Play

🗨️ Comments

Learn the basics of neural networks and backpropagation, one of the most important algorithms for the modern world.

Neural Networks



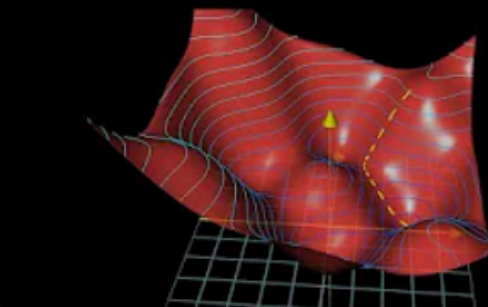
1 **From the ground up**
18:40

But what is a neural network? | Chapter 1, Deep learning

3Blue1Brown · 17M views · 7 years ago



How machines learn



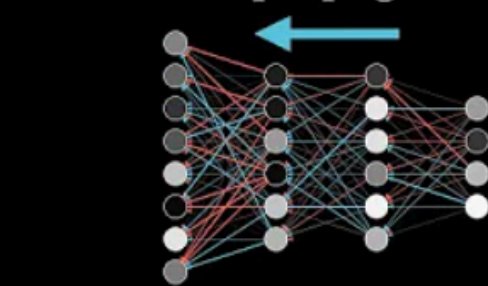
20:33

Gradient descent, how neural networks learn | Chapter 2, Deep learning

3Blue1Brown · 7.1M views · 7 years ago



Backpropagation



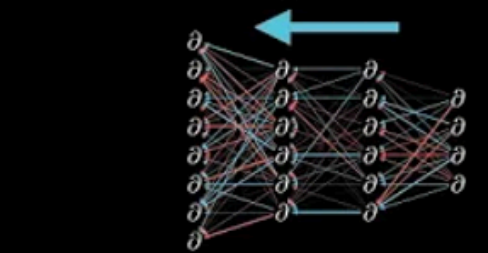
12:47

What is backpropagation really doing? | Chapter 3, Deep learning

3Blue1Brown · 4.6M views · 6 years ago



Backpropagation calculus



10:18

Backpropagation calculus | Chapter 4, Deep learning

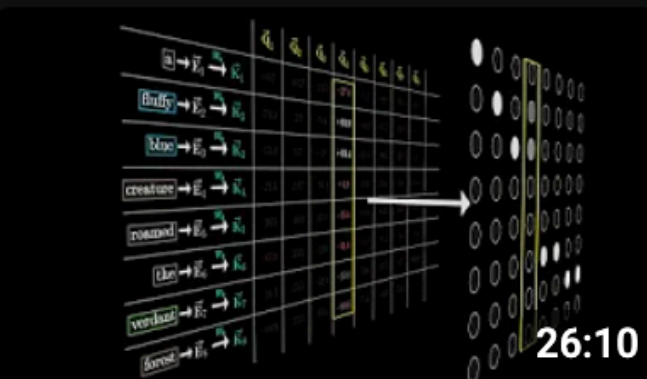
3Blue1Brown · 2.9M views · 6 years ago



27:14

How large language models work, a visual intro to transformers | Chapter 5, Deep Learning

3Blue1Brown · 3.3M views · 6 months ago



26:10

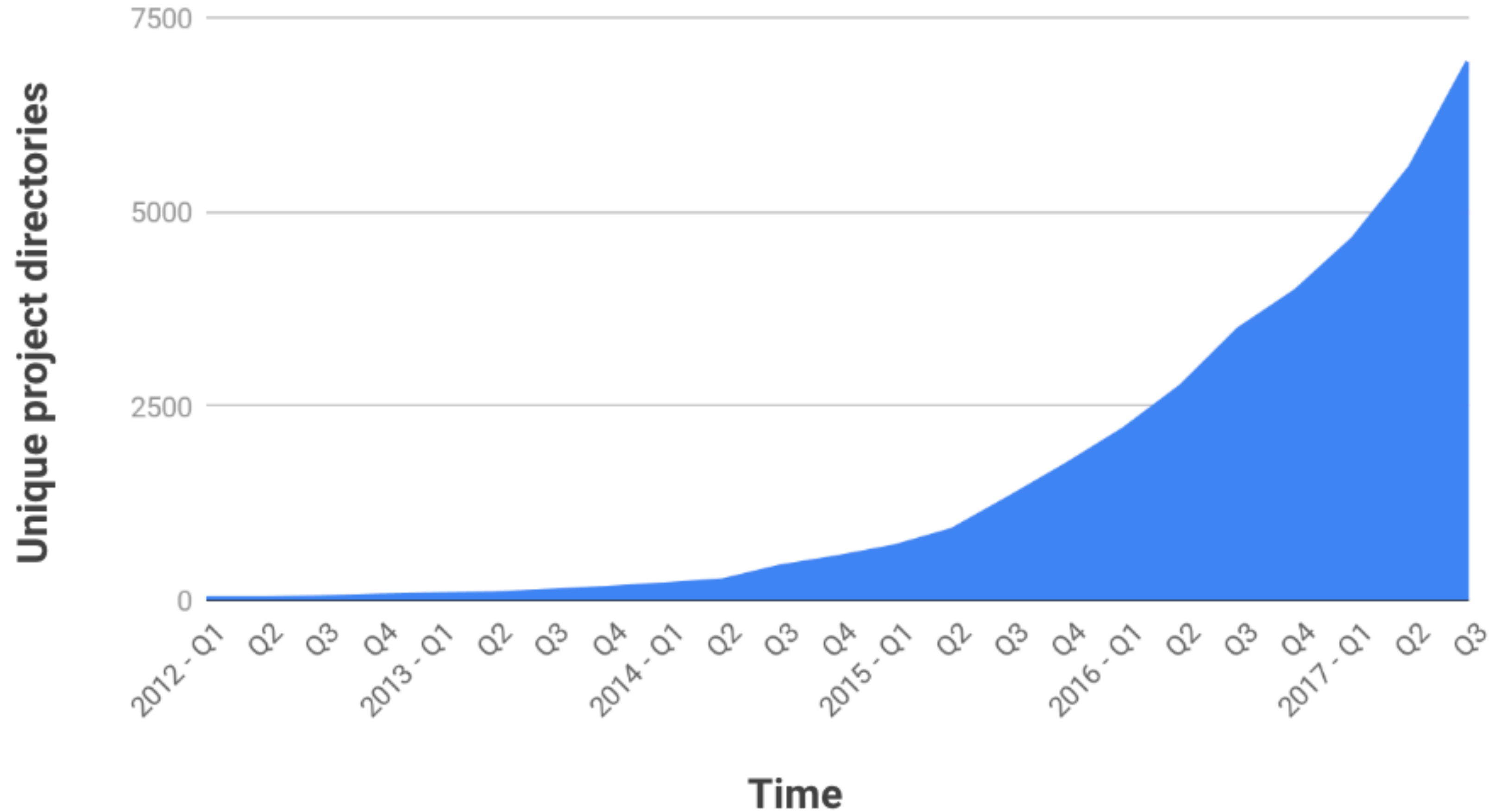
Attention in transformers, visually explained | Chapter 6, Deep Learning

3Blue1Brown · 1.7M views · 6 months ago

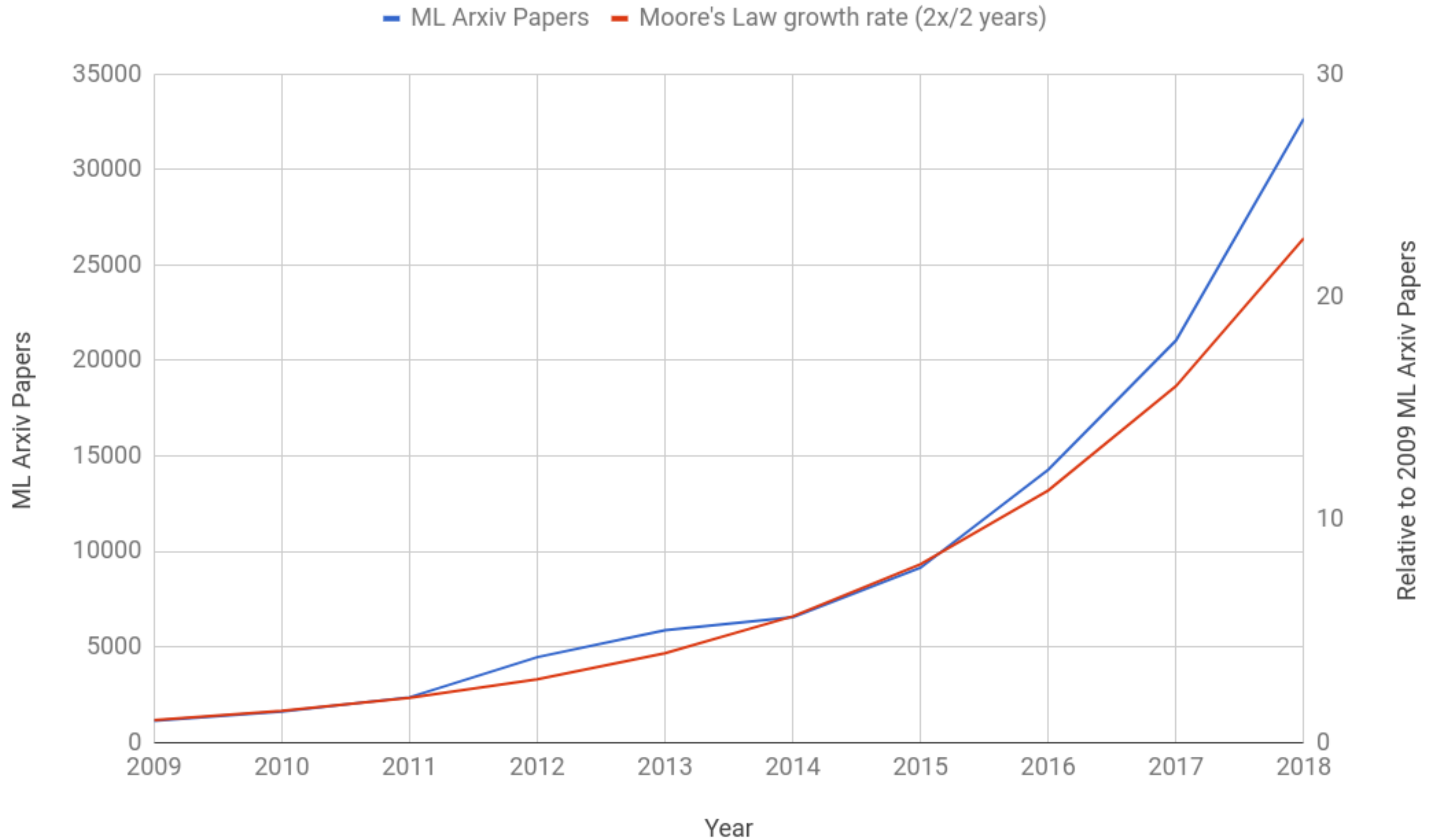


Use of Deep Learning at Google

source directories containing deep learning models



Industry Adoption

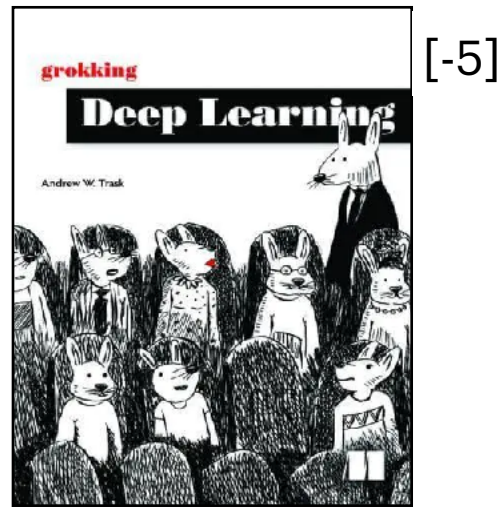


Embeddings

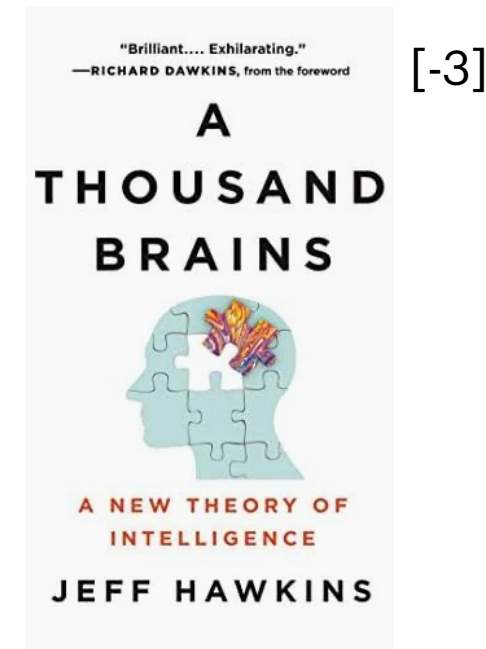
(The secret sauce of deep learning)

Recommending AI Books

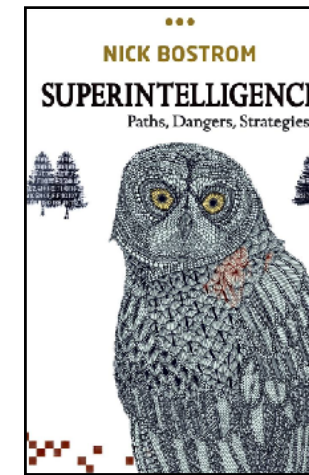
Beginner



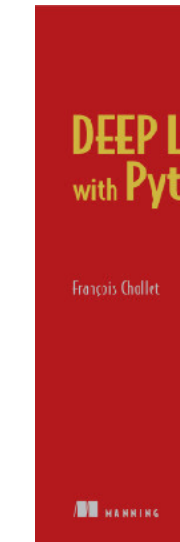
[-5]



[-3]

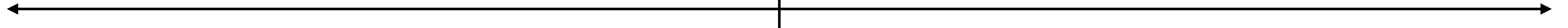


[2]

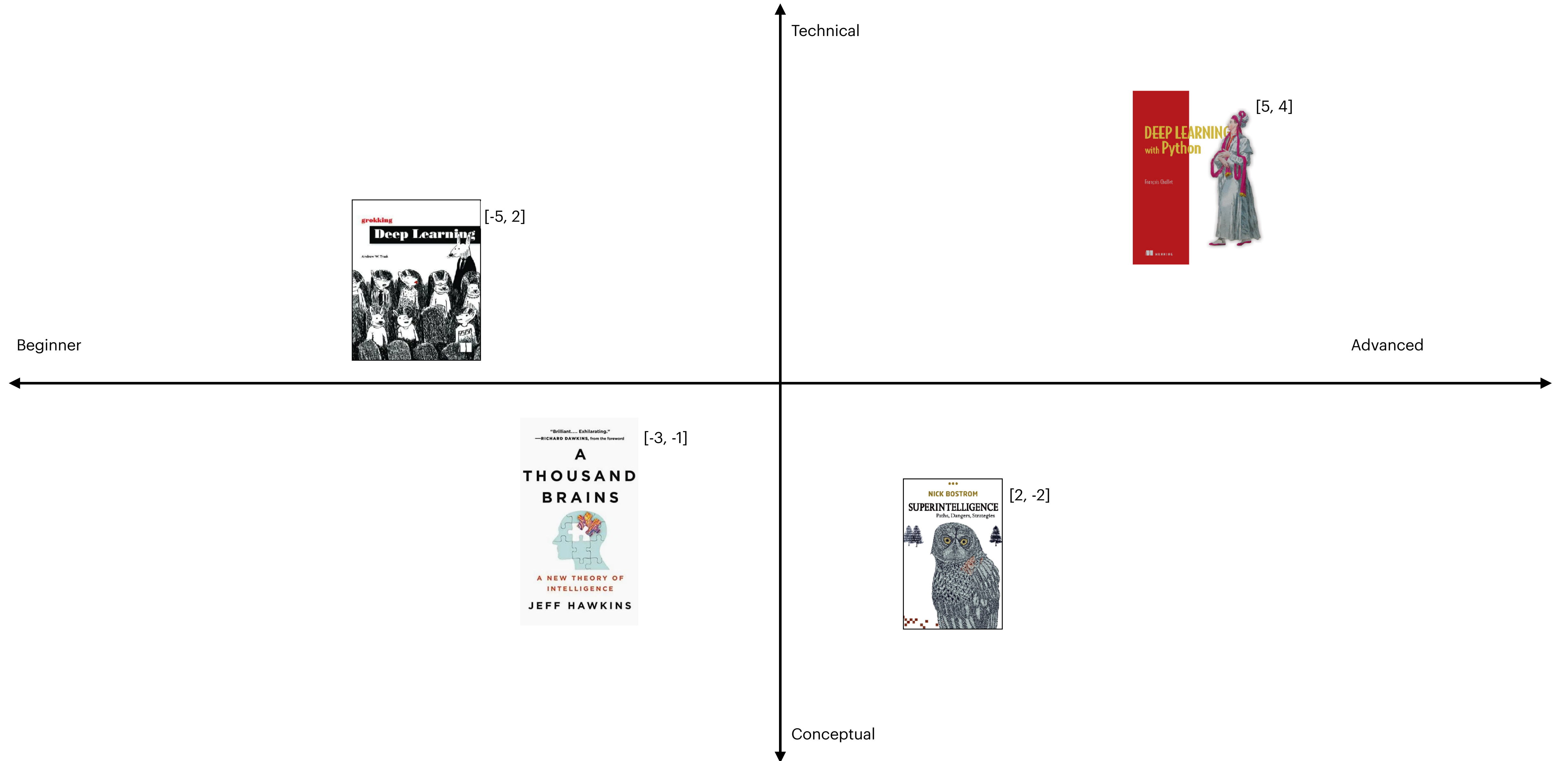


[5]

Advanced



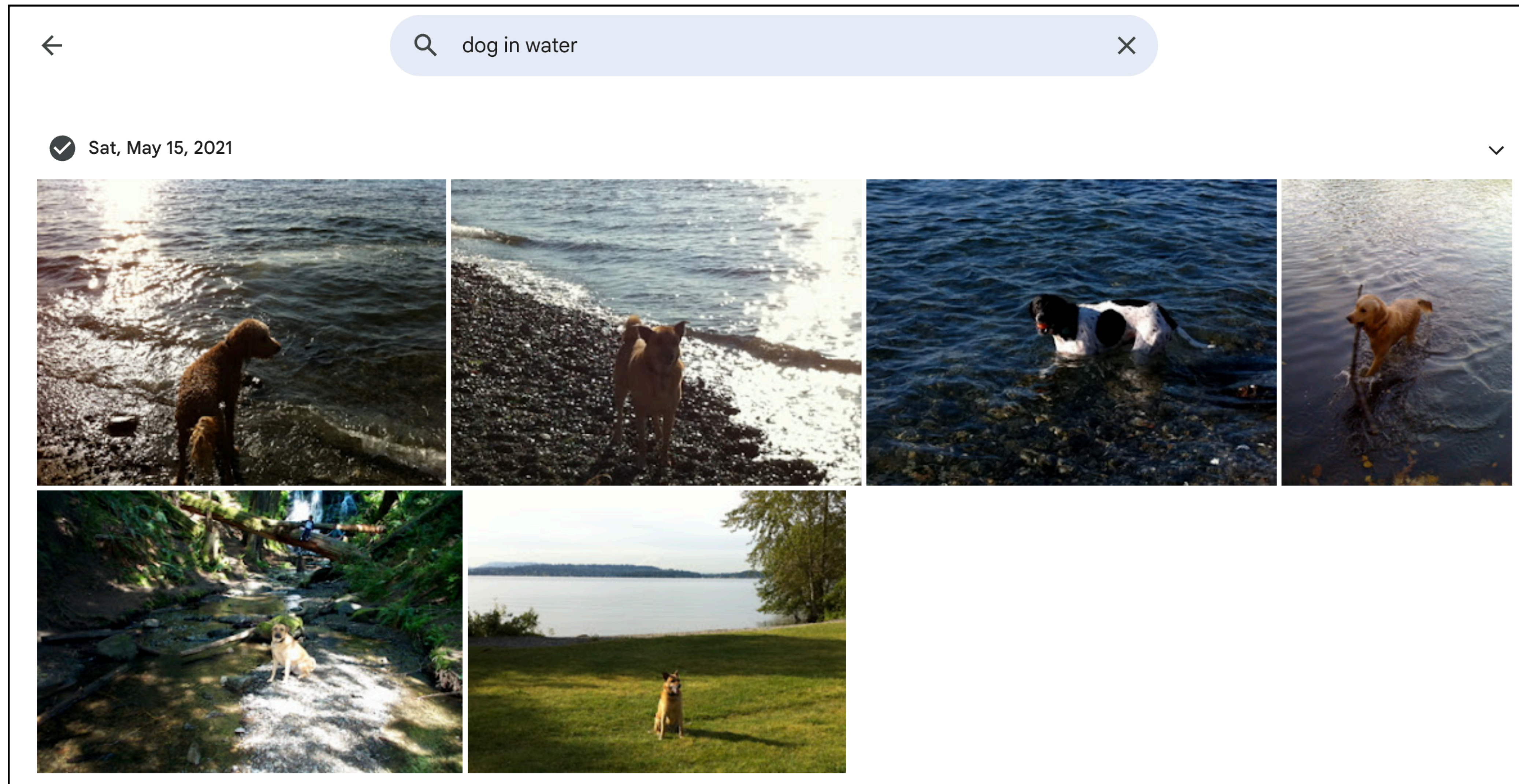
Better: 2-D Coordinate System



Even better: use N-dimensions

- **Neural networks choose the dimensions for us.**
- **Based on the labelled training data (think “cat” vs. “dog”), neural networks are able to “embed” objects (words, images, video, audio) into N-dimensional space.**
- **We can represent embeddings as vectors:**
 - **[a0, a1, a2, ..., aN]**
- **Similar objects get embedded in similar locations,**
- **This gives us the ability to do *semantic search*, i.e., find things that have similar meaning.**

Embeddings In Action



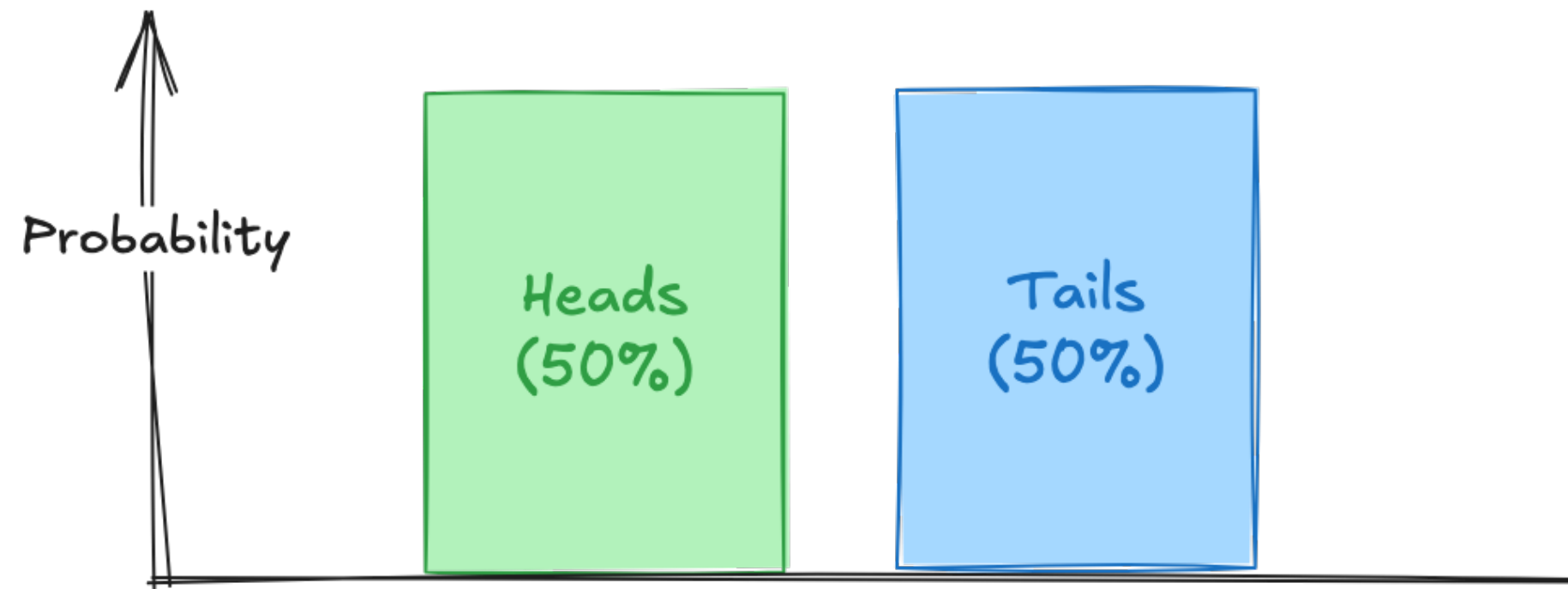
AI

An Intuitive Guide to How LLMs Work

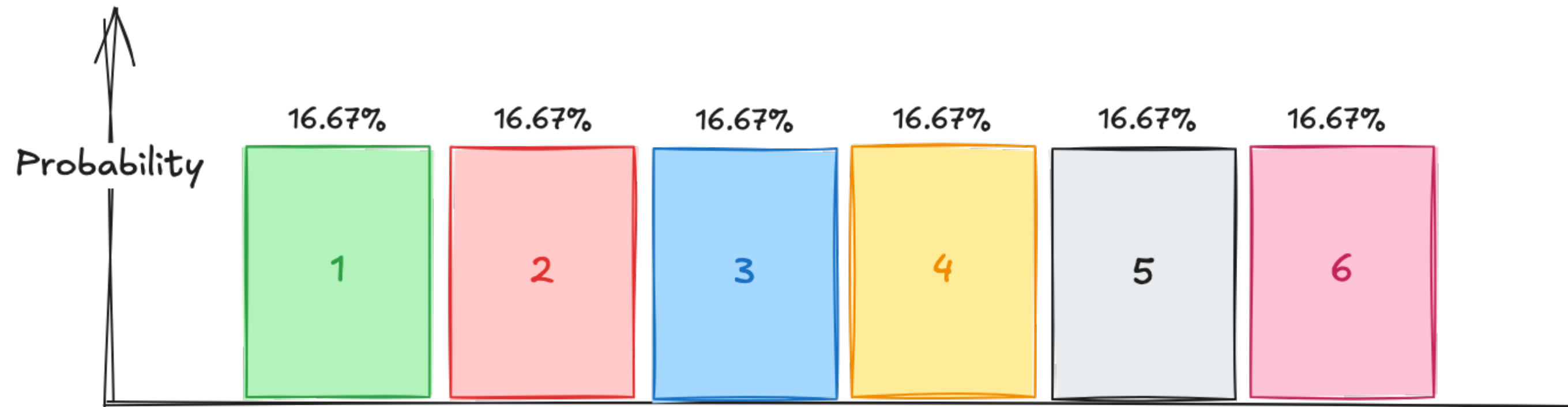
Chatting by chance

OCTOBER 6, 2024

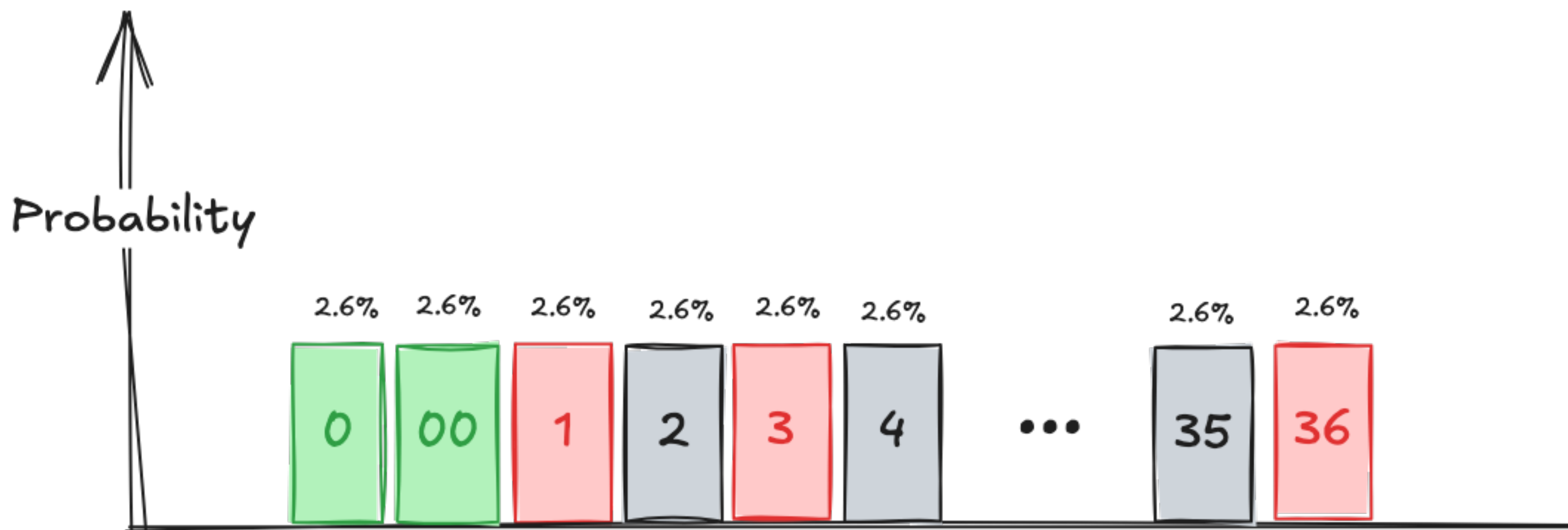




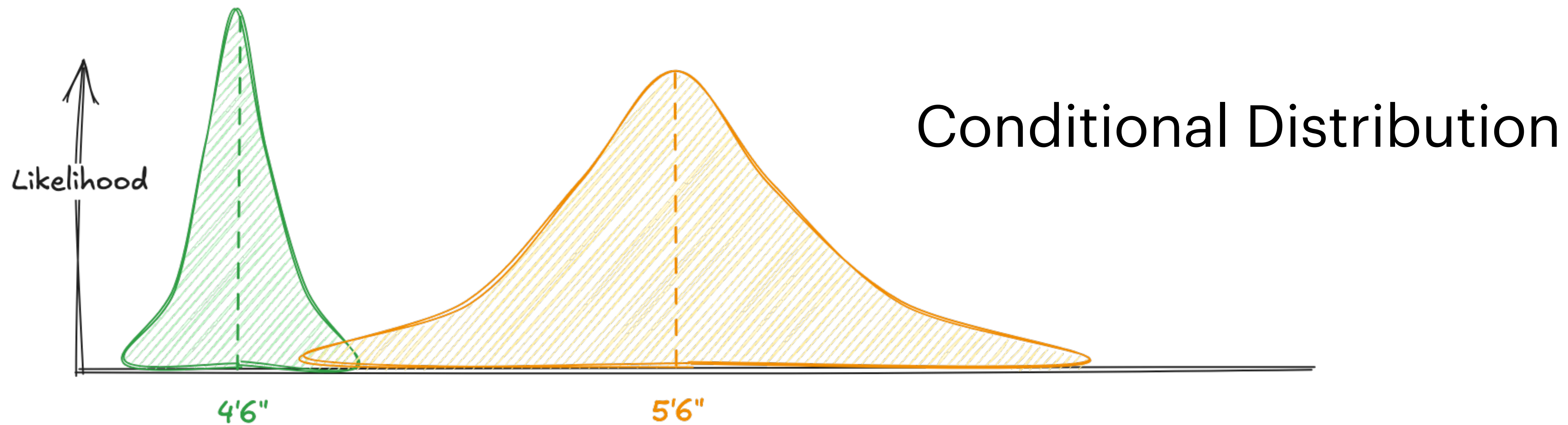
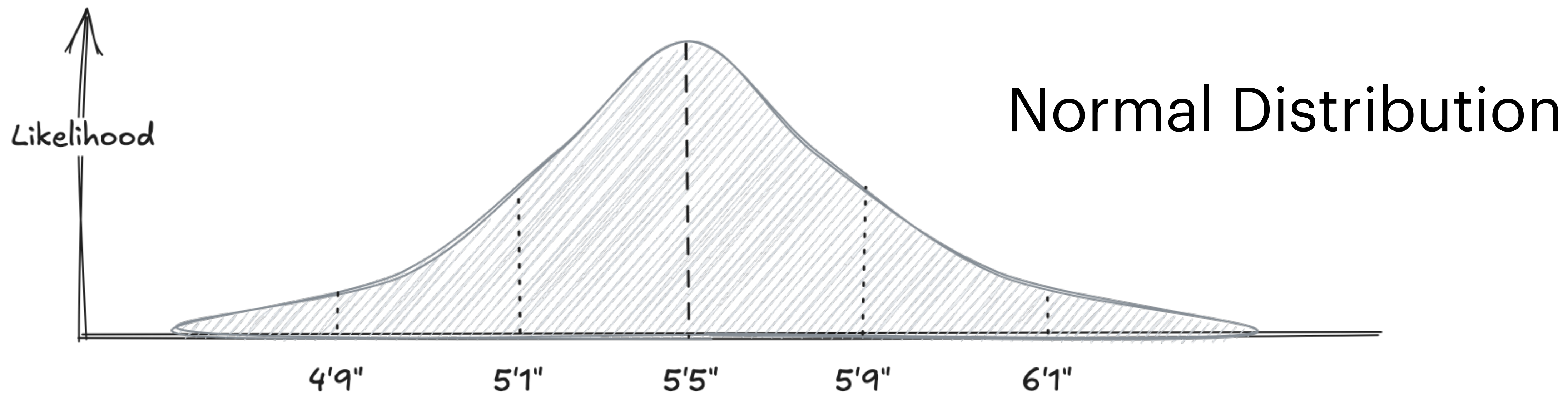
Coin Flip

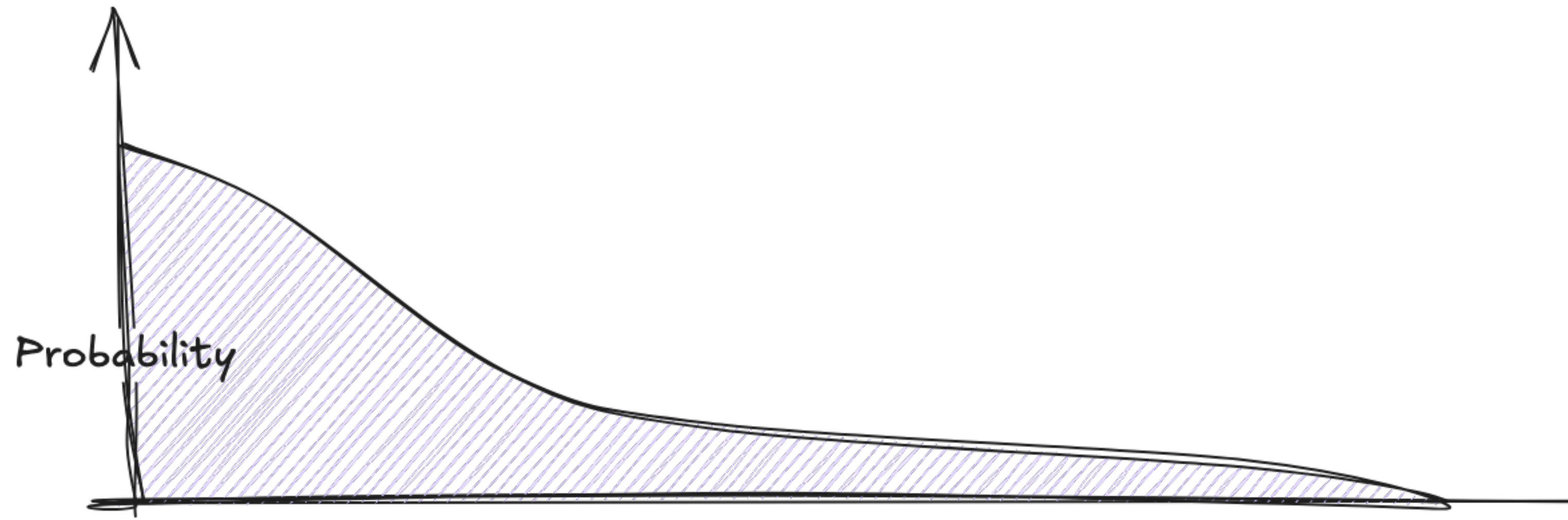


Die



Roulette Wheel





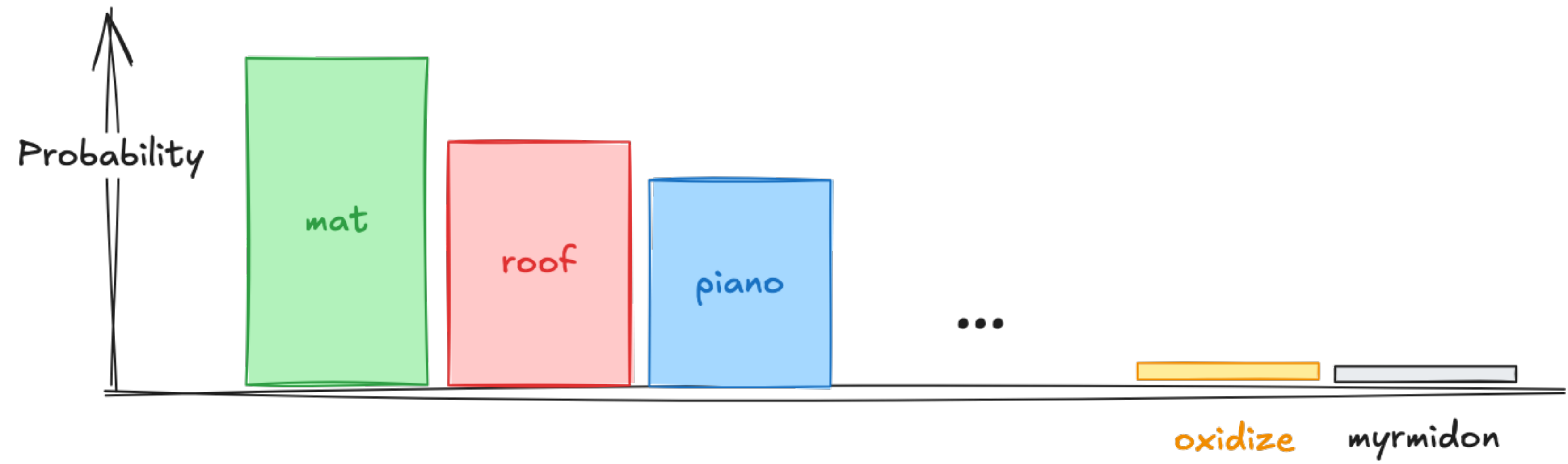
is
the
a

street
yellow
climb

oxidize
fissure
catalyst

peripatetic
verisimilitude
myrmidon

The cat sat on the _____



“I.”

“WANT.”

“HAIR!”

(IMPROVISERS / GET PERSONAL)



Diffusion Models

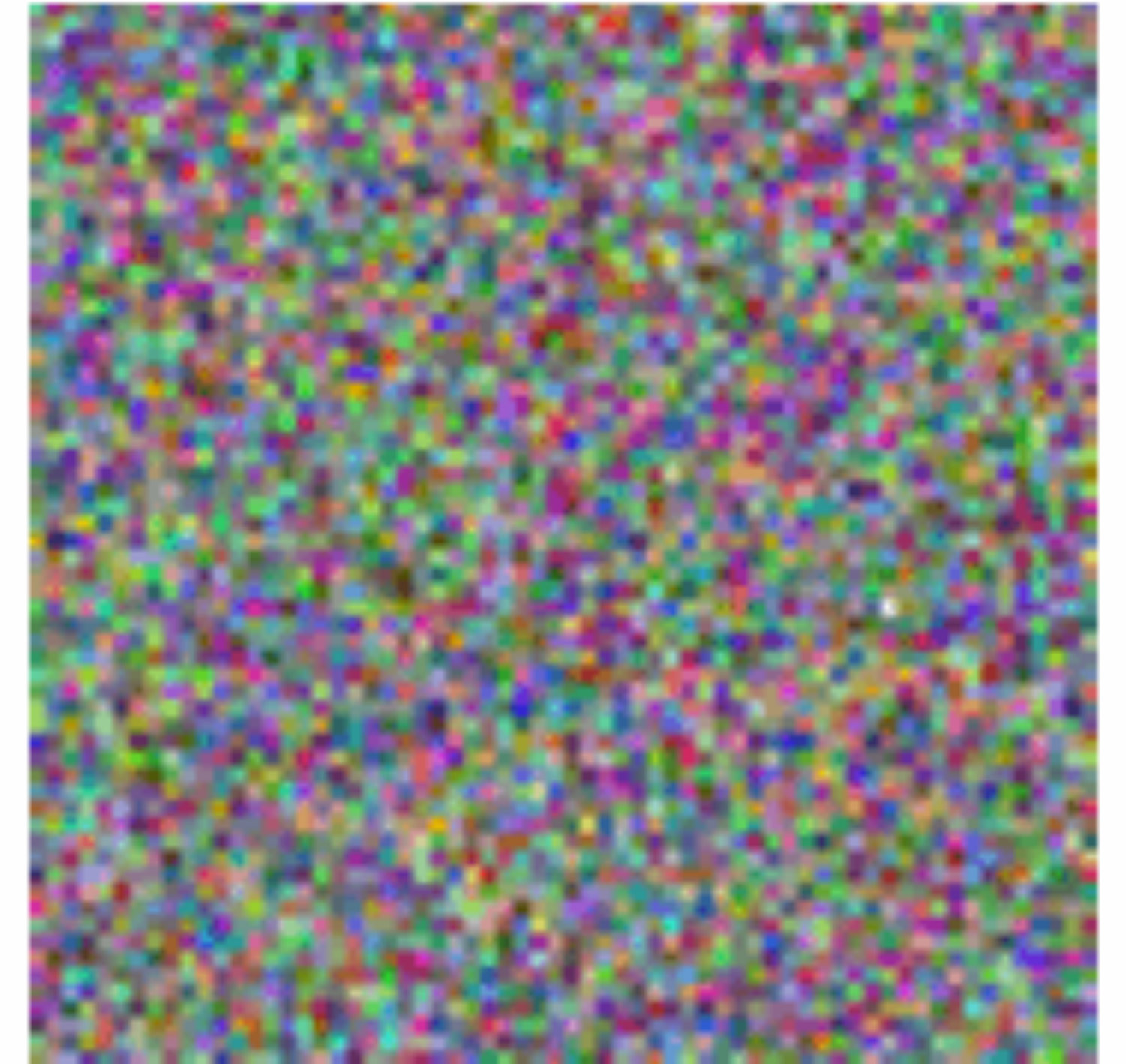
image



Forward diffusion
noisy image



noise



Diffusion Models



MJ

What will you imagine?



Search



berada.travel 15h



A child is playing with a baby koala really tiny, they both seem to be friends. The photo should look real and not a cartoon.

ar 9:16

v 6.1

Use

Image

Style

Prompt



Imagine 3m



Show how diffusion models take a random noisy image and iteratively convert them into a clear image guided by a text prompt

v 6.1

Creation Actions

More options

Vary

Subtle

Strong

Upscale

Subtle

Creative

More

Rerun

Editor

Use

Image

Style

Prompt

State of the Art

AlphaFold Protein Structure Database

Developed by Google DeepMind and EMBL-EBI

Search for protein, gene, UniProt accession or organism or sequence search

BETA

Search

Examples: [MENFQKVEKIGEGTYGV...](#) [Free fatty acid receptor 2](#) [At1g58602](#) [Q5VSL9](#) [E. coli](#)

[See search help](#) →

[Go to online course](#) →

[See our updates – September 2024](#)

Congratulations to Demis Hassabis, John Jumper and David Baker on winning the 2024 Nobel Prize in Chemistry!



AlphaFold DB provides open access to over 200 million protein structure predictions to accelerate scientific research.

Text to Text - ChatGPT


What can I help with?

 Message ChatGPT



 Create image

 Summarize text

 Brainstorm

 Code

 Make a plan

More

Does that look familiar?

The Google logo is centered on the page. It consists of the word "Google" in its signature multi-colored font: a blue 'G', a red 'o', a yellow 'o', a blue 'g', a green 'l', and a red 'e'.A search bar with rounded ends. On the left side, there is a magnifying glass icon and a vertical line. On the right side, there are two icons: a microphone and a camera.

Google Search

I'm Feeling Lucky

Generating Software

I want to build a live demo of a Turing test where I start two parallel chat dialogs with a human and with ChatGPT. The human should be able to participate from their own laptop in another location. The two dialogs should be displayed in parallel but it should not be obvious which is talking to the human and which is talking to ChatGPT. Can you write that app for me?



Building a live demo of a Turing test with two parallel chat dialogs (one with a human and one with ChatGPT) requires a real-time chat application with a user-friendly interface. Below is an outline of how you could create this app, along with some code samples to help you get started.

Tech Stack:

- **Backend:** Node.js with Express (for real-time communication)
- **Frontend:** HTML/CSS/JavaScript (for chat interface)
- **WebSocket:** Socket.IO (to handle real-time messaging between the server, the human participant, and the client performing the test)
- **AI Model:** ChatGPT API (via OpenAI API)
- **Database (optional):** You could use MongoDB or Firebase for logging the chat conversations, but this is optional.


```
~/p/turing$ ls -l
total 72
-rw-r--r--@ 1 mco  staff 11357  Oct 15 14:00 LICENSE
-rw-r--r--@ 1 mco  staff   71  Oct 15 14:00 README.md
-rw-r--r--@ 1 mco  staff 2405  Oct 15 14:12 app.py
-rw-r--r--@ 1 mco  staff 1286  Oct 15 14:13 human.html
-rw-r--r--@ 1 mco  staff 1928  Oct 15 14:13 index.html
-rw-r--r--@ 1 mco  staff  14  Oct 15 14:12 run.sh
-rwxr-xr-x@ 1 mco  staff  42  Oct 15 14:11 setup.sh
```

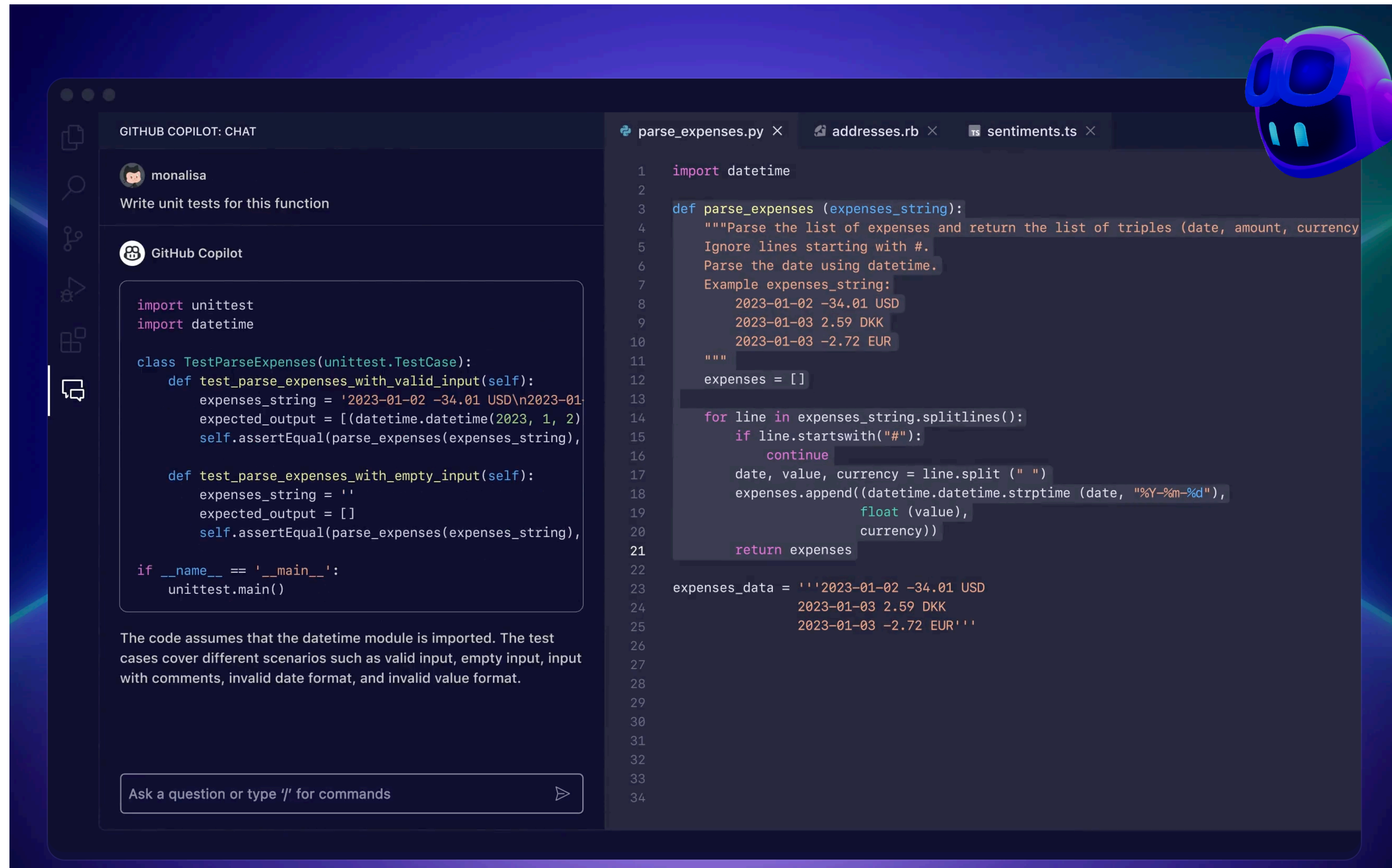
```
~/p/turing$
```

```
~/p/turing$ wc -l *
```

```
201 LICENSE
  2 README.md
 73 app.py
 55 human.html
 74 index.html
  1 run.sh
  1 setup.sh
407 total
```

```
~/p/turing$
```


How the pros do it



The image shows a screenshot of the GitHub Copilot interface. On the left, a chat window titled "GITHUB COPILOT: CHAT" shows a conversation with a user named "monalisa" who asks to "Write unit tests for this function". GitHub Copilot responds with a Python code snippet for unit testing. Below the code, a note explains that the code assumes the datetime module is imported and covers various input scenarios. At the bottom of the chat is a text input field with a send button.

On the right, a code editor shows the implementation of the `parse_expenses` function in `parse_expenses.py`. The function takes an `expenses_string` and returns a list of triples (date, amount, currency). It handles comments, date parsing, and value parsing. The test data is provided as a string variable `expenses_data`.

```
import unittest
import datetime

class TestParseExpenses(unittest.TestCase):
    def test_parse_expenses_with_valid_input(self):
        expenses_string = '2023-01-02 -34.01 USD\n2023-01-03 2.59 DKK\n2023-01-03 -2.72 EUR'
        expected_output = [(datetime.datetime(2023, 1, 2), -34.01, 'USD'), (datetime.datetime(2023, 1, 3), 2.59, 'DKK'), (datetime.datetime(2023, 1, 3), -2.72, 'EUR')]
        self.assertEqual(parse_expenses(expenses_string), expected_output)

    def test_parse_expenses_with_empty_input(self):
        expenses_string = ''
        expected_output = []
        self.assertEqual(parse_expenses(expenses_string), expected_output)

if __name__ == '__main__':
    unittest.main()
```

```
1 import datetime
2
3 def parse_expenses (expenses_string):
4     """Parse the list of expenses and return the list of triples (date, amount, currency)
5     Ignore lines starting with #.
6     Parse the date using datetime.
7     Example expenses_string:
8         2023-01-02 -34.01 USD
9         2023-01-03 2.59 DKK
10        2023-01-03 -2.72 EUR
11    """
12    expenses = []
13
14    for line in expenses_string.splitlines():
15        if line.startswith("#"):
16            continue
17        date, value, currency = line.split(" ")
18        expenses.append((datetime.datetime.strptime (date, "%Y-%m-%d"),
19                        float (value),
20                        currency))
21    return expenses
22
23 expenses_data = '''2023-01-02 -34.01 USD
24                  2023-01-03 2.59 DKK
25                  2023-01-03 -2.72 EUR'''
26
27
28
29
30
31
32
33
34
```


Turing Test Demo



Study finds ChatGPT's latest bot behaves like humans, only better


iStock/BlackJack3D

The most recent version of ChatGPT passes a rigorous Turing test, diverging from average human behavior chiefly to be more cooperative.

FEBRUARY 22, 2024

Text to Image - Midjourney

Midjourney

What will you imagine? 

[Explore](#)

[Create](#)

[Organize](#)

[Personalize New!](#)

[Chat](#)

- General Chaos
- Prompt Craft
- Daily Theme
- Newbies


[Tasks](#)

[Help](#)

[Updates](#)

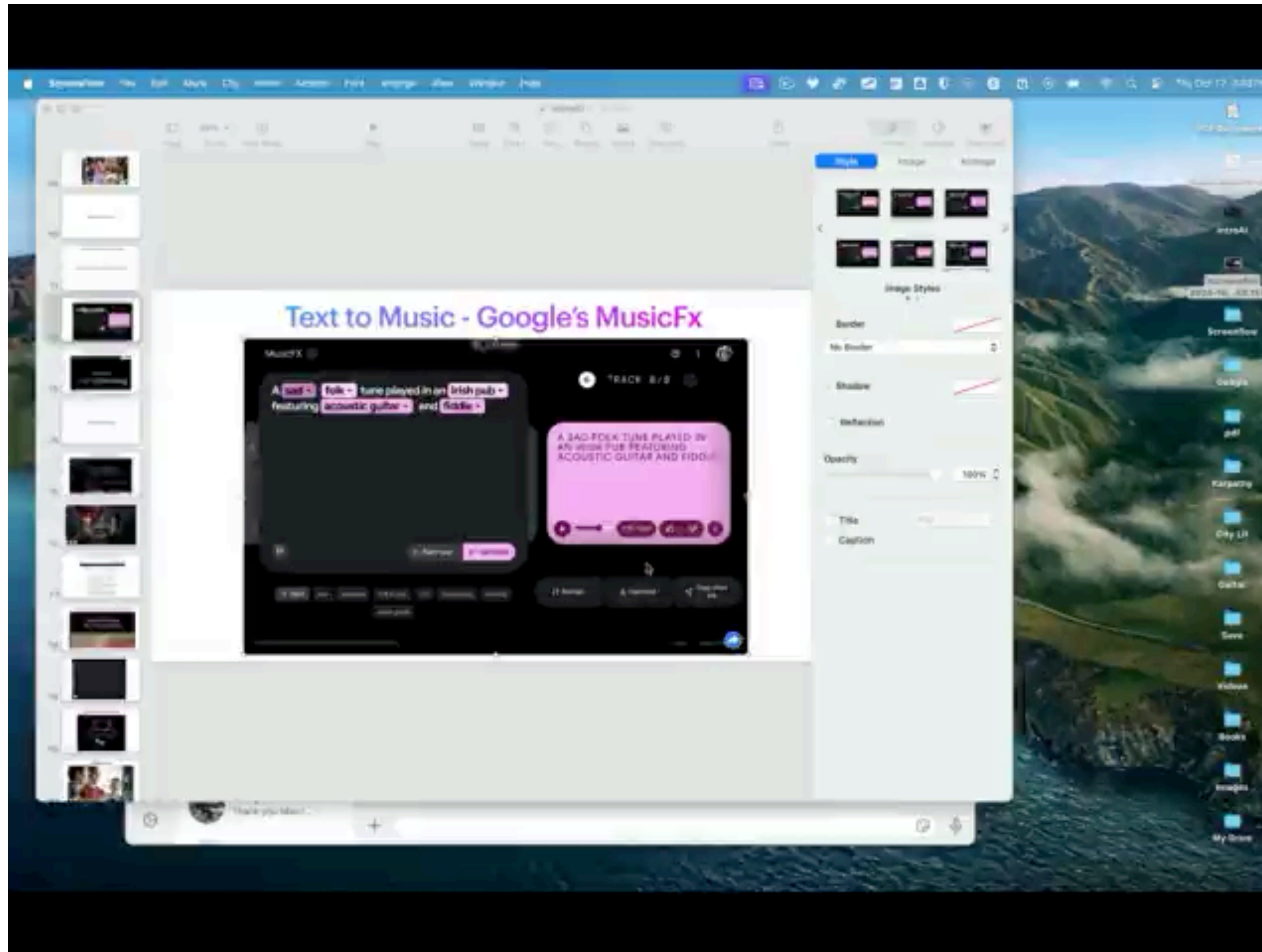
[Light Mode](#)

Random Hot Top Day ∨ Likes



Text to Speech - ElevenLabs

Text to Music - Google's MusicFx



Text to Audio - NotebookLM

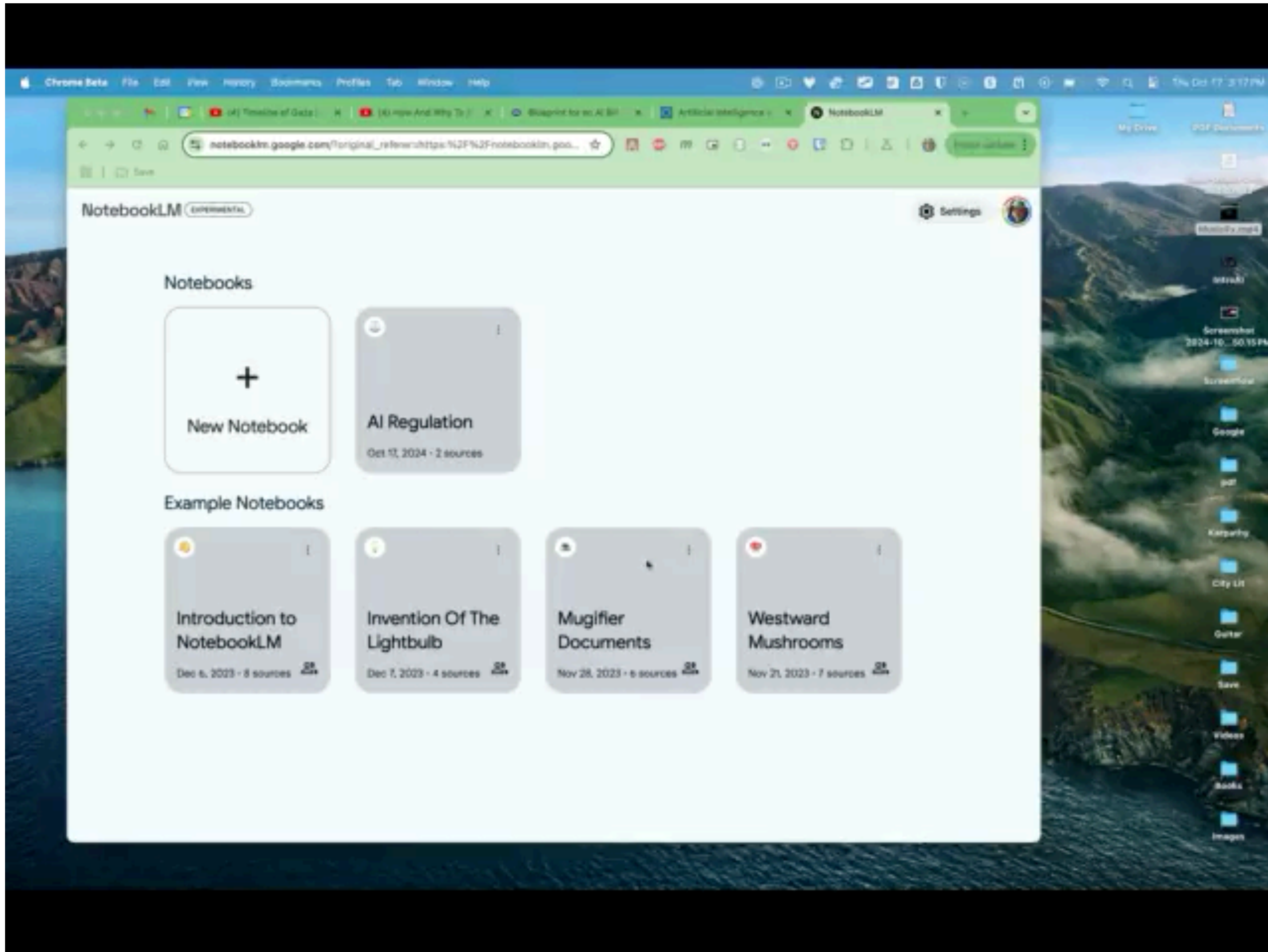
NotebookLM EXPERIMENT

Try NotebookLM

Do your best

brainstorming

NotebookLM is your personalized AI research assistant powered by Google's most capable model, Gemini 1.5 Pro.



Text to Video - Runway

“Make the kid in this photo come alive and dance a little dance”



A woman wearing a headset is working at a computer workstation in a server room. The room is dimly lit with blue and green lights from the server racks. The woman is looking at the monitor and has her hands on the keyboard. The background shows other server racks and a person in the distance.

SILVER
AI FILM
FESTIVAL
2024



Video to Text - Gemini

Gemini ▾

Try Gemini Advanced



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



summarize this video: 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.

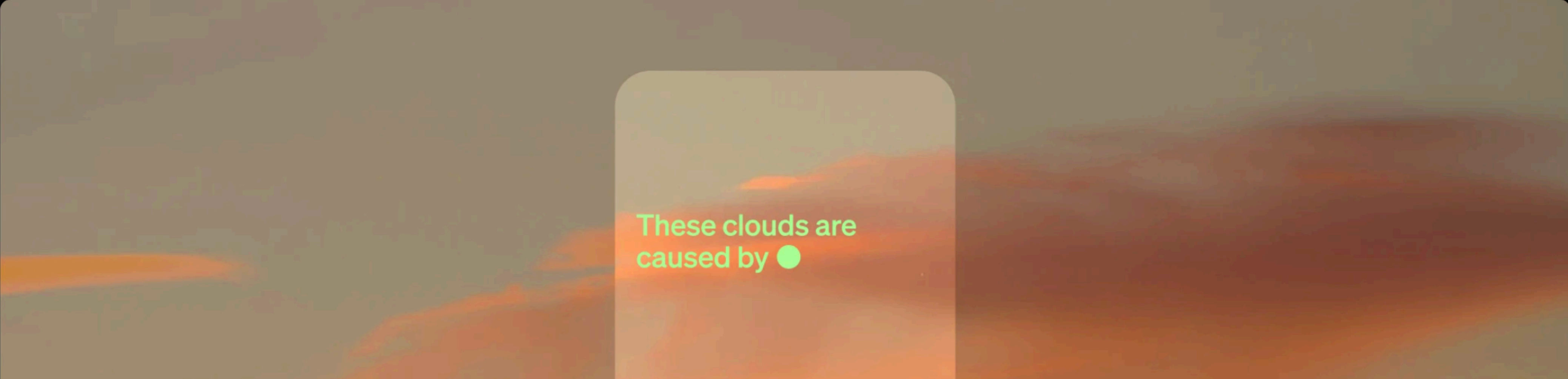
The AI Bill of Rights has five core principles: safe and effective systems, prevention of algorithmic discrimination, data privacy, proper notice and explanation, and alternative options. Rivera believes that the bill is a good start but that it needs to be implemented carefully. He also warns that AI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

by

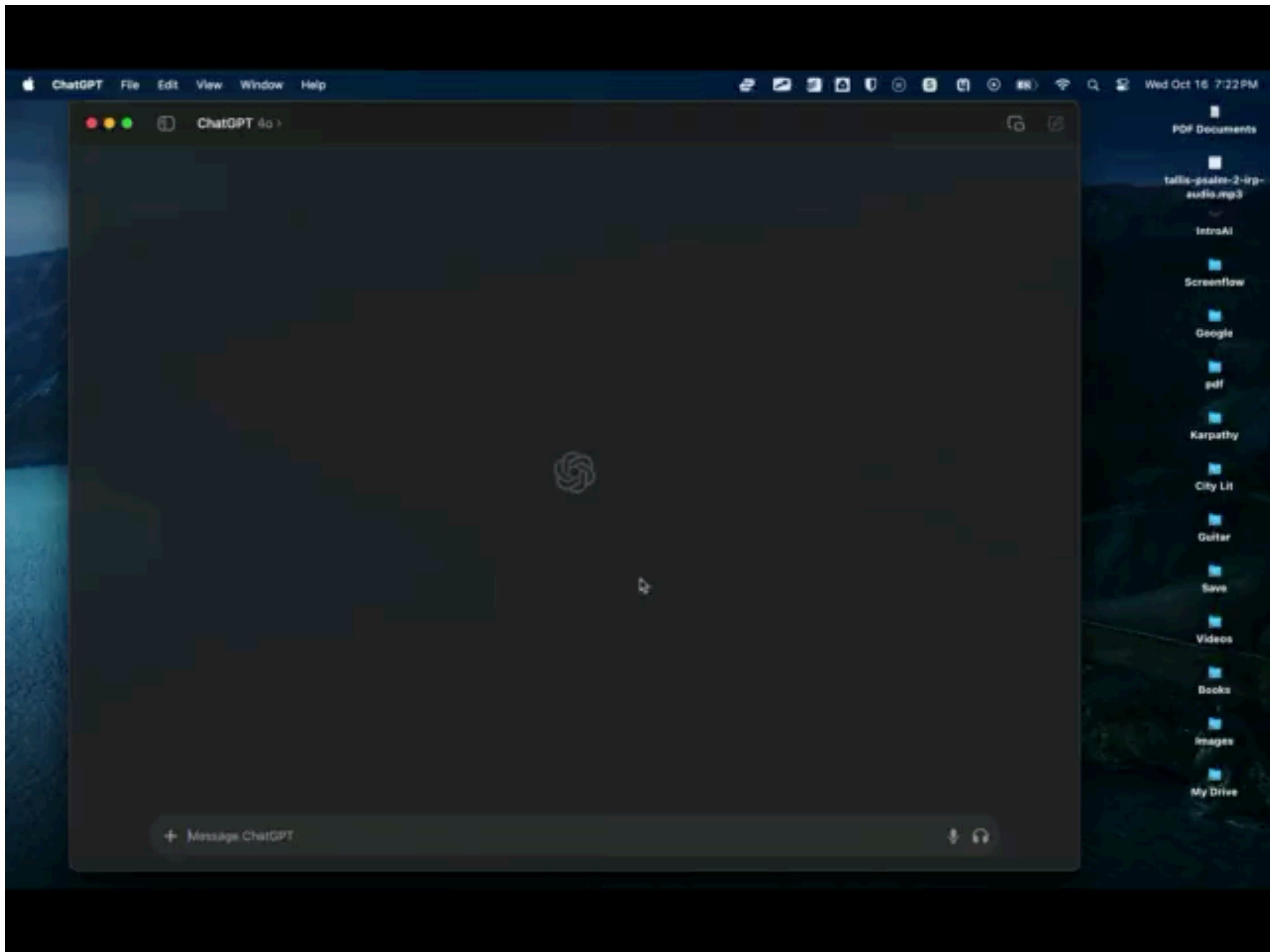
The Dream: Multimedia to Multimodal

September 25, 2023

ChatGPT can now
see, hear, and speak



These clouds are
caused by ●



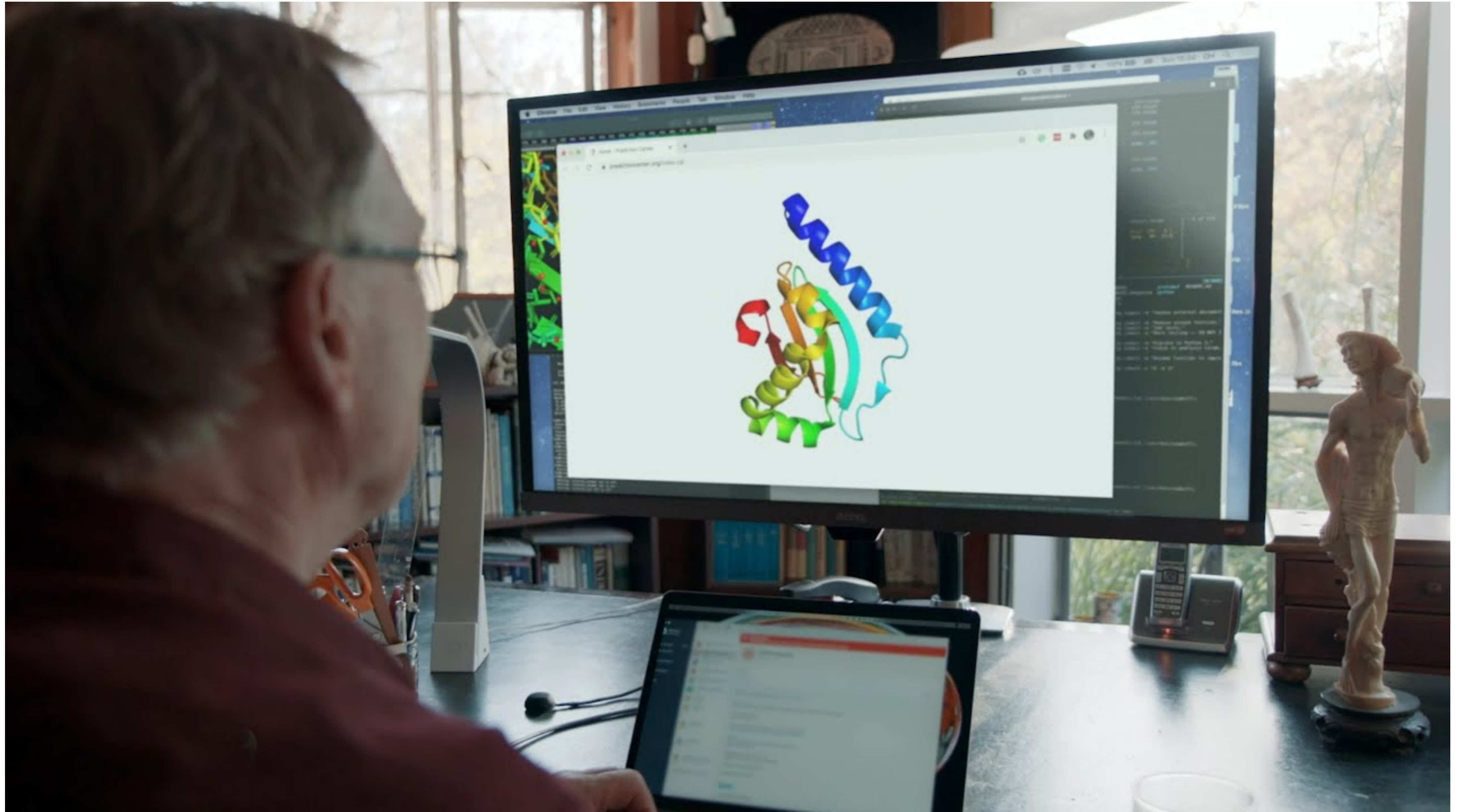
AlphaGo



AlphaZero



AlphaFold



AlphaFold is Open Source

<https://github.com/google-deepmind/alphafold>

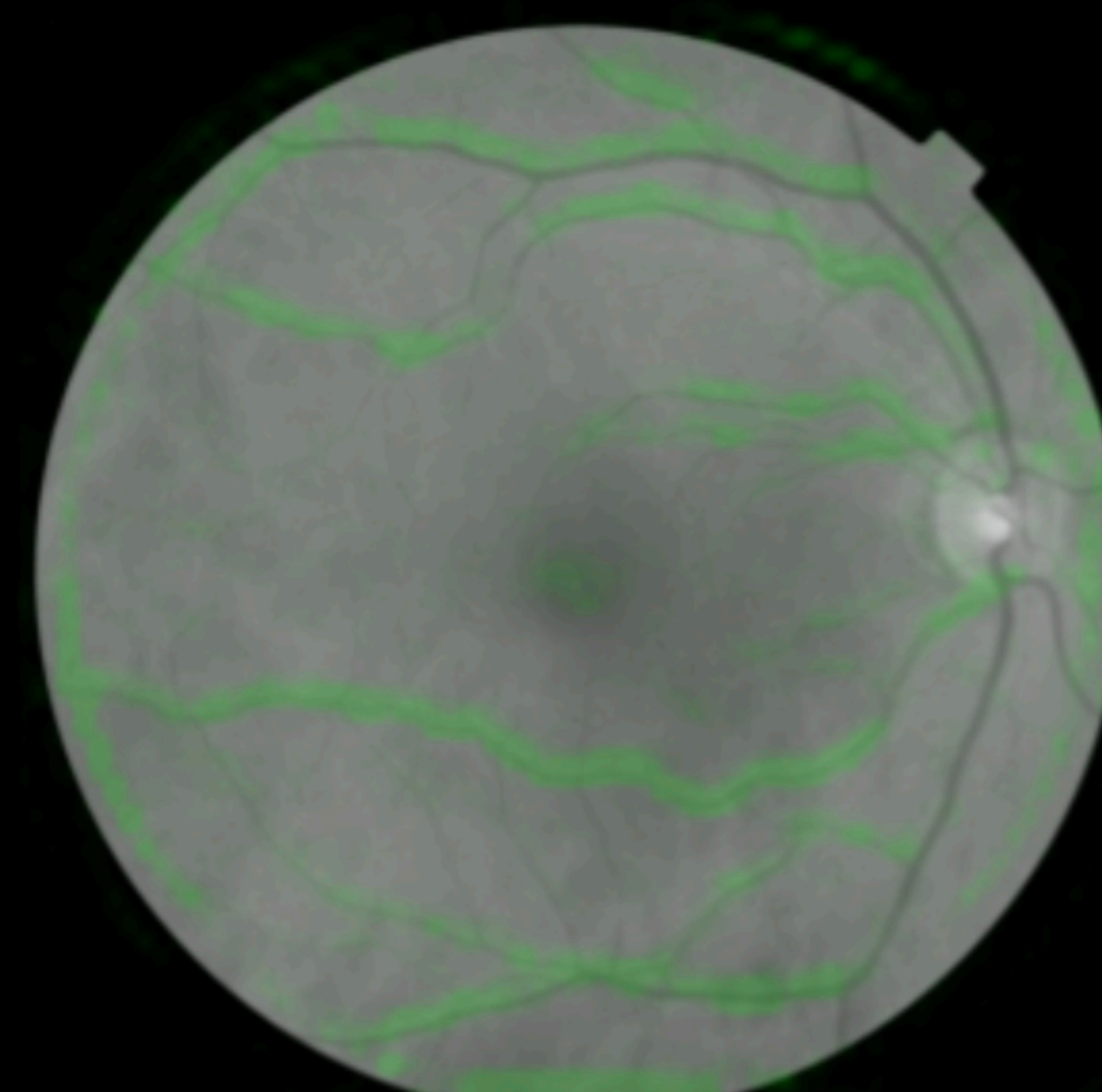
AI Advances in Medicine

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

Unexpected Discoveries



Image of retina



Blood pressure predictions
focus on blood vessels



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



Home



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users.cg.tuwien.ac.at/zsolnai and 3 more links

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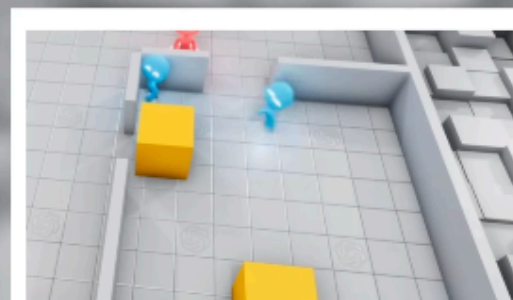
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Playlists

Posts



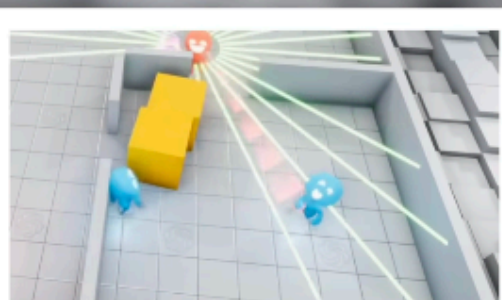
This paper was written by Bowen Baker, Ingmar Kanitscheider, Todor Markov, Yi Wu, Glenn Powell, Bob McGrew and Igor Mordatch, who all contributed significantly to it. For brevity, the "Source" in the lower left has been shortened to "OpenAI".



The agents can **move** by setting a force on themselves in the x and y



The agents can **see** objects in their line of sight and within a frontal



The agents can **sense** distance to objects, walls, and other agents

OpenAI Plays Hide and Seek...and Breaks The Game! 🤖

10,310,414 views · 4 years ago

♥ Check out Weights & Biases here and sign up for a free demo:

<https://www.wandb.com/papers>

♥ Their blog post is available here:

<https://www.wandb.com/articles/better...>

STATE OF AI REPORT.

October 10, 2024

Nathan Benaich

AIR STREET CAPITAL.

stateof.ai

airstreet.com

Ethics

Using AI Safely



“With great power comes great responsibility”

Discussion topic:

What are some of your concerns about AI?

Here's my list...

- **Privacy & Surveillance**
- **Bias & Fairness**
- **Misinformation & Disinformation**
- **Military use of AI**
- **Economic Impact**
- **Environmental Impact**
- **Copyright Protection**

Privacy & Surveillance

- **“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.**

Privacy & Surveillance





Bias & Fairness

- **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 & Disinformation

- **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 Use of AI

- **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 Impact

- **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 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

Environmental Impact

- 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 screenshot shows the top portion of a news article from The Washington Post. The page features the newspaper's logo and tagline at the top, followed by a navigation bar with categories like Business, Economy, and Technology. The main headline is 'Amazon doubles down on nuclear energy with deal for small reactors', and the sub-headline states that the company has signed a deal to buy electricity from small modular nuclear reactors. At the bottom of the article preview, there are icons for reading time (3 min), sharing, and a comment count (315).

 **The Washington Post**
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 Protection

- **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.

AI Regulation

- **US: Blueprint for an AI Bill of Rights**
- **EU: Artificial intelligence act**

NotebookLM:

Both the US and EU are taking steps to regulate AI, albeit with different approaches. The US Blueprint focuses on setting ethical guidelines and promoting responsible AI development, while the EU AI Act establishes legally binding rules with a stronger focus on enforcement. These frameworks highlight the growing global recognition of the need to govern AI development and use to protect individual rights and ensure its societal benefits are realized.

The Future

Where is all this going?



Discussion: Four Questions

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

My Answers

1. Are language models intelligent?

- Yes. These models “understand” things.
- How do we understand things?

2. Can humans be trusted with this tool?

- Clearly not. 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).
- The solution to most problems is education.

4. Are we doomed?

- Possibly, but given my answer to 1, I'm not sure that's all bad. :)
- [Geoff Hinton's view](#)

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

- Geoff Hinton

Recommended Listening



What are the biggest risks associated with the AI revolution?



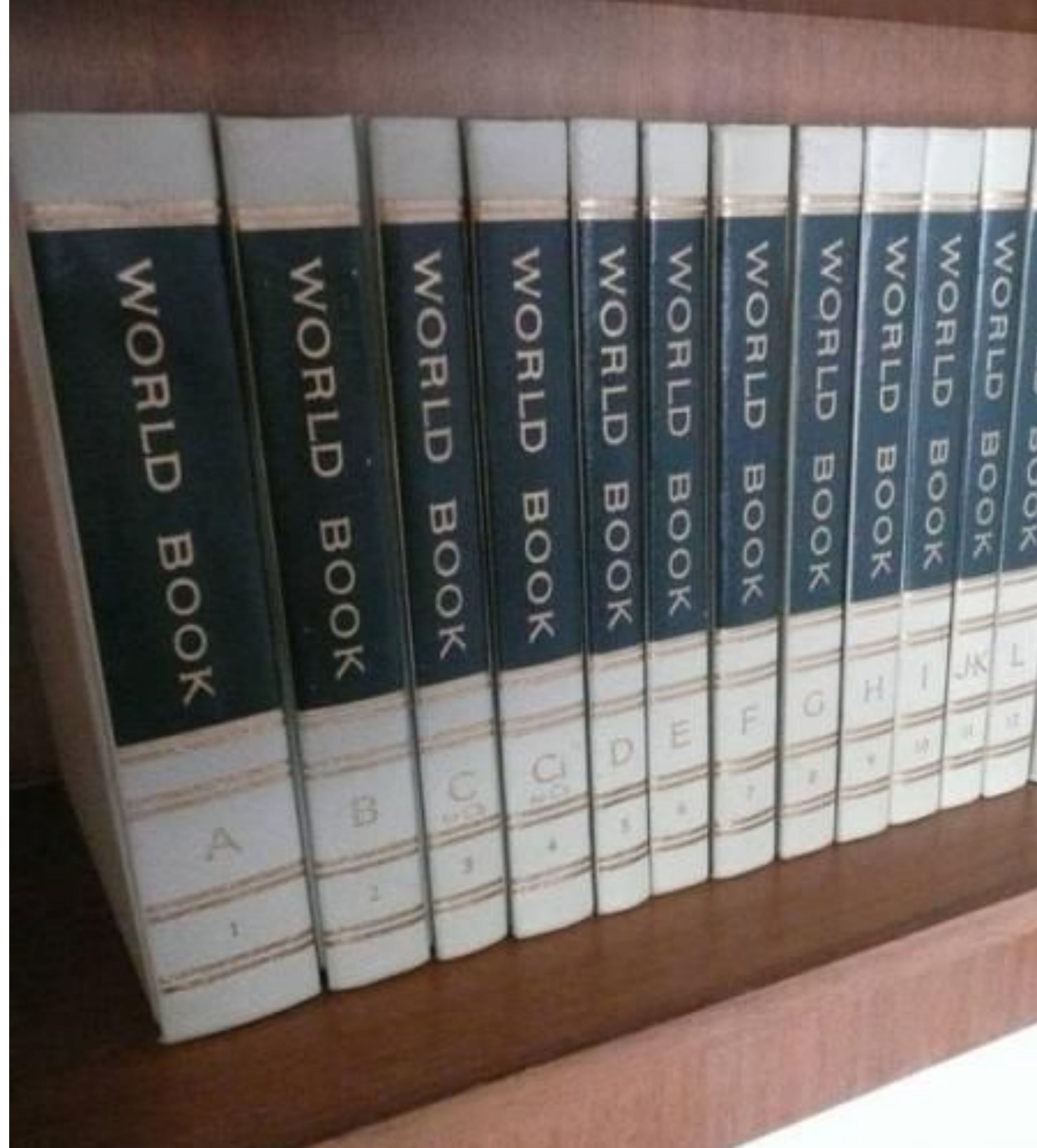
Navigating Change

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

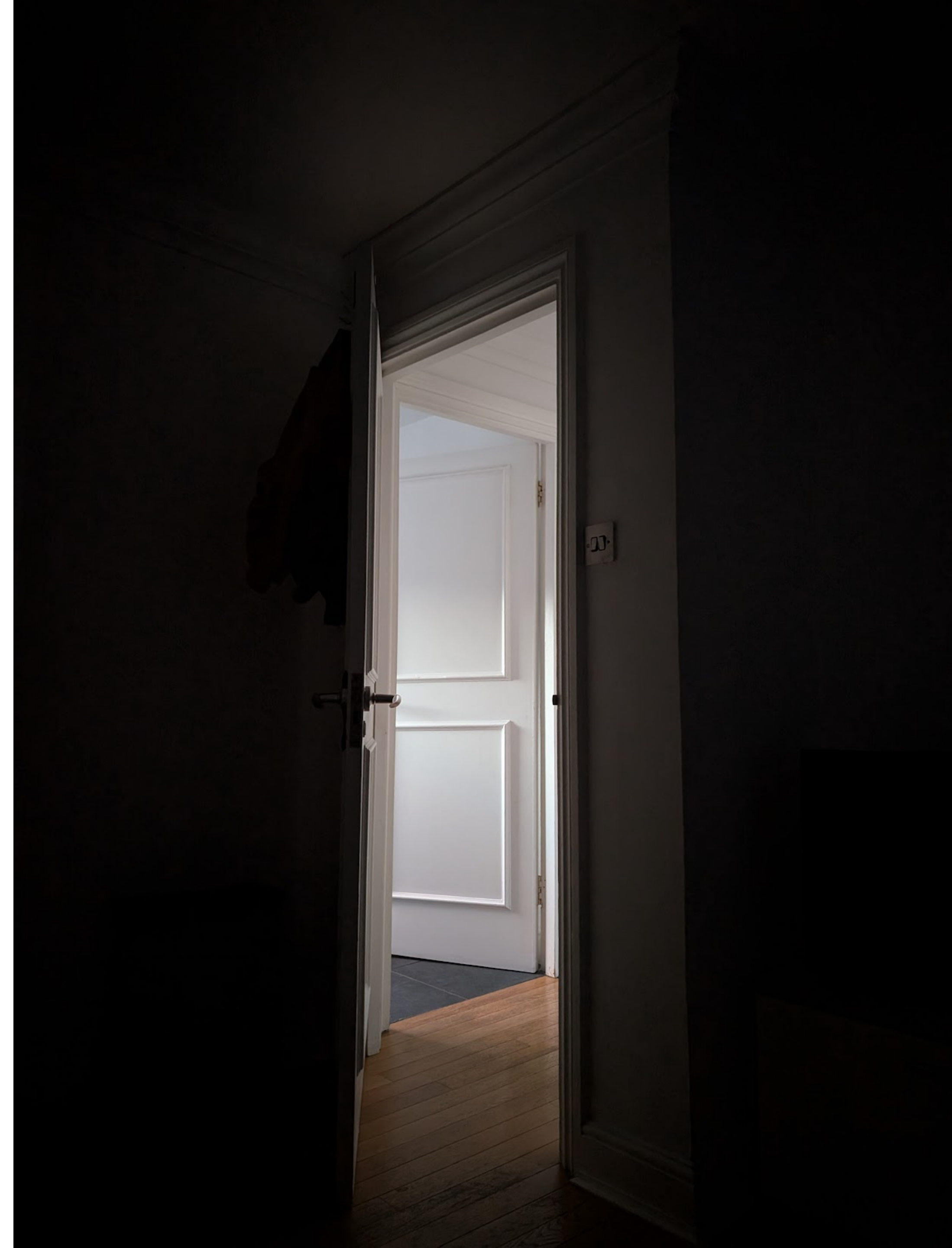
Ok, but how?



Be curious

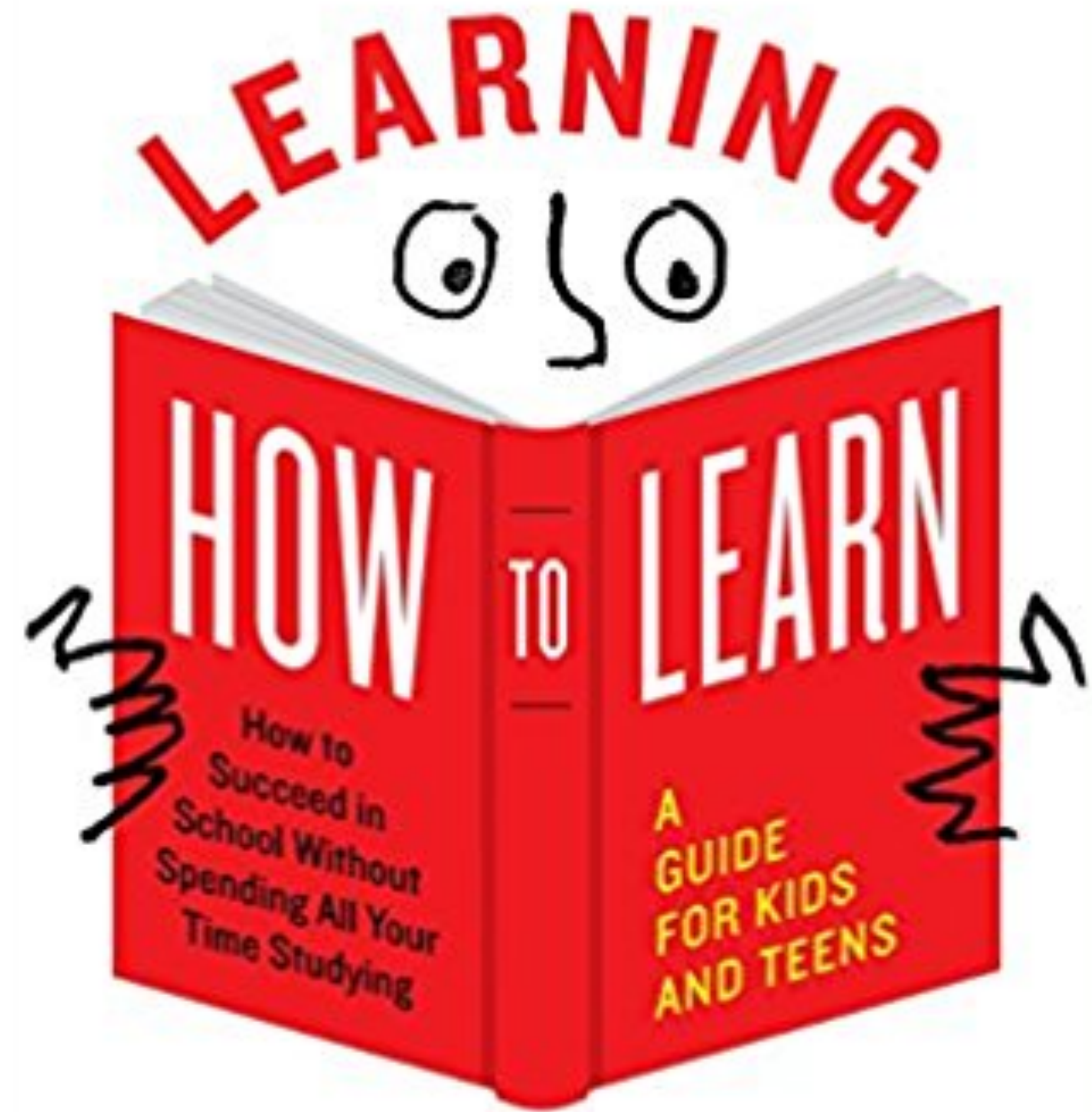


Be open to opportunity



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!)**



This is for everyone



Slides

mco.dev/ai

Feedback

<https://bit.ly/citylit-ai-eval>