Welcome

(queue to 8:40)

https://mco.dev/IntroAI.pdf

Understanding Artificial Intelligence

What a well informed person should know

Marc Cohen

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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

- Learn a bit of AI history
- 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

Photo by Domenico Loia on Unsplash

My Fave AI App

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 gRCP). With each step, highlight options and considerations in choosing backend technology
   a. sign in and user profile management

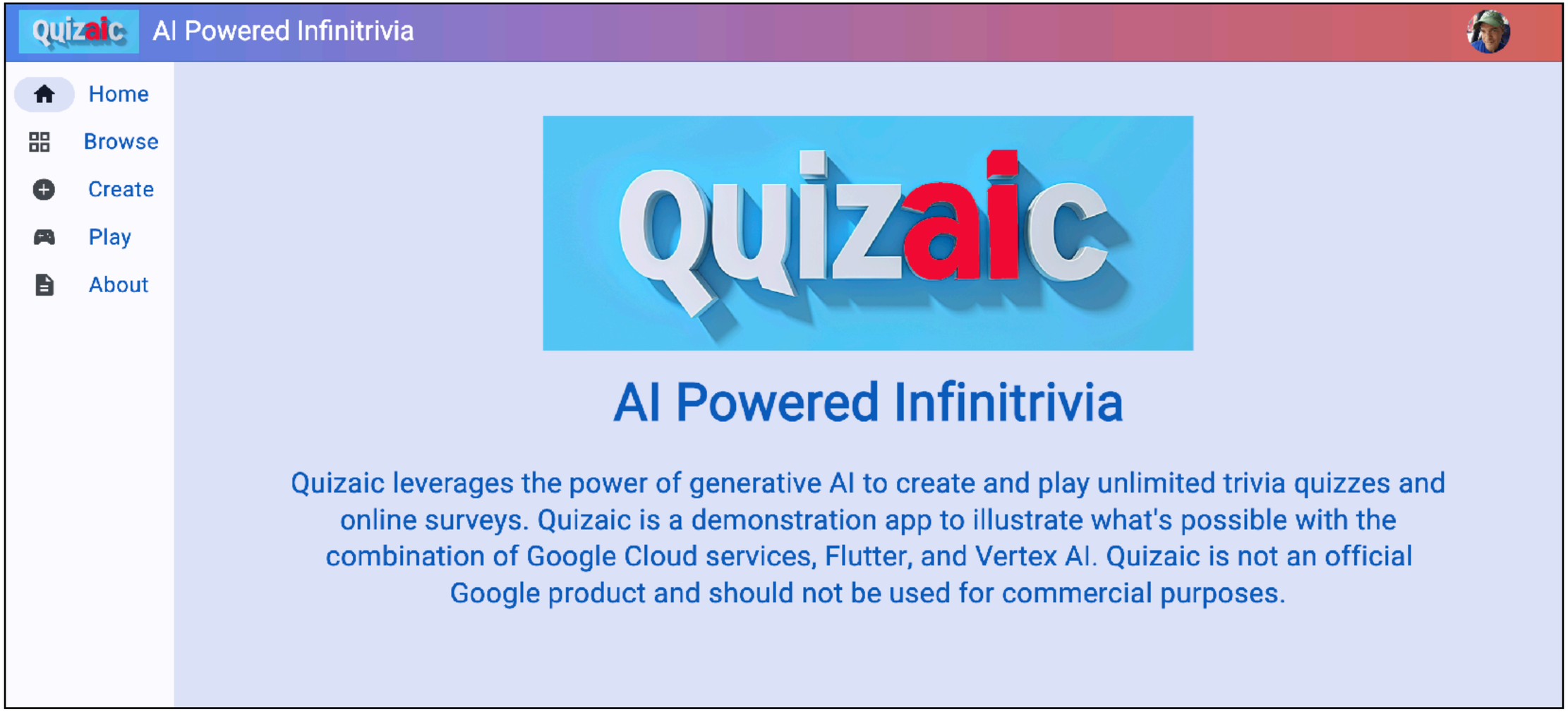
March 2023

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

Quizaic

(pronounced like **mosaic**)

Let’s play!


Quizaic
AI Powered Infinitrivia
Home
Browse
Create
Play
About
Quizaic
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 or 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

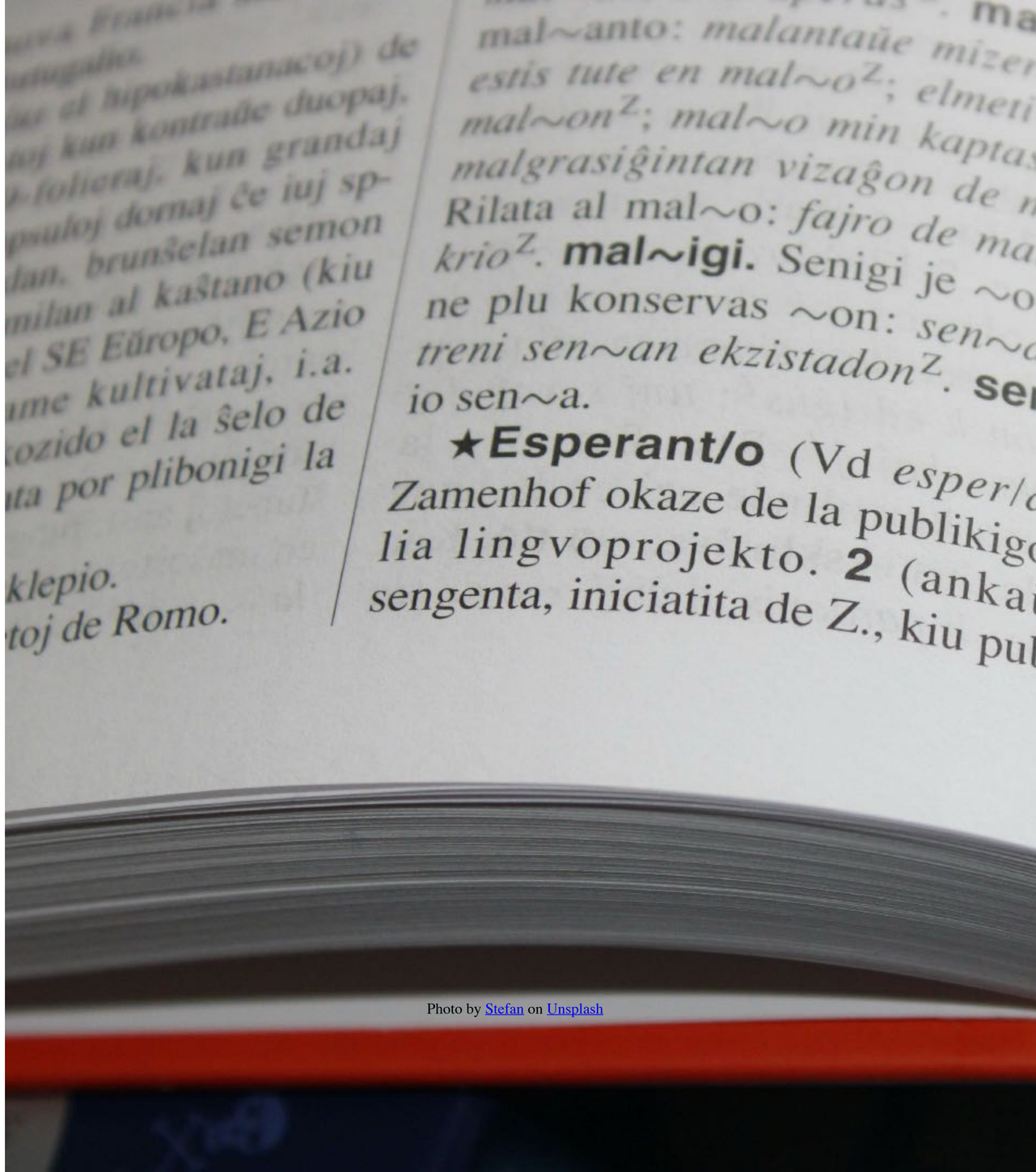


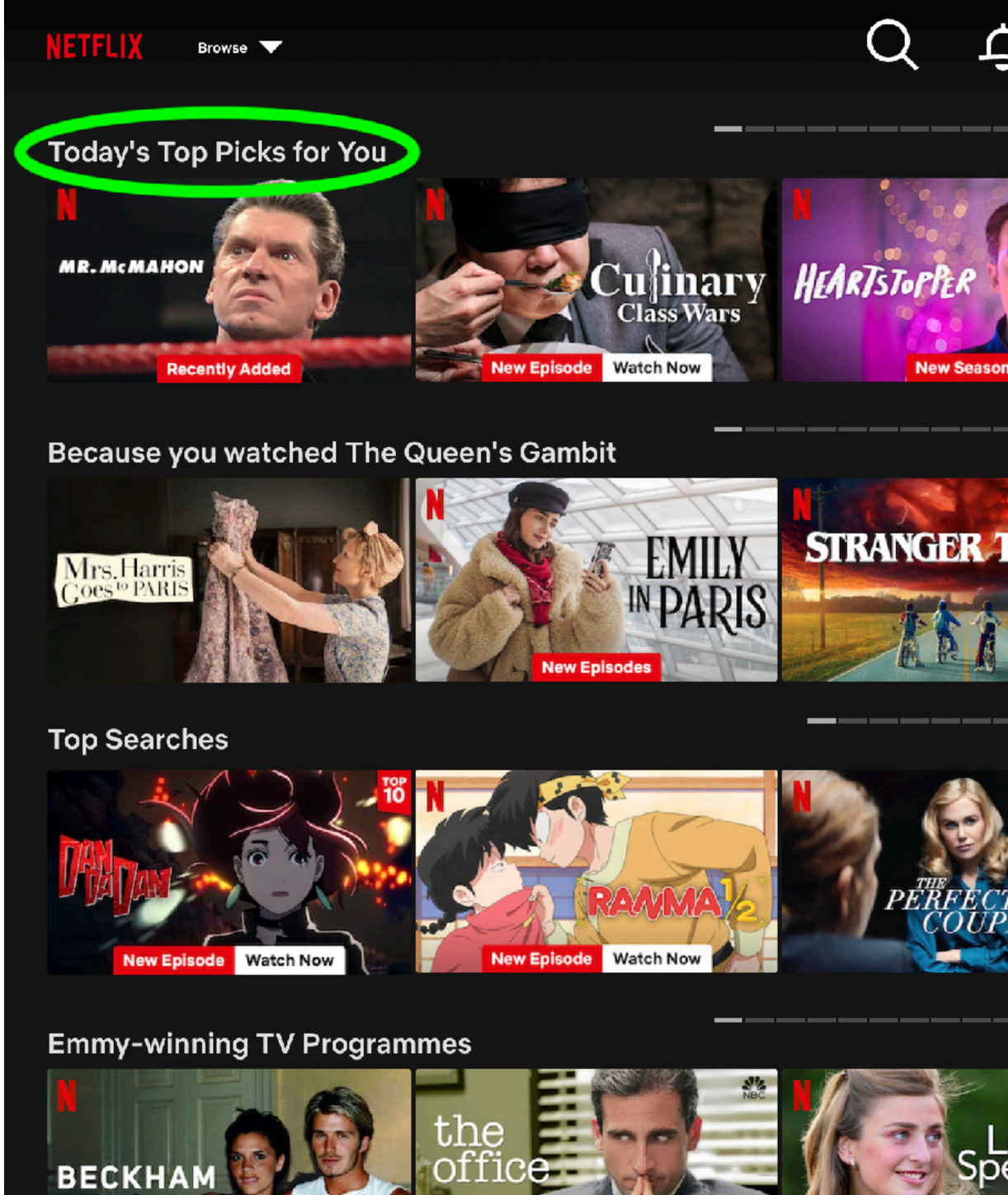
Photo by Stefan on Unsplash

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.

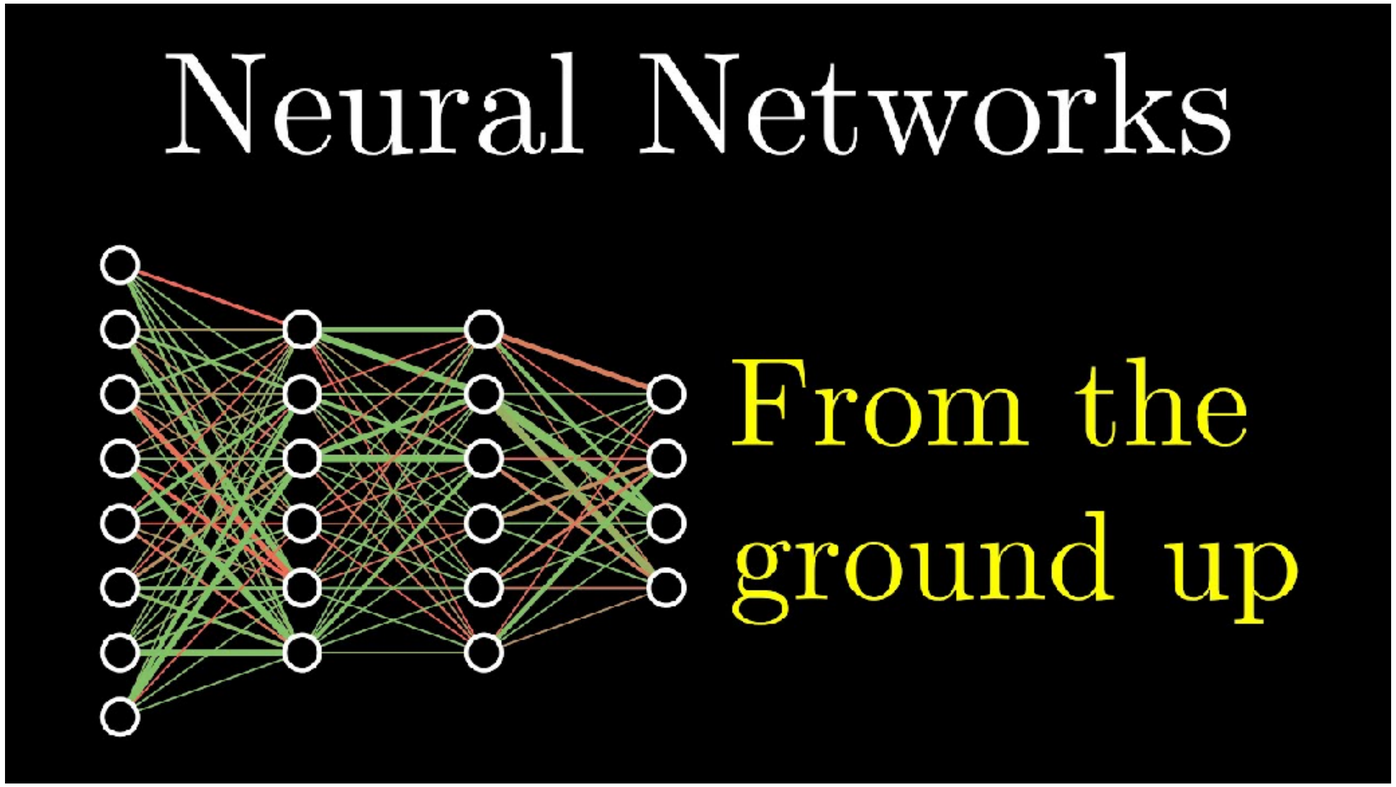
Definition: Machine Learning

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.



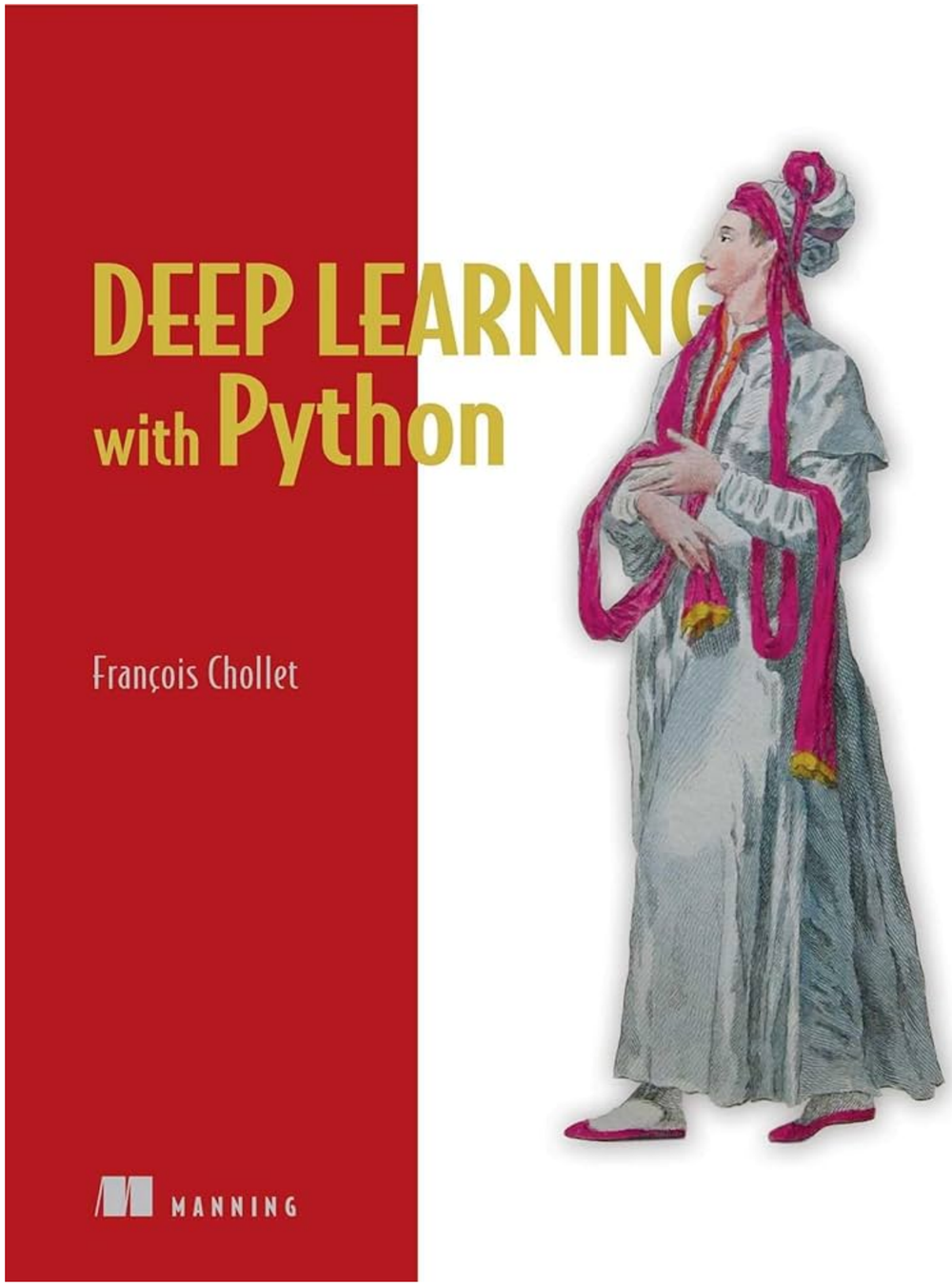
Definition: Neural Networks

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.



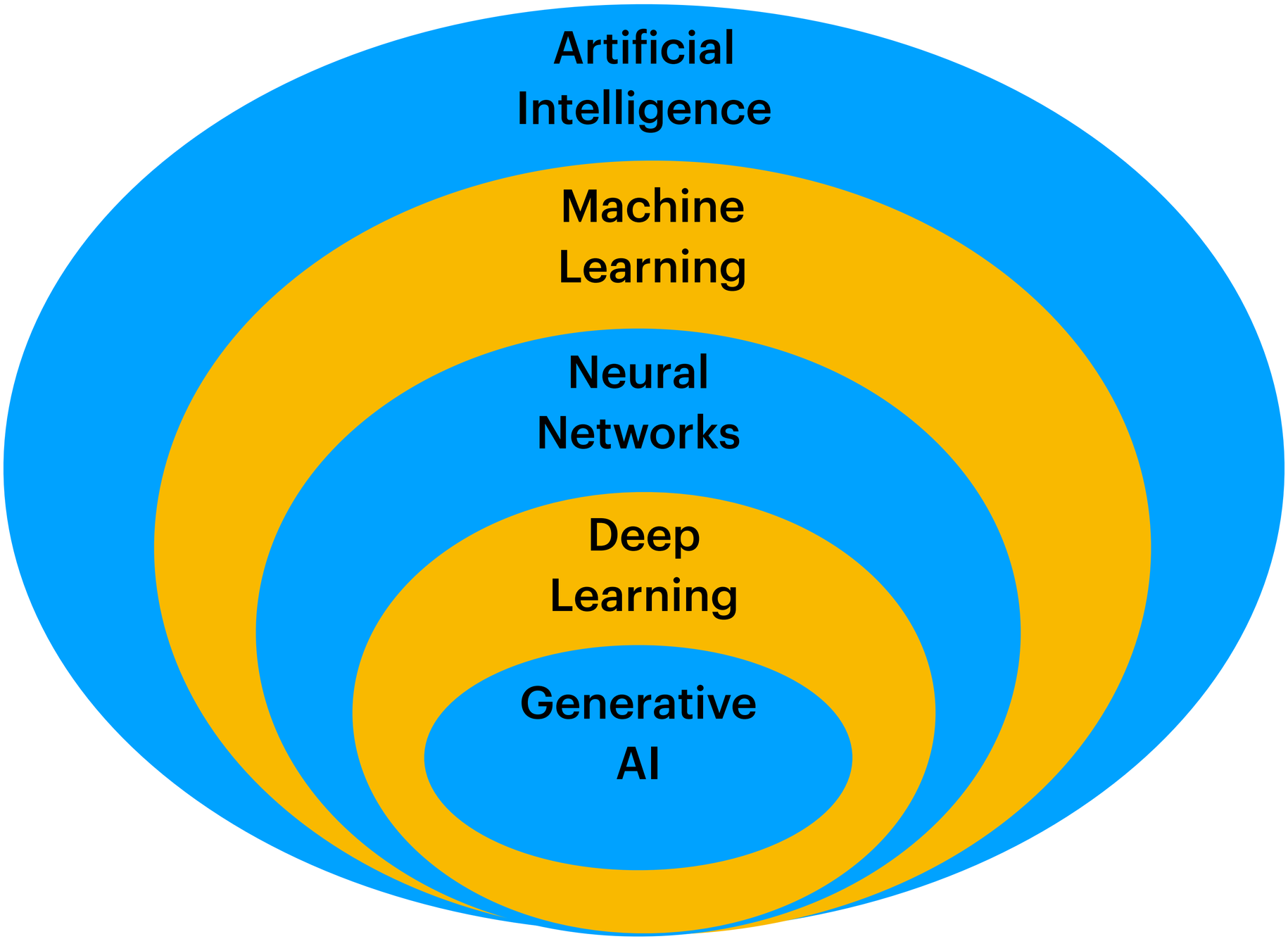
Definition: Deep Learning

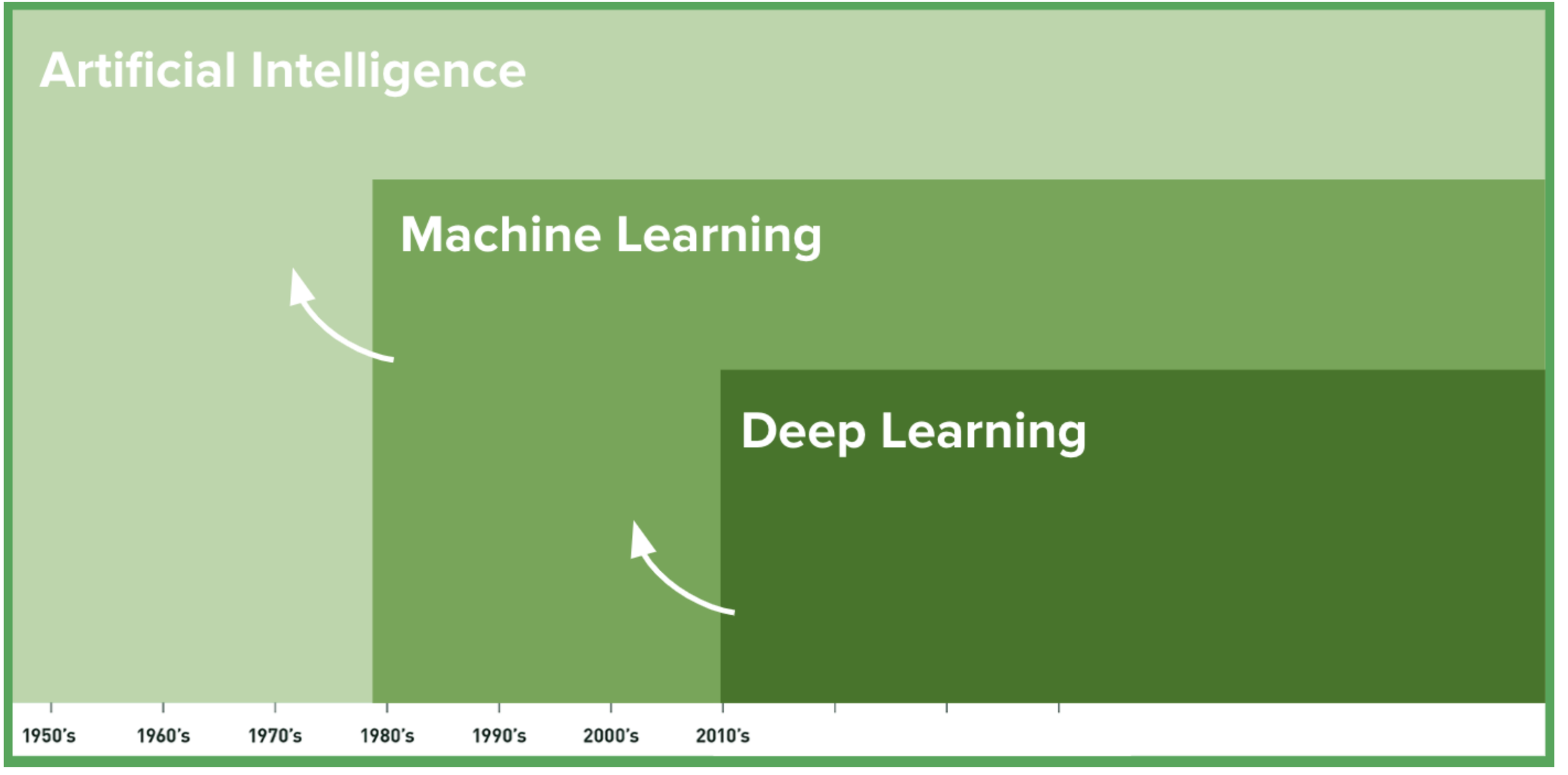
A type of machine learning that uses multi-layer neural networks to train computers to process data and make human-like decisions. Deep learning systems learn from large amounts of data, including images, text, audio, and video to recognize patterns, make predictions, and automate tasks.



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.

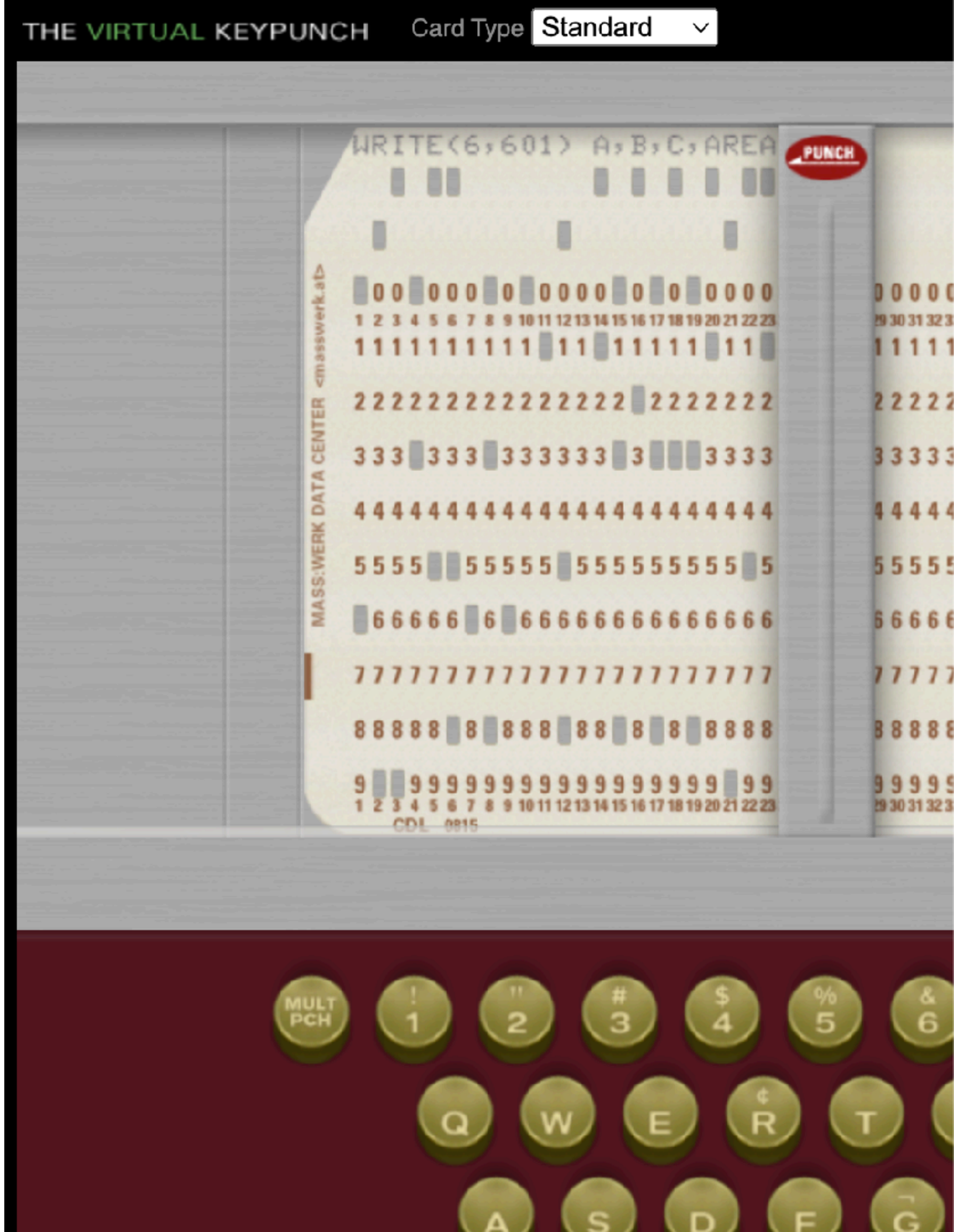

Artificial Intelligence
Machine Learning
Neural Networks
Deep Learning
Generative AI


Artificial Intelligence
Machine Learning
Deep Learning
1950's
1960's
1970's
1980's
1990's
2000's
2010's

History

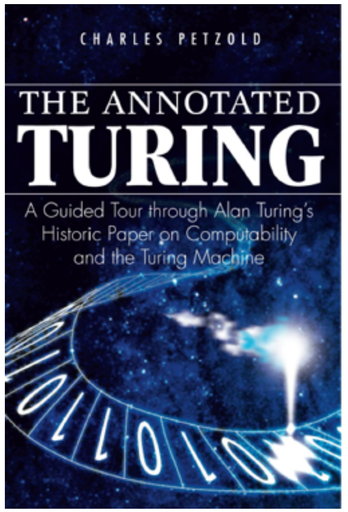
How did we get here?

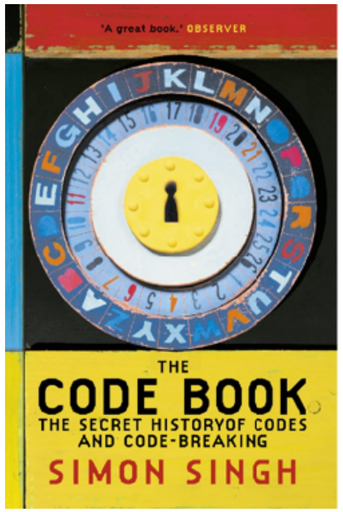
- Founders
- Timeline



Alan Turing

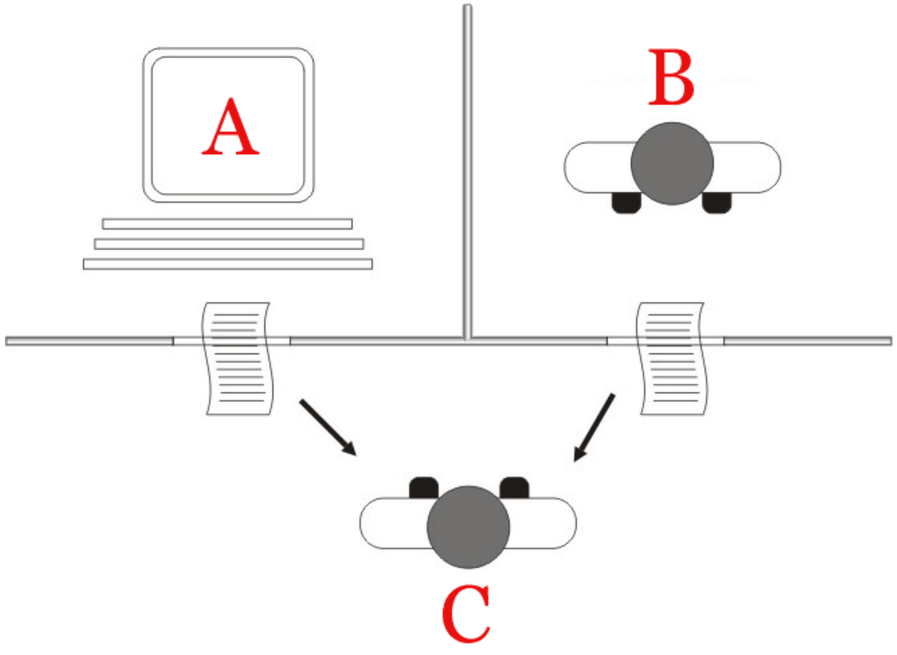
A Turing Machine is a theoretical construct that captures the essence of abstract symbol manipulation, i.e. computing. This invention inspired the founding of Computer Science and started the discussion about the possibility of thinking machines.





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!

Turing Test Demo

How Did You Do On The AI Art Turing Test?

...

NOV 20, 2024

371 623 37 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.

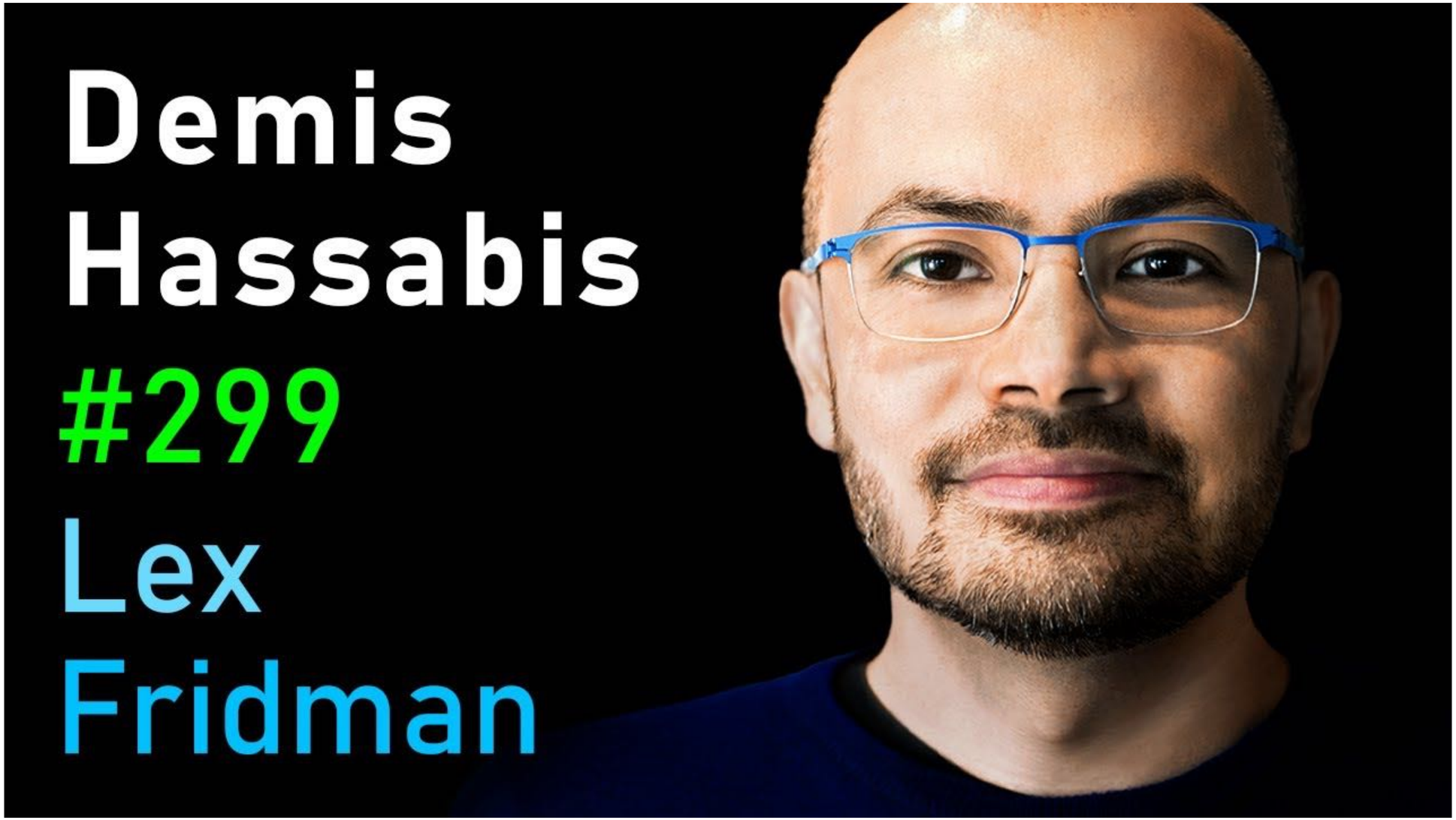
One of these two pretty hillsides is by one of history's greatest artists. The other is soulless AI slop. Can you tell which is which?

Claude Shannon

- 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

Demis Hassabis



AI Development Timeline

1836 — Charles Babbage & Ada Lovelace design the Analytical Engine, an early mechanical general-purpose computer.

1950 — Alan Turing publishes "Computing Machinery and Intelligence," introducing the Turing Test.

1952 — Arthur Samuel developed a program to play checkers, which is the first to ever learn the game independently.

1956 — John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon organize the Dartmouth Conference, coining the term "Artificial Intelligence."

1958 — John McCarthy created LISP, the first programming language for AI research, which is still in popular use to this day.

1959 — 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

1965 — 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.

1972 — The first AI winter begins as funding and interest decline due to unmet expectations.

1974 — Marvin Minsky and Seymour Papert publish Perceptrons, highlighting limitations in neural networks.

1980 — The resurgence of AI interest due to expert systems like MYCIN (medical diagnosis) and DENDRAL (chemical analysis).

1986 — David Rumelhart, Geoffrey Hinton, and Ronald Williams publish the backpropagation algorithm, revitalizing neural networks.

1997 — IBM's Deep Blue defeats world chess champion Garry Kasparov.

AI Development Timeline

2006
Geoffrey Hinton and colleagues publish a paper on deep belief networks, sparking renewed interest in neural networks.

2009
Fei-Fei Li launches ImageNet, a large-scale visual database for object recognition.

2011
Watson (created by IBM) won Jeopardy against two former champions in a televised game.

2011
Apple released Siri, the first popular virtual assistant.

2012
AlexNet, developed by Alex Krizhevsky, Ilya Sutskever, and Geoffrey Hinton, wins the ImageNet competition.

2012
Jeff Dean and Andrew Ng at Google trained a neural network to recognize cats.

2012
3,000 leaders signed an open letter to the worlds' government systems banning the use of autonomous weapons in war.

AI Development Timeline

2015 — DeepMind's AlphaGo defeats professional Go player Lee Sedol.

2017 — 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.

2018 — Chinese Alibaba beat humans on Stanford reading and comprehension test.

2020 — OpenAI releases GPT-3, a powerful language model with 175 billion parameters.

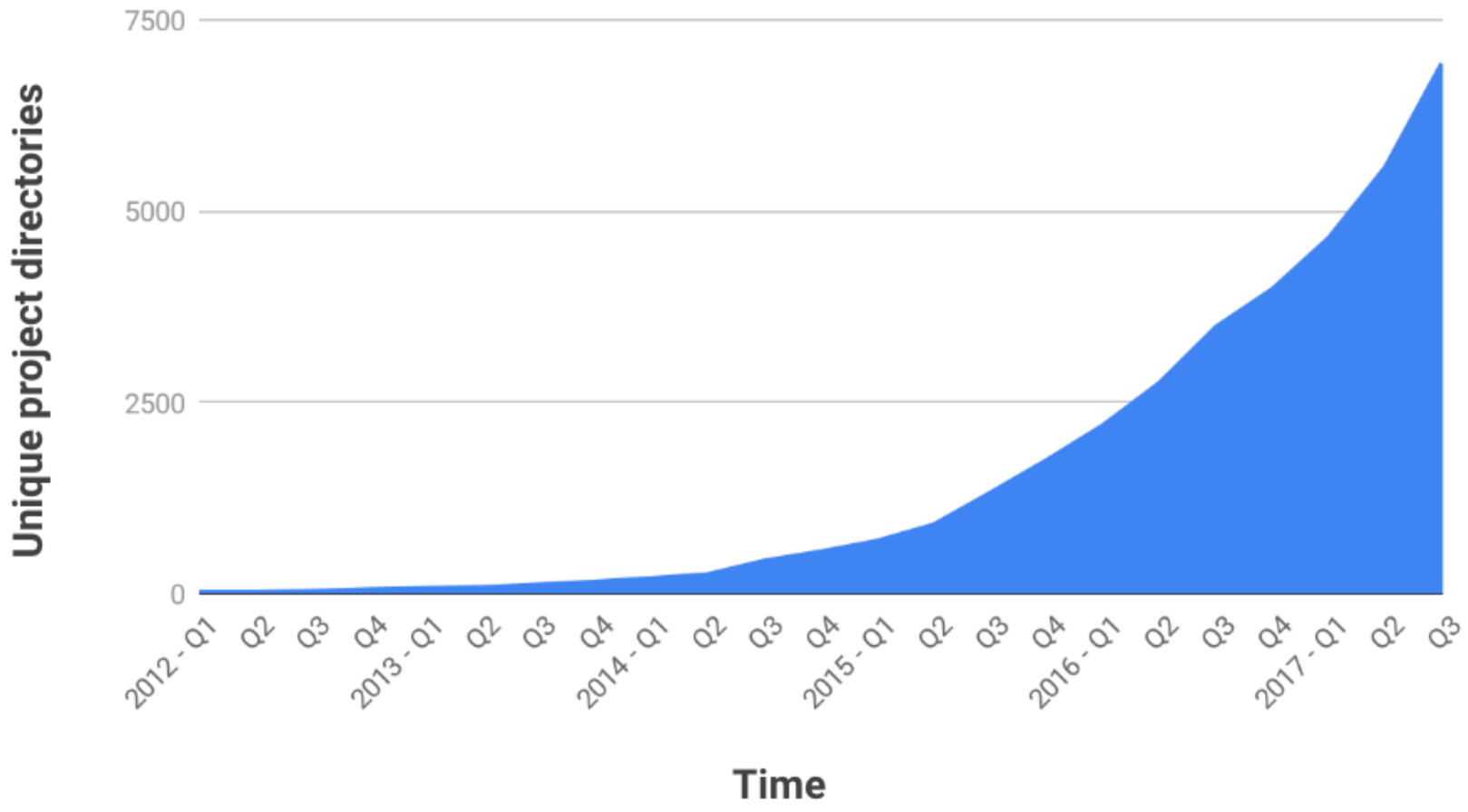
2020 — DeepMind's AlphaFold makes significant progress in protein folding.

2022 — Generative AI goes mainstream with ChatGPT

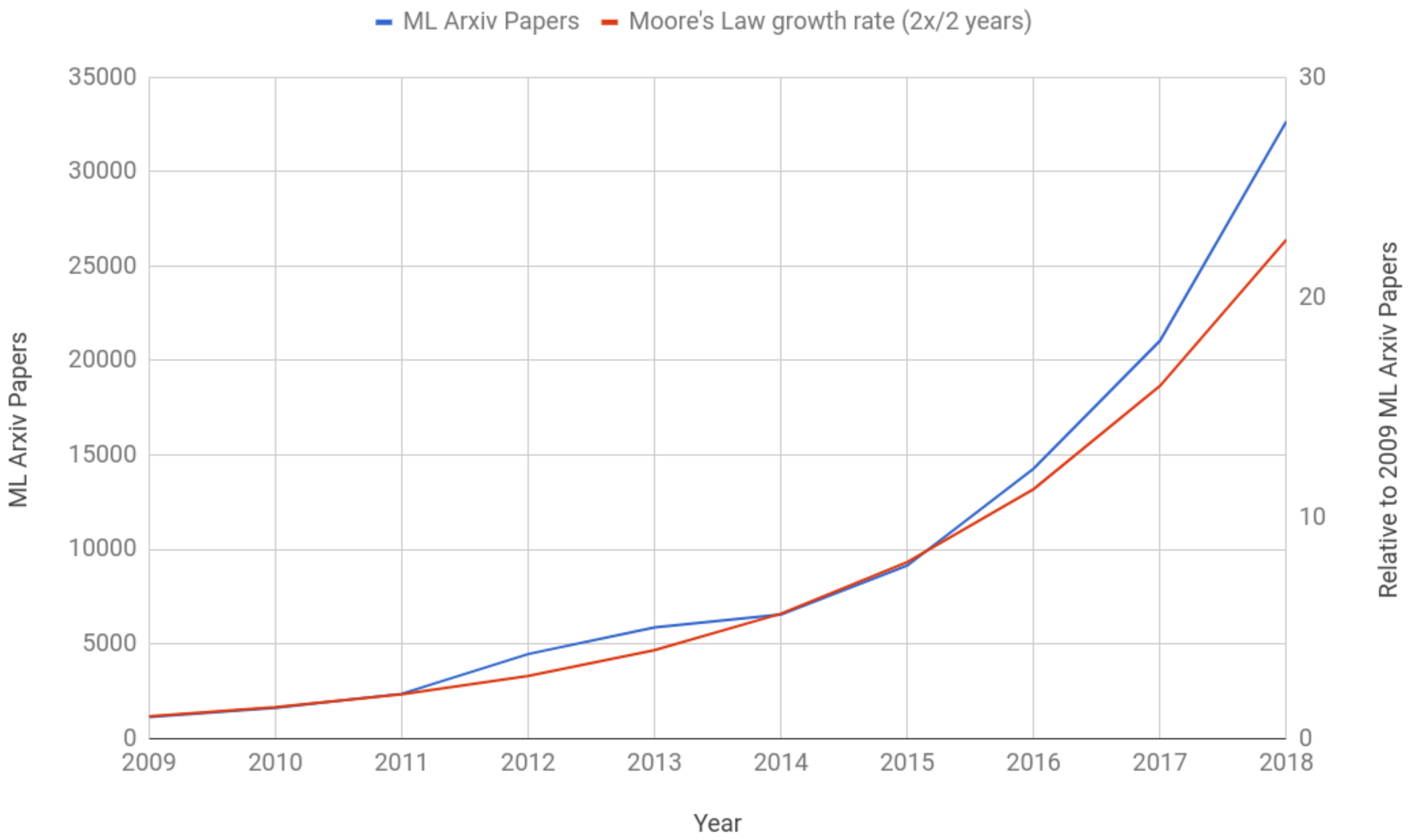
2024 — Open source AI era begins

Use of Deep Learning at Google

source directories containing deep learning models



Industry Adoption

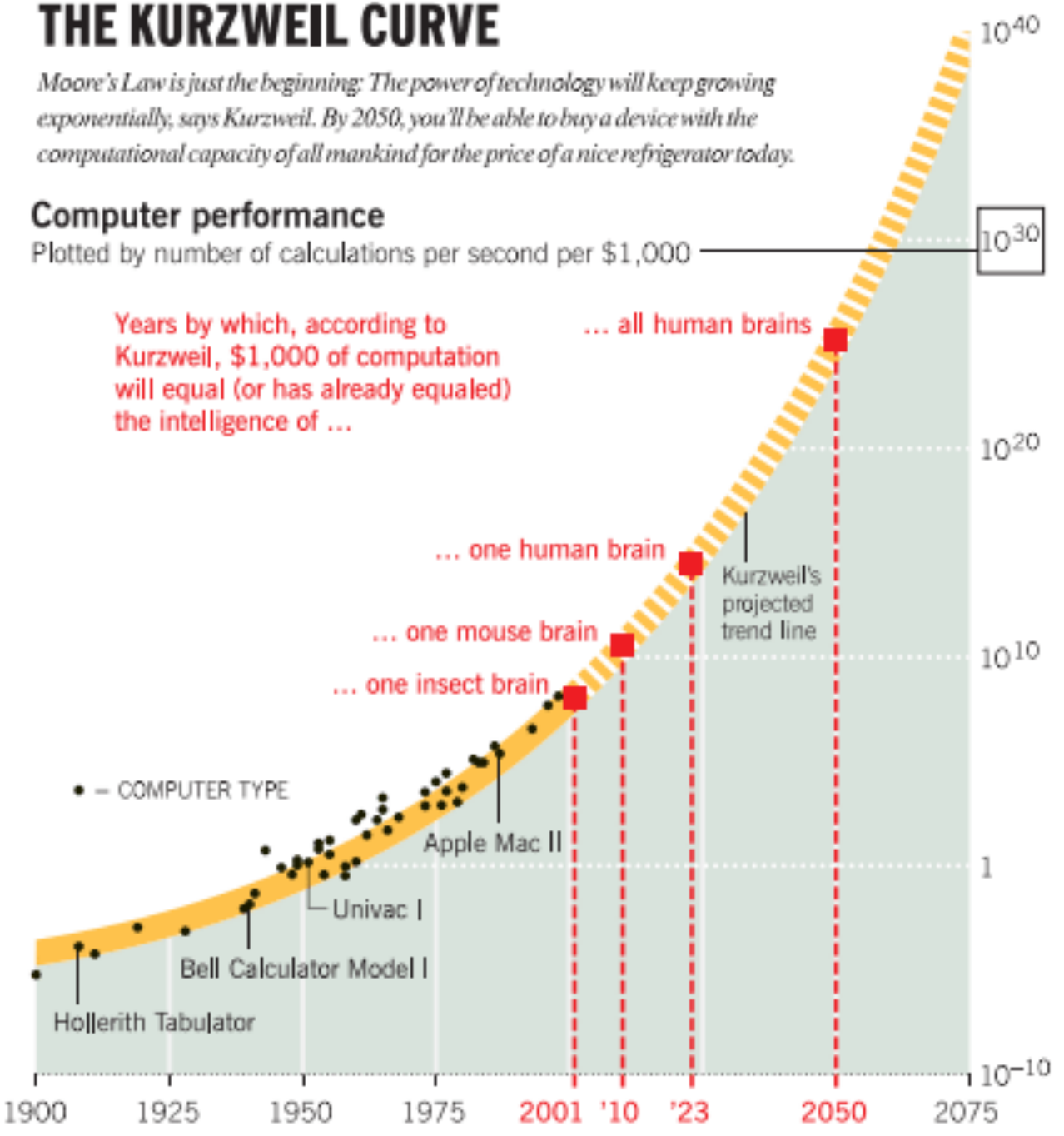


THE KURZWEIL CURVE

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



SOURCE: DATA FROM RAY KURZWEIL

Why did everything change so quickly?

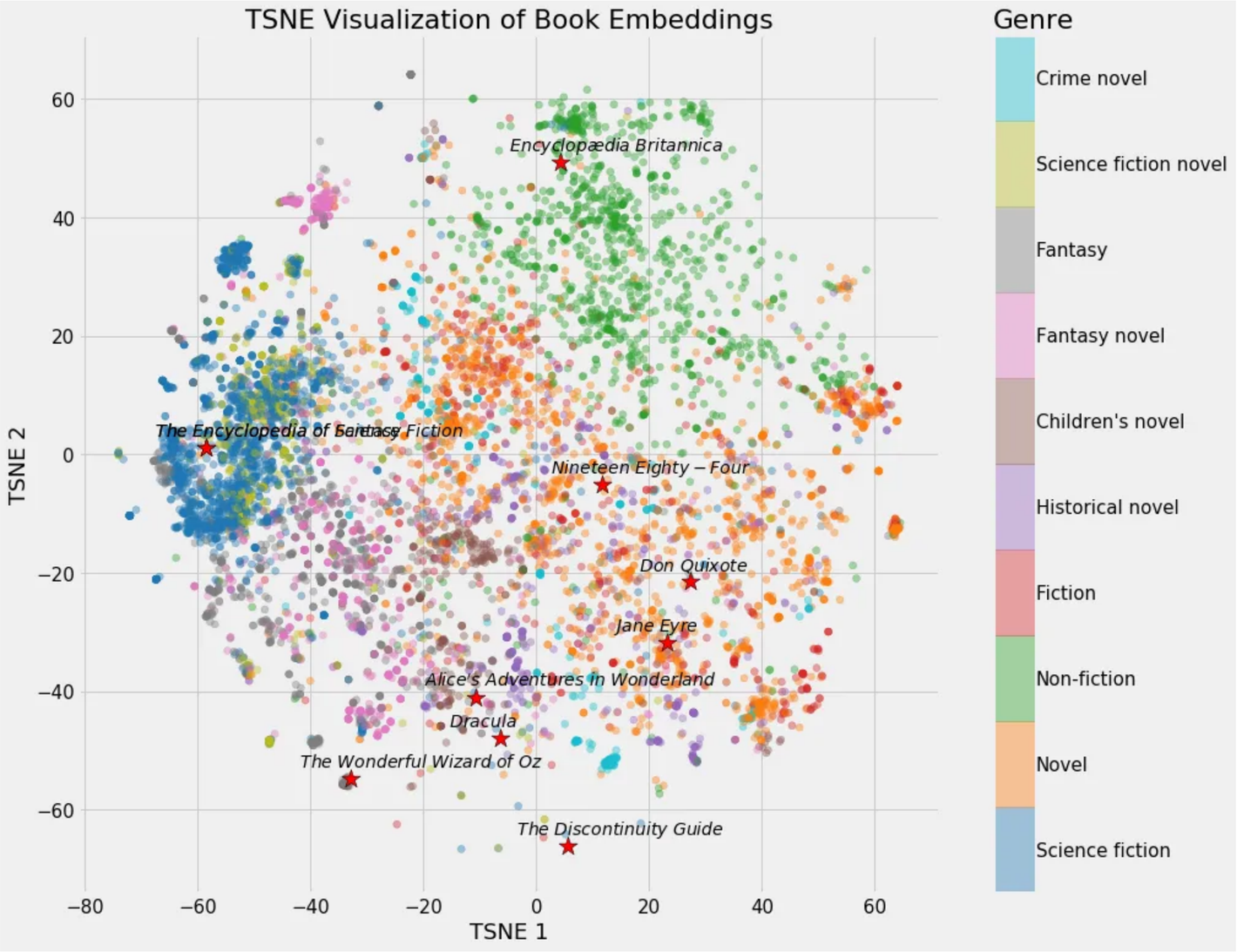
A perfect storm:

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

Photo by Max LaRochelle on Unsplash

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

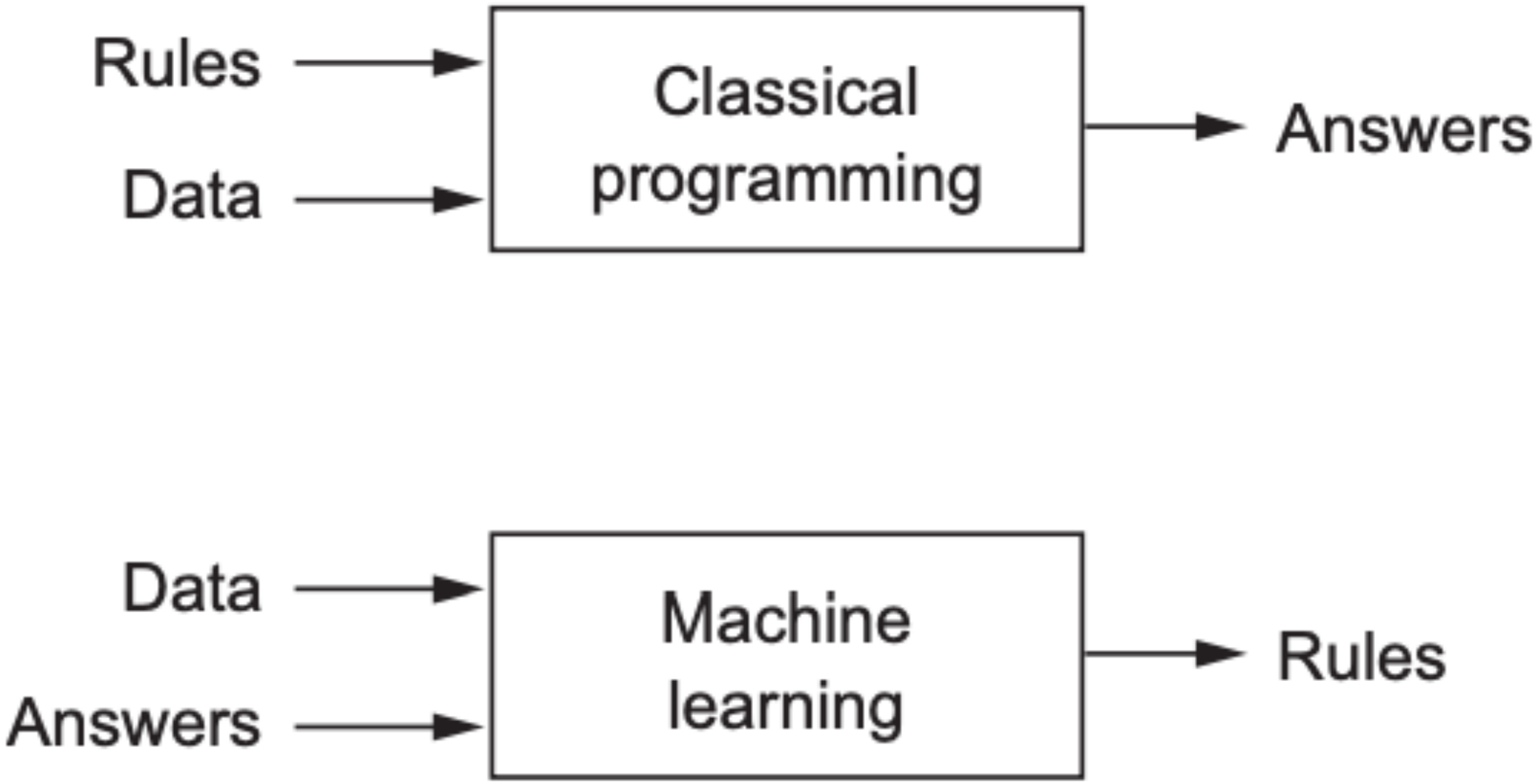
Machine learning is learning from rules *plus experience*

“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

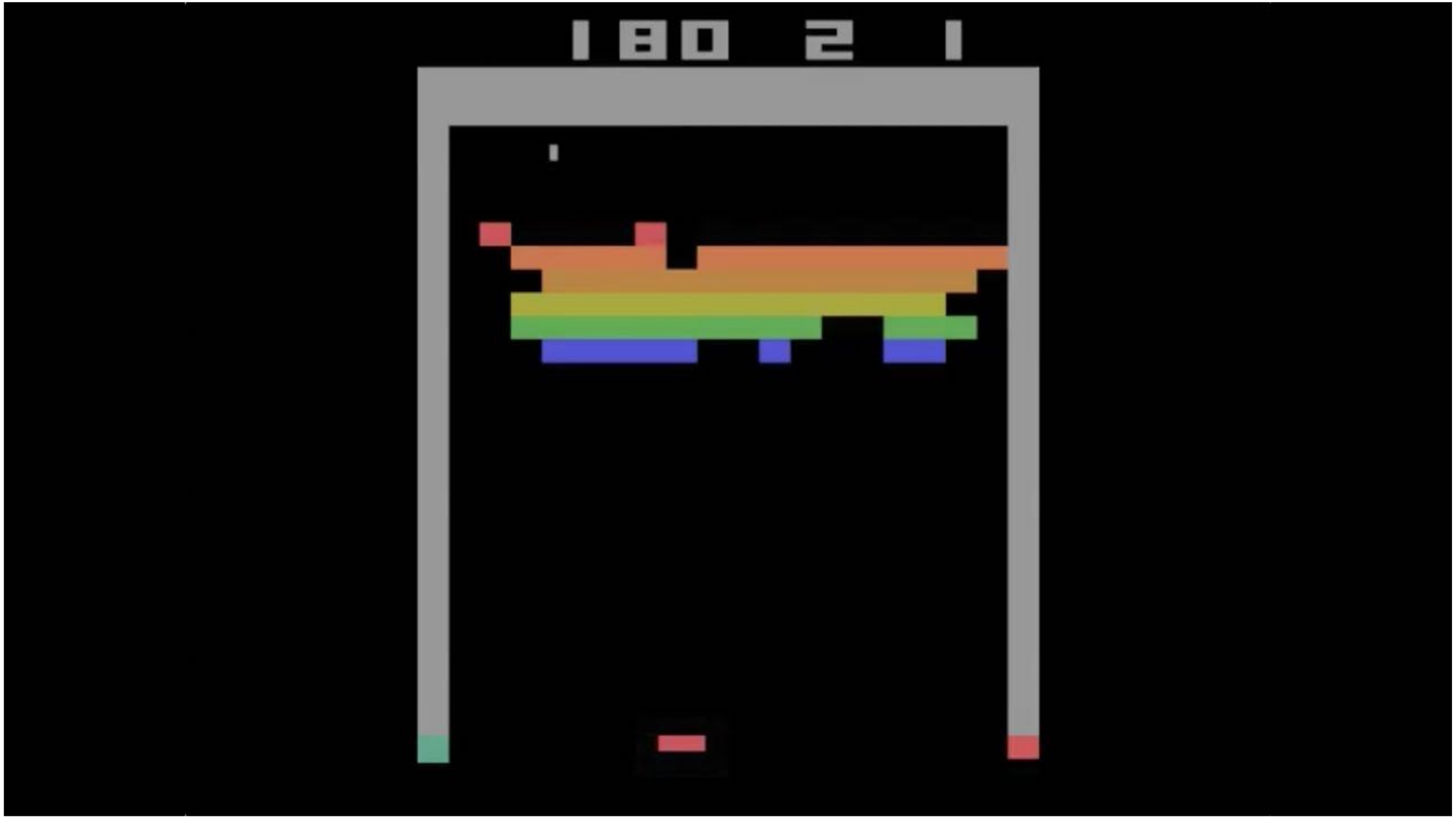
Unsupervised Learning

NETFLIX

	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



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

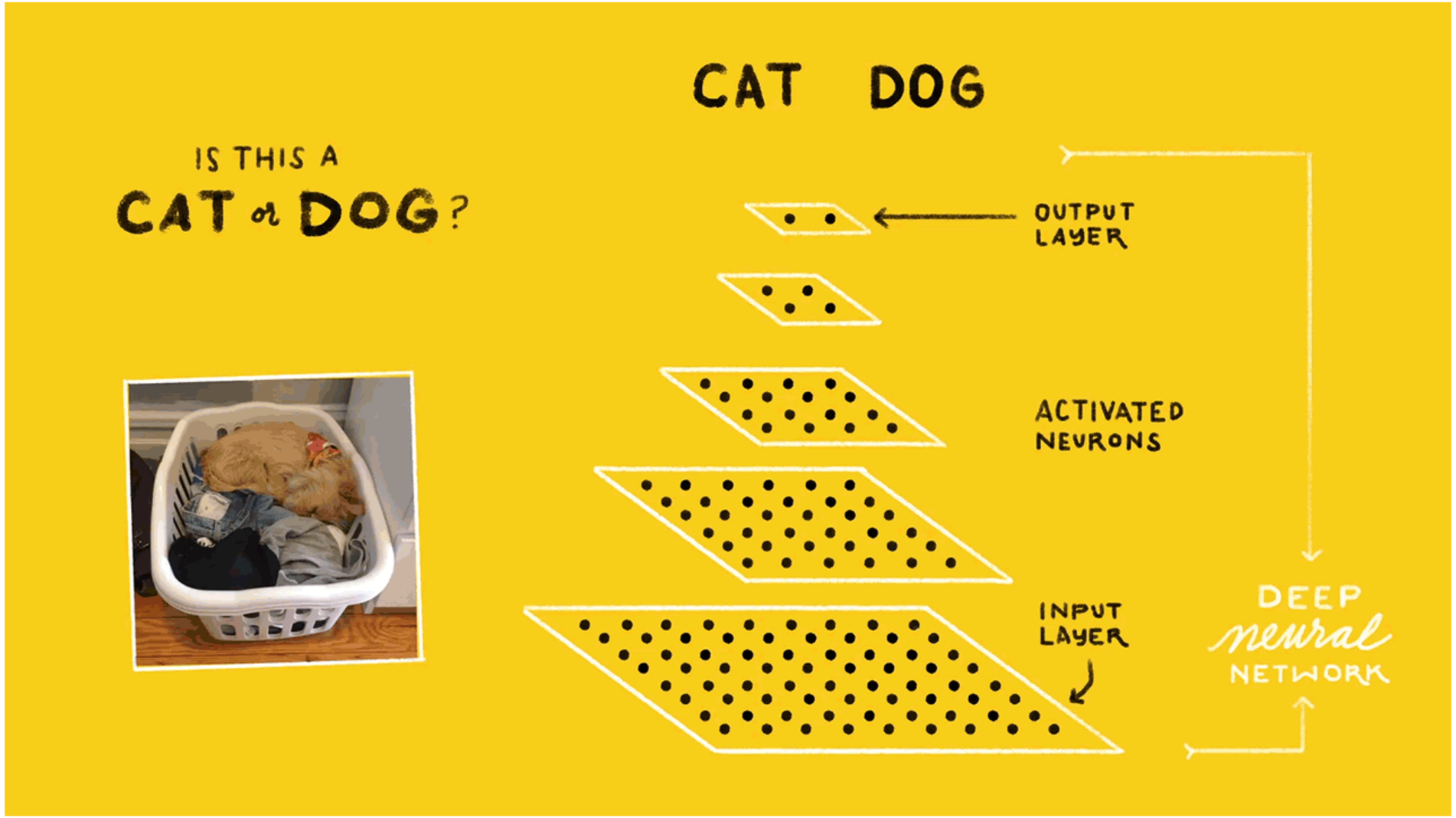
Reinforcement Learning

- reward based
- find optimal strategy

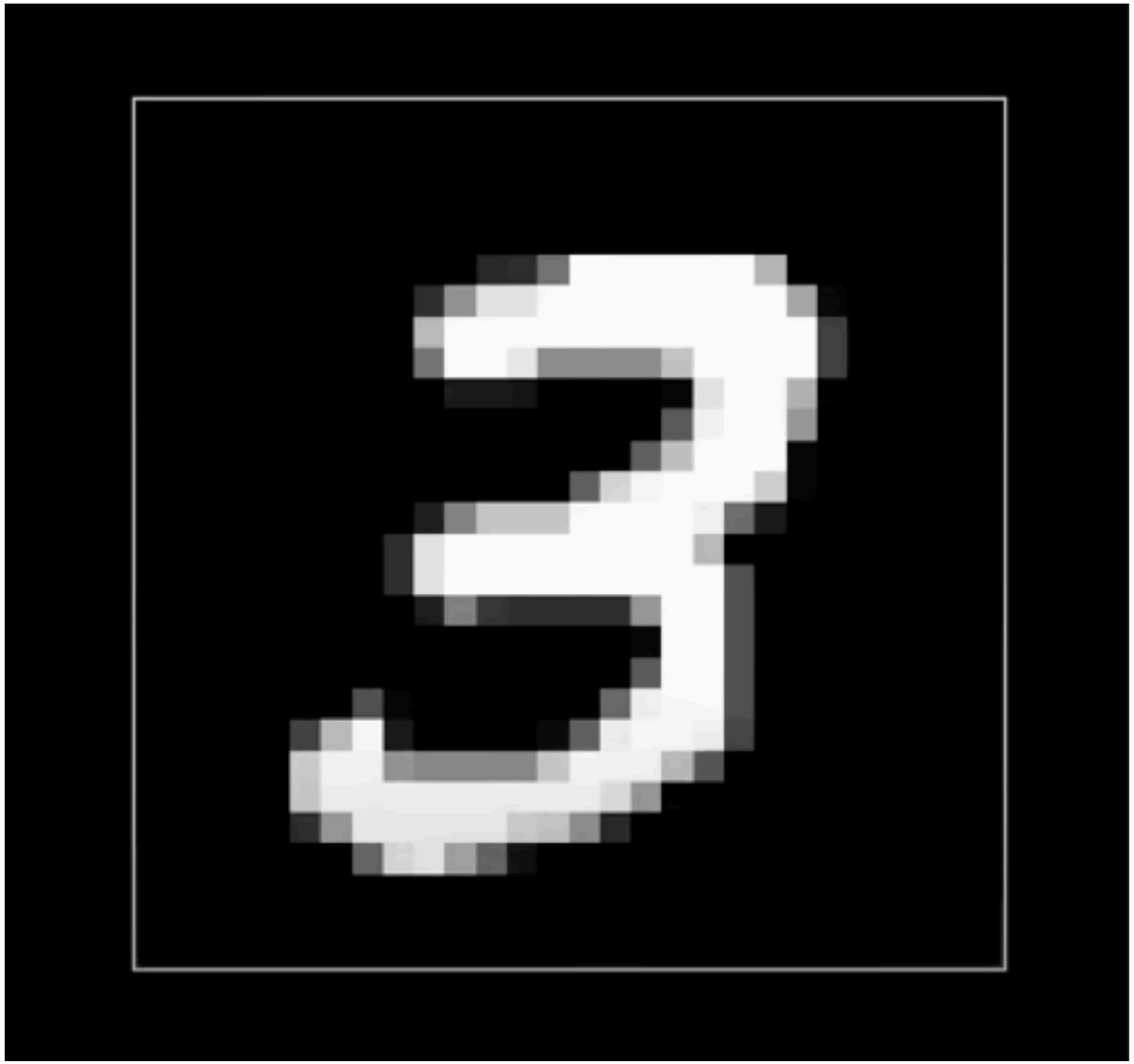
Examples:

- game playing
- autonomous driving

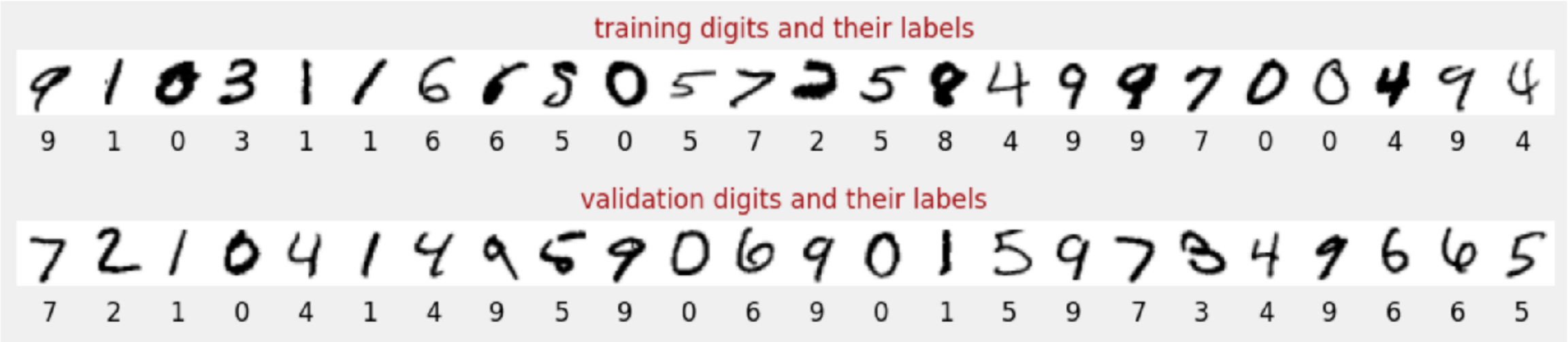
Neural Networks



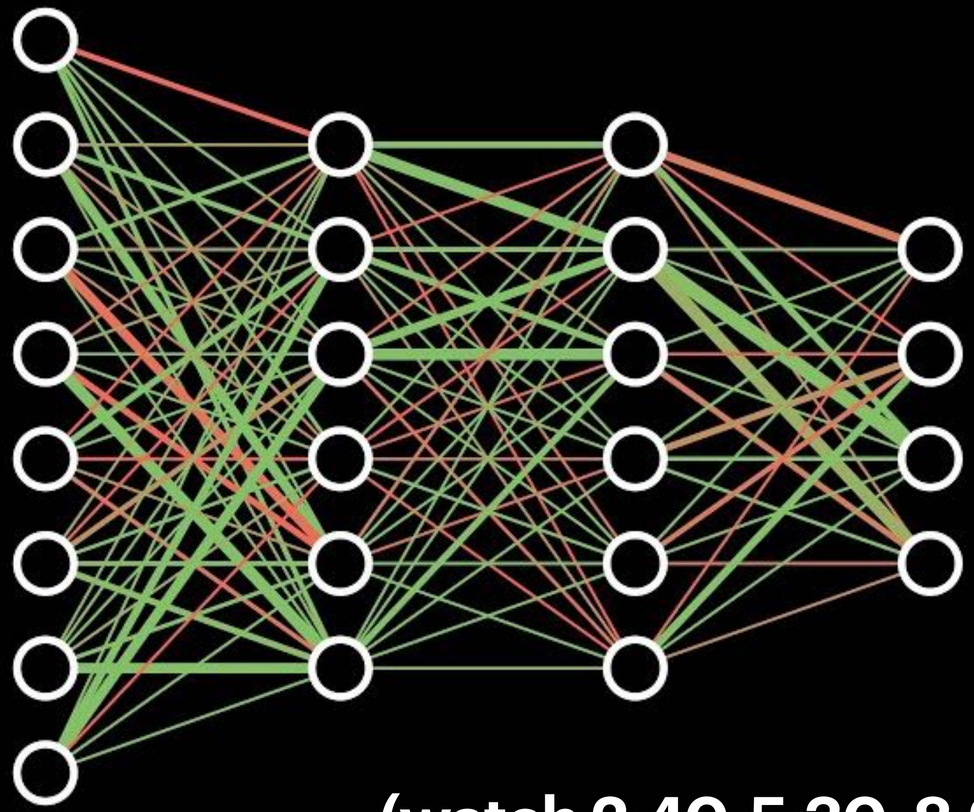
Which digit is this?



The MNIST Challenge



Neural Networks

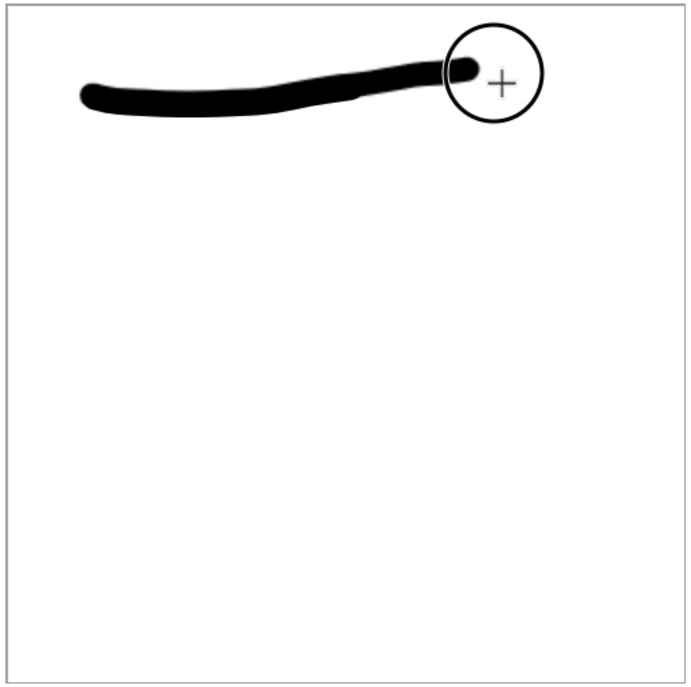


From the ground up

(watch 2:40-5:30, 8:20-10:15, 11:35-12:42)

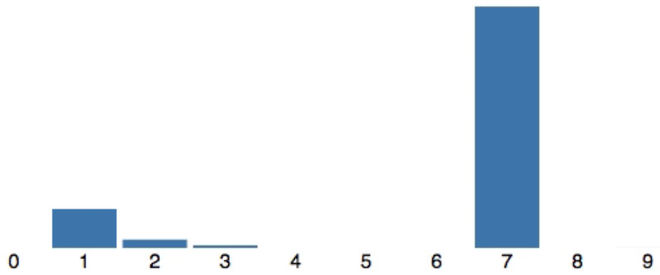
TensorFlow.js + MNIST

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 Network Training

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

Iterations

100

Polynomial Order (N)

3

$$y = -0.5x^3 + 0.8x^2 + 0.2x - 0.7$$

Coefficients

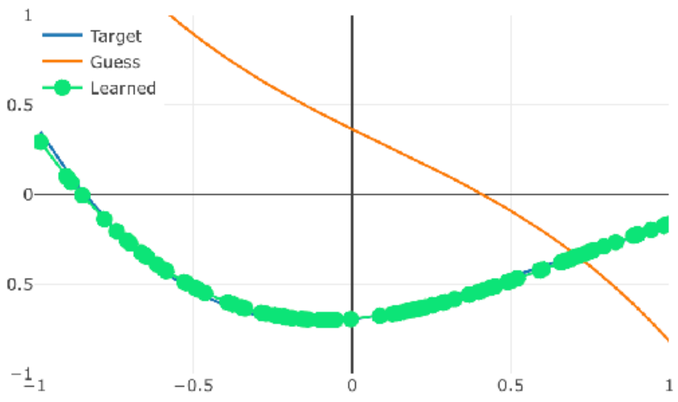
c0

c1

c2

c3

Reset Guess Learn

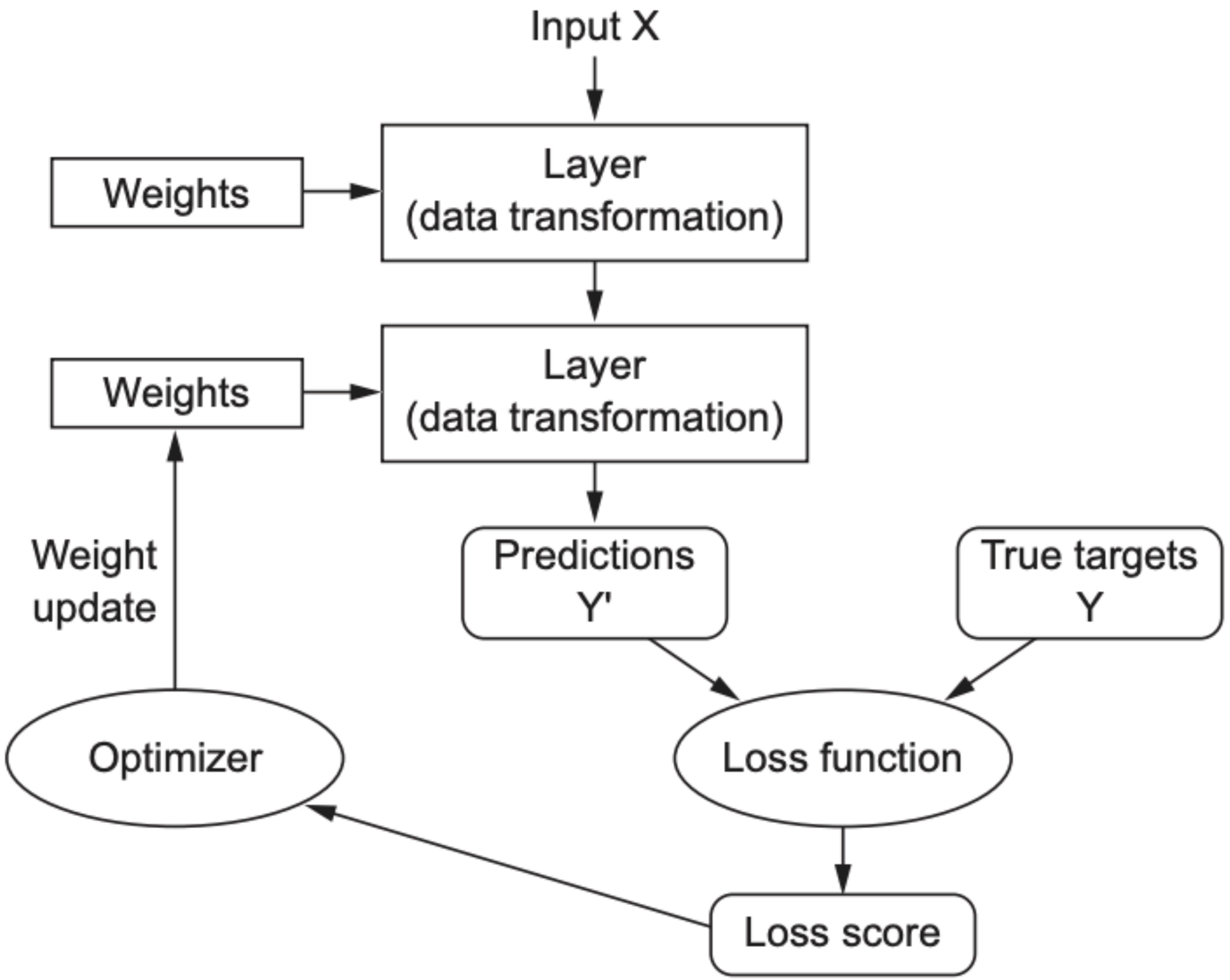


Iteration = 100, Loss = 0.00031277

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).

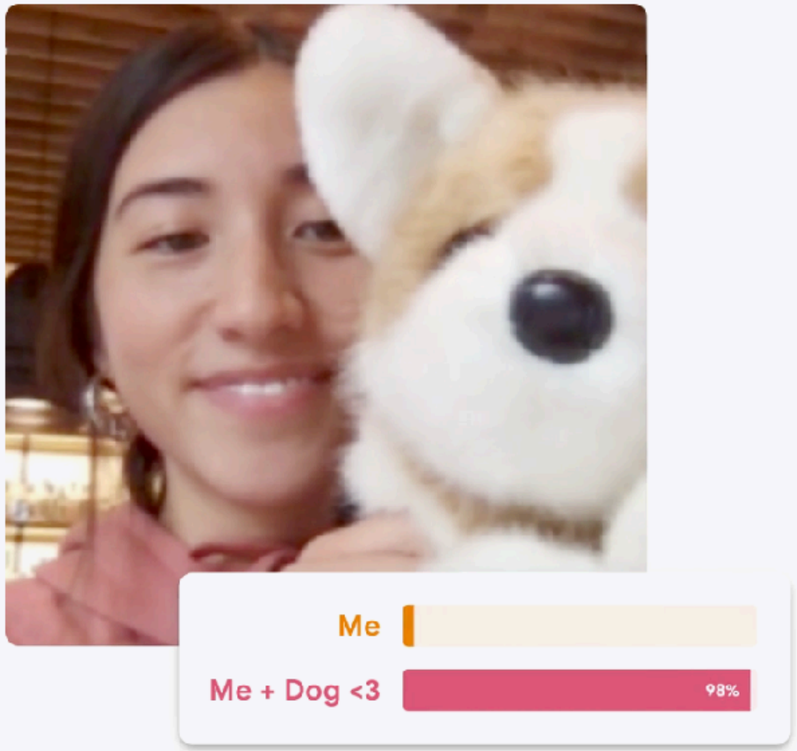
Inside a Neural Network



Teachable Machine

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

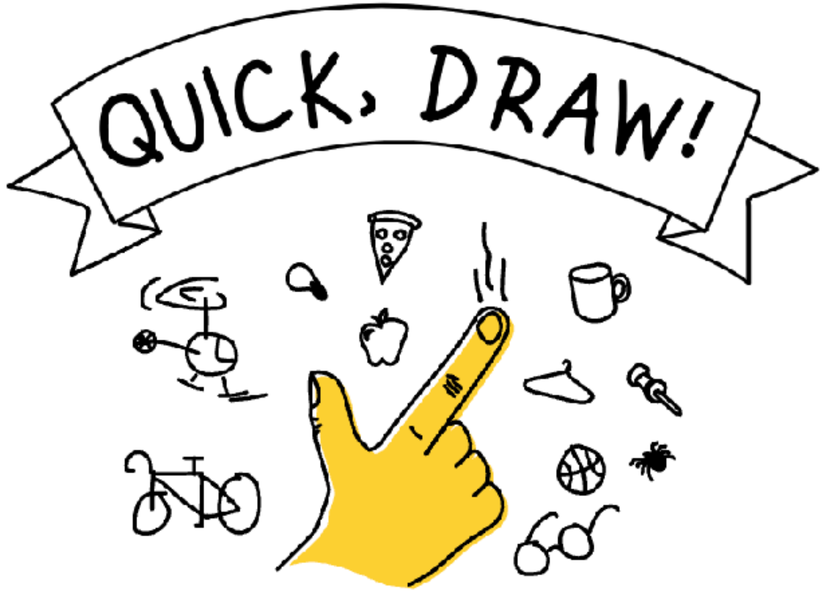
A fast, easy way to create machine learning models for your sites, apps, and more – no expertise or coding required.



Get Started

p5.js Coral ARDUINO

Demo: Quick, Draw



Can a neural network learn to recognize doodling?

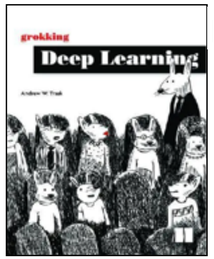
Help teach it by adding your drawings to the world's largest doodling data set, shared publicly to help with machine learning research.

Let's Draw!

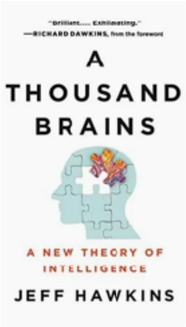
Embeddings
(The secret sauce of deep learning)

Recommending AI Books

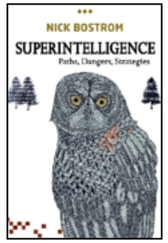
Beginner



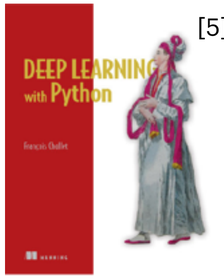
[-5]



[-3]



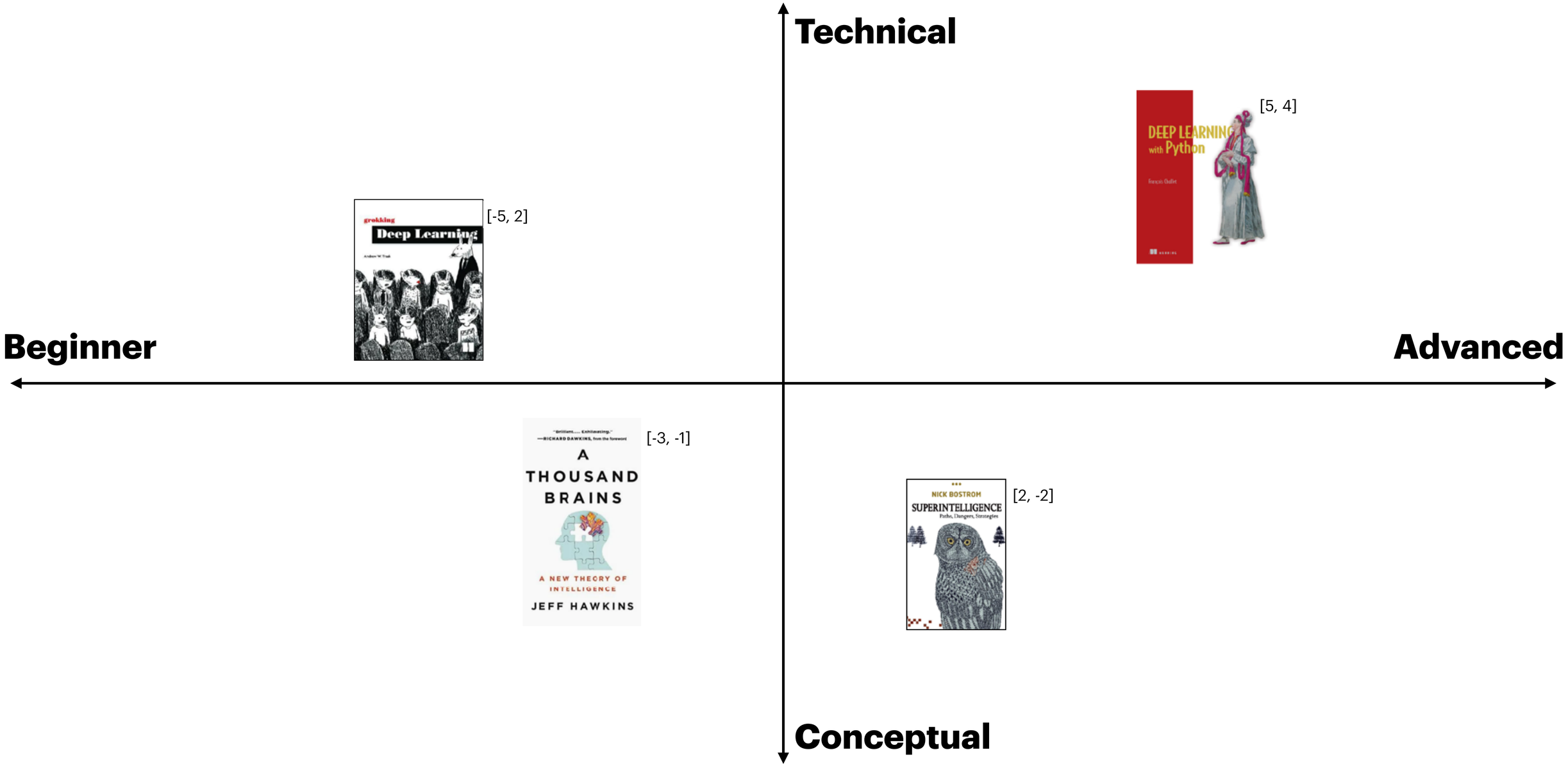
[2]



[5]

Advanced

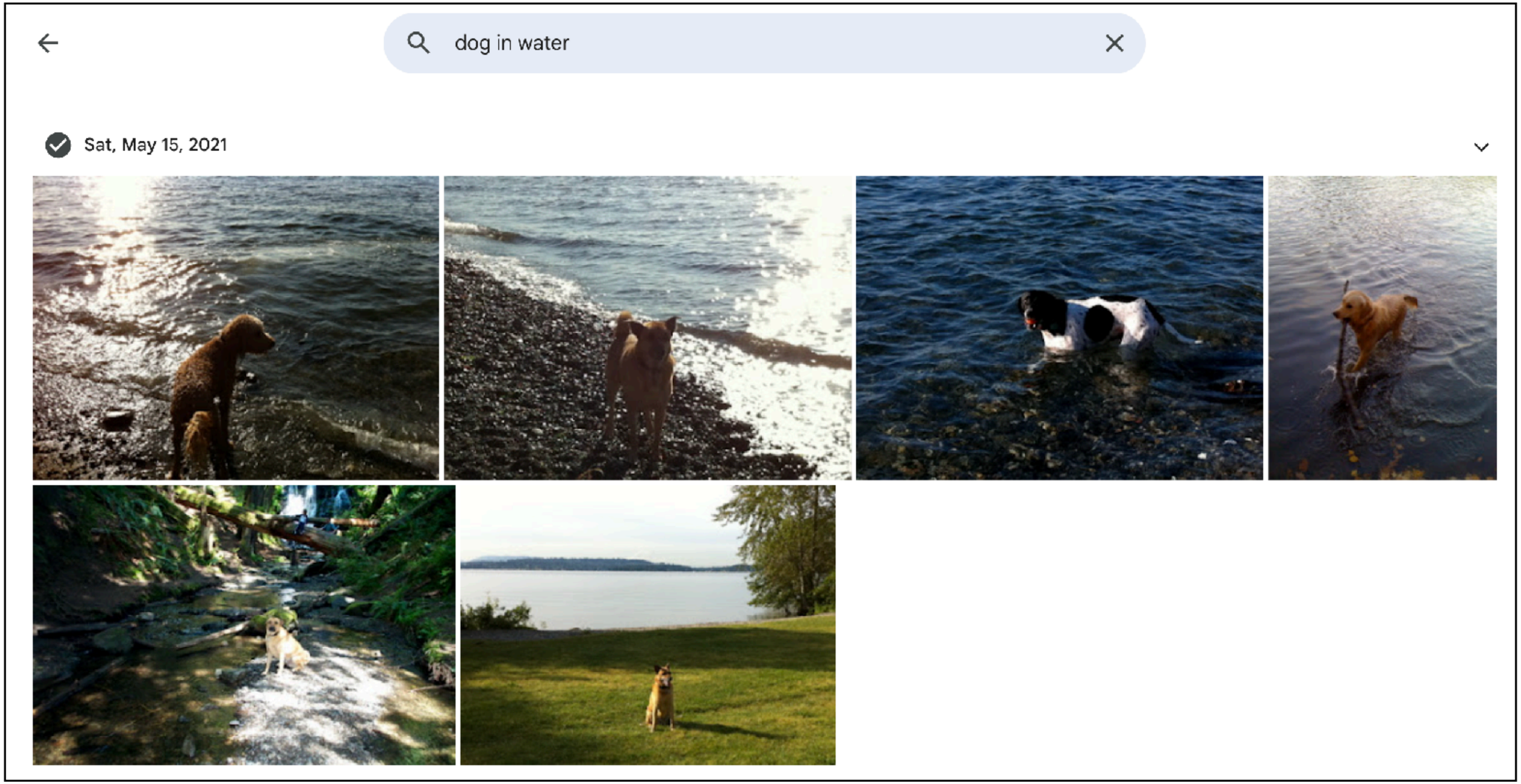
Better: 2-D Coordinate System



Even better: use N-dimensions

- **Based on the labelled training data, neural networks are able to "embed" data (words, images, video, audio) into N-dimensional space.**
- **We can represent embeddings as sequences of numbers, aka vectors:**
    - **[a0, a1, a2, ..., aN]**
- **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



Google's AI Awakening

Sign in / Sign up

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

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

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。

The New York Times Magazine

Account

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.

LLMs

For curious beginners

"I." "WANT." "HAIR!"
(IMPROVISERS GET PERSONAL)

GUIDE

Let’s think step by step: Chain of Thought prompting in LLMs

December 11, 2024

Introduction

LLMs are impressive feats of pattern recognition, able to sift through mountains of data and find connections invisible to the human eye. Yet, even with this prodigious ability, they sometimes stumble when faced with complex reasoning. They might offer a correct answer, but it's more akin to a lucky guess than genuine understanding. Chain-of-Thought prompting (CoT) offers a compelling solution to this intriguing paradox.

AI

An Intuitive Guide to How LLMs Work

Chatting by chance

OCTOBER 6, 2024

Understanding LLMs from Scratch Using Middle School Math

A self-contained, full explanation to inner workings of an LLM

Rohit Patel · Follow

Published in Towards Data Science · 40 min read · Oct 19, 2024

6.1K 78

Let’s build a chatbot!

gradio_chat.ipynb

File Edit View Insert Runtime Tools Help All changes saved

Share

+ Code + Text

RAM Disk Gemini

```
!pip install transformers
!pip install gradio
```

```
[ ] from transformers import AutoModelForCausalLM, AutoTokenizer
    import gradio as gr

    checkpoint = "HuggingFaceTB/SmolLM2-135M-Instruct"
    device = "cpu"  # "cuda" or "cpu"
    tokenizer = AutoTokenizer.from_pretrained(checkpoint)
    model = AutoModelForCausalLM.from_pretrained(checkpoint).to(device)

    def predict(message, history):
        history.append({"role": "user", "content": message})
        input_text = tokenizer.apply_chat_template(history, tokenize=False)
        inputs = tokenizer.encode(input_text, return_tensors="pt").to(device)
        outputs = model.generate(inputs, max_new_tokens=100, temperature=0.2, top_p=0.9, do_sample=True)
        decoded = tokenizer.decode(outputs[0])
        response = decoded.split("<|im_start|>assistant\n")[-1].split("<|im_end|>")[0]
        return response

    demo = gr.ChatInterface(predict, type="messages")

    demo.launch()
```

mco.fyi/chatbot

MJ

What will you imagine?

Search

berada.travel 15h

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

ar 9:16 v 6.1

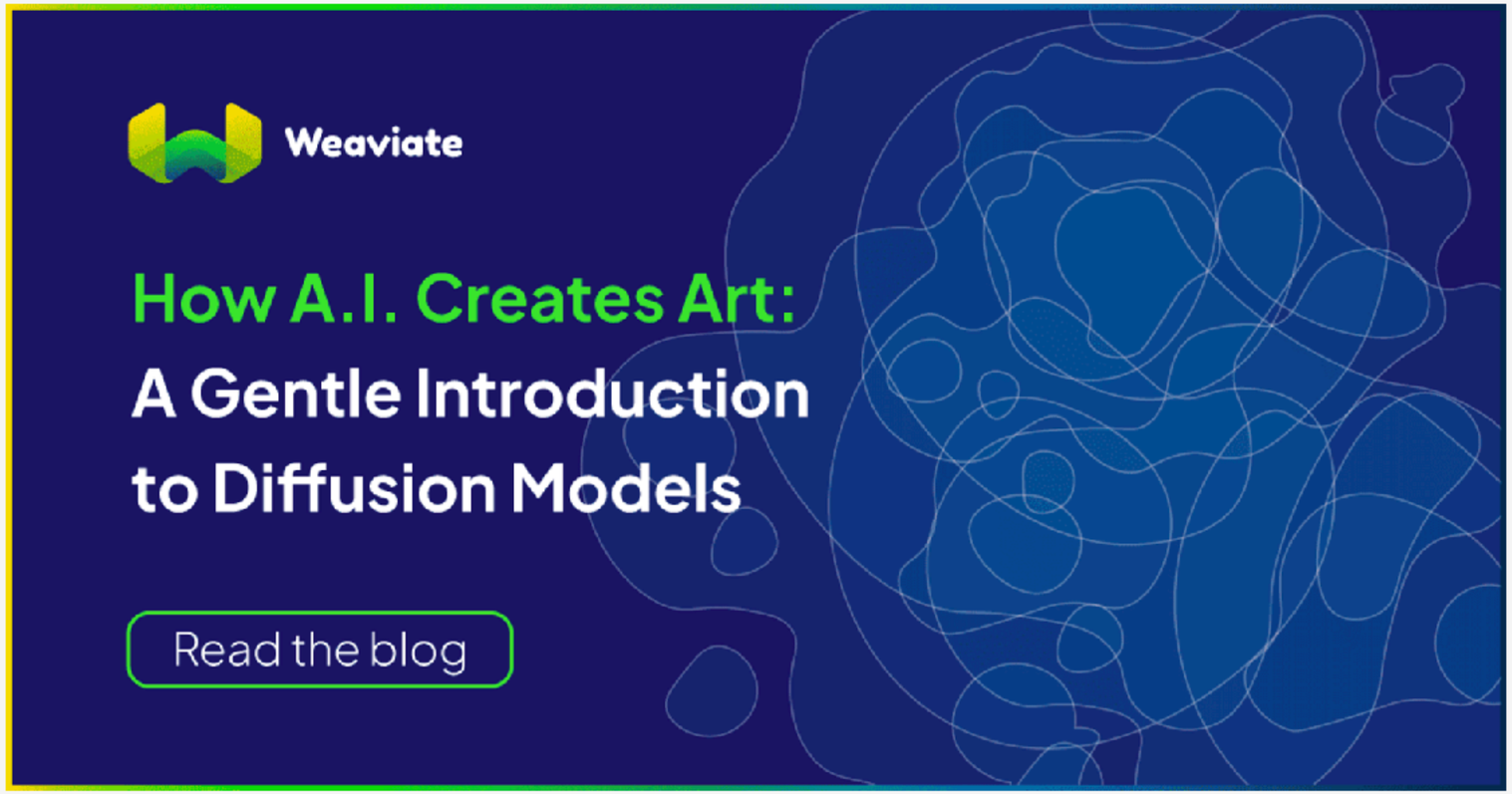
Use Image Style Prompt

How A.I. Creates Art - A Gentle Introduction to Diffusion Models

January 24, 2023 · 8 min read

Zain Hasan

Developer Advocate



How Diffusion Models Work

How Text Prompts Control the Image Generation Process

Diffusion Model Resources to Create Art

Sources and Further Reading

Diffusion Models

Let’s generate an image!

mco_stable_diffusion.ipynb

File Edit View Insert Runtime Tools Help Last saved at 20:02

+ Code + Text Connect GPU

mco.fyi/sdiff

Stable Diffusion 🎨

...using `🧨diffusers`

Stable Diffusion is a text-to-image latent diffusion model created by the researchers and engineers from CompVis, Stability AI and LAION. It's trained on 512x512 images from a subset of the LAION-5B database. This model uses a frozen CLIP ViT-L/14 text encoder to condition the model on text prompts. With its 860M UNet and 123M text encoder, the model is relatively lightweight and can run on many consumer GPUs. See the model card for more information.

This Colab notebook shows how to use Stable Diffusion with the 🤗 Hugging Face 🧨 Diffusers library.

Let's get started!

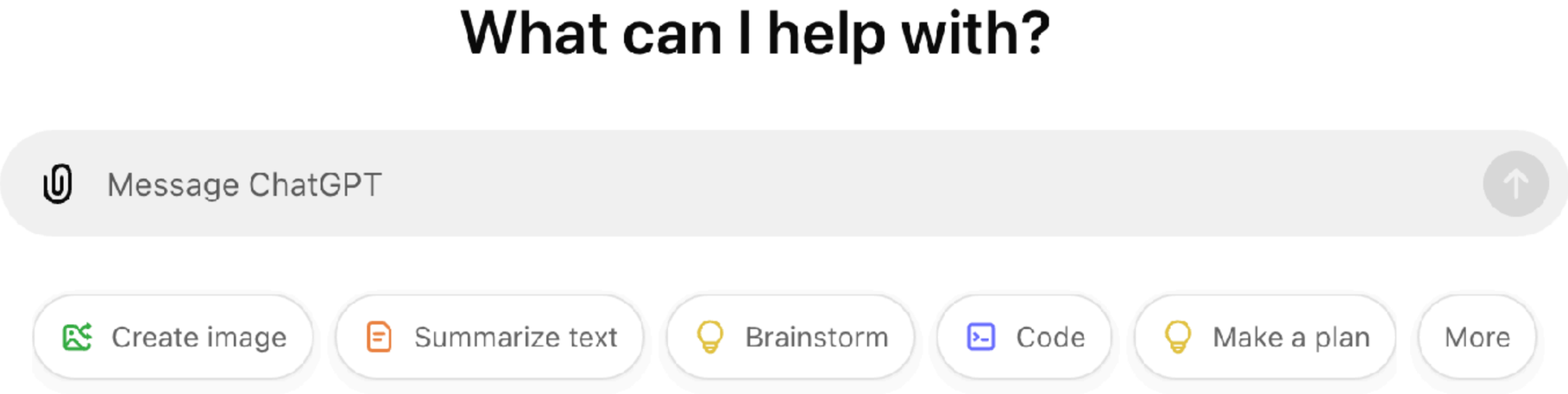
1. How to use `StableDiffusionPipeline`

Before diving into the theoretical aspects of how Stable Diffusion functions, let's try it out a bit 🤗.

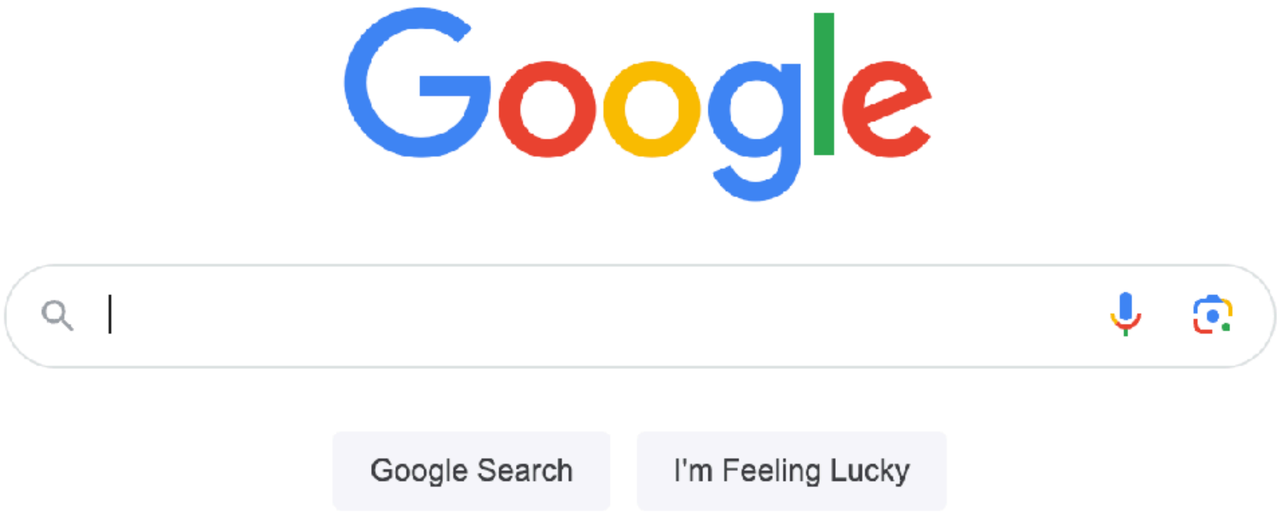
In this section, we show how you can run text to image inference in just a few lines of code!

State of the Art

Answering Questions



Does that look familiar?



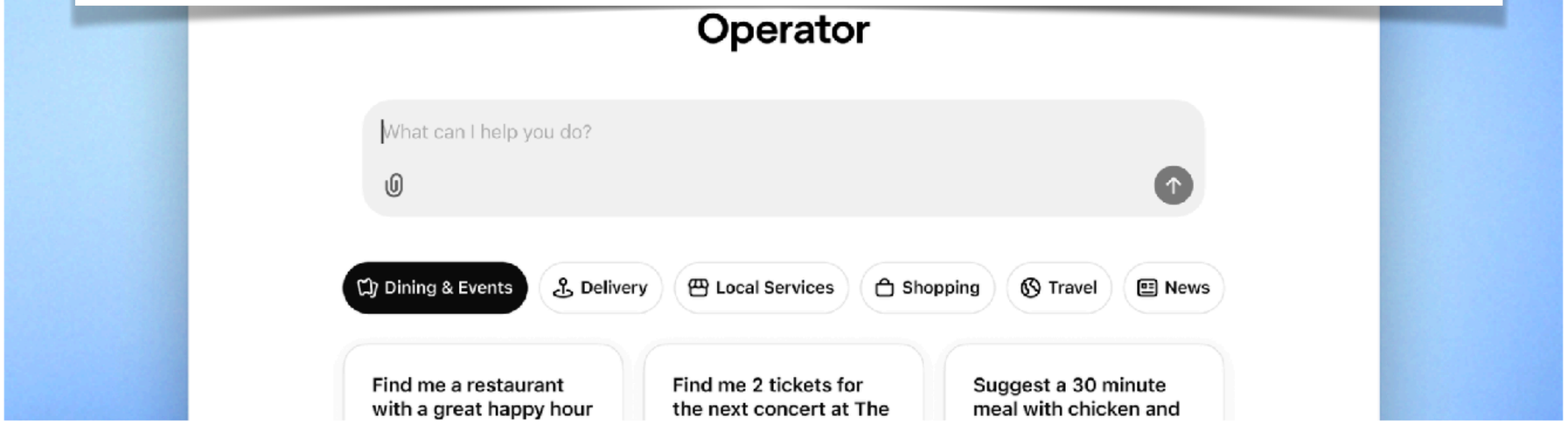
OpenAI Unveils A.I. Agent That Can Use Websites on Its Own

The new tool, called Operator, can shop for groceries or book a restaurant reservation. But it still needs help from humans.

Listen to this article · 3:40 min Learn more

Share full article

"This is not the most robust thing in the world," he said. "But it is way better than this kind of technology used to be."



Google

what is a transformer in machine learning

All Images Videos Web News Books Maps More Tools

AI Overview

Learn more

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.

How transformers work

1. Transformers learn context by tracking relationships between elements in a sequence.

Transformers in Artificial Intelligence - AWS

Transformers are a type of neural network architecture that transforms or changes an…

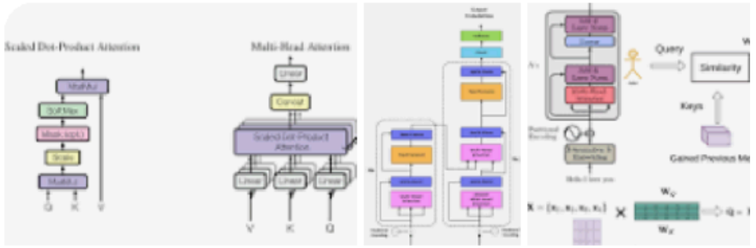
AWS

What Is a Transformer Model? - NVIDIA Blog

25 Mar 2022 — So, What's a Transformer Model? A transformer model is a neural…

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.



Generating Text

A Student's Guide to
Writing with ChatGPT

Text to Software

ChatGPT 4o >

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.

How the pros do it

GITHUB COPILOT: CHAT

monalisa

Write unit tests for this function

GitHub Copilot

```python
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-
        expected_output = [(datetime.datetime(2023, 1, 2)
        self.assertEqual(parse_expenses(expenses_string),

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

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

The code assumes that the datetime module is imported. The test cases cover different scenarios such as valid input, empty input, input with comments, invalid date format, and invalid value format.

Ask a question or type '/' for commands

parse_expenses.py | addresses.rb | sentiments.ts

```python
import datetime

def parse_expenses (expenses_string):
    """Parse the list of expenses and return the list of triples (date, amount, currency
    Ignore lines starting with #.
    Parse the date using datetime.
    Example expenses_string:
        2023-01-02 -34.01 USD
        2023-01-03 2.59 DKK
        2023-01-03 -2.72 EUR
    """
    expenses = []

    for line in expenses_string.splitlines():
        if line.startswith("#"):
            continue
        date, value, currency = line.split (" ")
        expenses.append((datetime.datetime.strptime (date, "%Y-%m-%d"),
                         float (value),
                         currency))
        return expenses

expenses_data = '''2023-01-02 -34.01 USD
                2023-01-03 2.59 DKK
                2023-01-03 -2.72 EUR'''
```

Pair Programming

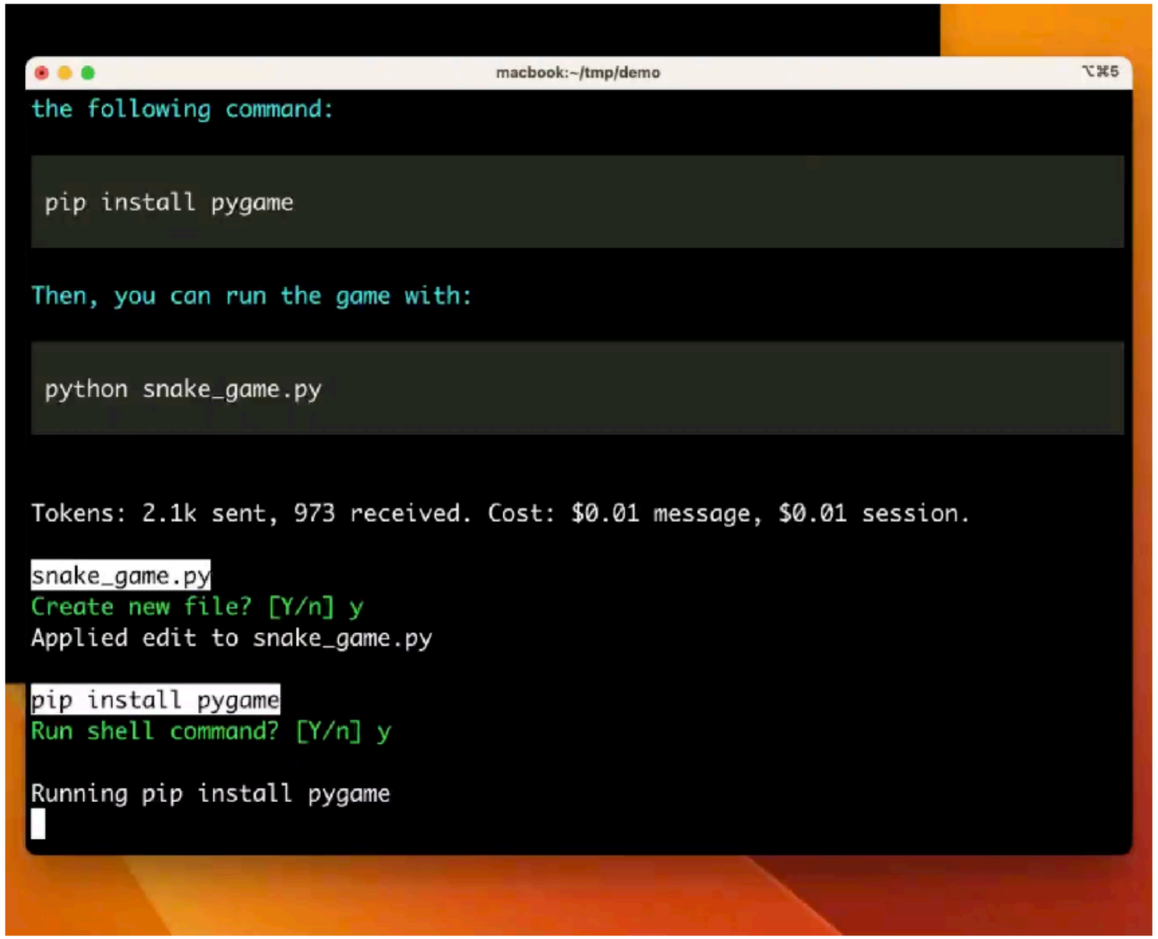
aider

- Home
- Installation
- Usage
- Connecting to LLMs
- Configuration
- Troubleshooting
- Example chat transcripts
- More info
- FAQ
- Release history
- Aider LLM Leaderboards
- Aider blog
- GitHub
- Discord

Aider is AI pair programming in your terminal. Aider is on GitHub and Discord.

Aider is AI pair programming in your terminal

Aider lets you pair program with LLMs, to edit code in your local git repository. Start a new project or work with an existing code base. Aider works best with Claude 3.5 Sonnet, DeepSeek V3, o1 & GPT-4o and can connect to almost any LLM.



Join Discord Read Docs

Thoughts On A Month With Devin

BLOG

Our impressions of Devin after giving it 20+ tasks.

Conclusion

Working with Devin showed what autonomous AI development aspires to be. The UX is polished - chatting through Slack, watching it work asynchronously, seeing it set up environments and handle dependencies. When it worked, it was impressive.

But that's the problem - it rarely worked. Out of 20 tasks we attempted, we saw 14 failures, 3 inconclusive results, and just 3 successes. More concerning was our inability to predict which tasks would succeed. Even tasks similar to our early wins would fail in complex, time-consuming ways. The autonomous nature that seemed promising became a liability - Devin would spend days pursuing impossible solutions rather than recognizing fundamental blockers.

AUTH
Hame
Isaac
Johno

In Ma n
Serie thers,
Elad le that
solve sed to
be a fully autonomous software engineer that could chat with you like a human colleague, capable of everything from learning new technologies and debugging mature codebases to deploying full applications and even training AI models.

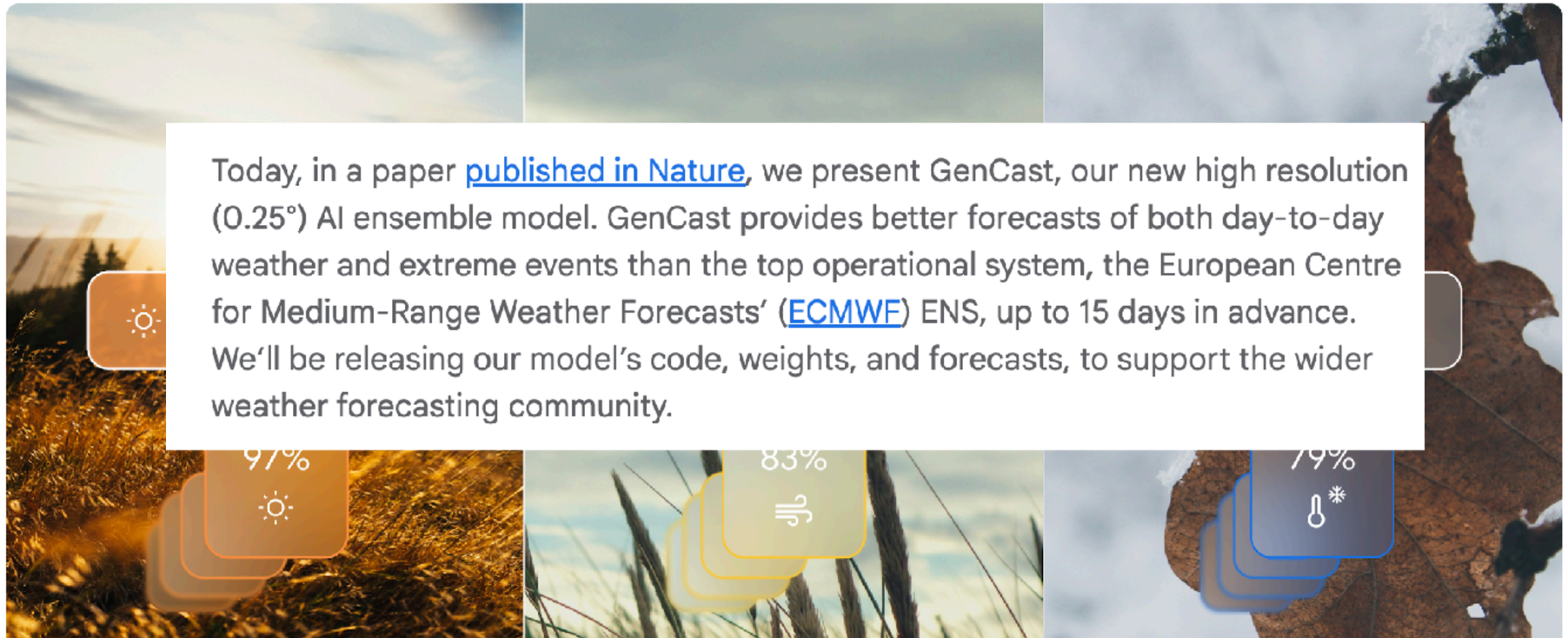
Weather Prediction

GenCast predicts weather and the risks of extreme conditions with state-of-the-art accuracy

4 DECEMBER 2024

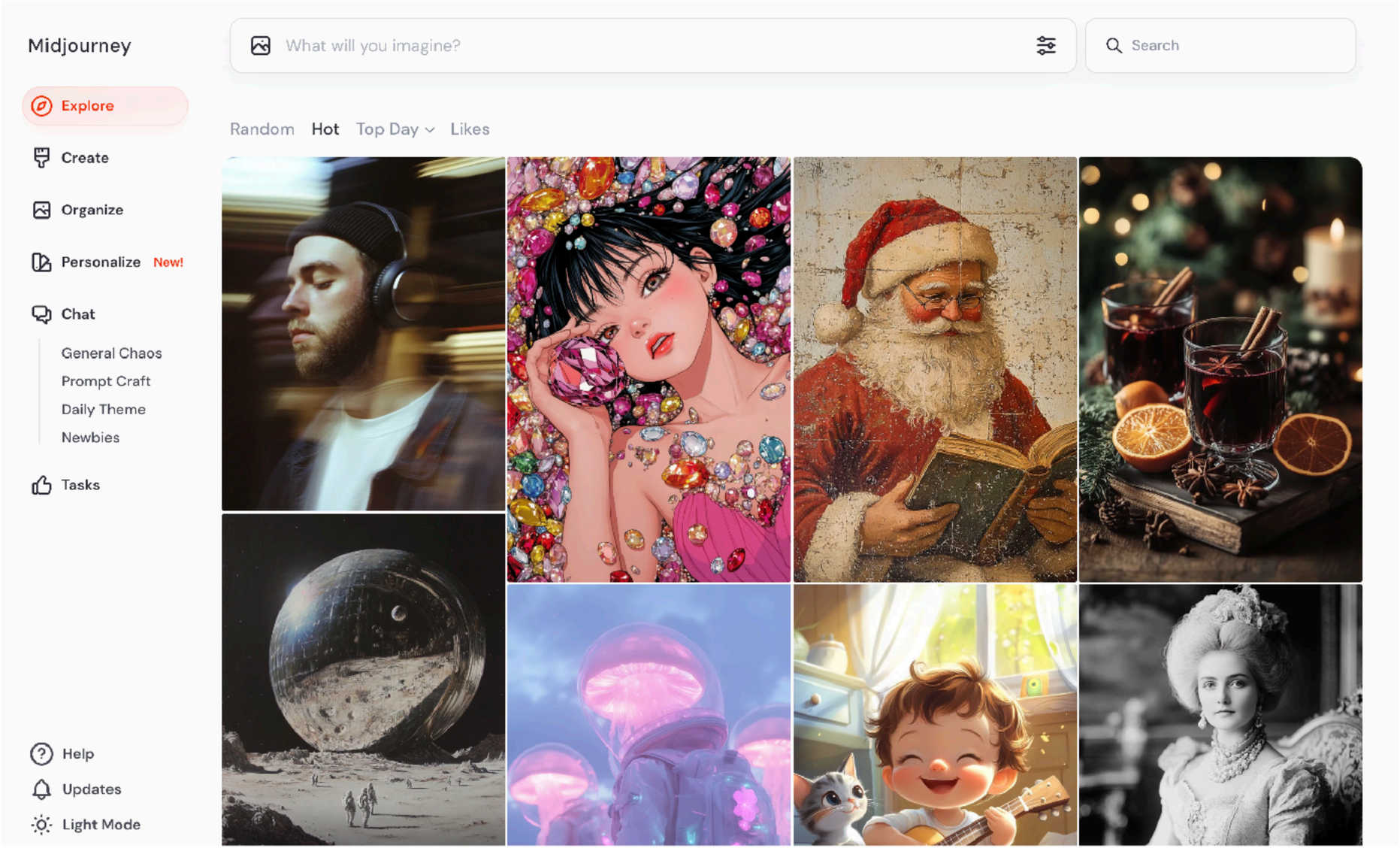
Ilan Price and Matthew Willson

Share



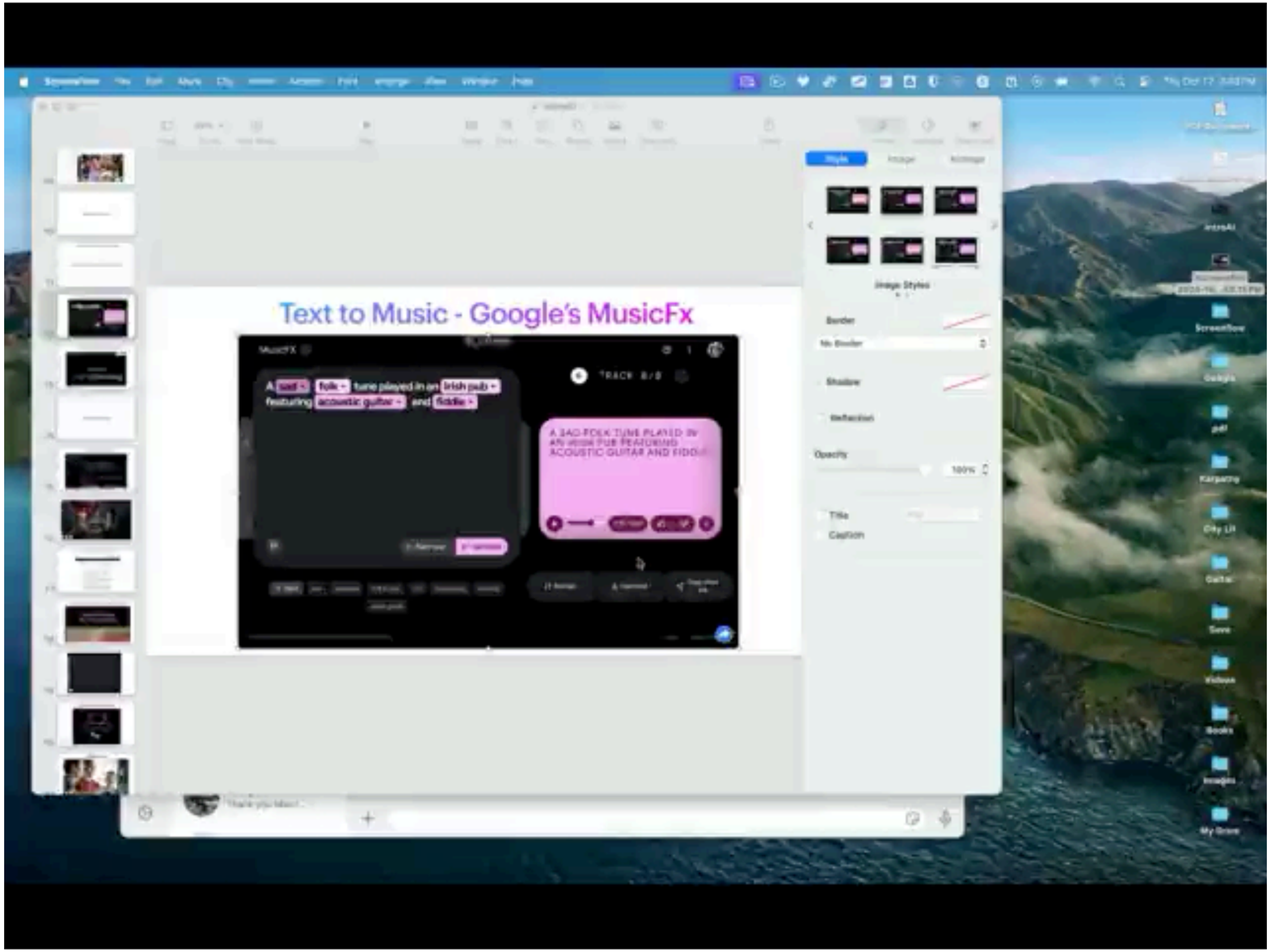
Today, in a paper published in Nature, we present GenCast, our new high resolution (0.25°) AI ensemble model. GenCast provides better forecasts of both day-to-day weather and extreme events than the top operational system, the European Centre for Medium-Range Weather Forecasts' (ECMWF) ENS, up to 15 days in advance. We'll be releasing our model's code, weights, and forecasts, to support the wider weather forecasting community.

Text to Image - Midjourney



Text to Speech - ElevenLabs

Text to Music - Google's MusicFx



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 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

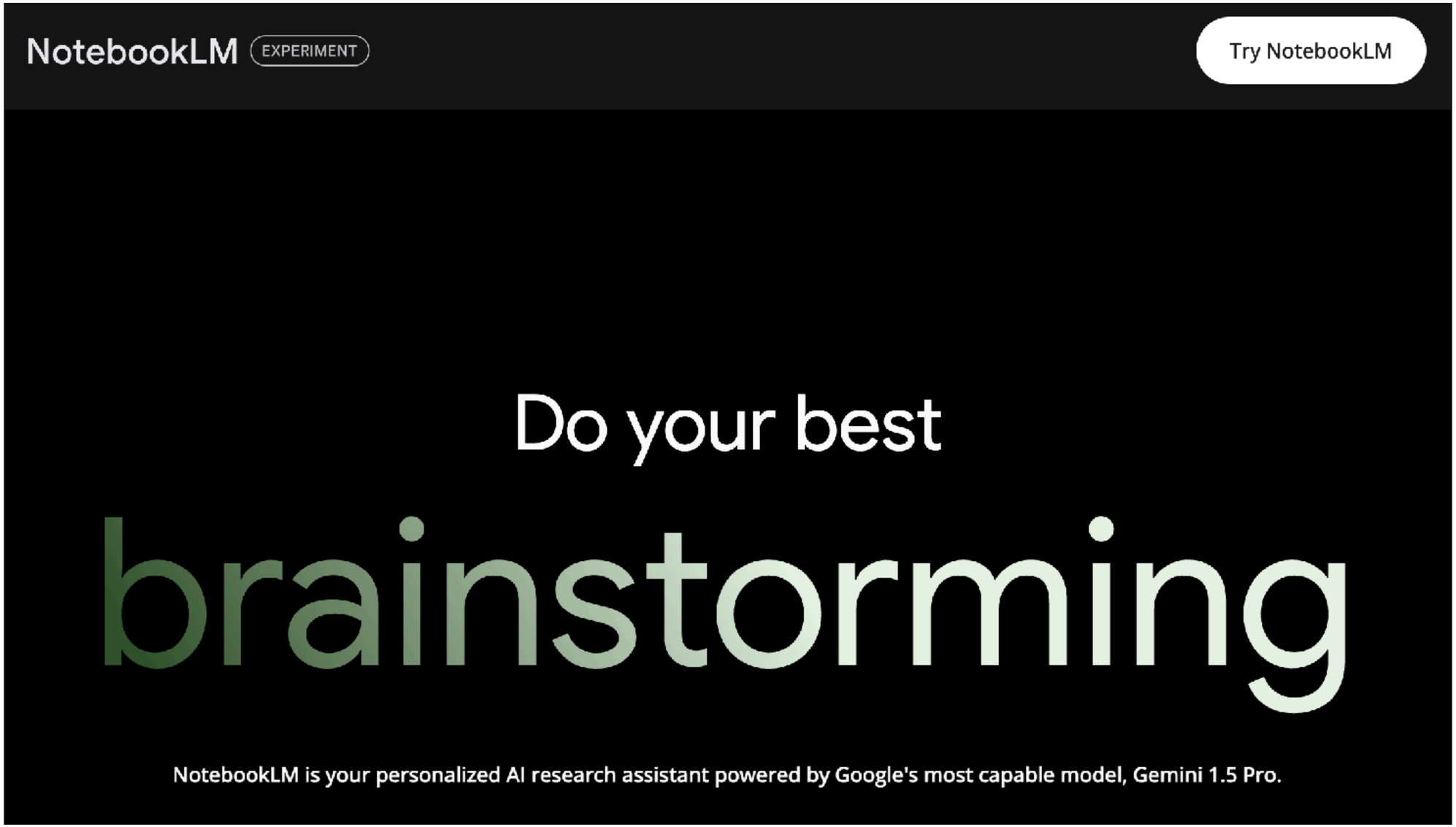
Gamahea = Udio.com/creators/songofthespheres | https://GamaheaMusic.com

Description

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

110 Credits

Text to Audio - NotebookLM



Chat

Transformer Deep Learning Architecture: A Comprehensive Overview

1 source

Transformers are a type of deep learning architecture that has become foundational in the field of machine learning. **Originating from the "Attention is All You Need" paper, they utilize a multi-head attention mechanism** to model relationships in data. **This architecture has surpassed recurrent neural networks in many tasks** due to its ability to process information in parallel. **Transformers are used in various applications including natural language processing, computer vision, and even fields like protein folding and game playing. Subsequent innovations focus on improving efficiency and adapting the architecture for different data types and tasks.** This has led to a diverse ecosystem of transformer-based models.

Text to Video - Runway

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

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).

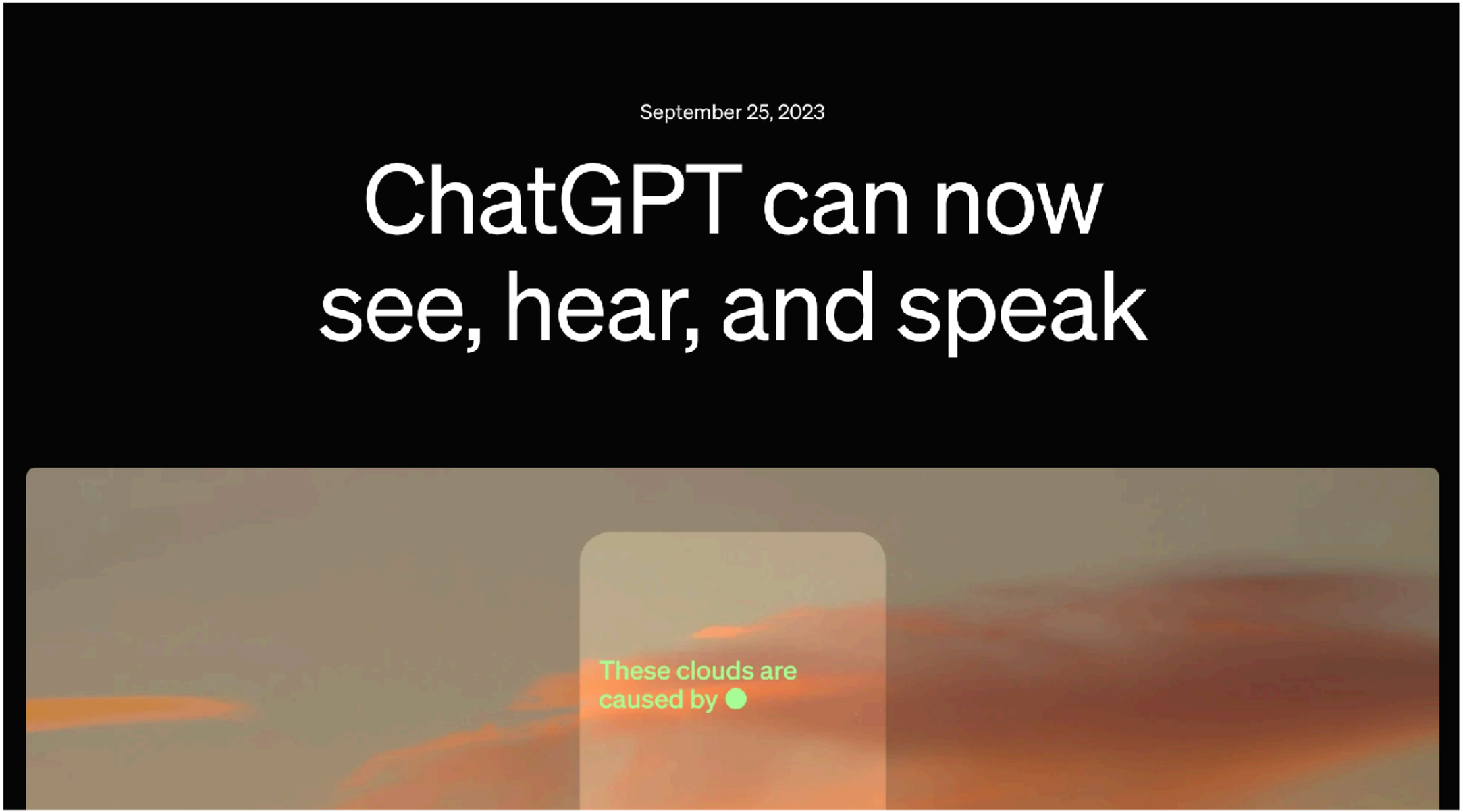
AI is being used to collect and track people's data. This data is then used for targeted advertising, identity theft, and other malicious purposes. The Biden Administration has recently unveiled a blueprint for an AI Bill of Rights to protect people's personal data and limit surveillance.

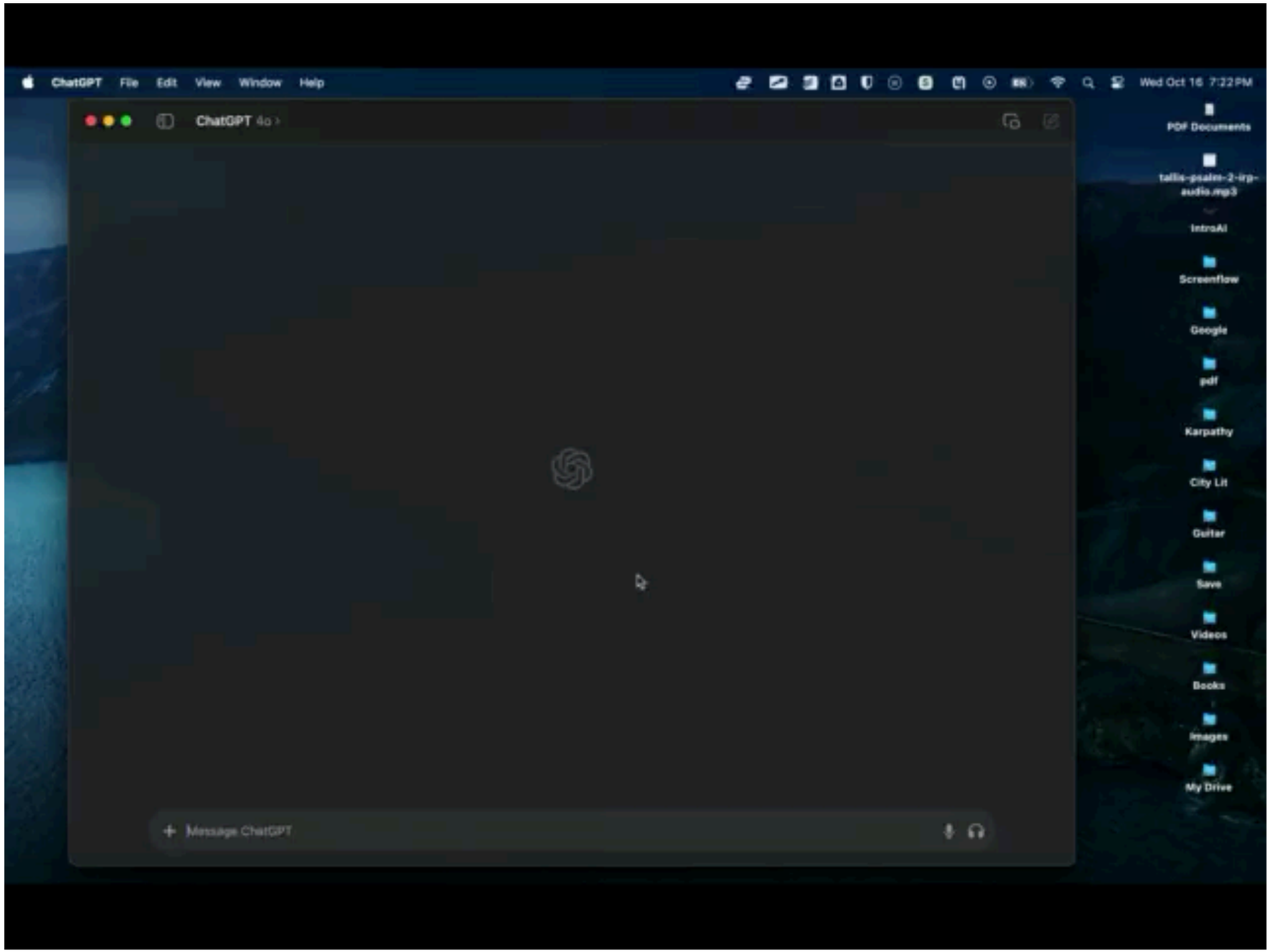
Cybersecurity analyst Julio Rivera believes that AI poses a serious threat to privacy. He says that people are living online and opting into data collection without realizing the risks. He also says that the government is collecting data on people's conversations and monitoring their homes.

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

Multimedia to Multimedia



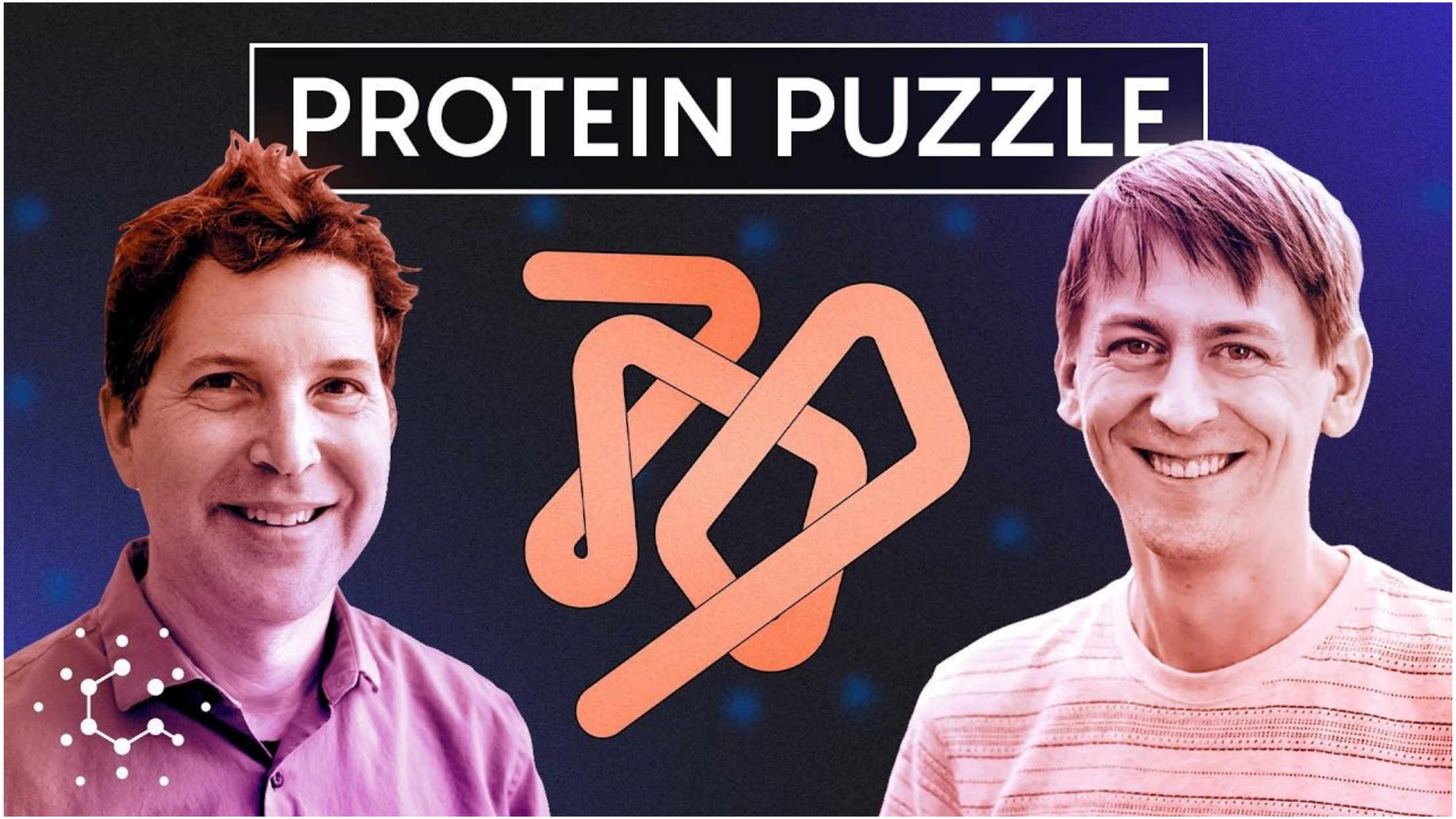

ChatGPT File Edit View Window Help
Wed Oct 16 7:22 PM
ChatGPT 4o
Message ChatGPT
PDF Documents
tallis-psalm-2-irp-audio.mp3
IntroAI
Screenflow
Google
pdf
Karpathy
City Lit
Guitar
Save
Videos
Books
Images
My Drive

AlphaGo

0:00 - 2:00

AlphaZero

AlphaFold


PROTEIN PUZZLE

AlphaFold is Open Source

github.com/google-deepmind/alphafold

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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
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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

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.

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

“With great power comes great responsibility”

Discussion topic:

What are some of your concerns about AI?

Here’s my 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.

Privacy

11661
11662
11667
11676
11628
11684
11648
11653
11663

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

Generative AI at Work*

Erik Brynjolfsson
Stanford & NBER

Danielle Li
MIT & NBER

Lindsey Raymond
MIT

April 25, 2023

Please see here for latest version

Abstract

We study the staggered introduction of a generative AI-based conversational assistant using data from 5,179 customer support agents. Access to the tool increases productivity, as measured by issues resolved per hour, by 14 percent on average, with the greatest impact on novice and low-skilled workers, and minimal impact on experienced and highly skilled workers. We provide suggestive evidence that the AI model disseminates the potentially tacit knowledge of more able workers and helps newer workers move down the experience curve. In addition, we show that AI assistance improves customer sentiment, reduces requests for managerial intervention, and improves employee retention.

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

122

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.

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
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

The 19th-Century Technology That Threatens A.I.

Dec. 28, 2024

Illustration by Kristie Bailey/The New York Times. Photographs by Getty Images.

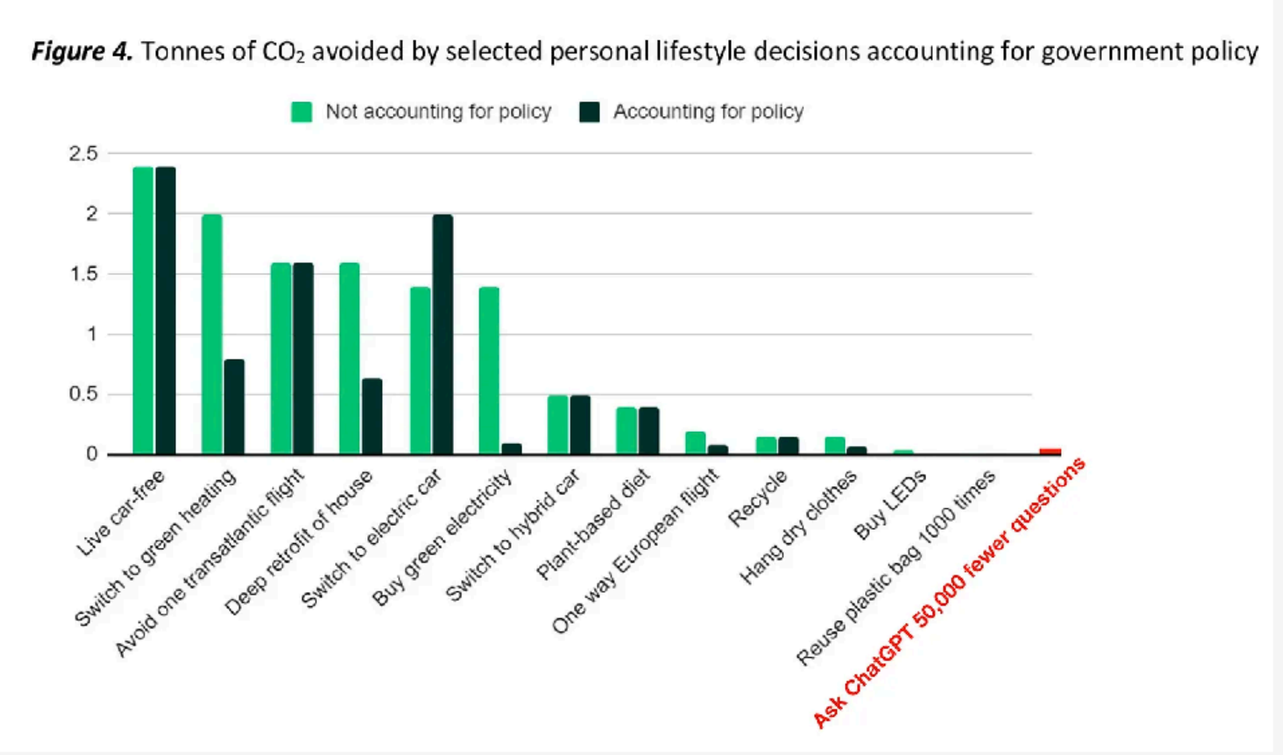
Using ChatGPT is not bad for the environment

And a plea to think seriously about climate change without getting distracted

ANDY MASLEY
JAN 13, 2025

34 33 5 Share

If you don't have time to read this post, these four graphs give most of the argument:



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.

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.

Recommended Listening

The Future

Where is all this going?

Photo by Mathilda Khoo on Unsplash

Things we learned about LLMs in 2024

A *lot* has happened in the world of Large Language Models over the course of 2024. Here's a review of things we figured out about the field in the past twelve months, plus my attempt at identifying key themes and pivotal moments.

This is a sequel to my review of 2023.

In this article:

- The GPT-4 barrier was comprehensively broken
- Some of those GPT-4 models run on my laptop
- LLM prices crashed, thanks to competition and increased efficiency
- Multimodal vision is common, audio and video are starting to emerge
- Voice and live camera mode are science fiction come to life
- Prompt driven app generation is a commodity already
- Universal access to the best models lasted for just a few short months
- "Agents" still haven't really happened yet
- Evals really matter
- Apple Intelligence is bad, Apple's MLX library is excellent
- The rise of inference-scaling "reasoning" models
- Was the best currently available LLM trained in China for less than $6m?

This is **Things we learned about LLMs in 2024** by Simon Willison, posted on 31st December 2024.

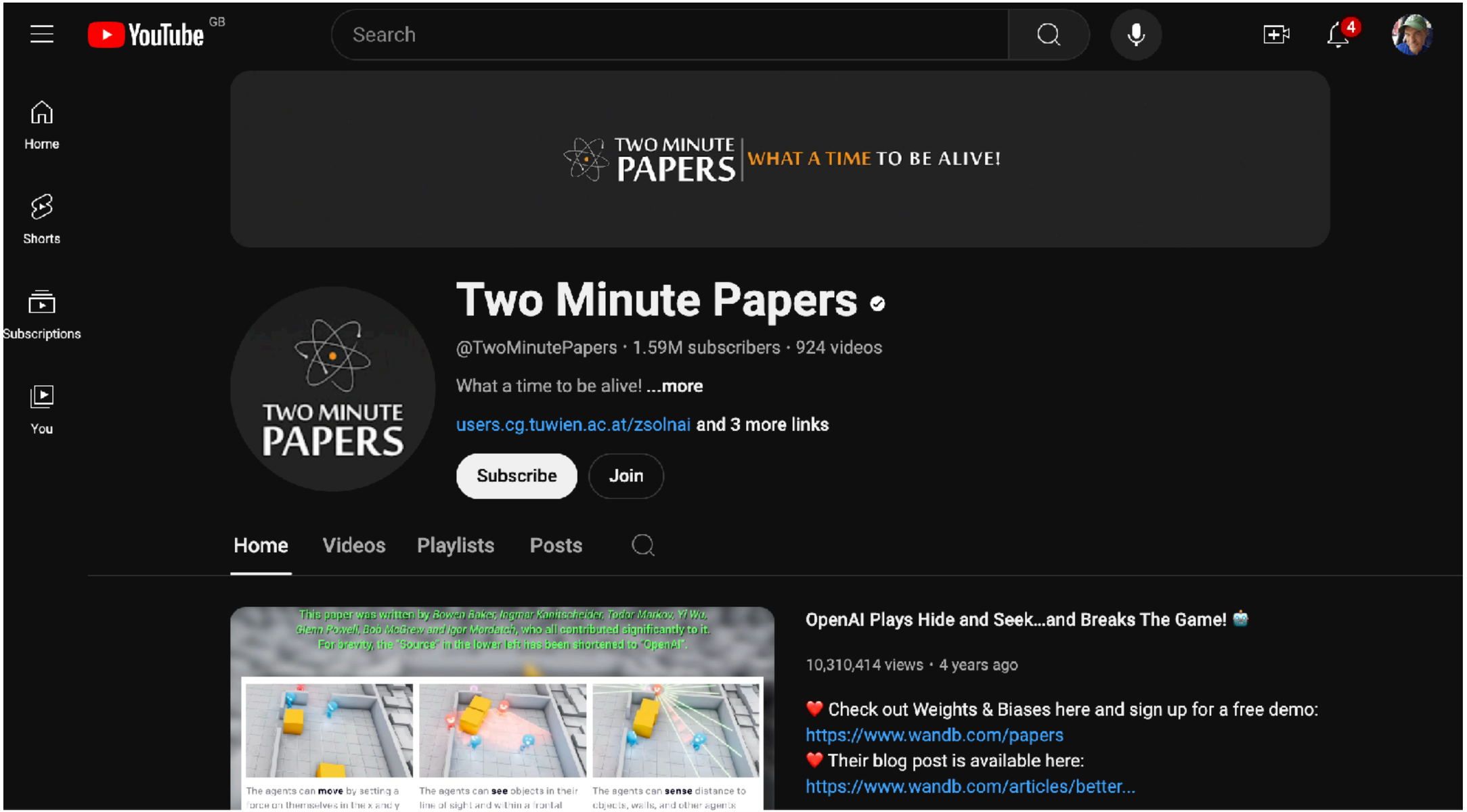
Part of series **LLMs annual review**

1. Stuff we figured out about AI in 2023 - Dec. 31, 2023, 11:59 p.m.
2. **Things we learned about LLMs in 2024** - Dec. 31, 2024, 6:07 p.m.

google 344 ai 1021 openai 239 generative-ai 873 llms 864 anthropic 104 gemini 52 meta 25 inference-scaling 14

Next: Ending a year long posting streak

Previous: Trying out QvQ - Qwen's new visual reasoning model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What a time to be alive! ...more
users.cg.tuwien.ac.at/zsolnai and 3 more links
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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
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STATE OF AI REPORT.

October 10, 2024

Nathan Benaich

AIR STREET CAPITAL.

stateof.ai

airstreet.com

THE AI INDEX REPORT

Measuring trends in AI

Artificial Intelligence Index Report 2024

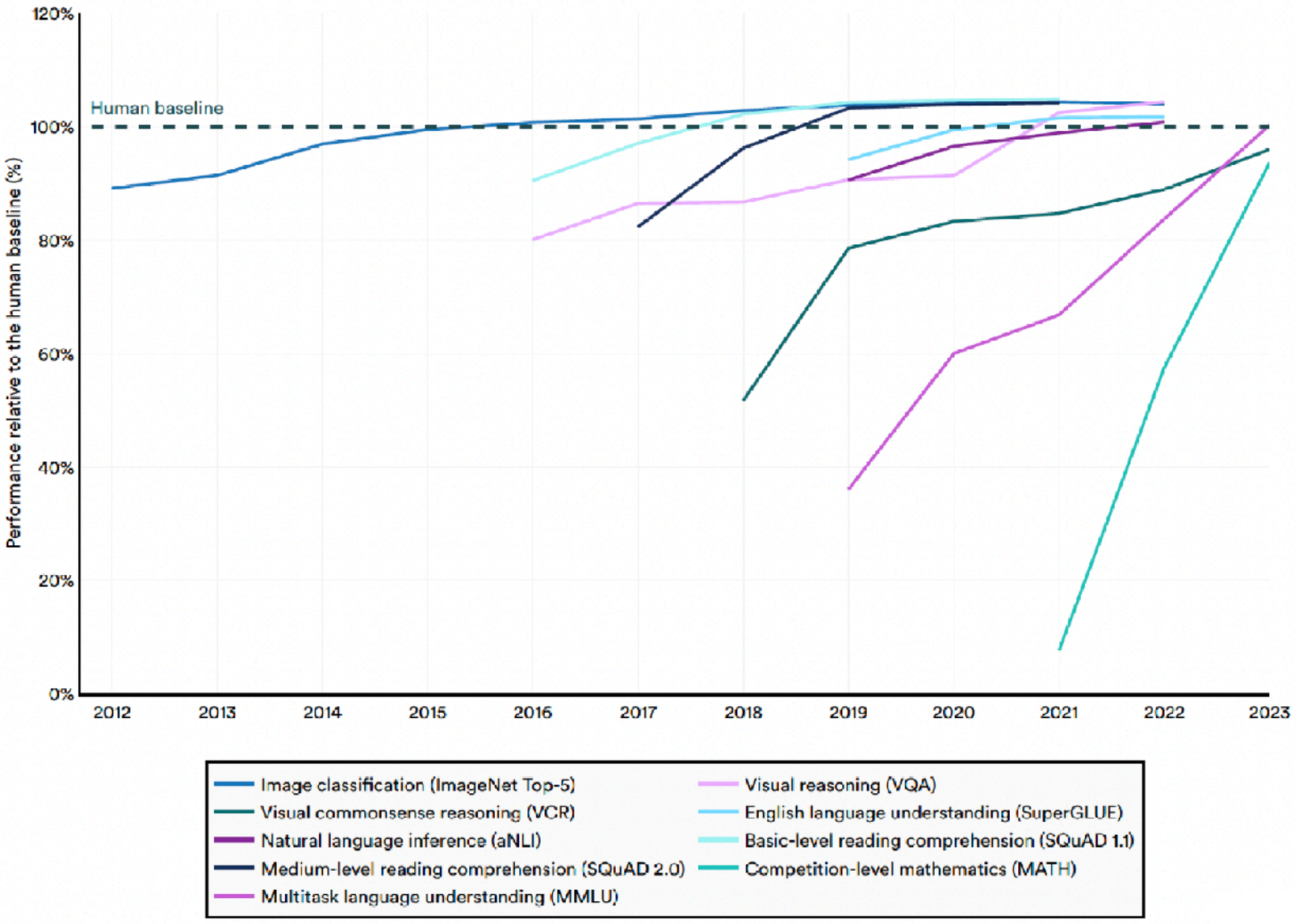
AI INDEX ANNUAL REPORT

Welcome to the 2024 AI Index Report

DOWNLOAD THE FULL REPORT

Welcome to the seventh edition of the AI Index report. The 2024 Index is our most comprehensive to date and arrives at an important moment when AI's influence on society has never been more pronounced. This year, we have broadened our scope to more extensively cover essential trends such as technical advancements in AI, public perceptions of the

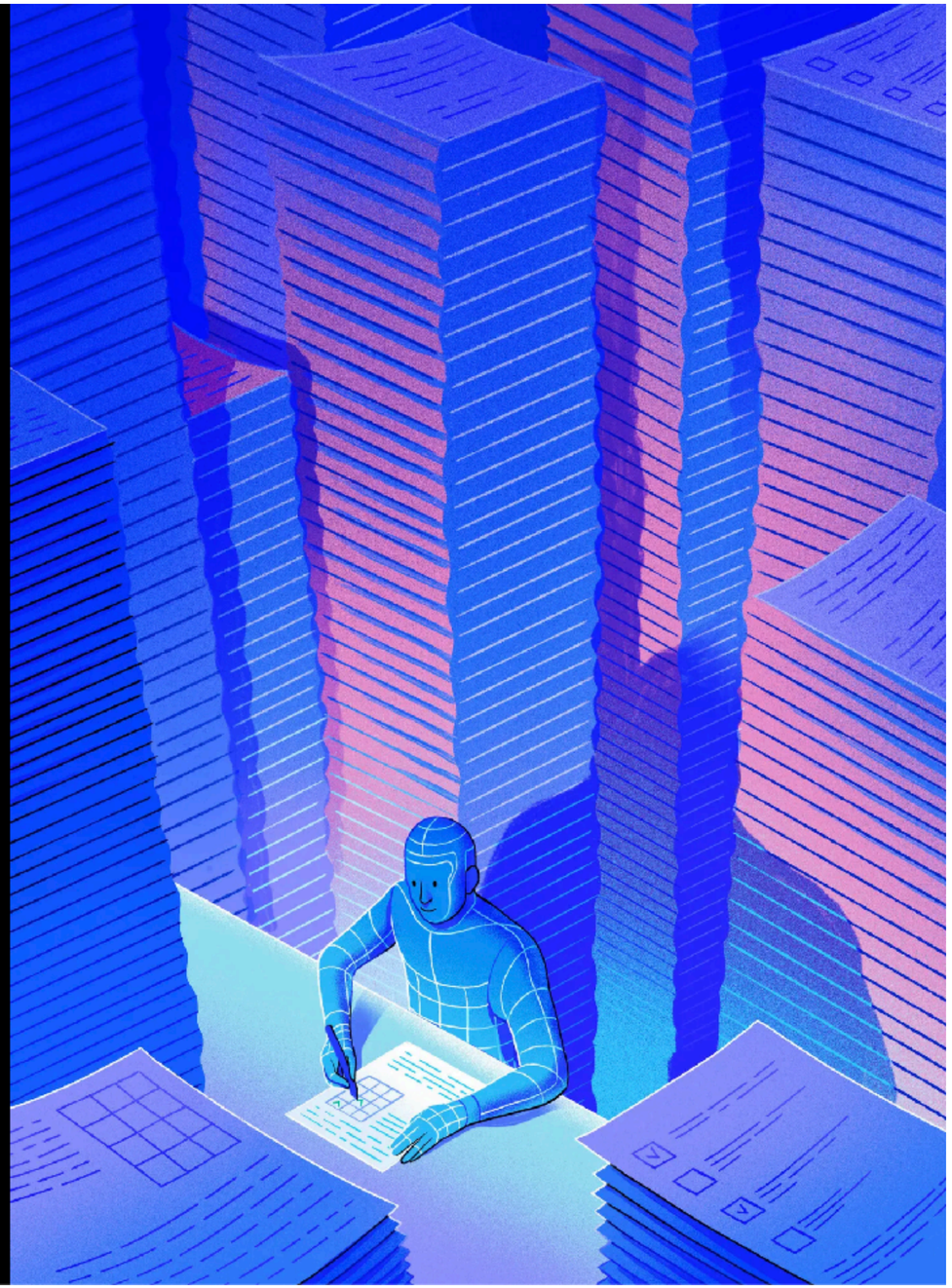
Select AI Index Technical Performance Benchmarks vs. Human Performance



THE SHIFT

When A.I. Passes This Test, Look Out

The creators of a new test called “Humanity’s Last Exam” argue we may soon lose the ability to create tests hard enough for A.I. models.



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.

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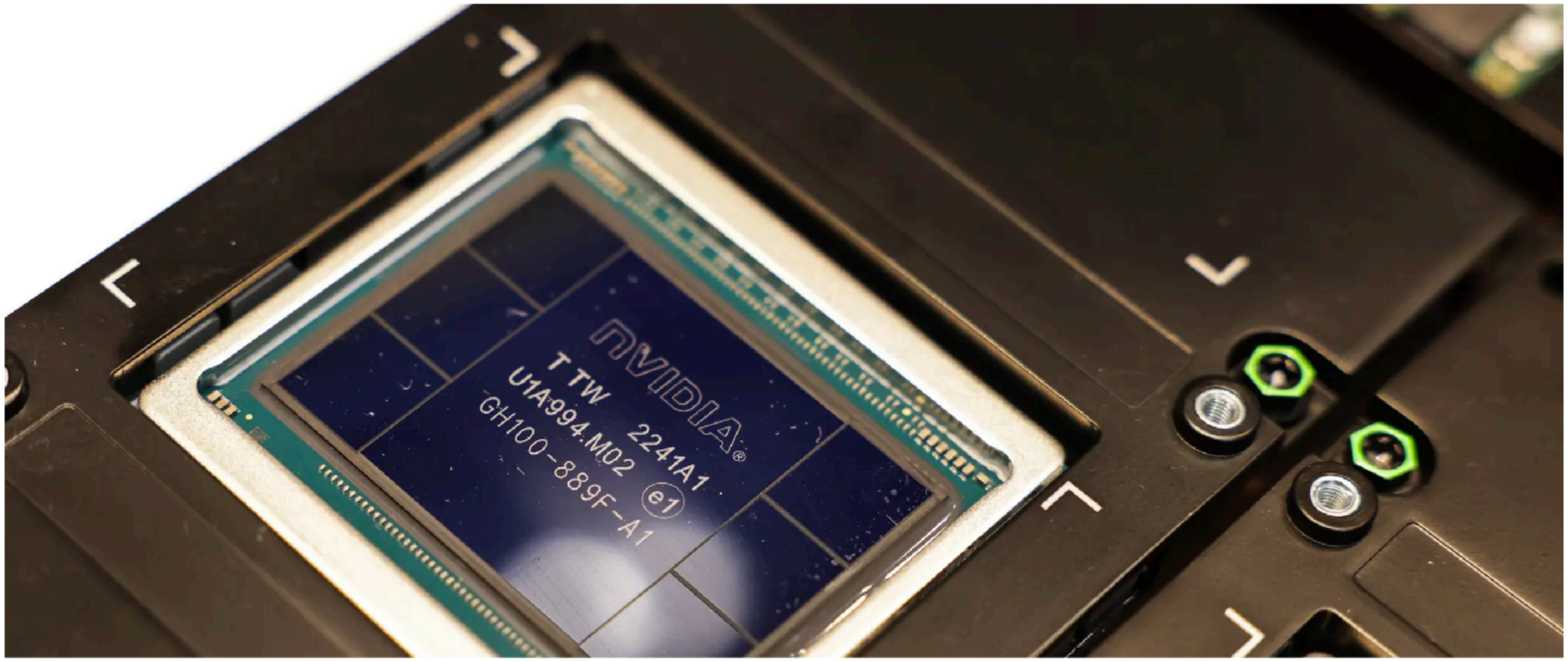

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Open-R1: a fully open reproduction of DeepSeek-R1

▲ Upvote 93

+81

Published January 28, 2025

Update on GitHub

eliebak
Elie Bakouch

lvwerra
Leandro von Werra

lewtun
Lewis Tunstall

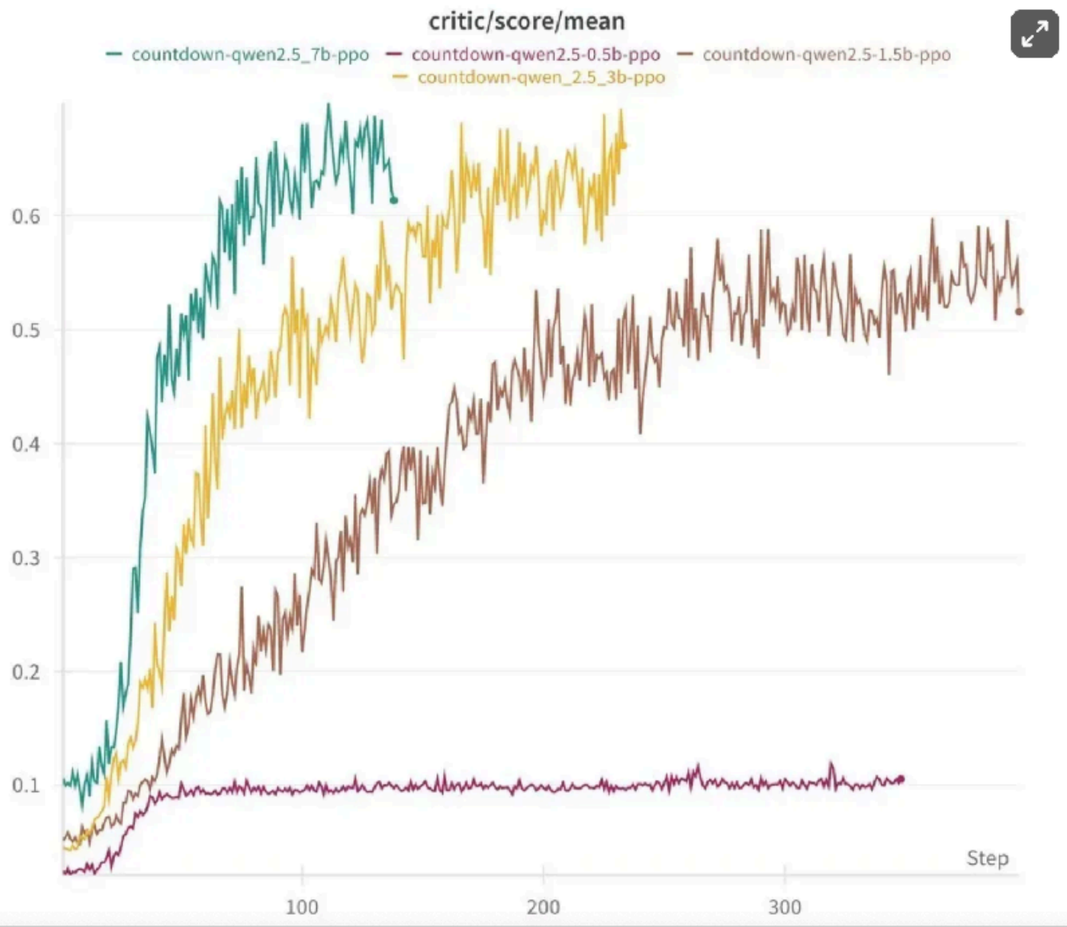
What is DeepSeek-R1?

If you've ever struggled with a tough math problem, you know how useful it is to think a little longer and work through it carefully. OpenAI's o1 model showed that when LLMs are trained to do the same—by using more compute during inference—they get significantly better at solving reasoning tasks like mathematics, coding, and logic.

Berkeley Researchers Replicate DeepSeek R1's Core Tech for Just $30: A Small Model RL Revolution

XYZ LABS
JAN 26, 2025

12 5 1 Share



LLM

DeepSeek and the Effects of GPU Export Controls

January 23, 2025 by Vincent Schmalbach

Last week, DeepSeek unveiled their V3 model, trained on just 2,048 H800 GPUs - a fraction of the hardware used by OpenAI or Meta. DeepSeek claims their model matches or exceeds several benchmarks set by GPT-4 and Claude

What's interesting isn't just the results, but how they got there.

The Numbers Game

Let's look at the raw figures:

- Training cost: $5.5M (vs $40M for GPT-4)
- GPU count: 2,048 H800s (vs estimated 20,000+ H100s for major labs)
- Parameters: 671B
- Training: 2.788M GPU hours

Recent research shows model training costs growing by 2.4x annually since 2016. Everyone assumed you needed massive GPU clusters to compete at the frontier. DeepSeek suggests otherwise.

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?
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 is education and regulation.
4. **Are we doomed?**
   - Geoff Hinton’s view

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.

Listen to this article · 3:38 min Learn more

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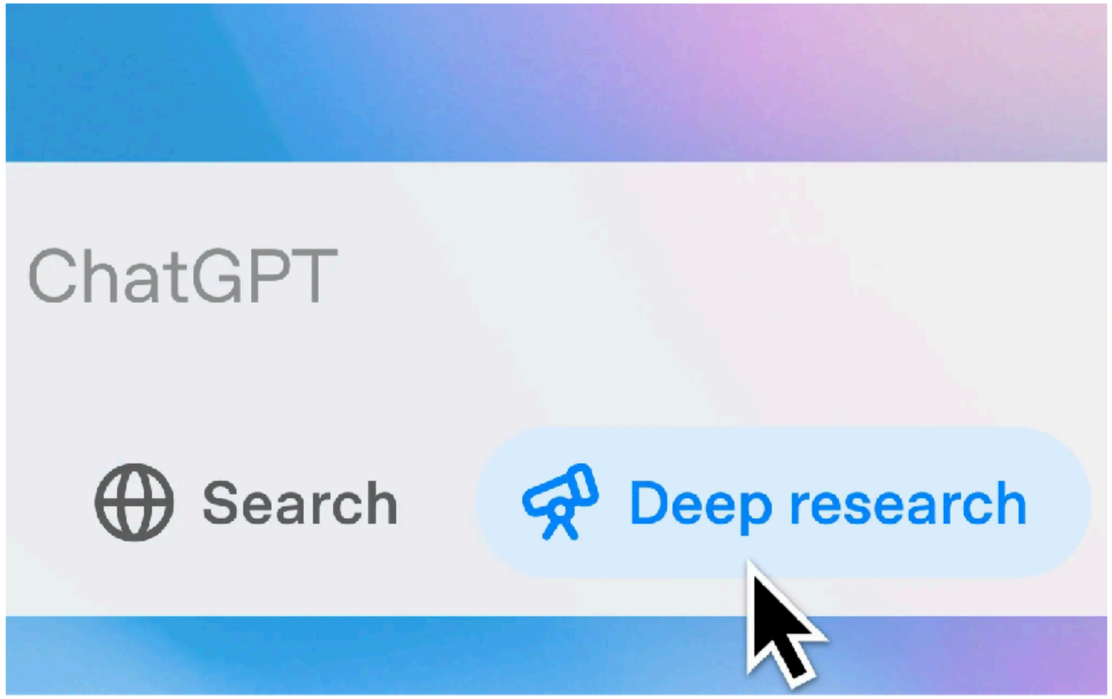


“There are very few examples of more intelligent things being controlled by less intelligent things”

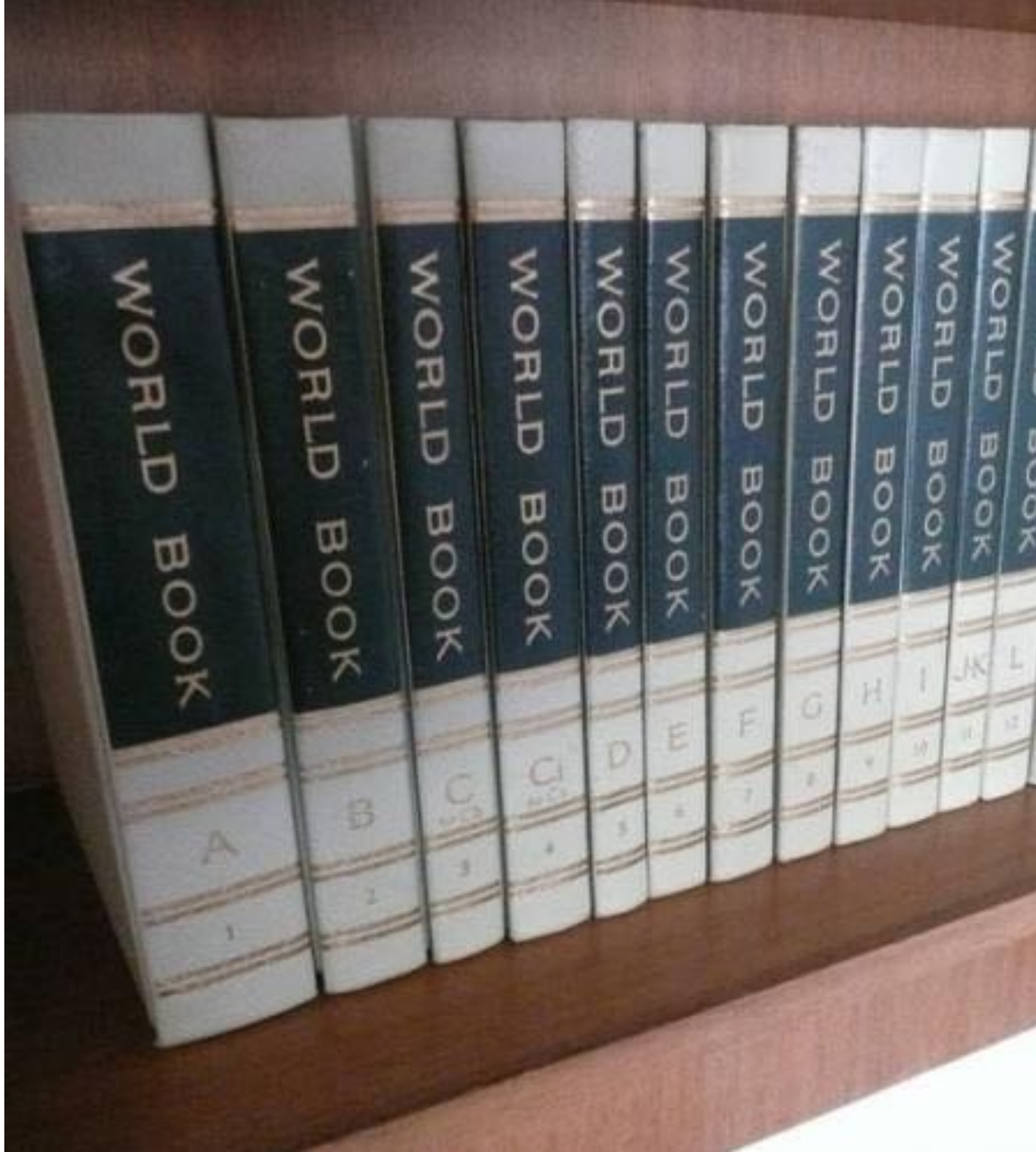
- Geoff Hinton

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

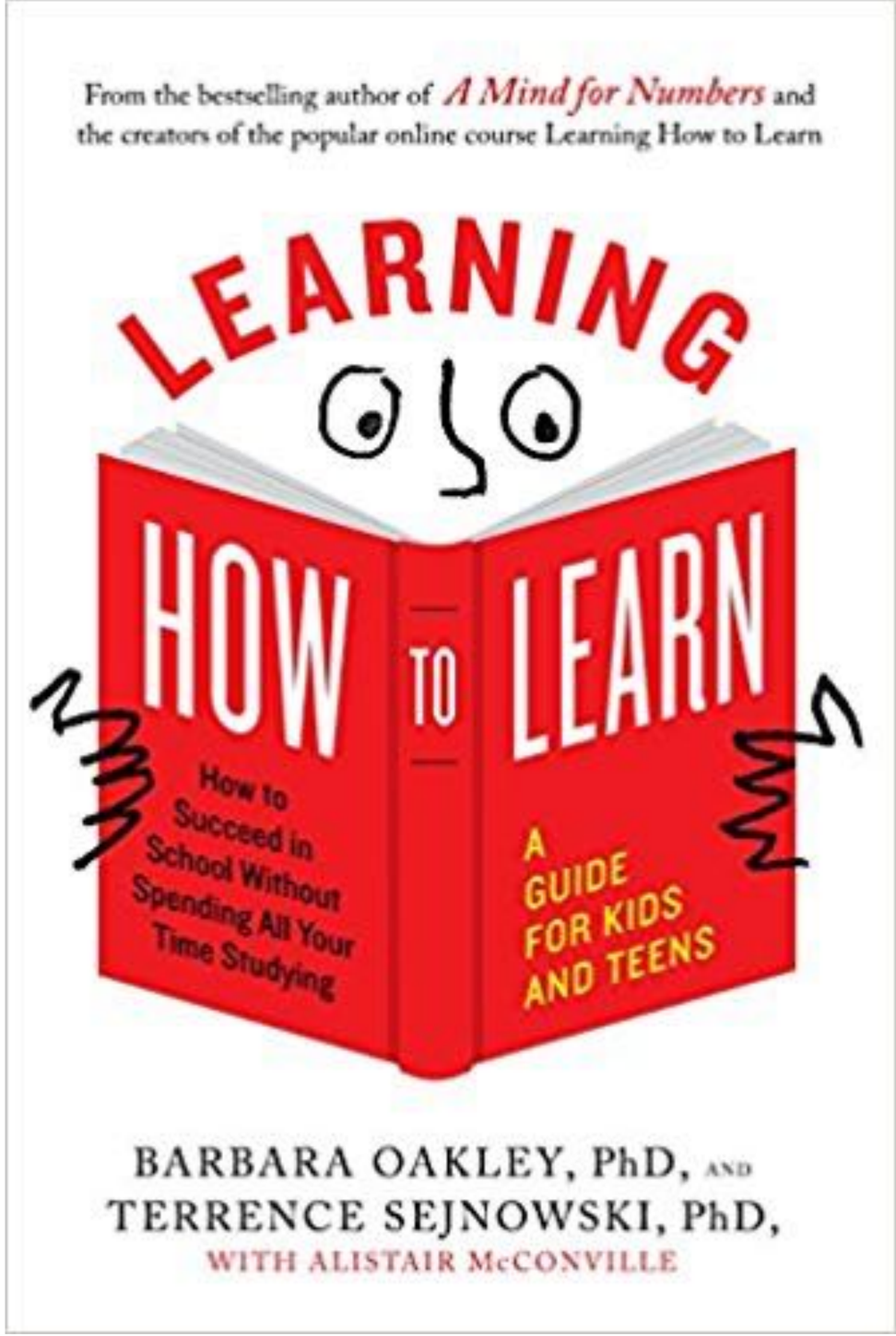
Ok, but how?

Stay curious



Be open to opportunity

Be a lifelong learner



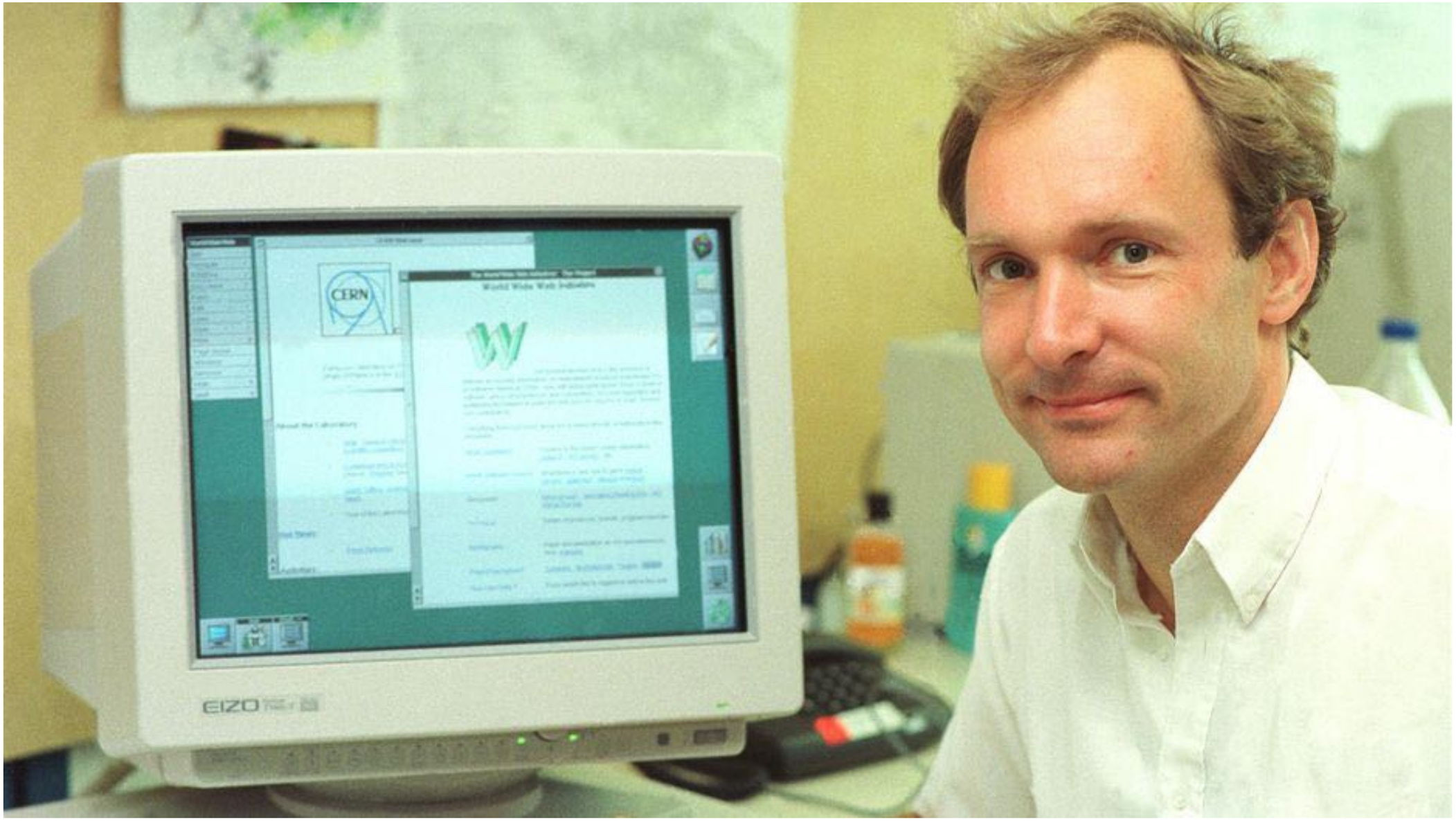
Be intentional (make plans)

Photo by Glenn Carstens-Peters on Unsplash

Slides

mco.dev/introAI.pdf

This is for everyone



Feedback

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