

A photograph of a large palm tree with many fronds, set against a clear blue sky. The perspective is from below, looking up at the canopy.

AI and the Business Gold Rush

Dr. Jim Hoover

Director, Business Analytics and Artificial
Intelligence Center

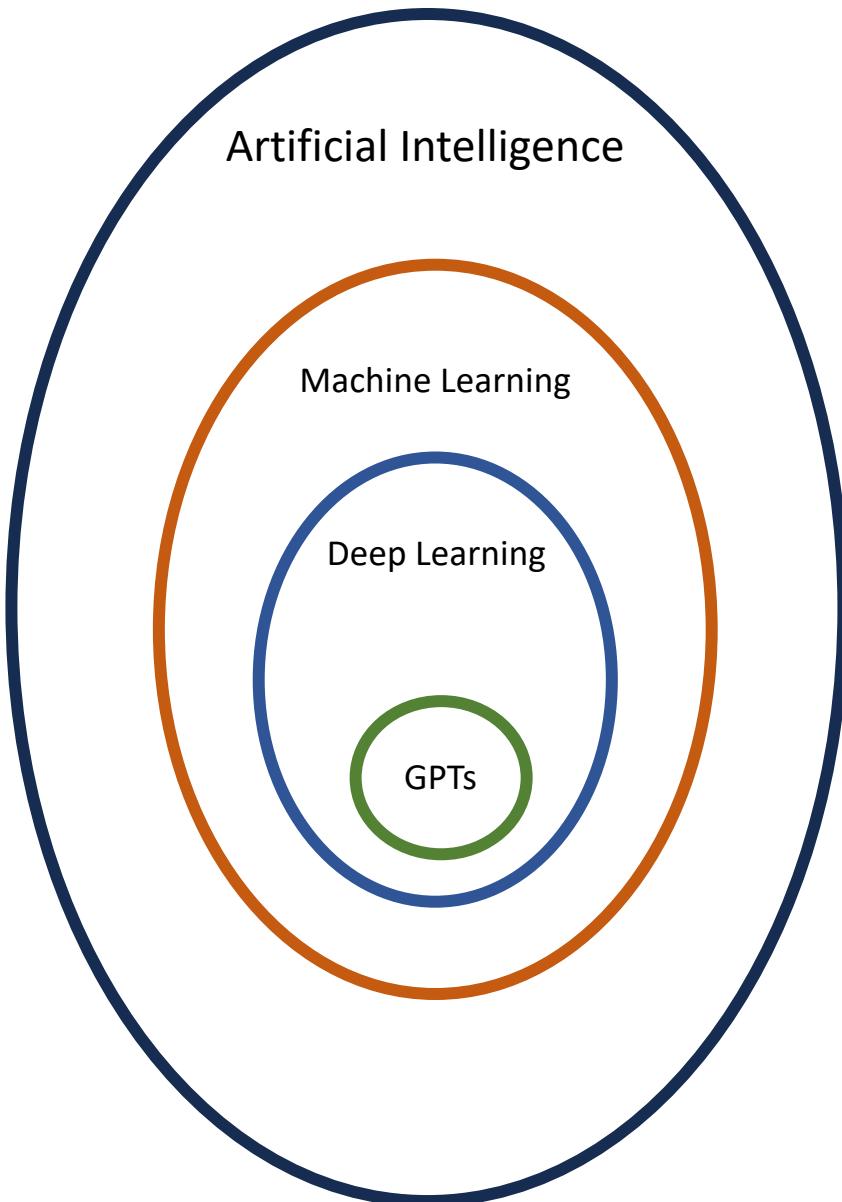
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Gator Club of Ponte Vedra
6/20/2024



What is AI?



- **AI** is a machine's ability to perform cognitive functions we associate with human minds. This includes functions like perceiving, reasoning, learning, interacting with an environment, and even exercising creativity.¹
- **Machine learning (ML)** is a subfield of artificial intelligence (AI) that focuses on the development of algorithms and statistical models that enable computers to perform tasks by learning from data, rather than being explicitly programmed for each specific task.²
- **Deep learning** is a subset of machine learning that involves the use of artificial neural networks with multiple layers to progressively extract higher-level features from raw input.³
- **GPTs**, or Generative Pre-trained Transformers, are a family of neural network models that use the transformer architecture.⁴ Sometimes these models are called Large Language Models (LLMs) or Foundation Models.

1. McKinsey – [Hyperlink](#)
2. IBM - [Hyperlink](#)

3. IBM – [Hyperlink](#)
4. Amazon AWS - [Hyperlink](#)

Major Machine Learning Types – Unsupervised Learning

- **Example – Customer Profiling**



[Hyperlink](#) to image source - Medium



Machine Learning Types – Supervised Learning

- **Example – Numeric Prediction Models**
 - You try to predict a number (e.g., deals closed)
 - Data includes past sales to use for training
 - Data also includes predictor variables (e.g., marketing effort)
 - Model created is applied to new predictor variables

Training Data

fx	A	B	C
1	Sales Period	Sales Calls - X	Deals Closed - Y
2	January 2019	20	50
3	February 2019	20	30
4	March 2019	40	60
5	April 2019	10	30
6	May 2019	30	70
7	June 2019	10	40
8	July 2019	30	60
9	August 2019	20	40
10	September 2019	30	60
11	October 2019	10	40
12	November 2019	20	30
13	December 2019	30	70
14	January 2020	20	30
15	February 2020	40	60
16	March 2020	20	40
17	April 2020	30	60
18	May 2020	10	30
19	June 2020	10	40
20	July 2020	20	40
21	August 2020	20	50
22	September 2020	20	30
23	October 2020	30	70
24	November 2020	20	50

Predictions

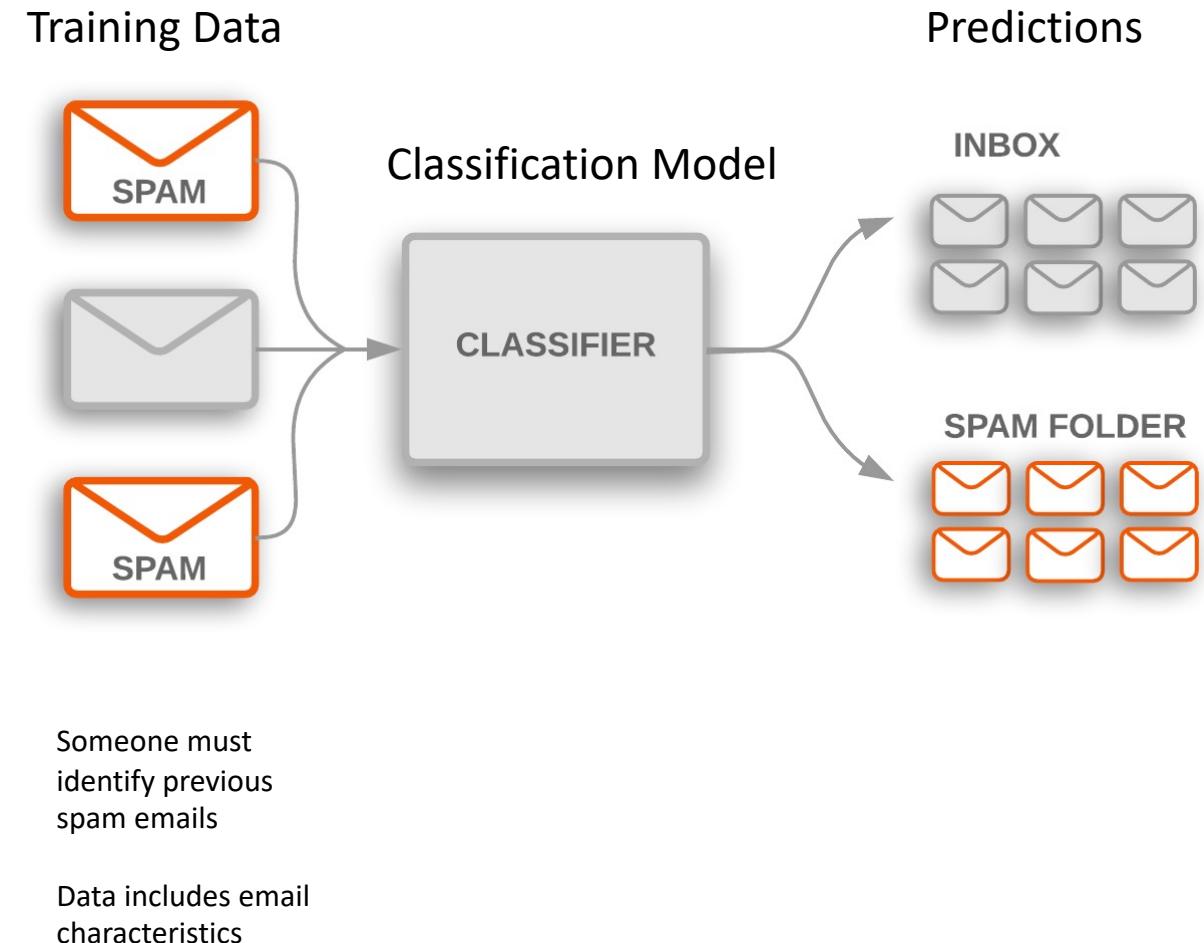
26	SALES PERIOD	TARGET CALLS	FORECAST
27	December 2020	50	
28	January 2021	60	
29	February 2021	70	
30	March 2021	80	
31	April 2021	90	
32	May 2021	100	

Machine Learning Types – Supervised Learning

[Hyperlink](#) to article with image - Google

- **Example – Classification Prediction Models**

- You try to predict classes or categories (e.g., will purchase an item or not)
- Data includes known previous categories
- Data also includes predictor variables (e.g., customer characteristics)
- Model created is applied to new predictor variables



Machine Learning Types – Reinforcement Learning

- **Example – Reinforcement Learning Models**

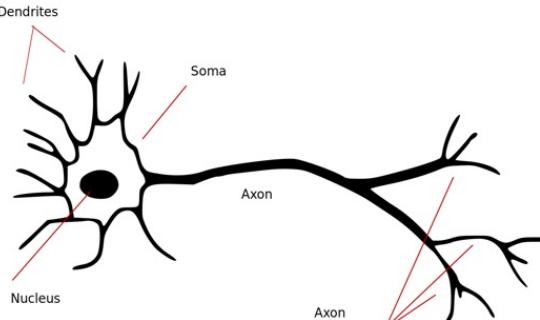
- You try to optimize the input variables (e.g., the speed) to achieve an objective (e.g., to win the race)
- Inputs measured along with environment (where are you on the track and at what speed) along with the outcomes



Deep Learning... Neural Networks

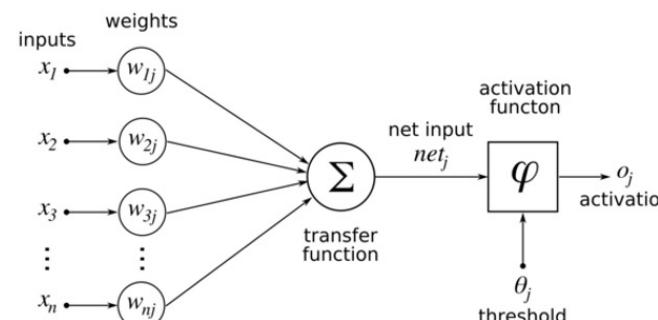
- Neural networks thought to mimic the human brain
 - Artificial Neural Networks and the activation function
 - Deep Neural Networks use multiple layers of hidden nodes (i.e., Neurons)

~ 100B neurons in the human brain



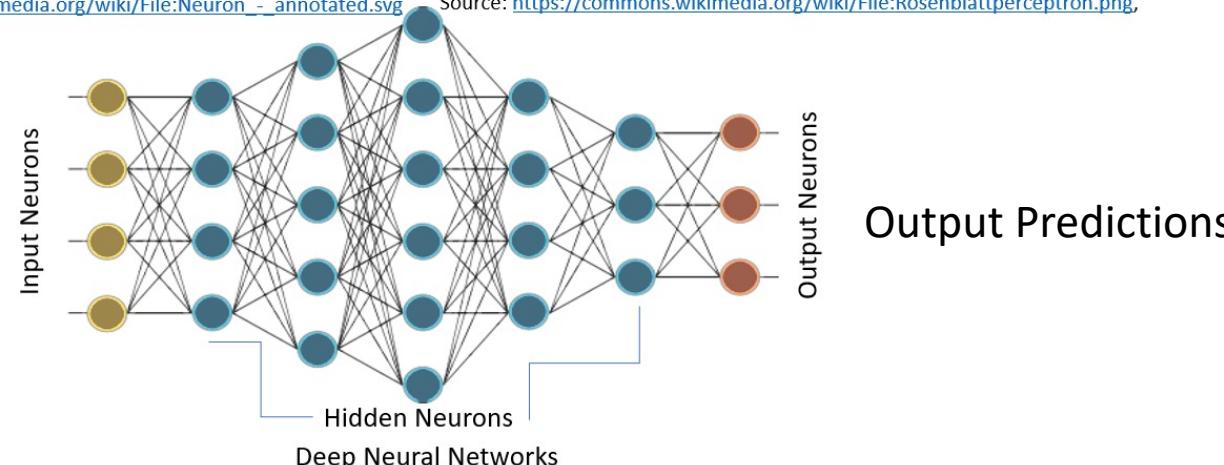
Source: https://commons.wikimedia.org/wiki/File:Neuron_annotated.svg

[Hyperlink](#) to image source – packt article



Source: <https://commons.wikimedia.org/wiki/File:Rosenblattperceptron.png>

Input variables



Neural Networks can be used for either numeric prediction or classification.

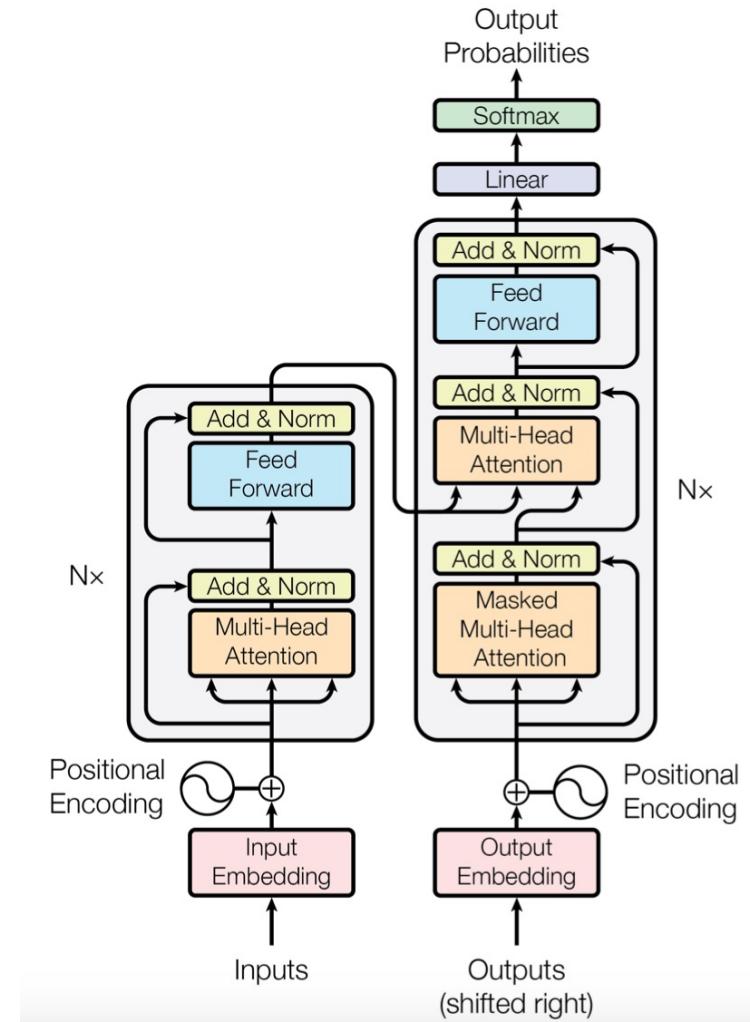
Neural networks require labeled data to train.

Generative AI

- **GPTs**

- Also referred to as Foundation Models or Large Language Models (LLMs)
- They are sophisticated neural networks that tie together multiple steps and neural networks
- Uses the transformer architecture
 - *Attention Is All You Need* paper by Google scientists (2017)
 - Requires a lot of data to train successfully
- ChatGPT architecture is more sophisticated
 - It also includes reinforcement learning (RLHF)

Attention Is All You Need



[Hyperlink](#) to image source – Google paper

Generative AI

- **How do large language models work?**

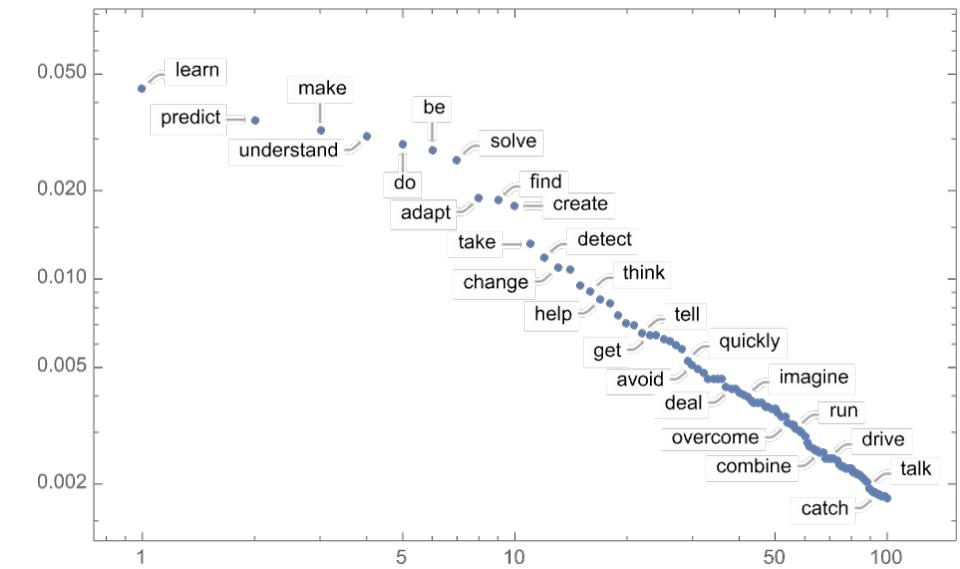
- By predicting the next word or symbol in a sequence based on the neural network training and the probability of occurrence of the next word.

The best thing about AI is its ability to

Words	Probabilities
learn	4.5%
predict	3.5%
make	3.2%
understand	3.1%
do	2.9%

“Given the text so far, what should the next word be?”

- “Temperature” changes which probability is selected.



The AI Business Gold Rush

ARTIFICIAL INTELLIGENCE

▼ NVDA \$680.555 -45.575 -6.28%

[Hyperlink to image source – NASDAQ](#)

The AI Gold Rush: Profiting From Picks and Shovels

CONTRIBUTOR

Richard Saintvilus

PUBLISHED

NOV 28, 2023 7:43AM EST



CREDIT: SHUTTERSTOCK



Without question, the market has developed an insatiable appetite for artificial intelligence (AI) technology and the companies steering this new frontier. Viewed as a promising future, the profit potential is staggering, with the generative AI market currently experiencing a 42% growth rate and the potential to reach \$1.3 trillion by 2032, according to Bloomberg Intelligence estimates.

Microsoft – Feb 2024 Earnings

Microsoft's revenue from its Azure cloud platform and related services rose 30% in the quarter ended Dec. 31, including a 6 percentage point boost from its artificial intelligence technologies.

OpenAI on track to hit \$2bn revenue milestone as growth rockets

San Francisco-based start-up joins Google and Meta as one of the fastest-growing tech companies ever



Sam Altman says 92% of Fortune 500 companies use OpenAI products © FT montage/AP

OpenAI's revenues have surpassed \$2bn on an annualised basis, as the runaway success of its flagship artificial intelligence product ChatGPT puts it among the fastest-growing technology companies in history.

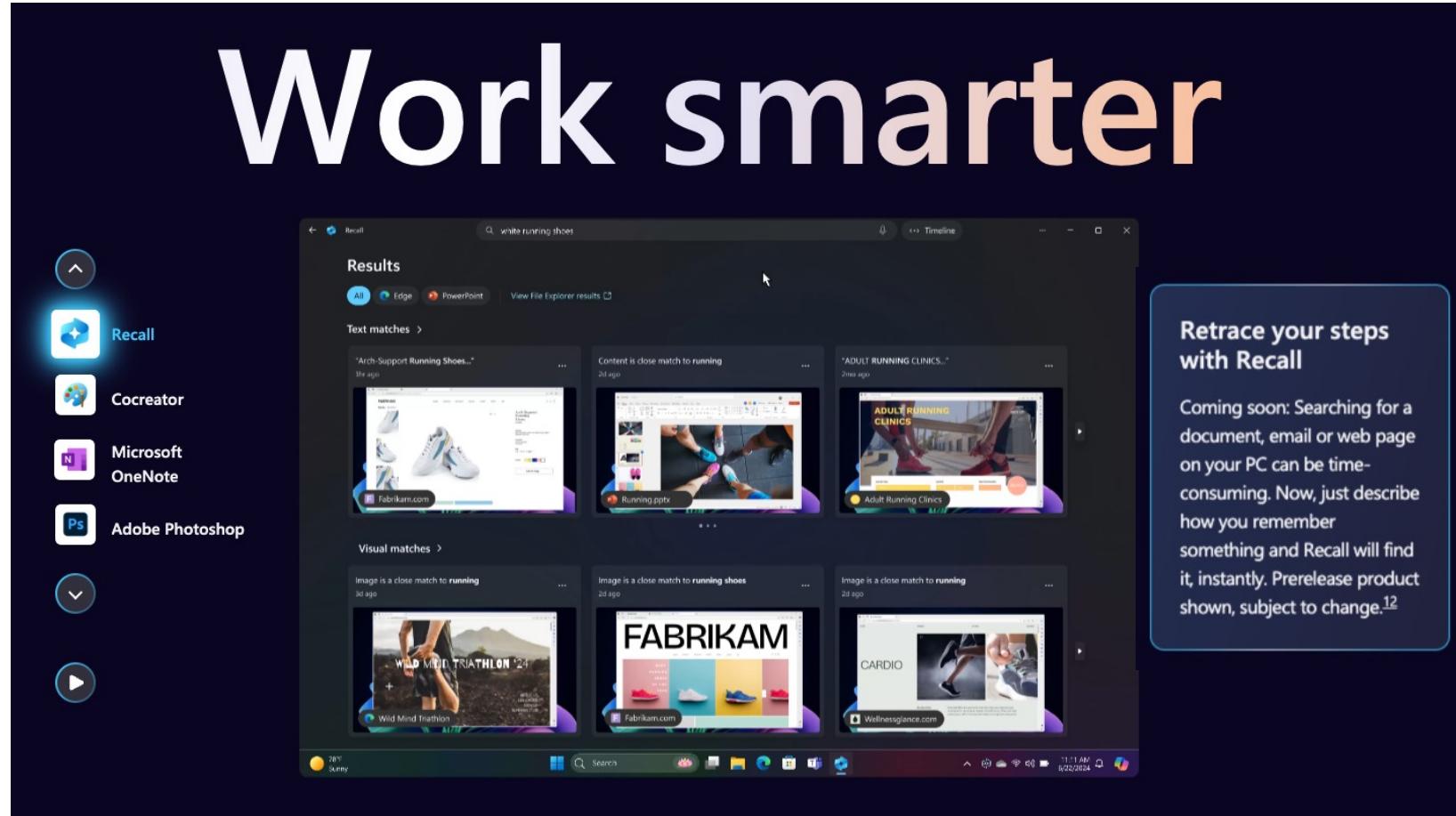
The AI Business Gold Rush

<https://www.microsoft.com/en-us/surface/devices/surface-pro-11th-edition>



The AI Business Gold Rush

<https://www.microsoft.com/en-us/surface/devices/surface-pro-11th-edition>



The AI Business Gold Rush

AP

WORLD U.S. ELECTION 2024 POLITICS SPORTS ENTERTAINMENT BUSINESS SCIENCE FACT CHECK ODDITIES BE WELL

Juneteenth shooting Israel-Hamas war Summer solstice New Mexico wildfire Stanley Cup finals

TECHNOLOGY

Microsoft delays controversial AI Recall feature on new Windows computers

[Hyperlink](#)



1 of 3 | Microsoft Surface Pro devices are displayed in a demo room following a showcase event of the company's AI assistant Copilot ahead of the annual Build developer conference at Microsoft headquarters, Monday, May 20, 2024, in Redmond, Wash. (AP Photo/Lindsey Wasson)

Updated 12:09 PM EDT, June 14, 2024

Share

REDMOND, Wash. (AP) — New laptops equipped with Microsoft Windows start shipping to customers next week without a flagship feature called Recall that drew concerns about privacy and cybersecurity.

Microsoft CEO Satya Nadella touted the new Recall feature at a showcase event last month, describing it as a step toward artificial intelligence machines that “instantly see us, hear, reason about our intent and our surroundings.”

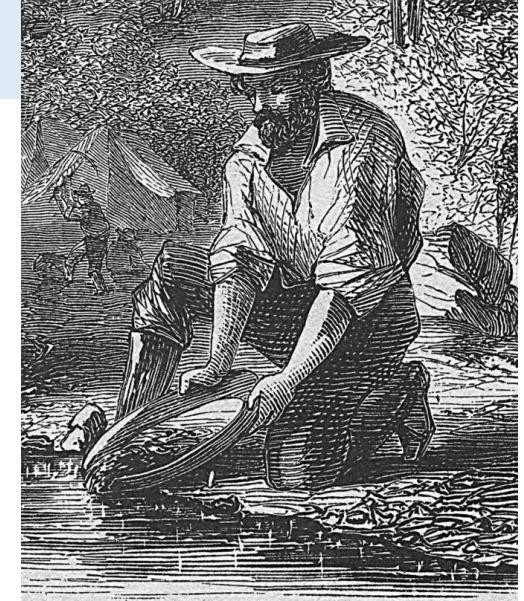
Recall works by periodically taking snapshots of a computer screen to give Microsoft’s AI assistant Copilot a “photographic memory” of a person’s virtual activity, ostensibly to help someone remember what they did earlier.

“We’re entering this new era where computers not only understand us, but can actually anticipate what we want and our intent,” Nadella said in May.

But on Thursday, the company said it was delaying a “broadly available” preview of Recall that was supposed to be included with new PCs starting Tuesday.

The AI Business Gold Rush

- **What are CEOs using ChatGPT / Gen AI to do?**
 - Primarily creative actions (particularly for marketing)
 - Ad Copy
 - SEO
 - Software coding assistance
 - Images for marketing
 - Marketing campaign ideas
- **Some are saying they are laying off white collar workers as a result**
 - By one tracker, US firms have announced 4,600 job cuts since May related to artificial intelligence. Source Bloomberg (2/8/24)
 - But many of these layoffs are of others in order to hire AI workers
- **How are You using or planning to use Gen AI?**



Is the Gold Rush for Gen AI a Bubble?

← → ⌂ wired.com/story/amazons-cloud-boss-selipsky-generative-ai-hype/



BACKCHANNEL BUSINESS CULTURE GEAR IDEAS POLITICS SCIENCE SECURITY MERCH

Amazon's Cloud Boss Likens Generative AI Hype to the Dotcom Bubble

Adam Selipsky, CEO of Amazon's dominant cloud platform AWS, says generative AI is valuable but that the excitement around some AI companies is similar to when internet pioneers were "dramatically overhyped."

- Similar to the dot-com bubble?
- Like other business fads?
- Some companies will be disappointed
- Some will invest in the wrong technologies
- Some will fail to see the return on investment

Selipsky says that companies looking for ways to apply generative AI to their own business or industry need to be careful they aren't misled by the hype. "Many companies and organizations are struggling to understand, 'Out of these hundred pilots or proofs-of-concept that I have going on, which ones do I take into production?'" he says. "And they're starting to see that it can be very expensive once they go into production." The implication? A lot of generative AI projects hastily born over the past year may not have long to live. The technology can be expensive to deploy because of the many high-powered computer chips required for generative AI projects.

[Hyperlink to Article on Wired](#)

Is the Gold Rush for Gen AI a Bubble?



RollingStone

BEAT THE BOTS

Brands Are Beginning to Turn Against AI

After lots of hype from big tech and a rush to integrate trendy new tools into every aspect of our lives, the backlash seems inevitable

BY MILES KLEE

JUNE 15, 2024



Silicon Valley seems to think AI is inevitable, but resistance is growing. RUZLAT/ADOBESTOCK

6/14/24, 9:20 AM

Is Slop A.I.'s Answer to Spam? A Phrase Emerges for Bad Search. - The New York Times

The New York Times

<https://www.nytimes.com/2024/06/11/style/ai-search-slop.html>

First Came ‘Spam.’ Now, With A.I., We’ve Got ‘Slop’

A new term has emerged to describe dubious A.I.-generated material.



Listen to this article · 5:11 min [Learn more](#)



By Benjamin Hoffman

June 11, 2024

You may not know exactly what “slop” means in relation to artificial intelligence. But on some level you probably do.

Slop, at least in the fast-moving world of online message boards, is a broad term that has developed some traction in reference to shoddy or unwanted A.I. content in social media, art, books and, increasingly, in search results.

Is the Gold Rush for Gen AI a Bubble?

5/22/24, 10:19 AM

Why do only a small percentage of GenAI projects actually make it into production? - Stack Overflow



Blog



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MAY 13, 2024

Why do only a small percentage of GenAI projects actually make it into production?

Only about 5% of GenAI projects lead to significant monetization of new product offerings.



Credit: Alexandra Francis

It seems like everybody in tech is working on a new AI project. But how many of these generative AI (GenAI) initiatives will make it into production—much less lead directly to a new revenue stream?

Harvard
Business
Review

[Hyperlink](#)

Why Adopting GenAI Is So Difficult

by Terence Tse, Mark Esposito, Danny Goh, and Paul Lee

March 08, 2024

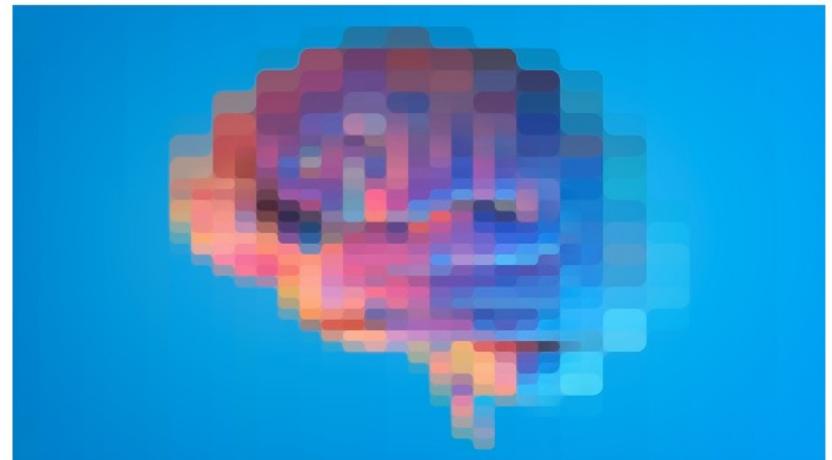


Illustration by Eddie Guy

Summary. More than a year after the launch of ChatGPT, companies are still facing the same question when they first considered the technology: How do they actually go about putting it into business use? Many companies have simply discovered that generative AI tools like LLMs, while impressive, aren't plug and play. Companies should consider a few suggestions when

Is the Gold Rush for Gen AI a Bubble?

[Hyperlink](#)

[Hyperlink](#)

A *Harvard Business Review* article by Terence Tse, Mark Esposito, Danny Goh, and Paul Lee dug into some of the reasons [why adopting GenAI projects is so difficult](#). Three they highlighted:

1. **Companies are still figuring out the previous generation of AI tools.** Plenty of companies are still figuring out how to integrate “traditional AI” (that is, non-generative AI; tools like machine learning and rule-based algorithms) into their business operations. Maybe they’re still exploring traditional AI, or maybe they’re completely at sea. They’re not in a position to leverage the next generation of AI tools while they’re still getting their arms around traditional AI.
2. **GenAI is designed for very specific use cases.** GenAI is not only much more complicated than traditional AI; it’s also designed for highly-specific use cases. While GenAI “is able to write a 5,000-word report in no time,” per Tse et al., “it cannot, for example, do a basic data entry task, like extracting and classifying driver’s license data, that traditional AI can do easily.” Business cases for GenAI are not necessarily easy to find, and GenAI won’t always deliver benefits worth the cost.
3. **We don’t know what we don’t know.** The long-term implications of GenAI, including costs and the effects of regulation, are still unknown. Tse et al. compare our current moment to the late 90s: “While companies back then may have seen the need for setting up websites, few could clearly see the specific roles that the wider internet would play as an integral part of omnichannel strategies, let alone across devices and as phone apps.”

Risks – Aligning Gen AI Solutions with IT Development

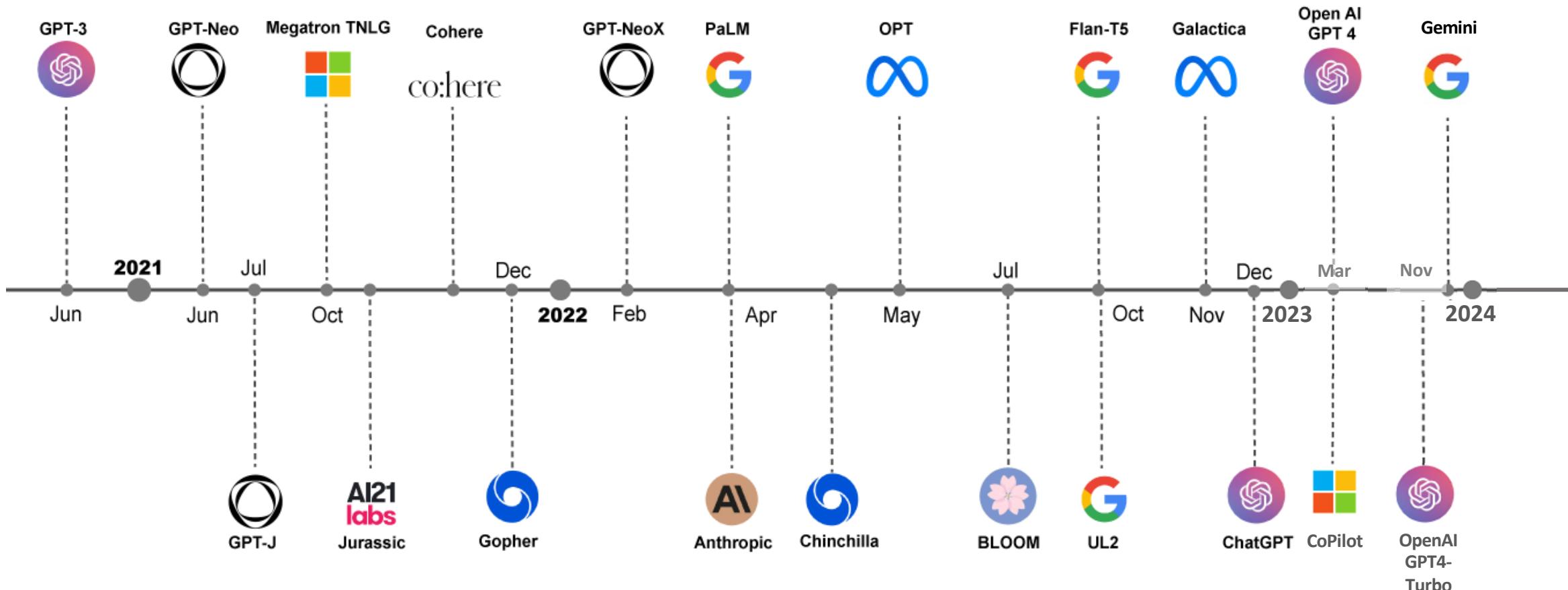
6 Phases of the Software Development Life Cycle

Image source – [Medium](#)



- How long is your software development life cycle?
- What is your release schedule?
- Even with Agile SDLC, it can be challenging to match the innovation cycle and deprecation pace for Gen AI.
- After development, how long before your product no longer works?
- Cloud-based or internal GPTs may provide longer effective software lifetimes
 - While this may increase ROI on the development, it may come at the cost of slower capability integration

Risks – Rapidly Changing Capabilities & Players



Risks – Rapidly Changing Capabilities & Players

Changelog

Keep track of changes to the OpenAI API. You can also track changes via our [public OpenAPI specification](#) which is used to generate our SDKs, documentation, and more. This changelog is maintained in a best effort fashion and may not reflect all changes being made.

Feb 9th, 2024

- Added `timestamp_granularities` parameter to the Audio API

Feb 1st, 2024

- Released gpt-3.5-turbo-0125, an updated GPT-3.5 Turbo model

Jan 25th, 2024

- Released embedding V3 models and an updated GPT-4 Turbo preview
- Added `dimensions` parameter to the Embeddings API

Dec 20th, 2023

- Added `additional_instructions` parameter to run creation in the Assistants API

Dec 15th, 2023

- Added `logprobs` and `top_logprobs` parameters to the Chat Completions API

Dec 14th, 2023

- Changed `function parameters` argument on a tool call to be optional.

Nov 30th, 2023

- Released OpenAI Deno SDK

Nov 6th, 2023

- Released GPT-4 Turbo Preview, updated GPT-3.5 Turbo, GPT-4 Turbo with Vision, Assistants API, DALL-E 3 in the API, and text-to-speech API
- Deprecated the Chat Completions `functions` parameter in favor of `tools`
- Released OpenAI Python SDK V1.0

- Changes occurring very rapidly
- Deprecation of functions and capabilities
- Model changes
- Bug fixes
- Implications for integration into software development efforts

Risks – Hallucinations

THE SHIFT

The Year Chatbots Were Tamed

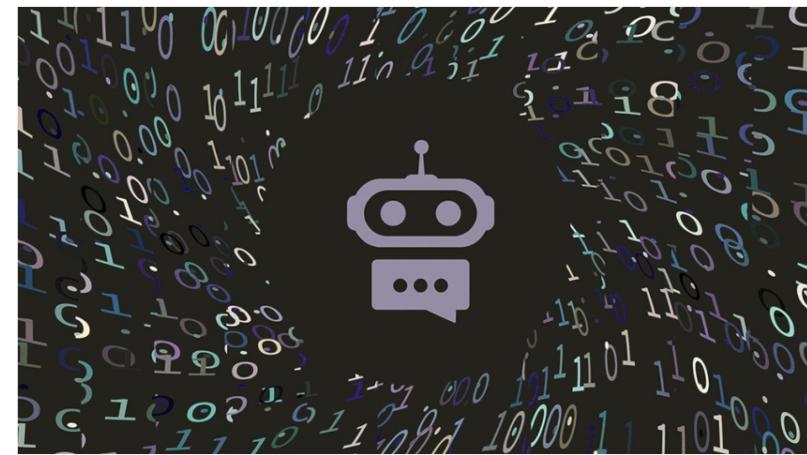
A year ago, a rogue A.I. tried to break up my marriage. Did the backlash help make chatbots too boring?



 By **Kevin Roose**
Reporting from San Francisco

Feb. 14, 2024

Article about Microsoft's Sydney AI – [NYT Article](#)



The risks of 'AI hallucinations' in customer service

 Ant Marketing
3,799 followers

[+ Follow](#)

February 20, 2024

Gartner's latest [Strategy and Leadership Predictions for Service and Support Leaders in 2024](#) highlights 'AI hallucinations' as a significant risk for businesses.

Artificial intelligence (AI) is playing an increasingly pivotal role in customer service. So, I thought I'd look at what AI hallucinations entail, their potential impact on customer engagement and brands, and how to effectively mitigate them.

Impacts on Business Applications of AI – [Ant Marketing Article](#)

Risks – Aligning Gen AI Projects with Capabilities

Good at:

- Administrative tasks
- Content generation
- Coding assistance
- Effective customer communication
- Multilingual communication and translation
- Strategy outlining
- Audio, Video, and Image generation

Not Good at:

- Always providing truthful answers
- Negotiation
- Identifying when it is being manipulated
- Lack of true emotional intelligence
- Providing details aligned with strategy recommendations

Risks – Ethics and Gen AI

- Training data
 - Copyrighted content
 - Harmful content
- Amplification and perpetuation of existing biases
 - Caused by training data
- Providing inaccurate responses
- Providing inaccurate references or attribution
- Reliance on AI answers
- Impact on humans

CIO JOURNAL

Companies Increasingly Fear Backlash Over Their AI Work

Until now businesses have assumed that leveraging cutting-edge technology was inherently a good thing. That's no longer the case.

By [Isabelle Bousquette](#) [Follow](#)

Aug. 17, 2023 10:54 am ET

WSJ Article on this topic - [Hyperlink](#)

TheVerge ership with the media outlet.

In a [blog post](#), OpenAI said the *Times* “is not telling the full story.” It took particular issue with claims that its ChatGPT AI tool reproduced *Times* stories verbatim, arguing that the *Times* had manipulated prompts to include regurgitated excerpts of articles. “Even when using such prompts, our models don’t typically behave the way *The New York Times* insinuates, which suggests they either instructed the model to regurgitate or cherry-picked their examples from many attempts,” OpenAI said.

The Verge article on the NYT copyright suit - [Hyperlink](#)

Risks – Ethics and Gen AI

The Rome Call for AI Ethics - [Hyperlink](#)

THE SIX PRINCIPLES

.1 Transparency
AI systems must be understandable to all_

.2 Inclusion
These systems must not discriminate against anyone because every human being has equal dignity_

.3 Accountability
there must always be someone who takes responsibility for what a machine does_

.4 Impartiality
AI systems must not follow or create biases_

.5 Reliability
AI must be reliable_

.6 Security and Privacy
These systems must be secure and respect the privacy of users_

Risks – Regulation and Gen AI

The screenshot shows a web browser window with the URL nytimes.com/2023/12/06/technology/ai-regulation-policies.html. The page is from The New York Times, featuring a large, bold title: *How Nations Are Losing a Global Race to Tackle A.I.'s Harms*. Below the title is a subtitle: "Alarmed by the power of artificial intelligence, Europe, the United States and others are trying to respond — but the technology is evolving more rapidly than their policies." The background of the article page is dark blue.



[Administration](#) [Priorities](#) [The Record](#)

OCTOBER 30, 2023

FACT SHEET: President Biden Issues Executive Order on Safe, Secure, and Trustworthy Artificial Intelligence

Improving Probability of Good Gen AI Project Outcomes

- The “5% better rule”
- Evaluating opportunities
 - IT Cost, schedule and likelihood of good outcomes
 - Time to return evaluation
- Future-proofing your investments
- Training your workforce
 - Using the system
 - Assessing the accuracy of output (see hallucinations)

Improving Probability of Good Gen AI Project Outcomes

- Mitigate legal and regulatory issues
 - What data was used to train your Gen AI solution?
 - What happens if you lose access to your built solution due to legal or regulatory issues with your Gen AI provider?
 - Put in place “guardrails” for when and how your people can use Gen AI
 - If you can, develop a risk plan associated with Gen AI projects and solutions

Improving Probability of Good Gen AI Project Outcomes

- Mitigate Rate of Change Issues
 - Align your Gen AI solution with a trusted provider
 - OpenAI turmoil over leadership and direction
 - Longevity
 - Consider cloud implications
 - Cost
 - Longevity
 - Place bets with companies likely to survive in the long run

Copy of the Presentation on GitHub

Presentation Location



<https://github.com/Hoover-code/AI-Presentations>

Backup Slides

The AI Business Gold Rush

ANDY GREENBERG SECURITY JUN 7, 2024 12:11 PM

Microsoft Will Switch Off Recall by Default After Security Backlash

After weeks of withering criticism and exposed security flaws, Microsoft has vastly scaled back its ambitions for Recall, its AI-enabled silent recording feature, and added new privacy features.



PHOTOGRAPH: DAVID RAMOS/GETTY IMAGES

The AI Business Gold Rush

The Briefing: AI Euphoria Disappears From Public Market

Martin Peers <info@theinformation.com>
Reply-To: Martin Peers <info@theinformation.com>
To: Jim Hoover <hooverjh@gmail.com>

31 May 2024 at 18:41

[Home](#) / [Feature](#) / [PCs & Components Feature](#)

FEATURE

If you rolled the dice on first-gen AI PCs, you lost

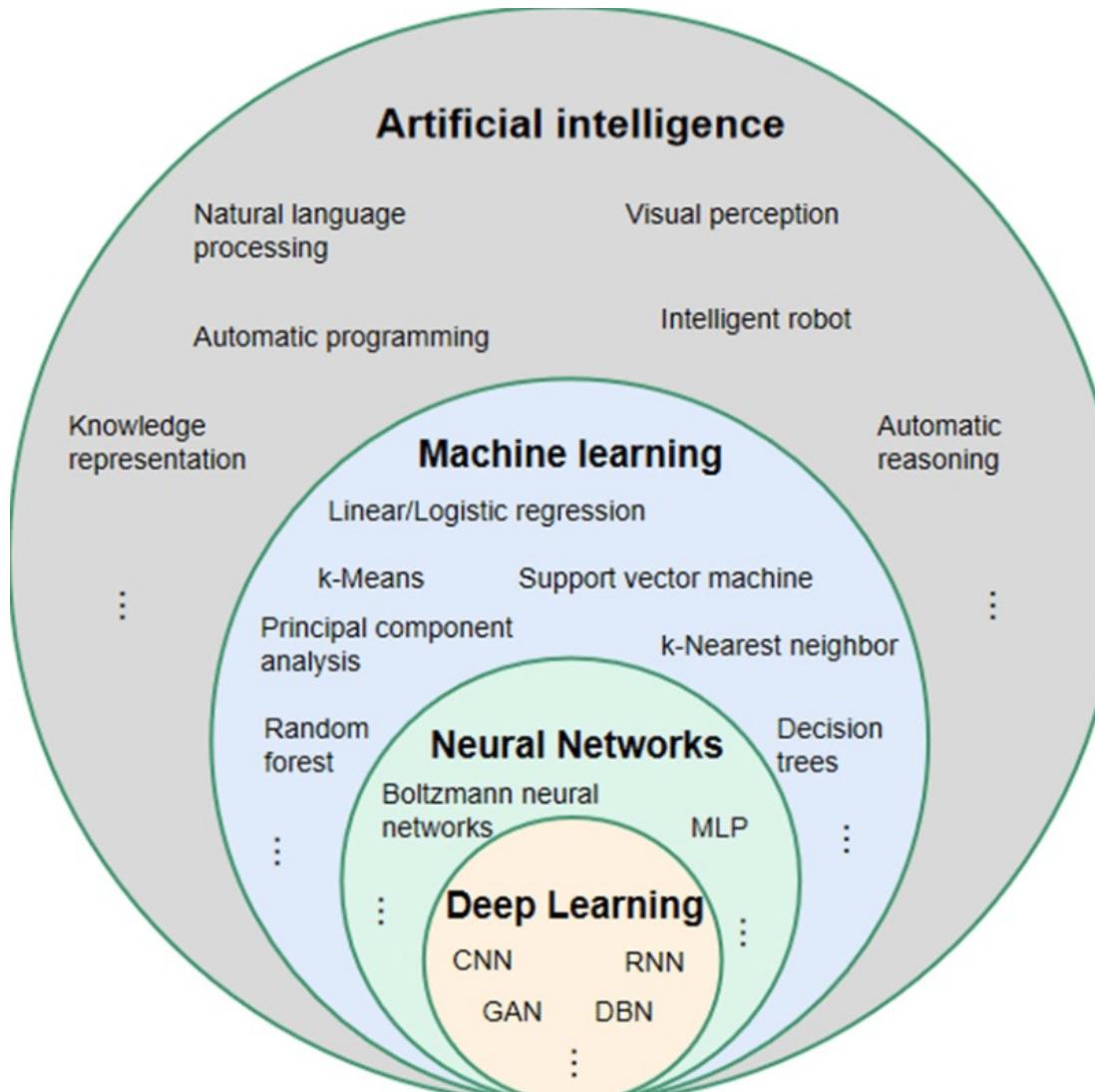
When you're on the bleeding edge of tech, expect to get cut now and then.



By [Chris Hoffman](#)

| MAY 29, 2024 3:30 AM PDT

What Is AI?



Why Artificial Intelligence???



Datasciencejourney · Follow

3 min read · Dec 10, 2023

[Hyperlink](#)

Major Machine Learning Types

- Machine Learning Tasks – 3 major types:
 - **Supervised learning** – Humans provide labels to data related to the outcome of a task in order to “train” the computer algorithm
 - **Unsupervised learning** – The computer doesn’t receive labels from humans, but looks to find “structure” in the input data. This can be the first step in labeling the data for further supervised learning.
 - **Reinforcement learning** – The computer interacts with the environment and data from the environment to reward or penalize algorithms as it is exposed to more data (or scenarios). Example – cars under varying conditions like speed, cornering, acceleration, etc.

Generative AI – Reinforcement Learning (RLHF)

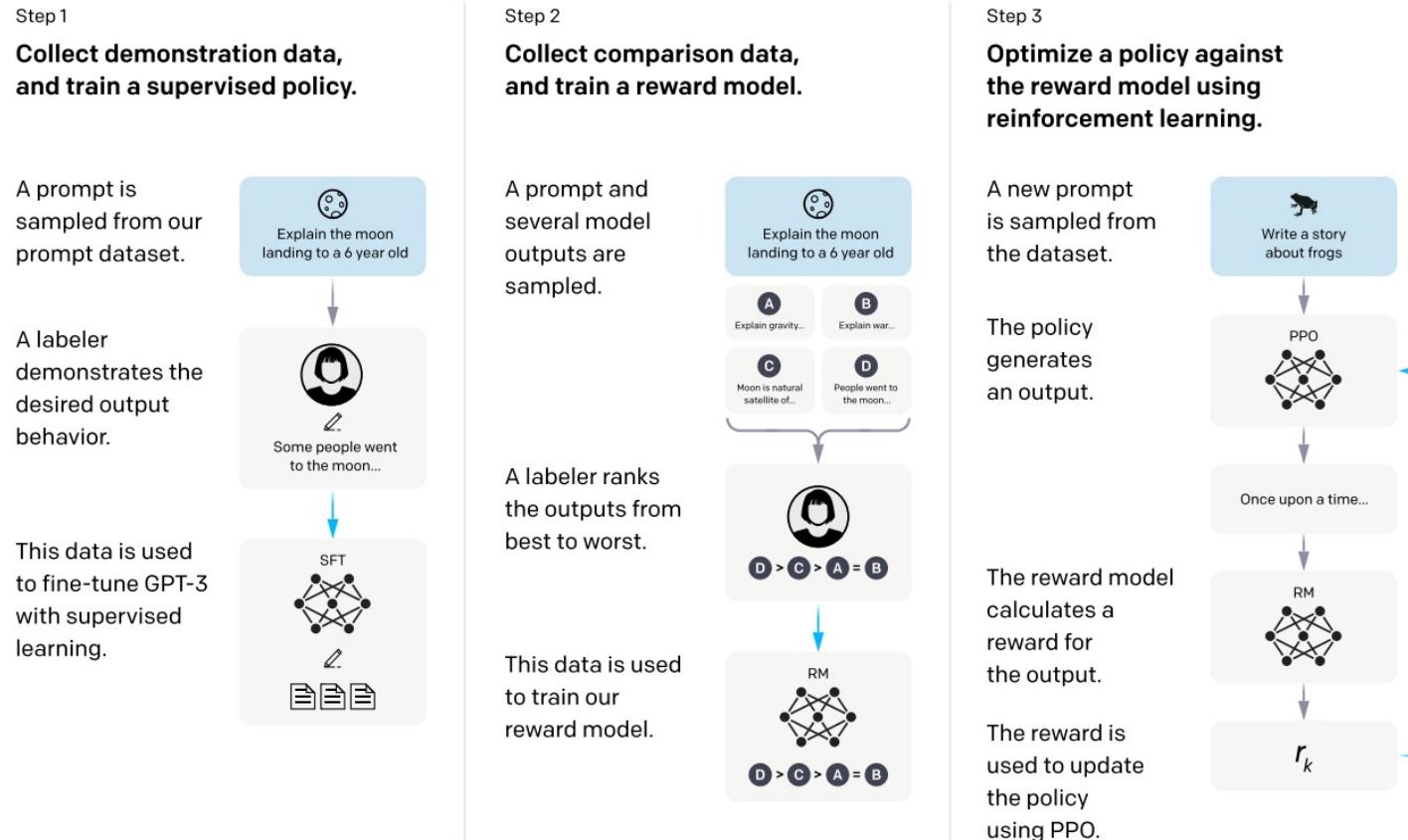
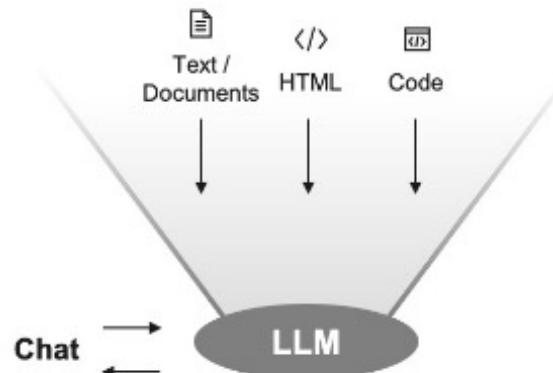


Figure 2: A diagram illustrating the three steps of our method: (1) supervised fine-tuning (SFT), (2) reward model (RM) training, and (3) reinforcement learning via proximal policy optimization (PPO) on this reward model. Blue arrows indicate that this data is used to train one of our models. In Step 2, boxes A-D are samples from our models that get ranked by labelers. See Section 3 for more details on our method.

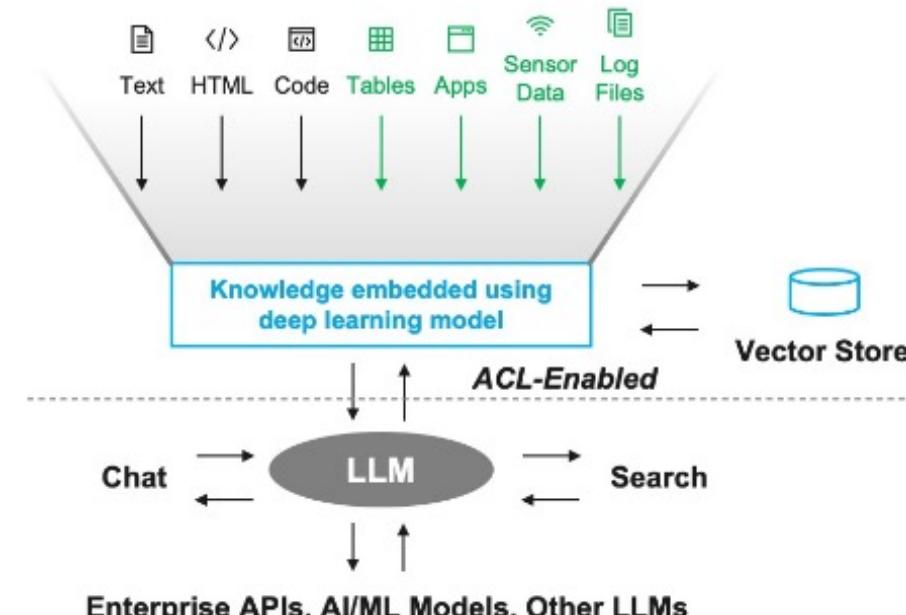
[Hyperlink](#) to image source – OpenAI paper

Mitigating Risks – c3.ai example

Standard LLM Architecture



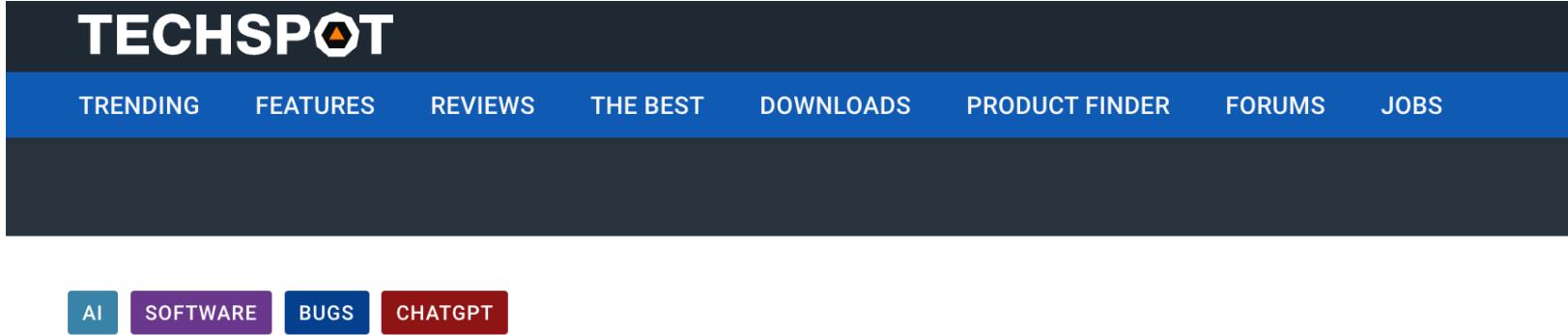
C3 Generative AI Architecture



- ✖ Random responses
- ✖ No traceability
- ✖ No Enterprise Access Controls
- ✖ Risk of information leakage
- ✖ Prone to hallucination
- ✖ LLM-specific

- ✓ Deterministic responses
- ✓ Full traceability
- ✓ Full Enterprise Access Controls
- ✓ No leakage of proprietary information or IP
- ✓ No hallucination
- ✓ LLM-agnostic

Mitigating Risks – Dementia

A screenshot of a Techspot article page. The header features the 'TECHSPOT' logo with an orange triangle icon. Below the header is a blue navigation bar with links: TRENDING, FEATURES, REVIEWS, THE BEST, DOWNLOADS, PRODUCT FINDER, FORUMS, and JOBS. The main title of the article is 'Forget hallucinations, ChatGPT has developed full blown dementia'. Below the title is a subtitle: 'The LLM and its offshoots, like Copilot, started spouting nonsense last night'. The author is Cal Jeffrey, and the date is February 21, 2024 at 1:44 PM. There are 12 comments. At the bottom of the thumbnail, there are four colored tags: AI (light blue), SOFTWARE (purple), BUGS (dark blue), and CHATGPT (red).

Forget hallucinations, ChatGPT has developed full blown dementia

The LLM and its offshoots, like Copilot, started spouting nonsense last night

By [Cal Jeffrey](#) February 21, 2024 at 1:44 PM | [12 comments](#)