DOTE 6635: Artificial Intelligence for Business Research (Spring 2026)

What's New in AI

Renyu (Philip) Zhang

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What Happened Since We Last Met?

Nature's 10

Ten people who helped shape science in 2025

8 December 2025

Liang Wenfeng: Tech disruptor

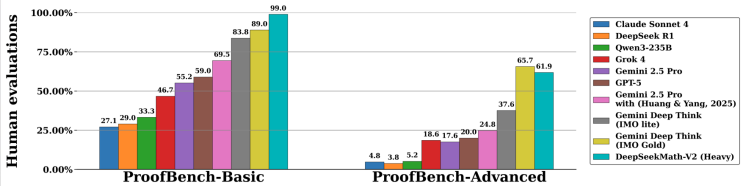
After making his name in investing, a Chinese finance wizard founded DeepSeek.

Article | Open access | Published: 17 September 2025

DeepSeek-R1 incentivizes reasoning in LLMs through reinforcement learning

Daya Guo, Dejian Yang, Haowei Zhang, Junxiao Song, Peiyi Wang, Qihao Zhu, Runxin Xu, Ruoyu Zhang, Shirong Ma, Xiao Bi, Xiaokang Zhang, Xingkai Yu, Yu Wu, Z. F. Wu, Zhibin Gou, Zhihong Shao, Zhuoshu Li, Ziyi Gao, Aixin Liu, Bing Xue, Bingxuan Wang, Bochao Wu, Bei Feng, Chengda Lu, ... Zhen Zhang + Show authors

Nature **645**, 633–638 (2025) | Cite this article



Contest	Problems	Points
IMO 2025	**P1** , **P2** , **P3** , **P4** , **P5**	83.3%
CMO 2024	**P1** , **P2** , **P4** , **P5** , **P6**	73.8%
Putnam 2024	**A1** ~ **B4** , **B5**, **B6**	98.3%

Table 1 | Problems in gray are **fully solved** , while underlined problems received **partial credit**.

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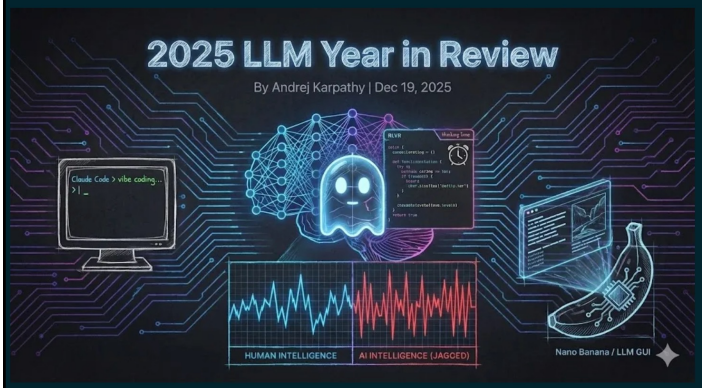
karpathy

Home Blog

2025 LLM Year in Review

20 Dec, 2025



2025 has been a strong and eventful year of progress in LLMs. The following is a list of personally notable and mildly surprising "paradigm changes" - things that altered the landscape and stood out to me conceptually.

https://karpathy.bearblog.dev/year-in-review-2025/

What Happened Since We Last Met?

1. Reinforcement Learning from Verifiable Rewards (RLVR)

2. Ghosts vs. Animals / Jagged Intelligence

3. Cursor / new layer of LLM apps

4. Claude Code / AI that lives on your computer

5. Vibe coding

6. Nano banana / LLM GUI

TLDR. 2025 was an exciting and mildly surprising year of LLMs. LLMs are emerging as a new kind of intelligence, simultaneously a lot smarter than I expected and a lot dumber than I expected. In any case they are extremely useful and I don't think the industry has realized anywhere near 10% of their potential even at present capability. Meanwhile, there are so many ideas to try and conceptually the field feels wide open. And as I mentioned on my Dwarkesh pod earlier this year, I simultaneously (and on the surface paradoxically) believe that we will both see rapid and continued progress *and* that yet there is a lot of work to be done. Strap in.

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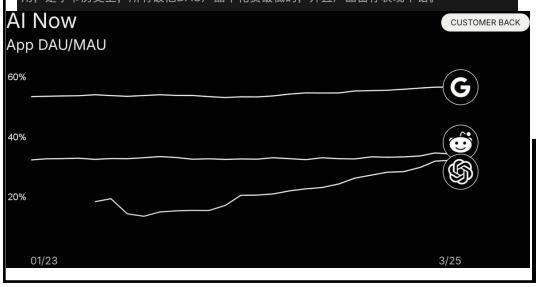
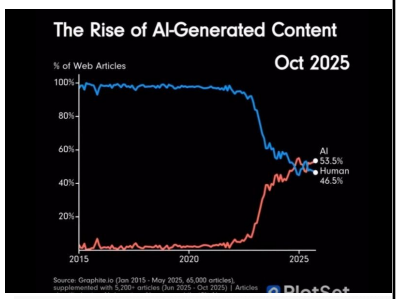
豆包DAU破亿，成字节史上推广费用最少的破亿产品

界面新闻 2025年12月24日 21:56

最新数据显示豆包的日均活跃用户数（DAU[8]）已突破1亿大关。豆包的UG、市场推广费用，是字节历史上，所有破亿DAU产品中花费最低的，并且产品留存表现不错。



What Happened Since We Last Met?



Compensation

$280K – $400K + Offers Equity

manus

The general AI agent

Meta just acquired a Chinese-founded AI startup for $2B. Here's why that matters

AI firm Manus claims its bot can make decisions with far less prompting than rivals

Jenna Benchetrit · CBC News · Posted: Dec 30, 2025 3:36 PM EST | Last Updated: December 31, 2025

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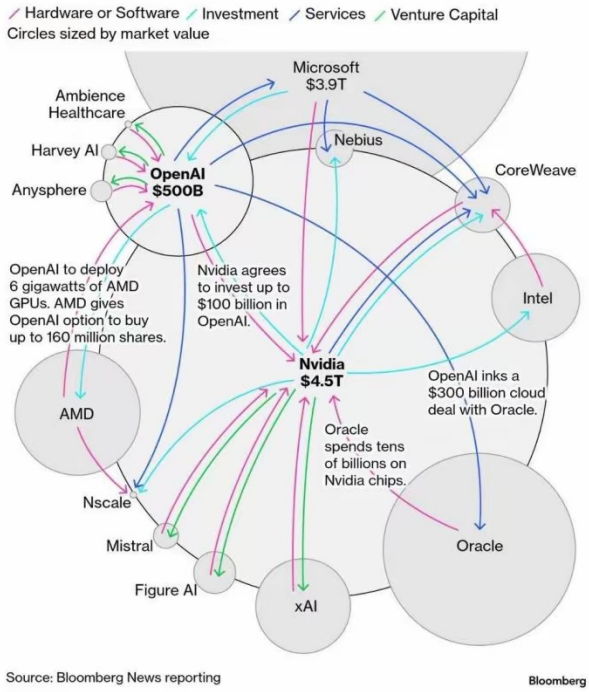
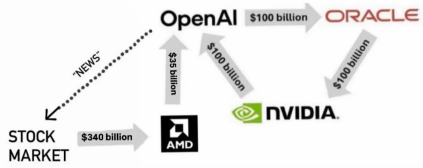


What Happened Since We Last Met?



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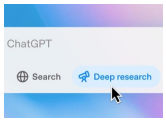
Maintrack: Facilitates Humans to Leverage Compute

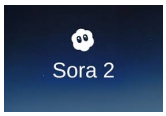
- AI Coding: Connecting human & compute

- Deep Research: Automation of information acquisition & processing



manus

- World Model: Data-driven simulation of physical world



- AI Scientist: Automated hypothesis generation and validation

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AI Starts to Replace Human Workers

At the age of AI, what talent is needed by the market?

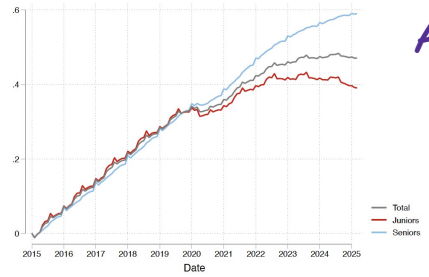


Figure 2: Time Series of Junior and Senior Employment in Sample Firms

Notes: This figure plots the average number of junior-level workers and senior-level workers in our sample of firms over time, normalized to 1 in January 2015. We define "junior" workers as those in Entry- or Junior-level positions, and "senior" workers as Associate level and above (see Section 3.1 for details).

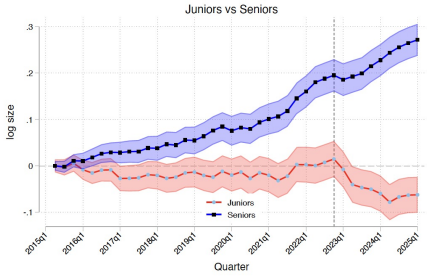


Figure 3: Employment Differences Between Adopters and Non-Adopters Over Time

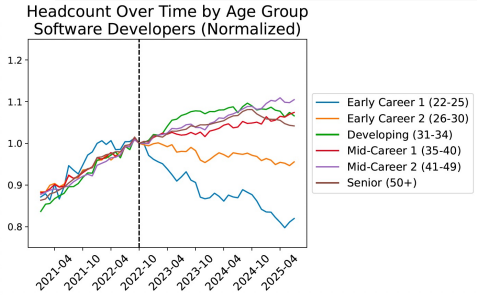
Notes: The graph present the estimated coefficients β_j from Equation 1, ran separately to juniors and seniors. Standard errors are clustered in firm level.

LEADERSHIP > CAREERS

It's Time To Get Concerned, Klarna, UPS, Duolingo, Cisco, And Many Other Companies Are Replacing Workers With AI

By Jack Kelly, Senior Contributor. ⓘ Jack Kelly covers career growth, job ... Follow Author

May 04, 2025, 09:52am EDT



At the age of AI, what education should business schools provide?

- First Principles
- Growth Mindset
- Paradigm Shift

https://digitaleconomy.stanford.edu/wp-content/uploads/2025/08/Canaries_BrynjolfssonChandarChen.pdf
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5425555
https://www.forbes.com/sites/jackkelly/2025/05/04/its-time-to-get-concerned-klarna-ups-duolingo-cisco-and-many-other-companies-are-replacing-workers-with-ai/

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Complete Replication of a PNAS Paper

https://github.com/andybhall/vbm-replication-extension

Universal vote-by-mail has no impact on partisan turnout or vote share

Daniel M. Thompson[a,1], Jennifer A. Wu[b,1], Jesse Yoder[a,1], and Andrew B. Hall[a,1,2]

[a]Department of Political Science, Stanford University, Stanford, CA 94305; and [b]Stanford Institute of Economic Policy Research, Stanford University, Stanford, CA 94305

Edited by Douglas S. Massey, Princeton University, Princeton, NJ, and approved May 6, 2020 (received for review April 15, 2020)

In response to coronavirus disease 2019 (COVID-19), many scholars and policy makers are urging the United States to expand voting-by-mail programs to safeguard the electoral process. What are the effects of vote-by-mail? In this paper, we provide a comprehensive design-based analysis of the effect of universal vote-by-mail—a policy under which every voter is mailed a ballot in advance of the election—on electoral outcomes. We collect data from 1996 to 2018 on all three US states that implemented universal vote-by-mail in a staggered fashion across counties, allowing us to use a difference-in-differences design at the county level to estimate causal effects. We find that 1) universal vote-by-mail does not appear to affect either party's share of turnout, 2) universal vote-by-mail does not appear to increase either party's vote share, and 3) universal vote-by-mail modestly increases overall average turnout rates, in line with previous estimates. All three conclusions support the conventional wisdom of election administration experts and contradict many popular claims in the media.

vote-by-mail | elections | COVID-19 | partisanship

The coronavirus disease 2019 (COVID-19) pandemic threatens the 2020 US election. Fears that the pandemic could deter many people from voting—or cause them to become infected if they do vote—have spurred calls for major electoral reforms. As election administration experts Nathaniel Persily and Charles Stewart put it, "The nation must act now to ensure receive an absentee ballot, while stopping short of moving to universal VBM; as such, by studying a more dramatic version of the recommended policies, our paper provides a useful upper bound related to these discussions." While a large literature in political science studies various forms of convenience voting—see *SI Appendix*, Table S1 for a full review—there has not been any comprehensive analysis of VBM that employs clear designs for causal inference to estimate effects on partisan outcomes.[†] The existing research supporting the neutral partisan effects of VBM compares turnout in Oregon before and after it implemented

Significance

In response to COVID-19, many scholars and policy makers are urging the United States to expand voting-by-mail programs to safeguard the electoral process, but there are concerns that such a policy could favor one party over the other. We estimate the effects of universal vote-by-mail, a policy under which every voter is mailed a ballot in advance of the election, on partisan election outcomes. We find that universal vote-by-mail does not affect either party's share of turnout or either party's vote share. These conclusions support the conventional wisdom of election administration experts and contradict many popular claims in the media. Our results imply that the partisan outcomes of vote-by-mail elections closely resemble in-person elections, at least in normal times.

Model Information

- **Model:** Claude Opus 4.5 (claude-opus-4-5-20251101)
- **Interface:** Claude Code CLI
- **Date:** January 2026

Jan 13, 2026

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Complete Replication of a PNAS Paper

https://github.com/andybhall/vbm-replication-extension/blob/main/INSTRUCTIONS.md

AI-Generated Academic Paper: Replicating and Extending "Universal Vote-by-Mail Has No Impact on Partisan Turnout or Vote Share"

Project Overview

You are tasked with producing a complete academic political science paper by replicating and extending Thompson, Wu, Yoder, and Hall (2020), published in PNAS. The original paper used a difference-in-differences design to estimate the causal effects of universal vote-by-mail (VBM) on partisan electoral outcomes, finding null partisan effects and a modest (~2 percentage point) increase in overall turnout.

Your task:

1. Replicate the original findings using the authors' published replication data and code
2. Extend the analysis by collecting new data for the same three states (California, Utah, Washington) through 2024
3. Test whether the null partisan findings hold in the post-COVID era

Original paper: https://www.pnas.org/doi/10.1073/pnas.2007249117
Original replication materials: https://github.com/stanford-dpl/vbm

IMPORTANT: Stop-and-Check Points

Throughout this project, there are mandatory **STOP AND CHECK** points marked with 🔴. At each of these points, you must:

1. Summarize what you have completed
2. Present key outputs for review
3. List any issues or concerns
4. **Wait for human approval before proceeding**

Do not proceed past a 🔴 checkpoint without explicit approval.

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Complete Replication of a PNAS Paper

https://github.com/andybhall/vbm-replication-extension/blob/main/CLAUDE_CODE_PROMPTS.md

Phase 0: Project Setup

Initial Prompt:

> I want to replicate and extend Thompson et al. (2020) "Universal Vote-by-Mail Has No Impact on Partisan Turnout or Vote Share" from PNAS. The paper studies California's Voter's Choice Act. I have the original replication data. Please set up the project structure and review the original materials.

Phase 1: Literature Review

Prompt:

> Approved, proceed to Phase 1: Literature Review

Phase 2: Replication

Prompt:

> Approved, proceed to Phase 2

Phase 3: Extension Data Collection

Prompt:

> Approved, proceed to Phase 3

Phase 4: Data Preparation

Prompt:

> Approved, proceed to Phase 4

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Complete Replication of a PNAS Paper

https://github.com/andybhall/vbm-replication-extension/blob/main/CLAUDE_CODE_PROMPTS.md

Phase 5: Extension Analysis

Prompt:

> Approved, proceed to Phase 5

Phase 6: Paper Writing

Prompt:

> Approved, proceed to Phase 6

Phase 7: Final Deliverables

Prompt:

> Approved, proceed to Phase 7

Bug Fix Session

Prompt:

> Can you take a look at the event study? It seems like something may be wrong with the turnout one since it's not showing the same positive effect as all the regressions (which I trust more) are showing

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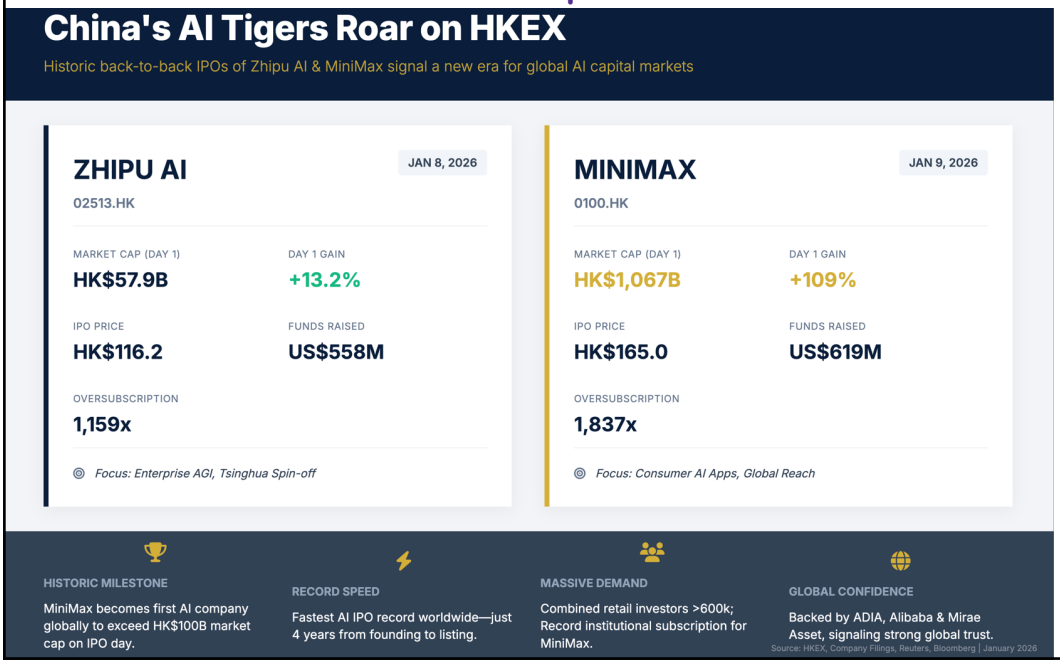
IPOs of Zhipu AI and MiniMax



https://www.scmp.com/tech/tech-trends/article/3339301/minimax-and-zhipus-stellar-hong-kong-ipos-supercharge-chinas-ai-ambitions

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DeepSeek to Disrupt the World Again?

News · Artificial Intelligence

Insiders Say DeepSeek V4 Will Beat Claude and ChatGPT at Coding, Launch Within Weeks

DeepSeek's upcoming V4 model could outperform Claude and ChatGPT in coding tasks, according to insiders—with its purported release nearing.

By Jose Antonio Lanz
Edited by Andrew Hayward

Jan 10, 2026
4 min read

Capability	Description
Long Code Prompts	A significant breakthrough in handling and parsing extremely long code prompts, offering a major advantage for developers working on complex software projects 6 .
Data Pattern Understanding	Improved ability to understand data patterns across the entire training pipeline, with no observed degradation in performance 6 .
Reasoning Ability	The model's outputs are described as more logically rigorous and clear, indicating stronger reasoning capabilities and greater reliability for complex tasks 6 .

https://tech.yahoo.com/ai/articles/insiders-deepseek-v4-beat-claude-205234497.html

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AI for Math by AxiomProver

Axiom ✓ Following
5,629 followers
1d

AxiomProver solved all 12 Putnam 2025 problems. Today we're releasing the Lean proofs.

We also put together our take on the problems, proof visualizations, and a look at how humans and AI approached things differently. Lots of fun math and Lean.

We sorted our findings into three categories:

Some problems are trivial for humans but tedious for AI. Calculus (A2, B2) and combinatorial constructions (A5) fall here. A positivity lemma humans find obvious takes chunks of Lean to satisfy the formal checker. After a combinatorial construction that's natural to see, our A5 formalization is 2054 lines and took 518 minutes. Combinatorics are friendly beasts to AI and analysis formalization could make one grumpy.

Some problems were surprisingly within reach. AxiomProver doesn't have a Euclidean geometry engine, so we didn't expect it to get B1. It reduced everything to symbols and pushed through. It also handled the combinatorial game theory question (A3) cleanly -- usually a tough domain for AI as we observed in last two years' model performance in the IMO.

Some problems got completely different solutions. On A4, our mathematicians thought algebraically. AxiomProver went geometric. On B4, we found one picture that settles it elegantly. AxiomProver chose 1061 lines of combinatorial bookkeeping. No picture, just grinding through cases until the result falls out.

The one that stunned us: A6. None of our in-house mathematicians finished it. AxiomProver did.

What's hard for humans and what's hard for machines are different questions. Understanding that gap matters as we are closing it.

Grothendieck uses the rising sea metaphor to say, don't attack the problem, raise the water level until it surrounds the land.

When will AI bring in definitions, build theories, choose the right abstraction to make problems dissolve?

We are not there yet. But days like this makes it feel closer.

Problem	Time to Solve	Tokens Used	Proof Length (Lines)	Theorems Generated	Tactics Used
A1	110 minutes	7,000,000	652	23	561
A2	185 minutes	6,000,000	556	26	581
A3	165 minutes	8,000,000	1,333	78	1,701
A4	107 minutes	8,000,000	960	32	1,107
A5*	518 minutes	9,100,000	2,054	52	3,074
A6*	259 minutes	16,000,000	588	28	670
B1	270 minutes	7,000,000	1,386	49	1,841
B2	65 minutes	2,000,000	417	28	325
B3	43 minutes	2,900,000	340	11	422
B4*	112 minutes	249,000	1,061	23	1,433
B5	354 minutes	18,000,000	1,495	66	1,967
B6*	494 minutes	21,000,000	1,019	30	1,052

"*" means AxiomProver solved the problem in the followng day.

https://github.com/AxiomMath/putnam2025

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Human Performance of Putman 2025

SCORE-TO-RANK CORRESPONDENCE

A participant is said to have rank n if $n-1$ participants scored higher. There were 3988 participants in the competition.

Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
90	1	64	32	49	96	35	202	21	505	7	1335
87	2	63	34	48	100	34	208	20	546	6	1344
81	3	62	37	47	106	33	220	19	641	5	1373
80	4	61	38	46	109	32	238	18	669	4	1428
78	6	60	45	45	111	31	254	17	686	3	1557
75	9	59	52	44	116	30	272	16	698	2	1760
74	10	58	58	43	119	29	295	15	713	1	2408
72	11	57	61	42	126	28	313	14	750	0	2807
71	13	55	64	41	137	27	328	13	820		
70	17	54	66	40	150	26	337	12	905		
69	18	53	69	39	173	25	349	11	1090		
67	23	52	76	38	180	24	374	10	1171		
66	26	51	79	37	194	23	404	9	1274		
65	30	50	87	36	198	22	449	8	1305		

About 4'000 students participated in Putman 2025.

FREQUENCY DISTRIBUTION OF PROBLEM SCORES OF THE TOP 504 CONTESTANTS

Score	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6
10	449	93	29	112	5	0	375	81	75	95	1	0
9	28	10	1	11	3	1	25	76	21	39	0	1
8	1	99	8	15	3	0	11	17	9	5	0	0
7	0	11	2	13	0	0	4	7	0	0	0	2
6	0	0	0	1	0	0	0	0	0	0	0	1
5	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
3	4	36	1	27	0	0	2	12	43	23	0	2
2	13	88	8	10	3	0	48	21	70	32	82	2
1	3	24	29	52	0	9	16	54	80	14	81	0
0	1	85	154	34	163	65	10	84	43	77	41	29
NA	5	58	272	229	327	429	13	152	163	219	299	467

https://maa.org/wp-content/uploads/2025/03/2024-William-Lowell-Putnam-Competition-Announcement-of-Winners.pdf Jan 13, 2026

15

AI Native Mindset: Zero Marginal Cost of Code Compute

Michael Truell
@mntruell

We built a browser with GPT-5.2 in Cursor. It ran uninterrupted for one week.

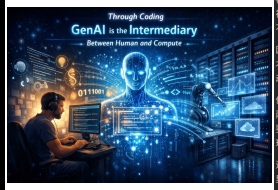
It's 3M+ lines of code across thousands of files. The rendering engine is from-scratch in Rust with HTML parsing, CSS cascade, layout, text shaping, paint, and a custom JS VM.

It *kind of* works! It still has issues and is of course very far from Webkit/Chromium parity, but we were astonished that simple websites render quickly and largely correctly.

我们在 Cursor 中用 GPT-5.2 构建了一个浏览器。它连续运行了一周。

代码量超过 300 万行，分布在数千个文件中。渲染引擎完全用 Rust 从零打造，包含 HTML 解析、CSS 层叠、布局、文字排版、绘制以及自定义的 JS 虚拟机。

它*基本能跑*！虽然仍存在不少问题，距离 Webkit/Chromium 的水平还很遥远，但简单的网页能快速且基本正确地渲染出来，这让我们感到惊讶。



一次性软件与被压缩的现实：AI Native 的本质是策略重构

Sat 22 November 2025 , by grapeot | 8 Comments AI Chinese

一次性软件与决策解析度

一切从一个十分钟的需求开始。在机器学习研发工作中我们用Labelbox来让人类标注数据。有一次我发现标注的数据质量特别差，就打回去让他重标。第二天新的结果来了，我就想要快速看一下他到底做了哪些改动，有没有把错的改对。

在没有AI的传统工作流里，这是一个典型的低效环节。虽然我们有前后的 JSON 文件，但人类没办法直接解析和理解大规模的结构化数据。要搞清楚具体的改动，我只有两个选择。第一是自己写python代码做解析和比较，写前端HTML来做可视化。这至少需要一两个小时的编码和调试。但考虑到我只是想做一个十分钟级别的任务，投入两个小时的开发成本显然不划算。

因此绝大多数工程师会选择第二条路，人工抽样。我会用文本编辑器打开 JSON 文件，配合图片查看器，随机抽取十个样本进行人肉比对。这种方式很快，可以十分钟内搞定，但带来的决策质量也很低。它要依赖直觉甚至运气。我们看不到改动的全貌，只能基于极其有限的样本进行推断。这非常考验工程师的经验和水平，需要从蛛丝马迹中推断整体。

但是在AI时代，我用了第三种方法。我把前后版本的 JSON 文件和原始图片链接直接丢给 AI，让它做一个网站来可视化。两分钟以后，它生成了一个包含完整前后对比、过滤、排序和搜索功能的网站。通过这个工具，我不需要抽样猜测，不需要手工比对，不需要碰运气，而是直接查看了所有改动的分布，然后决定对某些场景的例子仔细检查。10分钟以后，我发现有些错误改对了，但还是有个特定场景错误很多。基于这个全量的检查，我做出了退回重标部分例子的决策。

这件事情让我不安的地方在于，那个功能强大的可视化网站，在我做完检查的那一刻就没用了。在传统的软件工程观念里，这是对开发资源的极大浪费。我们在整个学习和职业生涯中都被反复教导，要设计和编写可复用、可维护的代码，恪守DRY（Don't Repeat Yourself）原则。这种用后即焚的一次性软件甚至是离经叛道的。

然而，正是这个一次性软件，将我从盲目抽样的低解析度决策中解放出来，让我拥有了对标注结果精细的、高解析的视野。换言之，当编写代码的成本接近于零时，以前离经叛道甚至匪夷所思的策略反而变成了最优策略：为了一个微小的临时需求，现场构建一个完善的专用工具。

CS146S: The Modern Software Developer
Stanford University • Fall 2025

Course Description

In the last few years, large language models have introduced a revolutionary new paradigm in software development. The traditional software development lifecycle is being transformed by AI automation at every stage, raising the question: how should the next generation of software engineers leverage these advances to 10x their productivity and prepare for their careers?

This course demonstrates that modern AI tooling will not only enhance developer productivity but also democratize software engineering for a broader audience. We'll show that software development has evolved from 0-1 code creation to an iterative workflow of plan, generate with AI, modify, and repeat. Students will master both the theory behind traditional software engineering challenges and the cutting-edge AI-powered tools solving them today.

Through hands-on engineering tasks and talks from industry pioneers building these revolutionary tools, you'll gain practical experience with AI-assisted development, automated testing, intelligent documentation, and security vulnerability detection. By the end of this course, you'll have a crisp understanding of how to integrate state-of-the-art LLM models into complex development workflows and avoid common pitfalls.

https://x.com/mntruell/status/2011562190286045552; https://themodernsoftware.dev/; https://yage.ai/ai-native-cost-structure.html Jan 20, 2026

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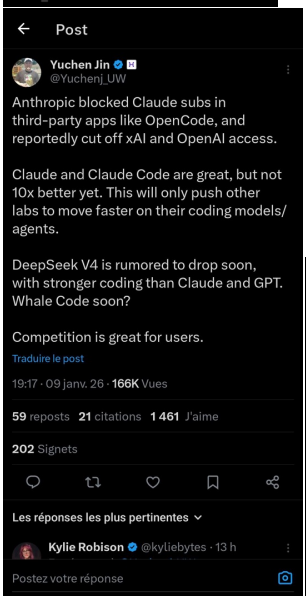
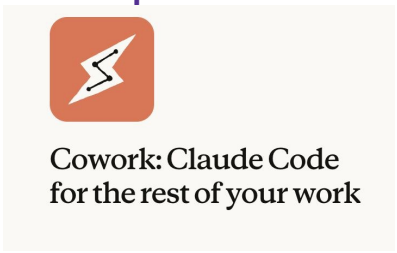
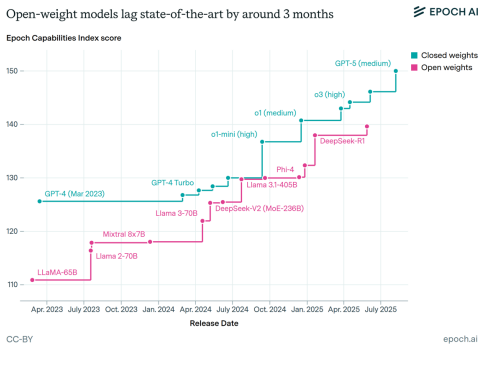
Open or Close in the Age of AI





Open-weight models lag state-of-the-art by around 3 months on average

Frontier open-weight models lag behind the most capable models by an average of 3 months in the Epoch Capabilities Index (ECI), our holistic measure of model capability. That corresponds to an average ECI gap of around 7 points, similar to the gap between o3 and GPT-5.



https://www.reddit.com/r/Anthropic/comments/1q8z1to/anthropic_blocking_access_to_thirdparty_apps/
https://github.com/eigent-ai/eigent; https://epoch.ai/data-insights/open-weights-vs-closed-weights-models

Jan 20, 2026

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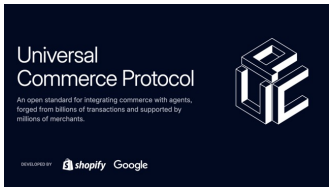
Agentic E-commerce and Beyond



OpenAI
9,698,246 followers
3h ·

We've been working to make powerful AI accessible to everyone through our free product and low-cost subscription tier, ChatGPT Go—which is now available globally in every country where ChatGPT is available.

In the coming weeks, we're also planning to start testing ads in the U.S. for the free and Go tiers, so more people can benefit from our tools with fewer usage limits or without having to pay. Plus, Pro, Business, and Enterprise subscriptions will not include ads.

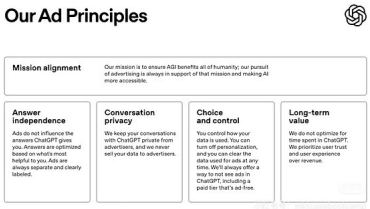
We're sharing our principles early on how we'll approach ads–guided by putting user trust and transparency first as we work to make AI accessible to everyone.

What matters most:
- Responses in ChatGPT will not be influenced by ads.
- Ads are always separate and clearly labeled.
- Your conversations are private from advertisers.
- Plus, Pro, Business, and Enterprise tiers will not have ads.

Once we begin testing our first ad formats, we look forward to getting your feedback and ensuring that ads can support broad access to AI and keep the trust that makes ChatGPT valuable.

https://lnkd.in/gPPiKPc8

Our Ad Principles



https://wallstreetcn.com/articles/3763338; https://www.linkedin.com/pulse/building-universal-commerce-protocol-ucp-ilya-grigorik-ekemc

Jan 20, 2026

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Executive Summary

- On Saturday, Jan 3 we (Andy Hall) released an empirical paper fully created by Claude Code. In this summary, Hall and Straus offer their interpretations of how Claude did, based on a manual audit that Straus carried out independently of Hall and which is detailed below.
- Our subjective conclusion: Claude Code did a remarkably good job at extending the main results of the original paper with extremely limited oversight in less than an hour of work. The small mistakes it made during the replication and extension, which we detail below, are the kind of mistakes we believe a human would also be likely to make. At the same time, the errors it made when going beyond the original paper's approach and providing totally new analyses were significantly more severe, suggesting that there are limits to what parts of a paper Claude Code can currently generate. All in all, while it's clear to us that AI agents require expert oversight to accurately produce new papers, it is also clear to us that this constitutes a major potential change to how empirical research will be conducted moving forward.
- Disclaimer: In response to a large number of inquiries from the community, we have moved quickly to provide this update. Manually extending and verifying an empirical project is very challenging. Just as Claude Code makes mistakes, so too do human researchers. We will be continuing to evaluate this project and will provide updates if we find any further mistakes of note.

Quality of Coding Agent's Replication

https://www.andrewbenjaminhall.com/Straus_Hall_Claude_Audit.pdf

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Quality of Coding Agent's Replication

- The main findings:
  - Claude Code correctly replicated the original paper's estimates exactly.
  - It correctly collected new information on the treatment variable with a high degree of accuracy. Claude correctly identifies the first election under the Voters' Choice Act for 29/30 California counties that adopt it. Its only mistake (coding Imperial County as treated in 2024 rather than 2025) was a mistake that we also made when we first constructed the new treatment data ourselves, due to a lack of clarity in the official online source.
  - It correctly collected new CVAP data and we are not able at present to detect any mistakes with its collection of this data.
  - It collected all relevant election data for the only state with new treatment variation (California) with no mistakes that we can currently detect.
  - Its most important error was failing to collect senatorial or gubernatorial data for Utah and Washington in 2020 and 2024 (it did correctly collect presidential data for these two states, as well as 2022 senatorial data). This error of omission has a relatively minor impact on the final vote share and turnout estimates because these states have no variation in the treatment variable in this time period.
  - It chose to define turnout based on total votes cast for the presidential election. While there may be contexts in which this choice is defensible, it is a deviation from the definition in the original paper it was instructed to extend, and causes it to drop some observations it could otherwise include in its subsequent turnout analysis.
  - It correctly estimated the key quantities of interest using the new data it collected (i.e., it ran the correct specifications and reported the results correctly).
- The main quantity of interest from the extended paper is the coefficient on the treatment variable in the quadratic trends specification. Claude Code reported this estimate as 0.003. In our independent, non-AI replication our estimate for this quantity is 0.004.
- A secondary coefficient of interest is the coefficient on the treatment variable in the vanilla specification of the diff in diff with turnout as the outcome variable. Claude Code reported this estimate as 0.026. In our independent, non-AI replication our estimate for this quantity is 0.023.
- Claude also produced several completely new analyses that were not direct extensions of the original paper. While these analyses may not contain glaring errors and are well within the norm for political science papers, they drift from the intent of the prompt, and make data decisions and specification decisions we would not have made, and are generally not of very high quality in our opinion.
- Claude failed to keep sufficiently detailed records of its data collection and related decisions, possibly in part due to an insufficiently specific prompt in this regard. This is bad from a transparency and reproducibility perspective.

https://www.andrewbenjaminhall.com/Straus_Hall_Claude_Audit.pdf

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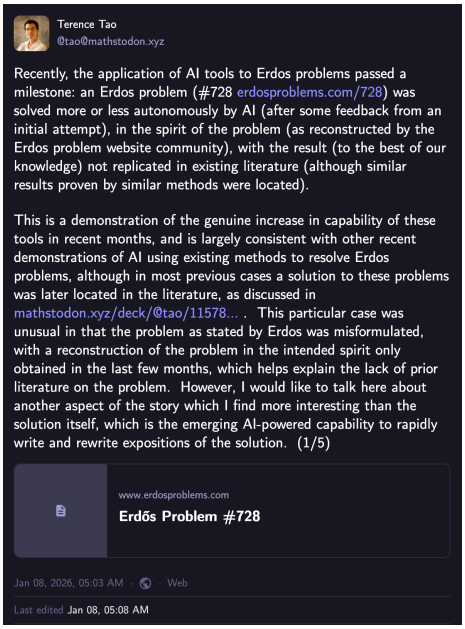
How About Theory?



Terence Tao
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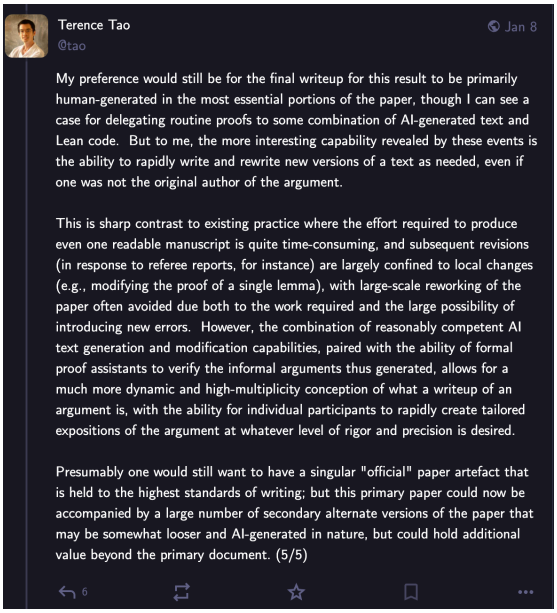
Recently, the application of AI tools to Erdos problems passed a milestone: an Erdos problem (#728 erdosproblems.com/728) was solved more or less autonomously by AI (after some feedback from an initial attempt), in the spirit of the problem (as reconstructed by the Erdos problem website community), with the result (to the best of our knowledge) not replicated in existing literature (although similar results proven by similar methods were located).

This is a demonstration of the genuine increase in capability of these tools in recent months, and is largely consistent with other recent demonstrations of AI using existing methods to resolve Erdos problems, although in most previous cases a solution to these problems was later located in the literature, as discussed in mathstodon.xyz/deck/@tao/11578... . This particular case was unusual in that the problem as stated by Erdos was misformulated, with a reconstruction of the problem in the intended spirit only obtained in the last few months, which helps explain the lack of prior literature on the problem. However, I would like to talk here about another aspect of the story which I find more interesting than the solution itself, which is the emerging AI-powered capability to rapidly write and rewrite expositions of the solution. (1/5)

www.erdosproblems.com
Erdős Problem #728

Jan 08, 2026, 05:03 AM · Web
Last edited Jan 08, 05:08 AM



Terence Tao
@tao
Jan 8

My preference would still be for the final writeup for this result to be primarily human-generated in the most essential portions of the paper, though I can see a case for delegating routine proofs to some combination of AI-generated text and Lean code. But to me, the more interesting capability revealed by these events is the ability to rapidly write and rewrite new versions of a text as needed, even if one was not the original author of the argument.

This is sharp contrast to existing practice where the effort required to produce even one readable manuscript is quite time-consuming, and subsequent revisions (in response to referee reports, for instance) are largely confined to local changes (e.g., modifying the proof of a single lemma), with large-scale reworking of the paper often avoided due both to the work required and the large possibility of introducing new errors. However, the combination of reasonably competent AI text generation and modification capabilities, paired with the ability of formal proof assistants to verify the informal arguments thus generated, allows for a much more dynamic and high-multiplicity conception of what a writeup of an argument is, with the ability for individual participants to rapidly create tailored expositions of the argument at whatever level of rigor and precision is desired.

Presumably one would still want to have a singular "official" paper artefact that is held to the highest standards of writing; but this primary paper could now be accompanied by a large number of secondary alternate versions of the paper that may be somewhat looser and AI-generated in nature, but could hold additional value beyond the primary document. (5/5)

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https://mathstodon.xyz/@tao/115855840223258103; https://github.com/teorth/erdosproblems/wiki/AI-contributions-to-Erd%C5%91s-problems

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An LLM agent-based framework for analytical characterization of Nash equilibria

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*Correspondence: jianweihuang@cuhk.edu.cn (J.H.); zhaojunhua@cuhk.edu.cn (J.Z.)
https://doi.org/10.1016/j.ynexs.2025.100107

BROADER CONTEXT

Deriving Nash equilibrium supports decision analysis in economics, energy systems, and public policy, yet traditional analytical methods fail when facing high-dimensional, non-convex, or dynamic games. PrimeNash pioneers the use of large language model agents to automatically derive and verify closed-form equilibria, converting equilibrium search from a manual exercise into a reproducible computational process. By integrating symbolic reasoning, code execution, and formal proof, it bridges AI reasoning with mathematical rigor. This breakthrough reduces the human effort required for equilibrium derivation by more than 80% while maintaining interpretability and auditability. Beyond methodological innovation, PrimeNash empowers transparent modeling of strategic interactions in carbon markets, energy systems, and regulatory design, which are areas critical for climate mitigation and economic resilience. Its agent-based framework marks a foundational step toward AI-driven scientific discovery in game theory and economics, opening pathways to scalable policy analysis and automated theorem-assisted research.

ABSTRACT

In this paper, we introduce PrimeNash, a large language model agent framework that, to our knowledge, is the first to automatically derive closed-form Nash equilibria with machine-checkable proofs. PrimeNash decomposes equilibrium search into three modules, strategy generation, payoff evaluation, and equilibrium proof, and it couples multi-agent reasoning with symbolic code execution to handle high-dimensional strategies, intertemporal recursion, and discontinuous, non-convex payoffs. Across seven canonical models, PrimeNash solves all static games and 70% of dynamic games in which success is defined as obtaining a symbolic closed-form solution that passes automated equilibrium checks. Notably, it produces the first analytical solution to a carbon market model previously lacking a closed-form characterization. The framework reduces manual derivation effort while preserving reproducibility and auditability through generated code and proof artifacts. By turning equilibrium derivation from a bespoke manual exercise into a transparent, scalable pipeline, PrimeNash extends the toolkit for economic analysis and opens new avenues for studying complex strategic systems from climate policy to financial markets.

https://www.cell.com/nexus/pdfExtended/S2950-1601(25)00054-3

LLM Agent for Stylized Modeling

Jan 27, 2026

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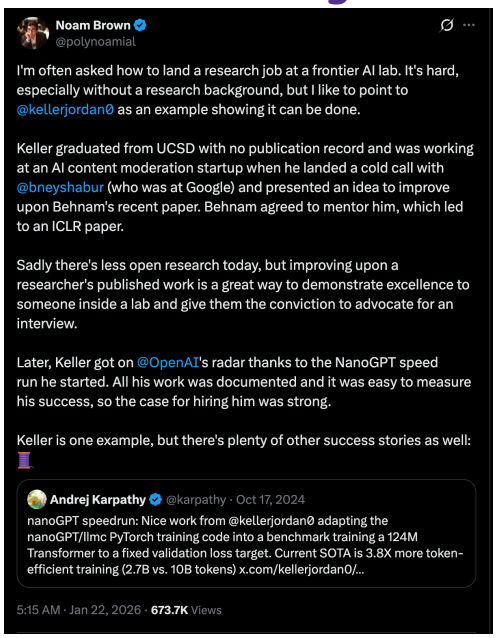
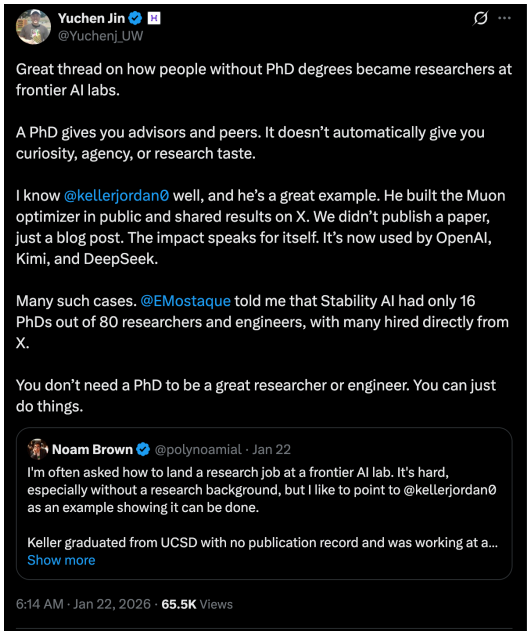
Doing AI @OpenAI without PhD





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Should AI be Adopted in Clinical Medicine

https://zhuanlan.zhihu.com/p/1996731913570916212

Jan 27, 2026

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How About Legal?

Generative AI hallucinations continue to plague unwary attorneys and pro se litigants, recent research finds, emphasizing the ongoing need for careful verification of case citations

核心还是25年AI大爆发下，以豆包+为首的AI模型（背后的公司）不断推广，导致普通民众对AI的认可度已经非常高了。

甚至部分人会觉得"AI比你们（律师）还要懂啊，还免费"

这两年整个经济都在下行，纠纷案其实更多了。

以前往往会说律师会发这些"烂财"，毕竟纠纷越多，律师出场机会越多嘛，普通人还是会咬咬牙请个律师来增加起诉信心的。

但现在呢，"AI快，AI好，AI又快又好"

以前普通民众可能没得选，因为不懂法。

现在呢？

他们随便打开一下豆包或者Deepseek，输入案情后，AI不仅"哐哐"给出法律分析，还能直接写起诉状、证据清单。

尤其在专业律师的加持下，很多写问案、诊案然后写法律文书的智能体层出不穷，直接说完后，全部材料"哒哒哒"就出来了。

"嘿，和找过的律师写得一样好！"（毕竟那位律师也有可能是用AI生成的文书）

于是，他们拿着AI生成的材料直接就可以去立案了。

虽然法庭上可能磕磕绊绊（让法官头疼去吧），但对于那些事实清楚、标的额不大的小民事案件，法官看材料其实就够了。

结果就是，**大量的初级案源直接蒸发了。**

https://www.zhihu.com/question/659369541; https://www.thomsonreuters.com/en-us/posts/technology/genai-hallucinations/

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