14th June, 2025

DeepSeek

Where Open-Source Meets Open-Minds

KIRTI SWARUP SWAIN

https://www.bbc.com/news/articles/c5yv5976z9po

DeepSeek: The Chinese AI app that has the world talking

4 February 2025

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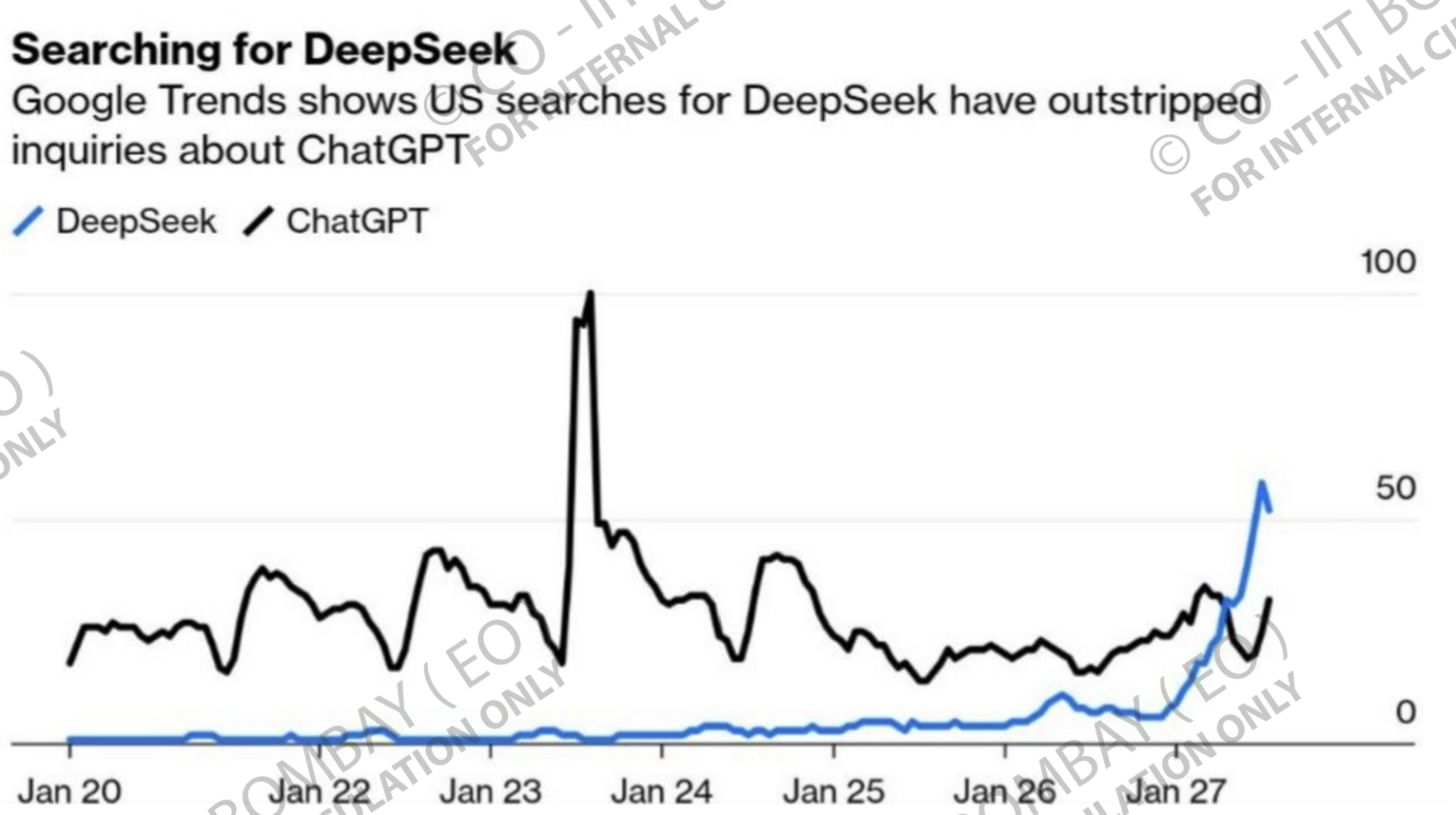
Trend



Online Service	Launch Year	Time Taken to Reach 1 Million Users	Time Taken to Reach 10 Million Users
DeepSeek	2025	14 days	20 days
ChatGPT	2022	5 days	40 days
Perplexity AI	2022	2 months	13 months
Instagram	2010	2.5 months	355 days
Facebook	2004	10 months	852 days
Threads	2023	1 hour	7 hours
Twitter	2006	2 years	780 days
Netflix	1999	3.5 years	9 years

1) https://www.facebook.com/photo/?fbid=1169983918464817&set=very-interesting-by-bloomberg-us-google-searches-for-deepseek-outstrip-inquiries

2) https://explodingtopics.com/blog/deepseek-ai

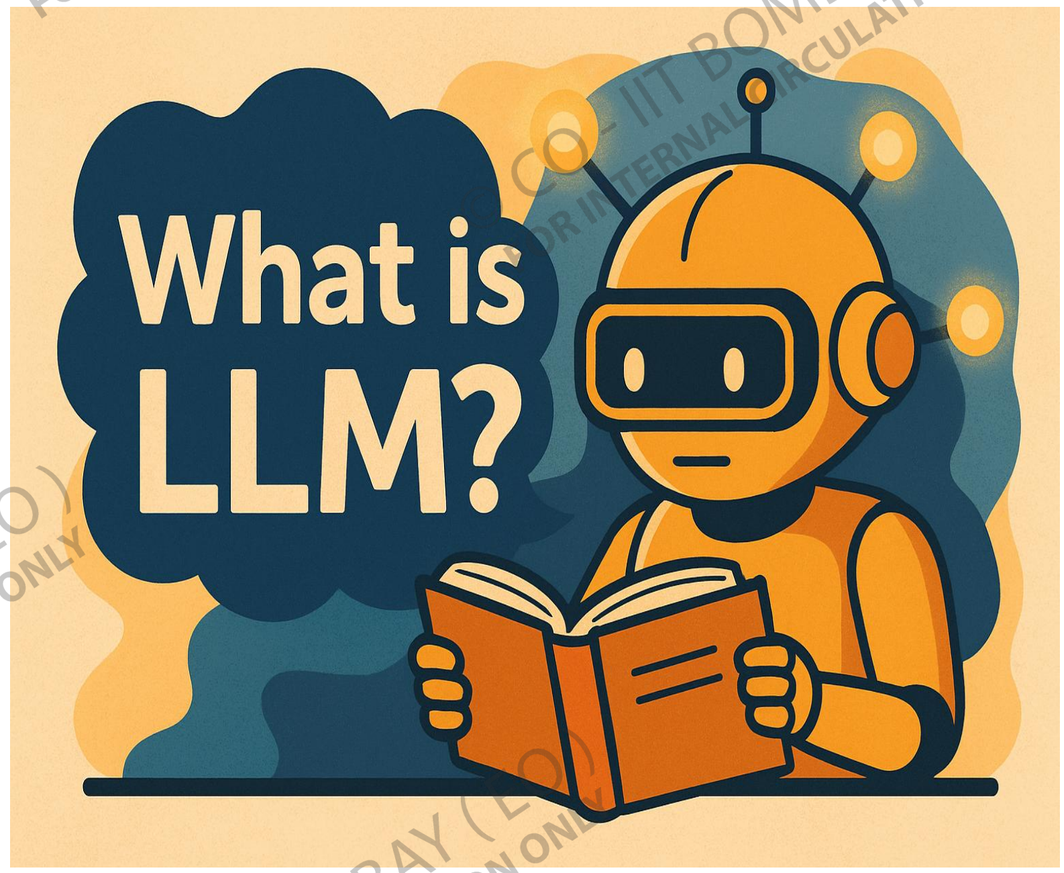
Foundational & Game-Changing LLMs

Year	Model	Organization	Highlights	Key Limitations
2018	**GPT-1**	OpenAI	First autoregressive transformer model	Small scale (117M), poor long-form results
2019	**GPT-2**	OpenAI	Breakthrough in coherent text generation	No fine-tuning, factual hallucinations
2020	**GPT-3**	OpenAI	175B params, few-shot learning	Expensive, biased, no tuning access
2022	**ChatGPT (3.5)**	OpenAI	Dialogue-tuned GPT-3.5	Repetitive, polite hallucinations
2023	**GPT-4**	OpenAI	Multimodal, 32K context, strong reasoning	Closed-source, high compute cost

Modern Popular LLMs (2023–2025)

Year	Model	Organization	Highlights	Key Limitations
2023	**Claude 2**	Anthropic	Harmlessness-focused, long context	Cautious replies, slower dev pace
2023	**Gemini 1.0**	Google DeepMind	Multimodal, web-connected	Closed-source, no public weights
2024	**Claude 3**	Anthropic	SOTA reasoning, 100K context	Limited tuning, cautious by design
2024	**Grok**	xAI (Twitter)	Real-time humor, X integration	Less smart than GPT-4, niche tone
2024	**Gemini 1.5**	Google DeepMind	1M token context, excellent search integration	Hardware-intensive, not open-source
2024	**Perplexity LLM**	Perplexity AI	Combines search + LLM in real-time	Depends on external data freshness
2025	**DeepSeek R1**	DeepSeek AI	Open-source, 16K context, cost-efficient	No moderation, early in ecosystem
2025	**GPT-4o**	OpenAI	Unified voice-vision-text, real-time	Closed, compute-heavy, costly at scale

LLM



Definition

A Large Language Model (LLM) is an advanced AI program designed to understand and generate human-like language.

Learning Process

It's trained by reading **millions of texts** — like books, articles, websites, and conversations — to learn how language works.

How It Responds

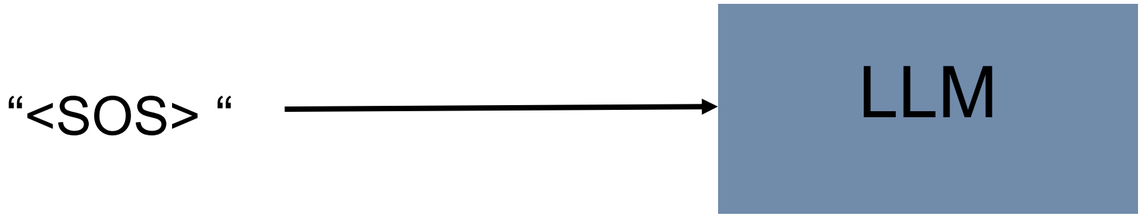
Based on what it has learned, it **predicts the next word** or **generates answers**, like completing sentences or replying to your questions.

Applications

LLMs power tools like:
Chatbots and virtual assistants
Language translators
Content writing tools
Code assistants
Search engines and summarizers

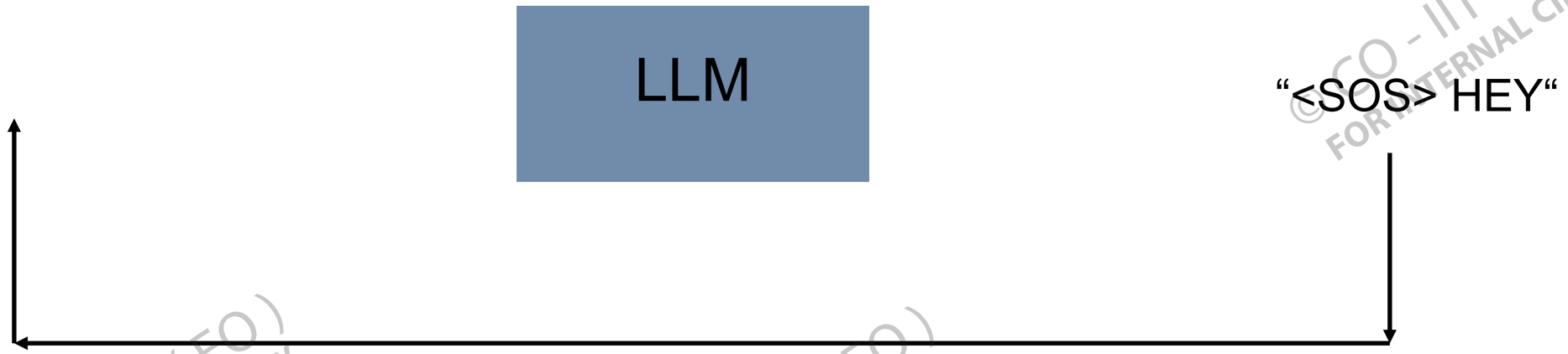
How traditional LLMs work

HEY ! HOW CAN I ASSIST YOU TODAY?

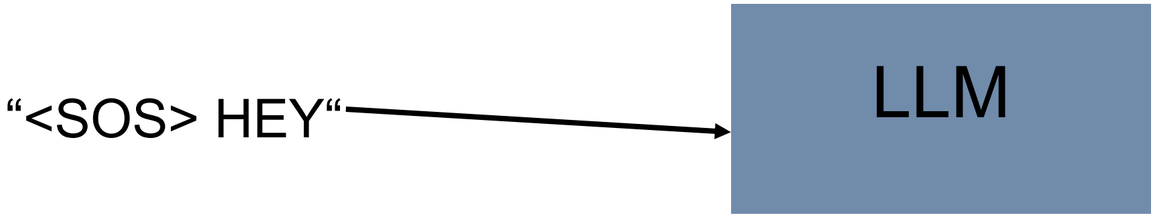


How traditional LLMs work

How traditional LLMs work



How traditional LLMs work



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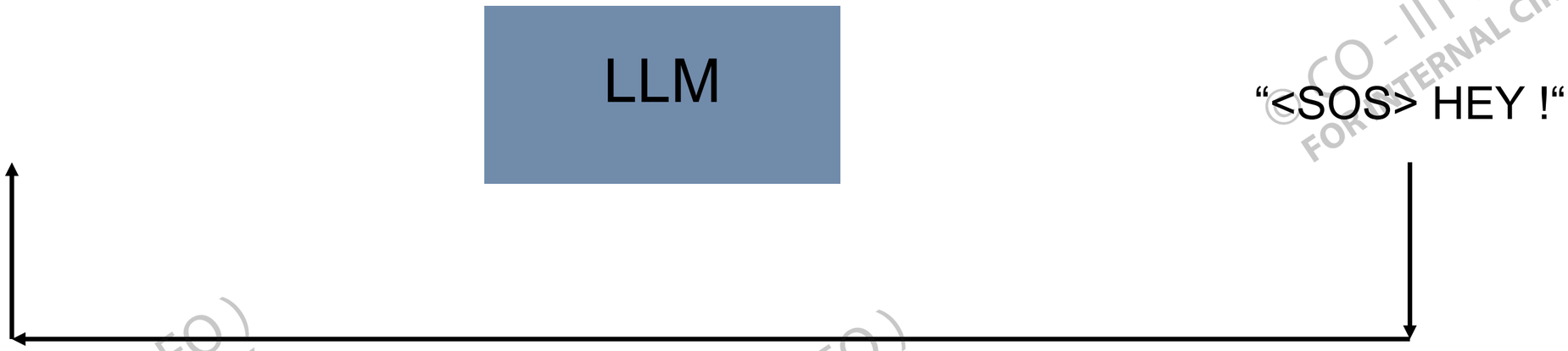

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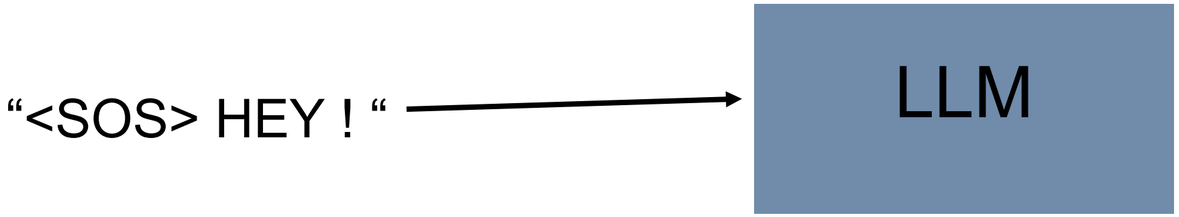

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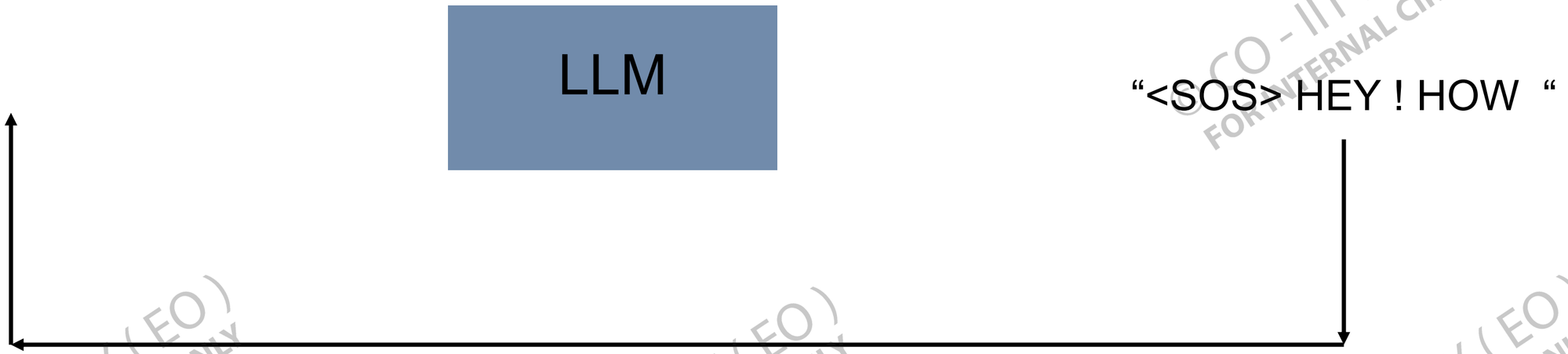
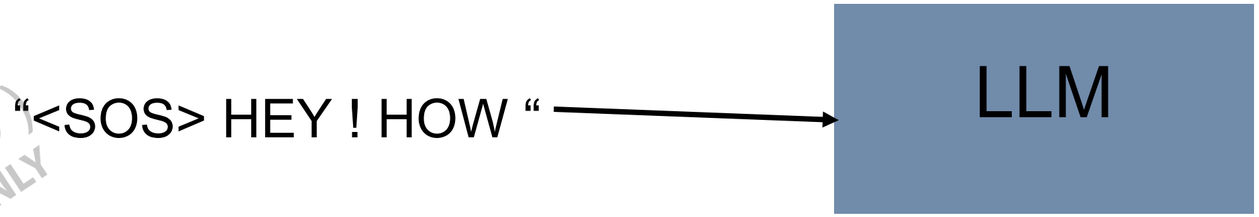


How traditional LLMs work



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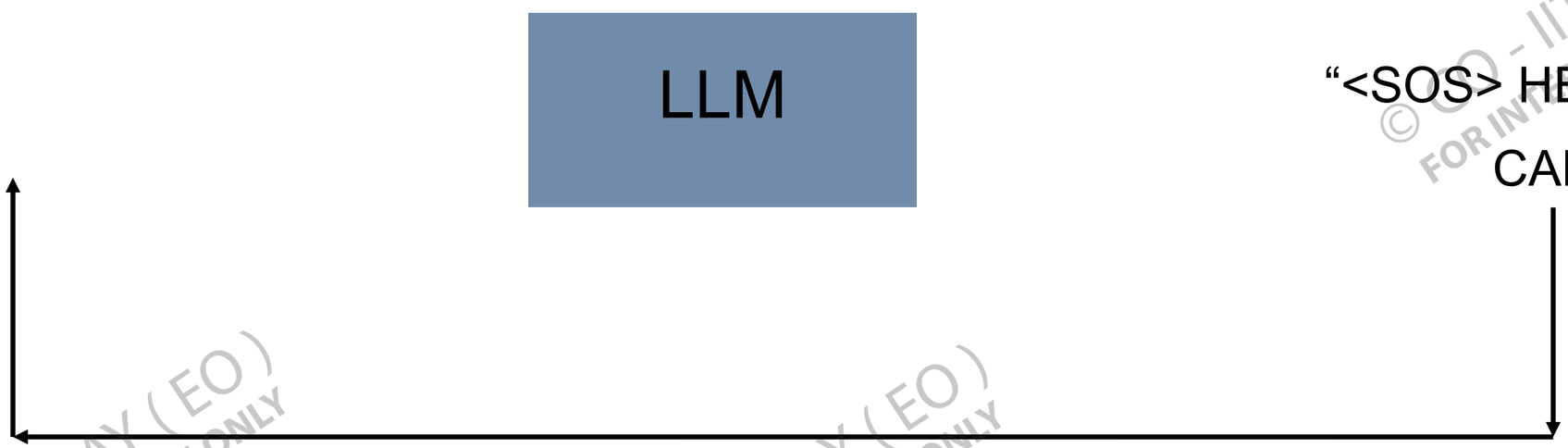

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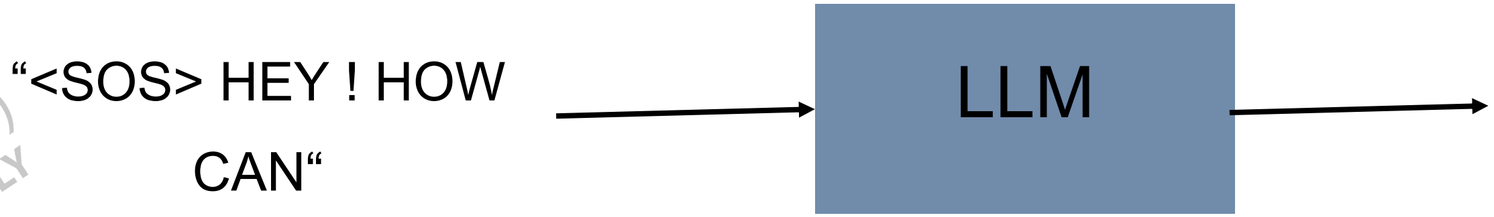


How traditional LLMs work

LET’S GET IN TO DEEPSEEK

- **Founded:** July 2023 in Hangzhou, China
- **Core Technology:** Large Language Models (LLMs) – DeepSeek-R1 & DeepSeek-V3
- **Open-Weight & Cost-Efficient:** MIT-licensed models trained for ≈ $6 million
- **Key Applications:**
  - Semantic document search
  - AI chatbots
  - Enterprise knowledge retrieval

DEEPSEEK- A STANDALONE MODEL

Hybrid Retrieval & Generation
Combines fast vector search with on-the-fly transformer reasoning for more accurate, context-aware results.

Lightweight & Scalable
Deploys in mobile apps (DeepSeek-Light) or powers enterprise systems (DeepSeek-Pro) with the same core engine.

Research-Backed Excellence
Backed by peer-reviewed papers (vector indexing optimizations, hybrid attention mechanisms) and active updates from the DeepSeek lab.

CHATGPT- PRICING

Realtime API

Build low-latency, multimodal experiences including speech-to-speech.

Text	GPT-4o	$5.00 / 1M input tokens	$2.50 / 1M cached input tokens	$20.00 / 1M output tokens
	GPT-4o mini	$0.60 / 1M input tokens	$0.30 / 1M cached input tokens	$2.40 / 1M output tokens
Audio	GPT-4o	$40.00 / 1M input tokens	$2.50 / 1M cached input tokens	$80.00 / 1M output tokens
	GPT-4o mini	$10.00 / 1M input tokens	$0.30 / 1M cached input tokens	$20.00 / 1M output tokens

DEEPSEEK- PRICING

MODEL[1]		deepseek-chat	deepseek-reasoner
CONTEXT LENGTH		64K	64K[2]
MAX OUTPUT[3]		DEFAULT: 4K MAXIMUM: 8K	DEFAULT: 32K MAXIMUM: 64K
FEATURES	Json Output	✓	✓
	Function Calling	✓	✓
	Chat Prefix Completion (Beta)	✓	✓
	FIM Completion (Beta)	✓	✗
STANDARD PRICE (UTC 00:30-16:30)	1M TOKENS INPUT (CACHE HIT)[4]	$0.07	$0.14
	1M TOKENS INPUT (CACHE MISS)	$0.27	$0.55
	1M TOKENS OUTPUT[5]	$1.10	$2.19
DISCOUNT PRICE[6] (UTC 16:30-00:30)	1M TOKENS INPUT (CACHE HIT)	$0.035 (50% OFF)	$0.035 (75% OFF)
	1M TOKENS INPUT (CACHE MISS)	$0.135 (50% OFF)	$0.135 (75% OFF)
	1M TOKENS OUTPUT	$0.550 (50% OFF)	$0.550 (75% OFF)

DEEPSEEK- MODELS

DeepSeek-Coder-V2 (Jul 2024)

- 236 B parameters • 128 K-token context
- Optimized for complex coding tasks and developer workflows

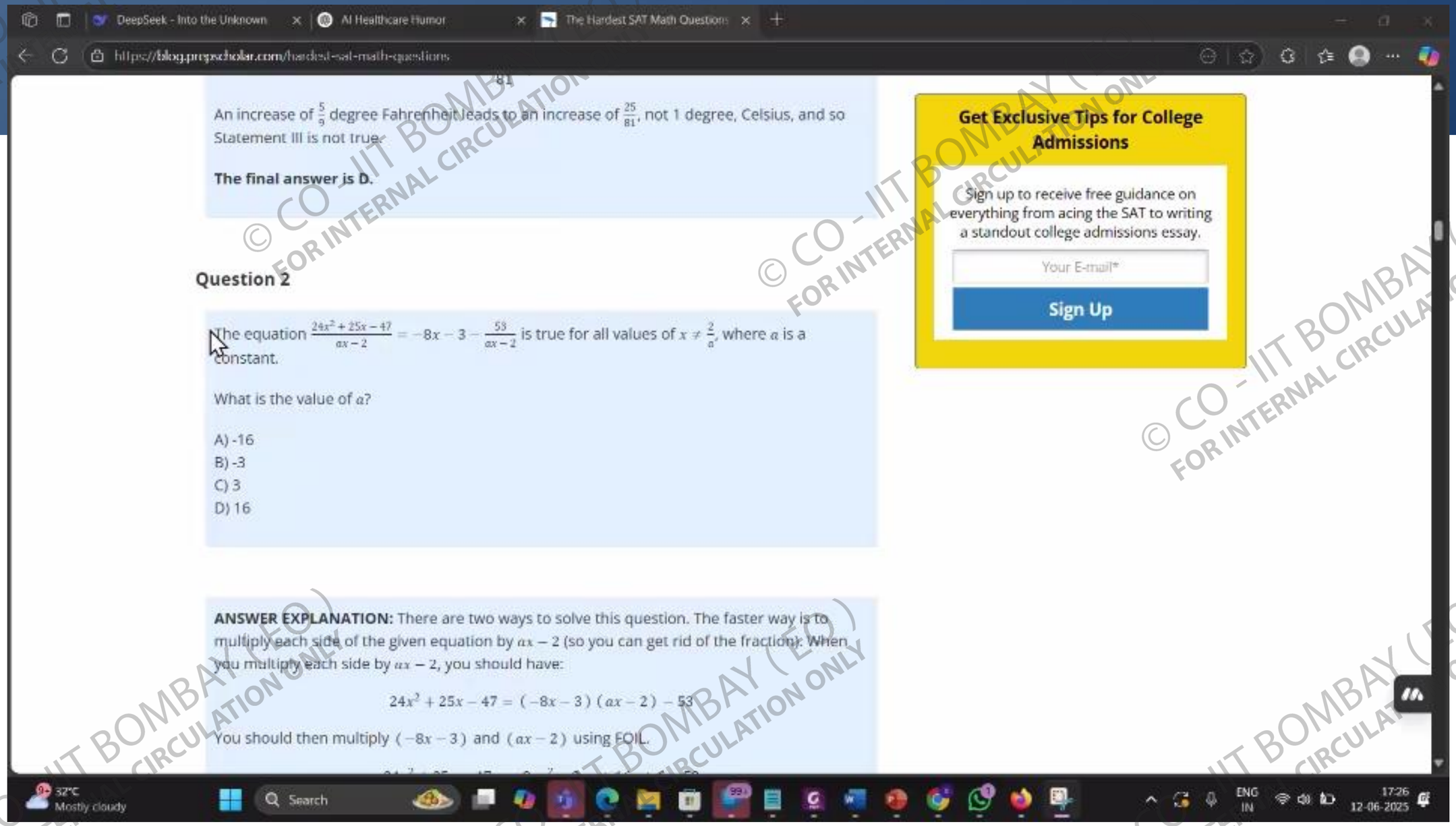
DeepSeek-V3 (Dec 2024)

- 671 B parameters • 128 K-token context
- Mixture-of-Experts (MoE) architecture for general-purpose AI, balancing speed and accuracy

DeepSeek-R1 (Jan 2025)

- 671 B parameters • 128 K-token context
- Extended reasoning via pure RL training—competes with top-tier models at far lower inference cost

DEEPSEEK- COMPARISON

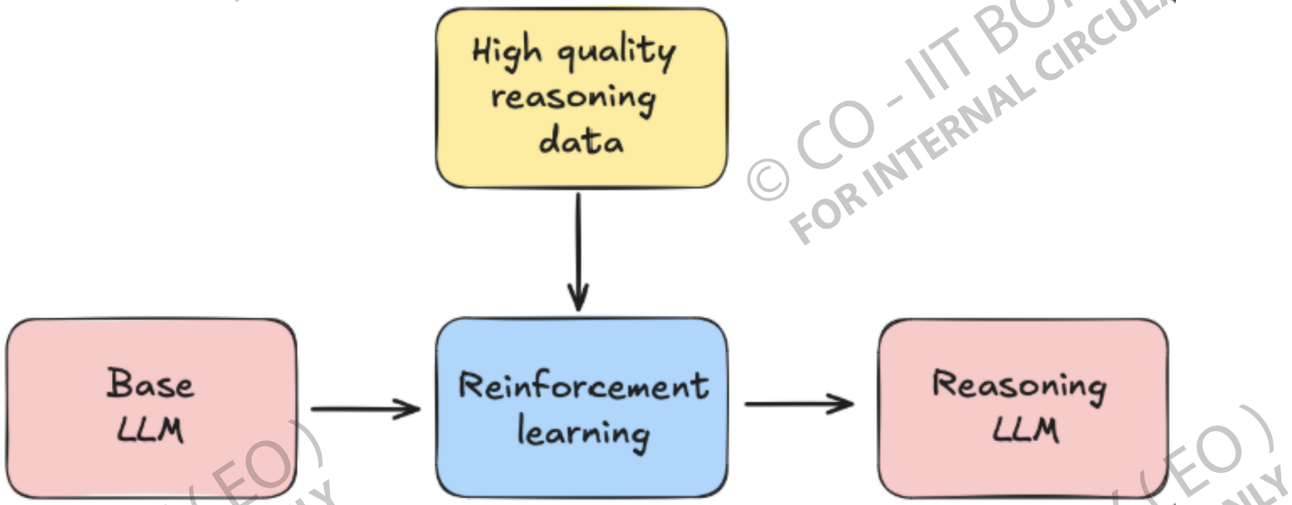


How is DeepSeek different from ChatGPT

1) Reduced cache size per token [3]

ATTENTION MECHANISM	KV CACHE ENTRIES PER TOKEN	KV CACHE SIZE PER TOKEN*	PERFORMANCE
Multi-Head Attention (MHA)	$2n_h d_h l$	4 MB	High
Multi-Query Attention (MQA)	$2d_h l$	31 KB	Lower
		57x Reduction	
Grouped-Query Attention (GQA)	$2n_g d_h l$	500 KB**	Medium
Multi-Head Latent Attention (MLA)	$d_l l$	70 KB	Higher

2) Reinforcement Learning [4]



[3] https://youtu.be/0VLAoVGf_74?si=Z73SLfM-ey1mvBS-

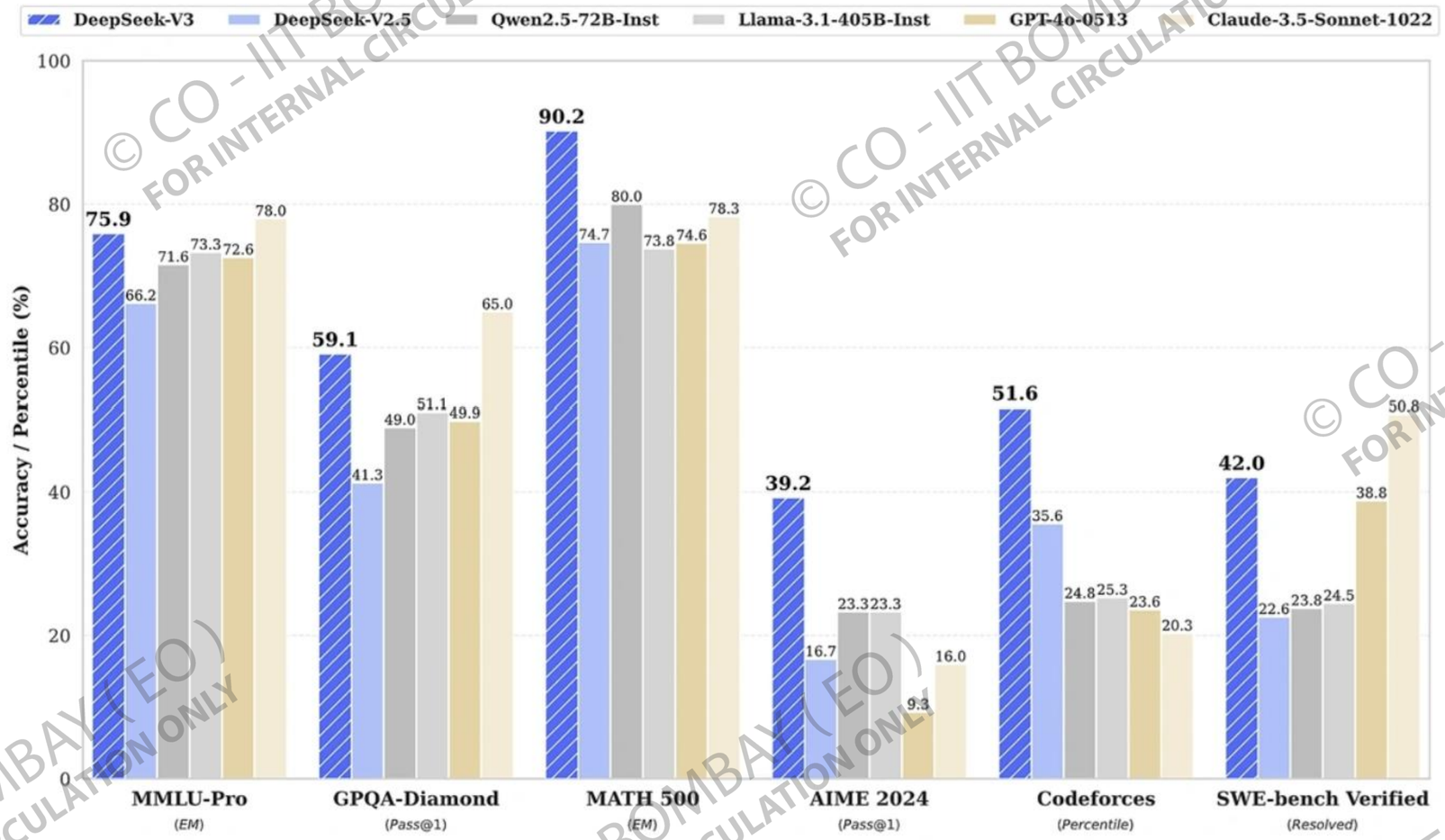
[4] https://huggingface.co/blog/open-r1

Change in cost

	DeepSeek R1	GPT 4o
Training Cost	$ 5.58 Million	> $ 100 Million
1M Tokens Output Price (API)	$ 1.10	$ 10.00

https://explodingtopics.com/blog/deepseek-ai

Performance Metrics



https://explodingtopics.com/blog/deepseek-ai

Performance Metrics

Issues? / Missing data? Contribute on GitHub

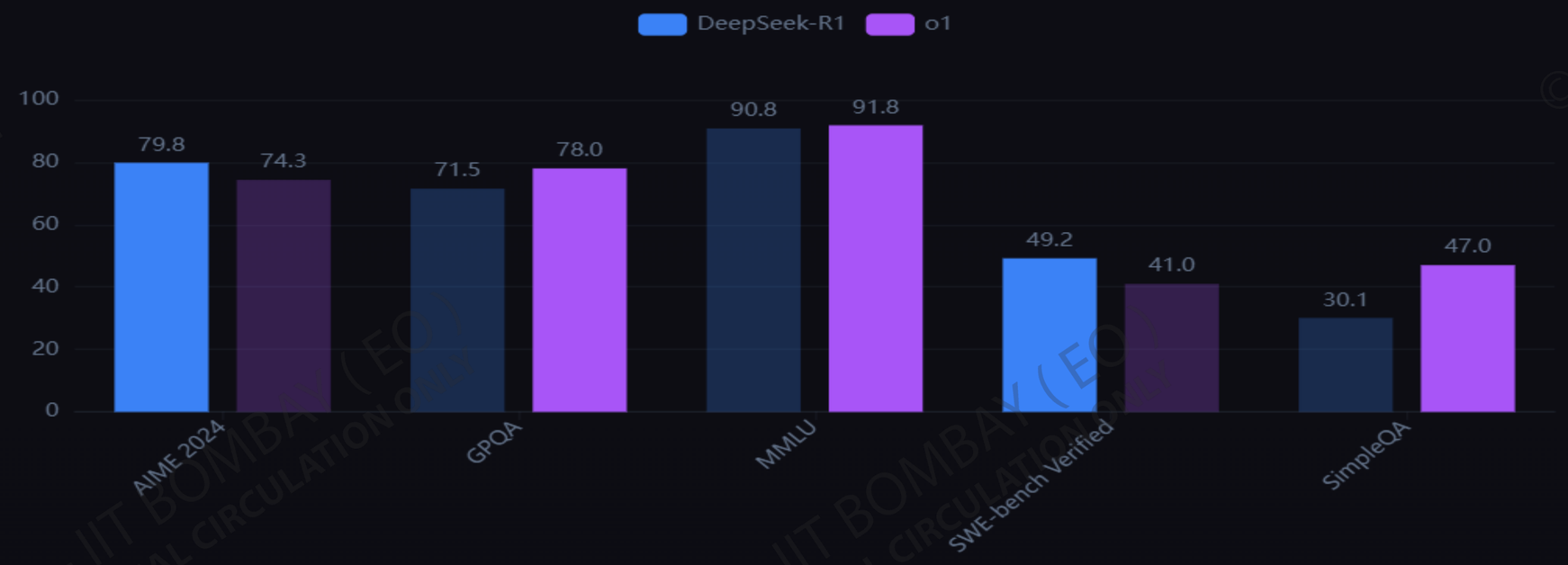
Performance Benchmarks

Comparative analysis across standard metrics

5 benchmarks compared

DeepSeek-R1 outperforms in 2 benchmarks (AIME 2024, SWE-bench Verified), while o1 is better at 3 benchmarks (GPQA, MMLU, SimpleQA).

o1 has a slight edge in benchmark performance.



Advantages

- Open-Source Model (Downloadable !)
  - Requires heavy computational resources to run
- API and User interface (like GPT) is available.

https://explodingtopics.com/blog/deepseek-ai

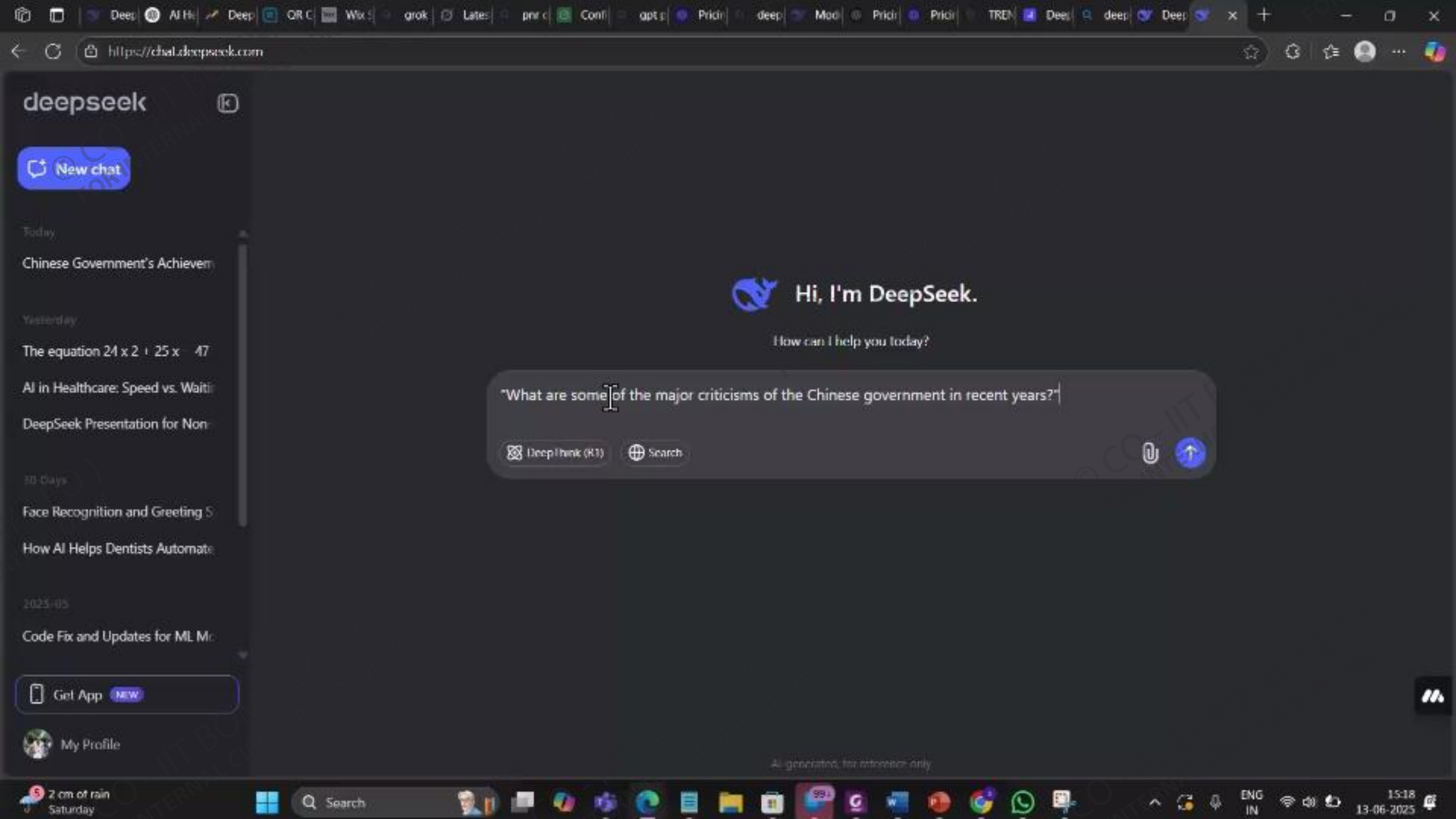
Integrating / Shifting to DeepSeek

- Amazon - Bedrock and SageMaker
- Perplexity
- Microsoft - Azure AI and Github
- Dell (along with Huggingface)
- IBM Watson

https://www.straive.com/blogs/top-10-deepseek-use-cases-to-explore/

Disadvantages

- Biasedness
- Speculations over Data privacy
- Deployment and Technical issues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New chat
Today
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Yesterday
The equation 24 x 2 + 25 x 47
AI in Healthcare: Speed vs. Waiti
DeepSeek Presentation for Non
30 Days
Face Recognition and Greeting S
How AI Helps Dentists Automate
2025-05
Code Fix and Updates for ML Mc
Get App NEW
My Profile
Hi, I'm DeepSeek.
How can I help you today?
"What are some of the major criticisms of the Chinese government in recent years?"
DeepThink (R1)
Search
AI-generated, for reference only
2 cm of rain
Saturday
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Thank You!!