THE GEORGE WASHINGTON UNIVERSITY

WASHINGTON, DC

# GW Competition & Innovation Lab Working Paper Series

No. 2024/12

## Competition in the Age of Generative AI

*Abraham Song*

Assistant Professor at Pepperdine University, Graduate School of Education and Psychology, and a Senior Fellow at the GW Competition and Innovation Lab

The GW Competition & Innovation Lab
805 21th Street NW
Washington, DC 20052
contact@gwucic.com

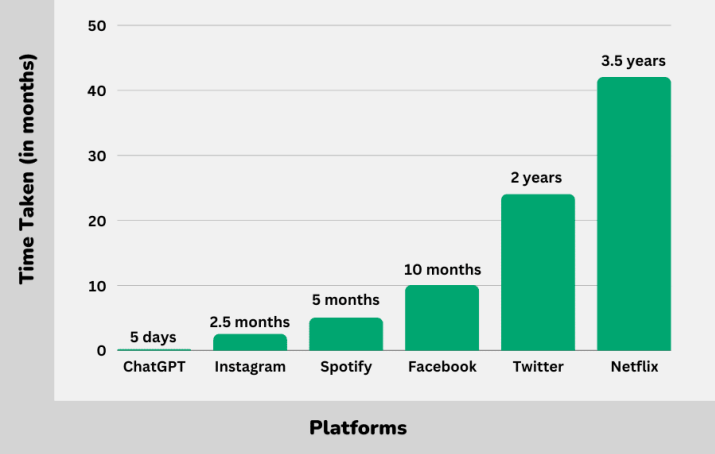
# Competition in the Age of Generative AI

Abraham Song, Pepperdine University and George Washington University

Abstract: The Age of Generative AI has arrived with ChatGPT in 2022. A race for dominance is on and it is clear that the technology will dramatically transform our societies and economies. This paper highlights a few insights based on the landscape of competition as it evolves. First, market dominance is not by the big tech but by a startup (OpenAI). Second, in the Generative AI race, competition appears to be less US-centric. Many of the leading products in generative AI are of non-US origin. Third, top tier AI research is distributed across academia and the private sector. One of the key inputs to generative AI race is talent. At the moment, the US dominates in the top 25 AI institutions, but when it comes to the talent pipeline, China has made major strides.

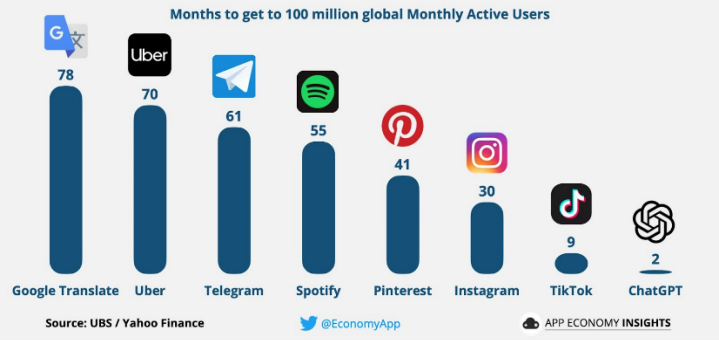
The OpenAI's launch of ChatGPT in November 30, 2022 unveiled a new era of generative artificial intelligence (AI). Since then, the generative AI has taken the world by storm. The generative AI was long way coming and at the same time, unexpected in its arrival and its technological capability. Built on decades of technology, such as computers, internet, cloud – the pace at which it scaled is unprecedented, reaching a million users in five days and a hundred million users in two months. The level of disruption that it will have across industries and occupations is also of magnitude that has yet to be seen.

**Figure 1: Time taken by Platforms to reach 1 Million Users**




Source: https://discoverthetech.com/chatgpt-stats/

**Figure 2: Time to Reach 100 million users**




Source: https://businessday.ng/technology/article/chatgpt-is-fastest-app-to-hit-100m-users-in-history/

When it comes to the competitive landscape, the way in which generative AI technology is evolving and being distributed presents a few interesting patterns.

1. Market dominance is not by the big tech but by a startup

A new wave of technology always presents startups a narrow window of opportunity for disruption. Big companies tend to be blindsided by startups that more effectively harness new technologies in the market. Perhaps, the most surprising is fact that the best product was released by a startup in an age dominated by big tech, like Google, Facebook, Microsoft, and the like who were equally caught off guard and scrambling to catch up. What is particularly curious about OpenAI's ascendance is that its product encroaches on big tech's territory. Investors consider ChatGPT a major challenge to Google's search business. Microsoft's $10 billion dollar partnership with OpenAI was certainly prescient but at the same time, it revealed that big tech's dominance in the digital age might not be as firm and absolute as it appears. Since ChatGPT launch, there's been a flood of investments into generative AI. 2023 was a breakout year for investment in generative AI startups with equity funding at nearly $22 billion across 400+ deals.[1] Some of other startups in the scene are: Tome, Stability AI, Mistral, Contextual, Glean, Typeface, Inflection AI, Databricks, and many more. The big tech giants have also released a series of products: Bard and Gemini (Google), Grok (X); Claude (Anthropic); ERNIE 3.5 (Baidu); DGX AI (Nvidia); LLaMA (Meta); Tongyi Qianwen (Alibaba). It has been over a year since ChatGPT's launch and despite the emergence of numerous contenders in the market, OpenAI's ChatGPT maintains a clear lead over its competitors.

**Table 1: Best Large Language Models, 2024**

| LLM | Developer | Popular apps that use it | # of parameters | Access |
|---|---|---|---|---|
| GPT | OpenAI | Microsoft, Duolingo, Stripe, Zapier, Dropbox, ChatGPT | 175 billion+ | API |

[1] https://www.cbinsights.com/research/generative-ai-funding-top-startups-investors-2023/

| | | | | |
|---|---|---|---|---|
| Gemini | Google | Some queries on Bard | Nano: 1.8 & 3.25 billion; others unknown | API |
| PaLM 2 | Google | Google Bard, Docs, Gmail, and other Google apps | 340 billion | API |
| Llama 2 | Meta | Undisclosed | 7, 13, and 70 billion | Open source |
| Vicuna | LMSYS Org | Chatbot Arena | 7, 13, and 33 billion | Open source |
| Claude 2 | Anthropic | Slack, Notion, Zoom | Unknown | API |
| Stable Beluga | Stability AI | Undisclosed | 7, 13, and 70 billion | Open source |
| StableLM | Stability AI | Undisclosed | 7, 13, and 70 billion | Open source |
| Coral | Cohere | HyperWrite, Jasper, Notion, LongShot | Unknown | API |
| Falcon | Technology Innovation Institute | Undisclosed | 1.3, 7.5, 40, and 180 billion | Open source |
| MPT | Mosaic | Undisclosed | 7 and 30 billion | Open source |
| Mixtral 8x7B | Mistral AI | Undisclosed | 46.7 billion | Open source |
| XGen-7B | Salesforce | Undisclosed | 7 billion | Open source |
| Grok | xAI | Grok Chatbot | Unknown | Chatbot |

Source: https://zapier.com/blog/best-llm/

Of course, the generative AI is a nascent industry where it is yet to be seen who will emerge as market leaders. In its earliest stage, the competition is fierce and a race for dominance is heating up. Anthropic, another Silicon Valley startup, just launched a Claude 3, which it claims is more powerful than the current market leader, ChatGPT 4.0.[2]

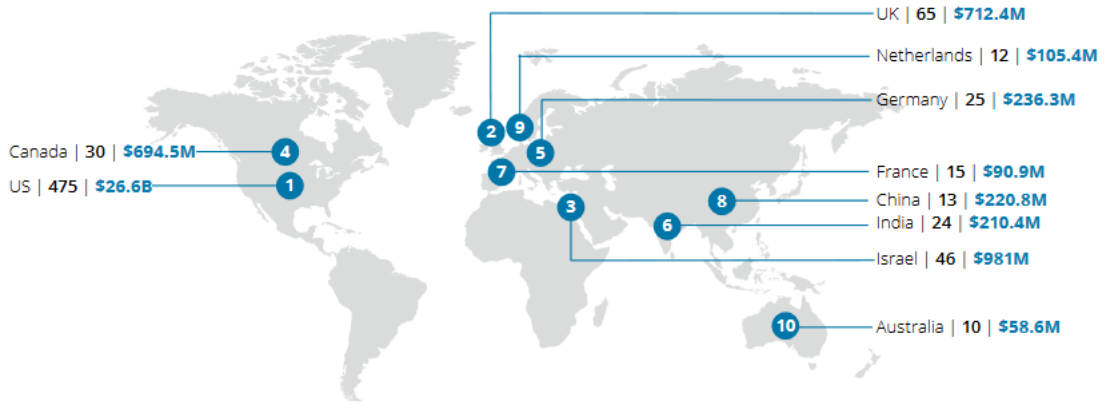
2. In the Generative AI race, competition appears to be less US-centric

Although OpenAI is a US-based company headquartered in the Silicon Valley with many startups, it also appears that generative AI startups are more distributed across the world.[3] Cohere and Chatbase are based in Toronto, Canada. Mistral AI is based in Paris, France. Aleph Alpha is based in Germany. Tabnine in Tel Aviv, Israel. Stability AI and Promptbase are based in London, UK.

[2] https://www.engadget.com/anthropic-says-its-new-claude-3-ai-chatbot-scores-better-on-key-benchmarks-than-gpt-4-071343736.html

[3] https://explodingtopics.com/blog/generative-ai-startups

**Figure 3: Top 10 countries with highest generative AI companies**




*Note: Dollar figure represents total funding raised (USD)*

Source: https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/press-releases/ca-national-ai-report-2023-aoda-en.pdf

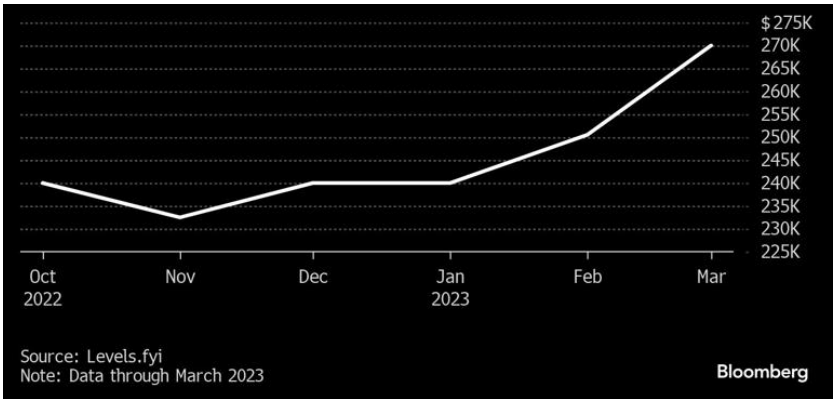
Question #3

What are the main drivers of competition (i.e., the elements that make a company a successful player) for the provision, distribution or integration of generative AI systems and/or components, including AI models?

3. In the Generative AI race, top tier AI research is distributed across academia and the private sector

The most indispensable input in the AI race is and will increasingly be talent. Talent also happens to be one of the most quantifiable inputs. When OpenAI went through turmoil with the temporary ouster of its CEO, Sam Altman, it really showed how sought after OpenAI workers were. Microsoft immediately offered to absorb all of its workers. Salesforce offered a job guarantee and match the salaries to any OpenAI worker willing to make the switch.

**Figure 4: Median total compensation for AI focused engineers**



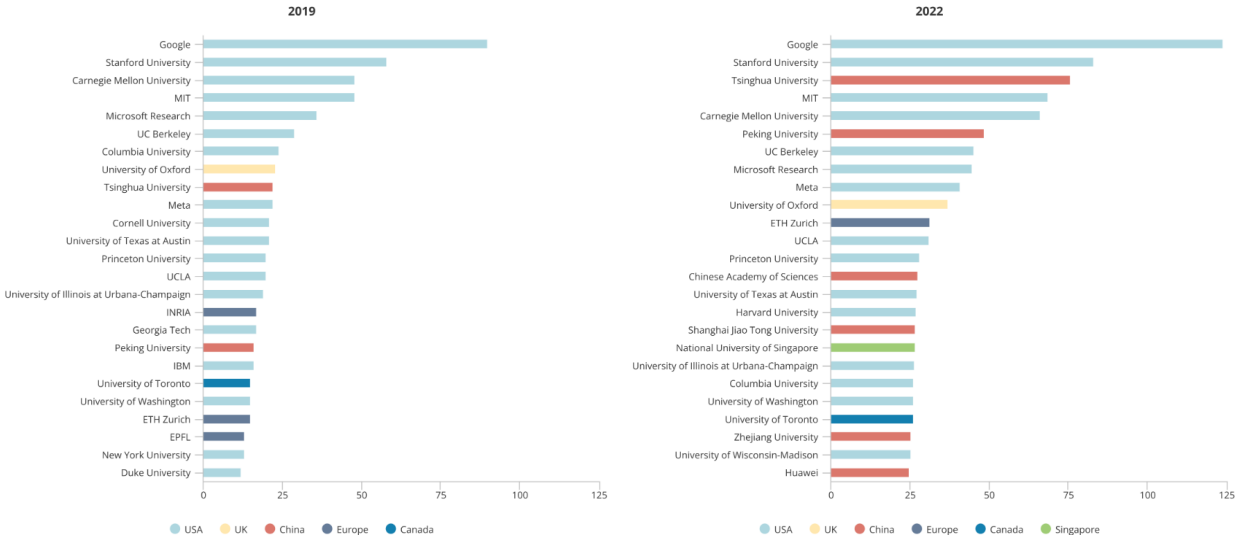
Source: https://www.msn.com/en-us/money/markets/openai-engineers-earning-800000-a-year-turn-rare-skillset-into-leverage/ar-AA1knfDQ

The United States remains the top destination for top-tier AI talent. Within the US, researchers of American and Chinese origin make up three-fourth of US institutions. The US claims the world's most elite AI talent (top 2%) and remains home to 60% of top AI institutions.

China has dramatically expanded its domestic AI talent pool over the last few years to meet the rising demand of its AI industry and as it tries to reduce its technology dependence on the US. China's share of AI talent production has risen from about 30% in 2019 to nearly 50% in 2022.

Top tier AI research is occurring in both academia and the private sector. Between 2019 and 2022, the leading institutions remain to be Google and Stanford University (Rankings are based on fractional count of authors). But in the short span of time, Chinese institutions, such as Tsinghua and Peking University have made major strides.

**Figure 5: Top 25 Institutions for Top-Tier AI Research**




Source: https://macropolo.org/digital-projects/the-global-ai-talent-tracker/

Conclusion

It remains to be seen who will come out on top in this race for AI dominance. The US institutions, both in the private sector and academia, maintain a sizable lead at the moment. But its lead appears far less certain and dominant than it has over the last several decades during software boom and digital platform boom. They key indicator to watch is the AI talent and the AI talent pipeline, and China's AI talent pipeline appears to be a formidable challenger to US dominance.