Supplementary information

Datasets of DeepSeek Corpus (D Corpus)

C Corpus

CHINADAILY

Spotlight on AI as future game changer

China fostering own vision of development through reliable, efficient application of artificial intelligence tools across industry sectors

Delegates and visitors to the Zhongguancun Forum, a key technology event held in Beijing recently, were in for a surprise when they arrived at the venue late last month.

As they stepped in, they were greeted not by ushers in uniform, but by a coordinated team of robots that mimicked human expressions, answered queries and translated conversations in real time.

In the shadow of a series of bullying (tariffs) imposed by the Trump administration earlier this month, China is doubling down on what may be its most potent counterstrike: AI. From breakthrough chips to frontier models rivaling the West's best to humanoid robots, China's AI breakthroughs could stand out to be a potential game changer, industry experts said.

Elsewhere at the venue, a robot with a friendly voice and precise movements guided guests to a coffee corner where a robotic barista brewed fresh beverages. And, once the coffee was ready, another humanoid robot delivered it directly to the guest.

While other robots played chess with visitors or displayed their brush calligraphy skills with serene focus, some robotic dogs darted easily through the crowd of visitors.

This was just one of several events held last month where artificial intelligence took center stage.

In March, China saw a series of major events, including the two sessions, or the annual gatherings of the country's top legislature and political advisory body; the Zhongguancun Forum; and the China Development Forum in Beijing, as well as the Boao Forum for Asia in Hainan province.

In fact, several AI-related panel discussions at the Boao and Zhongguancun forums saw packed houses, with attendees filling up every seat and some even standing to hear out the participants.

This overwhelming interest in AI mirrors the prominence of the nascent sector across the nation, displaying a vivid picture of China's technological future.

Industry experts said China is fostering its own vision for the development of AI through the reliable and efficient application of AI tools across a wide range of industries, a path that differs wisely from that of the United States.

Turing Award winner Joseph Sifakis said at the Zhongguancun Forum that China is crafting its own AI vision, distinct from that of the US.

"China has a solid and extensive industrial base and a unified domestic market. This enables the country to develop more reliable AI solutions that better align with the needs of the real economy, especially in the long-awaited transition to autonomous driving," he said.

Sifakis noted that China's strong industrial foundation, in particular, gives it an edge while industries such as self-driving vehicles, smart cities, smart factories and intelligent farms present more opportunities. "If developed well, (all these) will give China a dominant position in industrial AI," he said.

Kai-Fu Lee, a prominent AI expert and chairman and CEO of investment company Sinovation Ventures, said China has reached its "DeepSeek moment". He predicted that 2025 would mark a breakout year for AI applications and large-scale model deployment in China.

Lee recalled that about nine months ago, he had expressed frustration over China's lack of a "ChatGPT moment", as promising Chinese AI models at the time failed to stand out and spark nationwide adoption.

"However, **DeepSeek** has changed that landscape. Its success has awakened the Chinese market, ushering in a new AI era for the country," he said.

According to Lee, **DeepSeek**'s rise proves that "closed-source AI has no future", and only open-source development will drive greater progress.

"As AI scaling laws shift from the pretraining stage to the inference stage, AI applications will accelerate exponentially this year," he said.

Scaling laws describe how the performance of AI systems improves as the size of the training data, model parameters or computational resources increase.

Kuang Ziping, founding partner of Qiming Venture Partners, a toptier Chinese venture capital firm, echoed that sentiment.

While the first generation of AI saw fragmented innovation, the second generation -

dubbed "AI 2.0" - will be built on infrastructure, scalability and real-world application, he said.

"There's still a huge gap in foundational infrastructure investment," Kuang said. "But the application layer is poised for explosive growth."

From smart education and autonomous driving to embodied intelligence and hardware, he said the sectors that successfully integrate AI will define the future.

Zhu Xiaohu, managing partner at GSR Ventures, emphasized that generative AI must prioritize one principle above all - application is king.

Startups, he said, must embrace open-source ecosystems and rapidly iterate their products in vertical industries. The most effective businesses, he predicted, will not rely on AI alone, but on "AI plus human" hybrid models that combine intelligence with nuanced delivery capabilities.

As excitement around AI innovation builds in China, it also collides with geopolitical headwinds, especially after the nation, a major trading partner of the US, was hit with several rounds of so-called reciprocal tariffs since April, in addition to a 20 percent tariff imposed earlier this year.

Last month, the US also added dozens of additional Chinese entities, including the Beijing Academy of Artificial Intelligence and tech firm Inspur Group, to its export restrictions list.

But, the world is big enough for hundreds of countries, including the US and China, to codevelop AI, and Washington's sanctions on high-tech sectors will only steel Beijing's resolve to drive homegrown innovations, said industry experts and company executives.

During a panel discussion at Boao Forum for Asia, Zeng Yi, a member of the United Nations' high-level advisory body on AI and a researcher at the Chinese Academy of Sciences' Institute of Automation, said: "The future of AI is not decided by a handful of countries, but by nearly 200 countries and regions. The world is big enough to embrace both the US and China to codevelop AI."

Zheng Yongnian, dean of the School of Public Policy at the Chinese University of Hong Kong (Shenzhen), criticized as "unwise "the inclusion of Chinese companies in restrictive measures aimed at hindering China's AI progress.

"China possesses significant advantages in application scenarios, with the government actively promoting the AI Plus strategy to expedite technological implementation. US sanctions on technologies have, paradoxically, spurred China to intensify investments in these areas and foster indigenous innovation," Zheng said.

"If China's AI technologies continue to evolve at the current pace, the US might find itself relying on China's original innovations in certain sectors within 10 to 15 years," he added.

Carl Fey, a professor of strategy at BI Norwegian Business School, said that while US tech restrictions may cause short-term pain for China, they will ultimately compel the latter to fortify its technological base and sharpen its global competitiveness.

Fey warned that measures like tariffs and export bans not only slow global tech progress, but also backfire by accelerating domestic innovation.

A group of experts cited Deep-Seek as a case in point - a low-cost, open-source AI model that is transforming the industry landscape. **DeepSeek**'s accessible architecture enables rapid deployment, and widespread use may reshape the AI future globally, a vision where AI, like water or electricity, becomes a basic utility available to everyone.

Jiang Xiaojuan, a professor at the University of Chinese Academy of Social Sciences, said that Deep-Seek is breaking monopolies and ushering in a new era of vigorous competition, converting technical know-how into industrial might.

"In a competitive market, these challenges will naturally be resolved by the forces of the market itself," Jiang said.

Gao Xuefeng, founder and CEO of AI data infrastructure company Fabarta, said that after **DeepSeek**'s breakthrough, many Chinese companies no longer hesitate to invest in AI.

"Every few months, new technological advancements emerge. Companies can't afford to wait; they must integrate AI into their business and industry now," Gao said, adding that every sector in China can be re-imagined through AI in the coming years.

Amid rising AI enthusiasm, Wang Zhongyuan, head of the Beijing Academy of Artificial Intelligence, a leading nonprofit AI institute, said that **DeepSeek** has indeed delivered impressive results, proving that China can train large-scale AI models parallel to ChatGPT 4 despite limited computing power.

Regarding artificial general intelligence, in which an AI system can match or exceed the cognitive abilities of humans in any real-world task, Wang said that the industry is still far from achieving such capabilities. "I think we are still at least five to 10 years, or even longer, from reaching that level," he added.

DeepSeek 's wide adoption a market-driven choice: AI observers after NASA becomes latest US agency to block the platform

The recent wide adoption of Chinese artificial intelligence (AI) startup **DeepSeek** reflects a market-driven choice, experts told the Global Times, emphasizing that Chinese companies' technological progress should be viewed objectively. This comes after NASA, following the Pentagon's move to block access to **DeepSeek**'s website, cited "security concerns" as justification and became the latest US federal agency to ban its employees from using the Chinese platform.

In a memo on Friday to all NASA personnel from the agency's chief artificial intelligence officer, NASA employees were notified that **DeepSeek**'s servers "operate outside of the United States, raising national security and privacy concerns," according to CNBC.

Prior to NASA, Bloomberg, citing a defense official, reported that US Defense Department employees connected their work computers to Chinese servers to access **DeepSeek** for at least two days before the Pentagon moved to shut off access.

The Defense Information Systems Agency, which is responsible for the Pentagon's IT networks, moved to block access to the Chinese startup's website late Tuesday, the report said.

Zhu Rongsheng, an expert from Tsinghua University's Center for International Security and Strategy, said the US response is a mix of surprise and skepticism – surprise that China has managed to train advanced AI models despite US export controls, and skepticism about the effectiveness of their own policies to restrict China's tech development.

For the US government, after deploying a wide array of sanctions, there is growing doubt about whether targeting China's computing power is truly effective, alongside concerns about the US' ability to maintain its leadership in AI development, Zhu said.

Xiao Yanghua, a computer science professor at Fudan University, told the Global Times on Saturday that when China's technological advancements achieve market success and begin to challenge US counterparts, the US often moves to politicize the matter.

This reflects a growing lack of confidence in the US as it faces repeated challenges from Chinese companies in the ongoing tech competition among major global powers, Xiao said.

Echoing Xiao, Li Baiyang, an associate professor of intelligence studies with Nanjing University, told the Global Times on Saturday that the frustration, anger and powerless mindset among some US politicians on **DeepSeek**'s breakthrough in terms of training costs and effectiveness is due to its struggling to adopt the right mindset toward China's advancements in science and technology.

Besides, Li said that hyping ideological and cross-border data risks, from another perspective, reveals an entrenched mindset in some Western governments: it has long been accustomed to controlling their domestic tech companies, leading to a presumption of guilt toward emerging foreign AI firms.

On Friday, the Netherlands said it will launch an investigation into **DeepSeek**'s data collection practices and urged Dutch users to exercise caution with the company's software, Reuters said.

Earlier, Italy's data protection authority announced Thursday it had blocked **DeepSeek**'s AI services, citing insufficient transparency about how the company handles personal information.

Despite that some countries are blocking the Chinese AI platform citing “security concerns,” many tech companies are integrating **DeepSeek** into their own platforms – a move widely interpreted by industry observers as a pragmatic acknowledgment of its

technological strength.

The GPU-maker Nvidia announced that **DeepSeek**-R1 now live with Nvidia NIM. “**DeepSeek**-R1 is an open model with state-of-the-art reasoning capabilities. Instead of offering direct responses, reasoning models like **DeepSeek**-R1 perform multiple inference passes over a query, conducting chain-of-thought, consensus and search methods to generate the best answer,” Nvidia wrote on January 30.

Nvidia stock dropped as much as 17 percent on Monday after the Chinese AI developer **DeepSeek** unveiled its **DeepSeek**-R1 LLM.

Nvidia's integration of **DeepSeek** occurred within a day of Microsoft launching the new R1 model on Azure AI Foundry and GitHub.

“**DeepSeek** R1 is accessible on a trusted, scalable, and enterprise-ready platform, enabling businesses to seamlessly integrate advanced AI while meeting SLAs, security, and responsible AI commitments,” Microsoft wrote in a statement.

The stance of tech companies stands in stark contrast to the US government agencies' attempts to block **DeepSeek**. This indicates that the mainstream tech community in the US has a more objective and accurate understanding of **DeepSeek**'s open-source approach, reflecting a recognition of its technical capabilities, Li told the Global Times.

Tech media TechTarget wrote that the Chinese reasoning model has “caused a tsunami in the tech industry.” Cloud providers Amazon Web Services (AWS) and hardware maker Cerebras Systems have also engaged with **DeepSeek**.

"We expect to see many more models like this – both large and small, proprietary and open source – excel at different tasks," AWS said in an emailed statement, TechTarget reported.

Xiao stated that based on **DeepSeek**'s AI model, which is comparable to OpenAI's, both domestic and international users can build on **DeepSeek**'s open-source foundation and develop custom applications and enhancements. Such technological innovation has given **DeepSeek** a distinct commercial advantage.

"This is a reality the market must embrace, as its progress remains resilient despite political pressures," Xiao said.

DeepSeek shakes West's dominance over AI devt, triggering explosion of large models with lower costs: cybersecurity firm chairman

DeepSeek has shaken the unilateral dominance of the US and Western countries over the development of AI and helps promote a huge explosion of large - model applications at a relatively low cost, Qi Xiangdong, chairman of Qi An Xin Technology Group, a Chinese cybersecurity firm, told the Global Times.

Qi noted that as soon as **DeepSeek** came out, targeted and high-intensity cyberattacks broke out, sounding the alarm for the AI industry to hold fast to the bottom line of security.

Qi, who is also a member of the National Committee of the Chinese People's Political Consultative Conference (CPPCC), said that in the past, when it came to large-scale AI models, people would instinctively think of OpenAI's GPT series, Google's BERT, Meta's large-scale models.

However, DeepSeek has subverted the mainstream innovation path of "big data, large parameters, and high computing power." Compared with ChatGPT, both its training cost and its inference cost have been significantly reduced. This is a huge boon for application developers using AI models and the vast number of end-users in the consumer-facing sector, and has shaken the unilateral dominance of the US and Western countries over the development of AI, said the CPPCC member.

Qi praised **DeepSeek** for propelling the AI industry into a new era of greater openness and cooperation with announcement of its open-source strategy.

He said in the past, due to the dual constraints of technological blockades and commercial barriers, it was difficult to achieve efficient resource sharing and all-round collaborative development in the field of AI.

DeepSeek has, with lightning speed, opened up a large number of core assets and provided authorizations. Compared with Meta's open-source models, **DeepSeek**'s open-source approach is more thorough, more transparent, and comes with more technical details, invigorating the open-source ecosystem. In just a few short weeks, significant progress has been made in the reproduction projects of Open R1, said Qi.

He noted after that, AI giants have also successively accelerated the opening-up and updating of their technologies. OpenAI has made its inference function publicly available for free, and Baidu has opened its Wenxin Yiyan to the public free of charge. At the same time, technology-innovation enterprises around the world have been scrambling to get connected.

DeepSeek's open-source strategy is like a "starting pistol," enabling the AI industry to start breaking free from its closed-off and isolated state, Qi said.

Qi noted that as soon as **DeepSeek** emerged, targeted and high-intensity cyberattacks broke out, sounding the alarm for the AI industry to firmly hold the bottom line of security.

He said the attacks evolved from initial proxy attacks, SSDP and NTP reflection amplification attacks to application-layer DDoS attacks, becoming increasingly destructive. Subsequently, more than 2,000 counterfeit and phishing websites targeting DeepSeek were detected.

In the future, as the infrastructure status of large-scale AI models becomes more prominent, targeted malicious means and risky scenarios will surge, and the accompanying security risks such as data privacy, cognitive security, and infrastructure are beyond imagination, Qi warned.

On January 29, XLab, which belongs to Qi An Xin, reported that **DeepSeek** has been subjected to a series of sophisticated and large-scale cyberattacks over the past month.

The attacks, which began in early January, had escalated significantly in both scale and complexity, posing unprecedented challenges to **DeepSeek**'s operations and data security.

Qi said recently, the intensity of cyberattacks against **DeepSeek** has decreased, but the attacking behaviors have not completely ceased.

Qi said that currently, most government and enterprise institutions are rather casual in their deployment of large-scale AI models, and the associated network and data security risks are beyond imagination.

He said that the security issues faced by the development of AI can be the security issues of large-scale AI models, including risks in development, data collection, application and basic environment. For example, in terms of development, open-source, large-scale models may have problems such as code defects and backdoors left behind.

The other issue is the problem of cyberattacks using AI. AI has promoted the update and iteration of cyberattacks methods, making "saturation" attacks possible, said Qi, giving examples as outlaws to output false information through "face- swapping and voice-changing" for cyber fraud.

Then there are also risks of "cyberattack explosion" triggered by attacking AI. Qi explained that once large-scale AI models are embedded in key areas such as smart cities and smart government affairs, traditional security threats such as vulnerabilities will be magnified. Once a large-scale AI model is attacked, it may trigger security incidents such as interruptions in social services, production stagnation, and leakage of private data.

To cope with those threats, he suggested to establish a deep-defense system adapted to large-scale models to build a solid security foundation for AI. Then there's need to accelerate the follow-up of mandatory security compliance requirements for large-scale AI models to ensure the effectiveness and adaptability of supervision. It is also necessary to promote the implementation of the innovative achievements of "AI + security," Qi suggested.

The CPPCC member said that currently, the "grassroots-oriented" trend of AI

innovation in China is quite evident, and such trend is closely related to the country's forward-looking layout, policy support and comprehensive resource investment. What makes AI unique is that it is not dominated by authorities but by numerous entrepreneurs. The sudden popularity of DeepSeek and the success of science and technology innovation enterprises well illustrate this point, Qi said.

However, it is clear that without the country as a solid backing, these "grassroots" forces would find it difficult to thrive. At the beginning of this year, a new national AI investment fund was established, unleashing more room for growth in technological innovation and application expansion, said Qi.

Qi, the CPPCC member, also suggested that the country should strengthen policy guidance, enhance the business environment and promote ecological collaboration to further boost private sector innovation and entrepreneurship.

For example, implement targeted innovation policies for tech-driven private enterprises, and offer innovation protection periods, tax incentives, and financial subsidies, leverage financial tools, establish risk compensation funds, and enhance innovation through financial backing, said Qi. At the same time, optimize computing power scheduling and take the lead in building a public technology service platform, and so forth.

CHINADAILY

City officials looking for DeepSeek help

Beijing, Shenzhen among places eyeing streamlining administrative tasks

As the world is wowed by the meteoric rise of **DeepSeek**, a Chinese private artificial intelligence startup, cities in China are moving quickly to integrate its large language model into government services, offering a peek into the potential of AI to revolutionize public administration duties and responsibilities.

A batch of **DeepSeek**-powered "AI civil servants" recently rolled up their virtual sleeves and got to work in Shenzhen, Guangdong province. According to the city's Futian district, the 70 intelligent government "digital employees" are responsible for 11 major tasks, covering 240 government service scenarios, including document processing, emergency management and investment promotion.

Their efficiency is remarkable, document format correction accuracy exceeds 95 percent and review time is reduced by 90 percent, the local government said, adding that the AI assistants can instantly draft initial versions of law enforcement documents.

Shenzhen is not alone. Since the beginning of the year, Beijing and provincial authorities in Guangdong, Jiangsu, Liaoning and Jiangxi have scrambled to embrace **DeepSeek**.

Wang Lei, chairman of Beijing Wenge Technology Co Ltd, a Chinese AI startup, said: "**DeepSeek** performs exceptionally well in Chinese language processing, excelling in writing, conducting written dialogues and handling simple administrative tasks. Deploying **DeepSeek** marks the first step in promoting the wide adoption of AI in government services."

Wang said: "However, the real efficiency gains in government services are not achieved by merely deploying the model. Instead, they require a deeper integration of the model

with local policies and measures. This involves creating an intermediate application layer that aligns with specific government needs, followed by extensive testing and feedback mechanisms to ensure high accuracy and reliability."

For example, in Beijing's Zhongguancun high-tech zone, Beijing Wenge Tech has developed such an intermediate application layer that helps the local government create a customized AI assistant named "Guanxin" to streamline administrative tasks. Guanxin primarily helps government staff with community inspections, administrative document drafting and meeting minutes. It also assists citizens and businesses with government-related inquiries and provides service guidelines.

Meanwhile, the integration of **DeepSeek** into the 12345 public service hotline has brought significant improvements. Previously, citizens often complained about busy lines, slow processing and lack of feedback.

With **DeepSeek**, the 12345 hotline system in Liaoning province has seen a 20-fold increase in data processing efficiency, automatically generating high-frequency questions and response strategies to improve call handling speed and accuracy, the local government said.

Zhang Shijia, head of the technical department of Liaoning's 12345 Hotline Platform, said **DeepSeek** has significantly enhanced work efficiency.

"For instance, when a citizen raises an issue that spans multiple departments, the first step is to identify which department should take primary responsibility. In the past, this identification process was done manually, with an accuracy rate of only about 85 percent. However, with **DeepSeek**, the accuracy has improved to over 95 percent based on its analysis of previous data," Zhang said.

But can "AI civil servants" replace human workers? Gao Zeng, deputy head of the government services and data management bureau in Futian district, Shenzhen, said AI cannot make independent decisions and may sometimes produce biased results based on training data. To mitigate ethical risks, each of Futian's 70 digital employees has a

"human guardian" to ensure accountability, even if the AI makes a mistake.

So, for grassroots civil servants, AI assistance is like having an "electronic pen" and "electronic assistant", significantly improving work efficiency, experts said.

Wang Peng, associate researcher at the Beijing Academy of Social Sciences, said: "Futian district's move is a proactive attempt at intelligent government transformation, with significant innovative and practical value. In the future, more government departments and institutions will introduce AI technology to achieve intelligent and automated public services, improving work efficiency and service quality."

Wang from Beijing Wenge Tech said while AI models like **DeepSeek** offer significant potential, their deployment in government services faces challenges.

For instance, traditional AI models are static knowledge bases, meaning they cannot automatically incorporate new or dynamic data. There is a need to establish data engineering processes to integrate real-time and dynamic data with the model's capabilities.

Meanwhile, deploying AI large language models requires significant computational resources, which can be expensive. For example, deploying models like **DeepSeek** can cost millions of yuan, making it a high-barrier investment for some local governments or small and medium-sized enterprises.

To solve these problems, Beijing Wenge Tech is working to develop a better application powered by Deep-Seek. "Directly deploying **DeepSeek** is like having a Windows system. We still need applications such as WeChat and Word to connect with friends and to write documents."

A bigger industry challenge is that AI models can sometimes produce inaccurate or misleading results, known as "AI hallucinations". Additionally, opening the AI model to public use raises security concerns, especially when handling sensitive government

data, experts said.

Despite these challenges, the integration of **DeepSeek** into government systems offers a potential for true "human-machine collaboration", bringing public services closer to the needs of the people and ensuring that government responses align with public needs, said Wang, the associate researcher.

CHINADAILY

DeepSeek proves the need to protect, maintain sovereignty

Richard Cullen says US' stifling of Japan's semiconductor industry in the 1980s is a lesson on the importance of economic autonomy

Following the release of the new Chinese artificial intelligence chatbot, **DeepSeek**, Professor Peter Bloom, from the University of Essex in the United Kingdom, argued that, with its embrace of open-source AI, **DeepSeek** had "caused a geopolitical earthquake", adding that, "What makes **DeepSeek** particularly disruptive is its ability to achieve cutting-edge performance while reducing computing costs - an area where US firms have struggled due to their dependence on training models that demand very expensive processing hardware."

At about the same time, the BBC described **DeepSeek** as "the Chinese AI app that has the world talking".

Forty years ago, Japan was the world's paramount rising economic star. After its defeat in World War II, a compelling whole of government and educated-society cooperation approach financed and created an exceptional manufacturing-led recovery. Japan successfully revolutionized the way motor vehicles were built, for example, delivering products that performed well and were also well-equipped, super reliable, frugal, and an excellent value for the money. Similar patterns emerged with respect to the entire range of Japanese products, including cameras, audio-visual goods, and advanced optical and high-tech products.

By this time, Japan's leading semiconductor companies, including Toshiba, NEC and Hitachi, had also, according to one report, "taken a lead over American tech firms such as Intel and Fairchild Semiconductors to become the leading chipmakers in the world".

For the United States, especially, this was too much: The rise of Japan, on its way to overtaking the US as the world's largest economy, had to be contained. Due

significantly to US internal policymaking during the Ronald Reagan era, the US dollar had been rising in value. Eventually, America, under the Plaza Accord (named after a New York hotel), compelled key US trading partners Japan, Germany, France and the UK to intervene in currency markets to ensure that their currencies appreciated against the US dollar - in effect, depreciating the US dollar to enhance the global competitiveness of the American economy.

Even more striking was the US scheme to shut down Japan's semiconductor strength. Toshiba, at this time remarkably successful, was singled out for a savage multipronged attack - to teach the company a lesson and as a stark warning to other Japanese firms. Washington argued that Toshiba had sold some critical technology, against its clear wishes, to the Soviet Union. Heavy sanctions were imposed on Toshiba. New 100 percent import duties were applied. Certain key American companies stopped dealing with Toshiba. According to one expert commentator, Hiroo Kinoshita, "This was the start of the decline for Japan's semiconductor industry." US lawmakers claimed they were fighting "treachery", as they used sledgehammers to smash a Toshiba stereo system, on the grounds of the Capitol, for media cameras.

Toshiba almost immediately responded by kowtowing, taking full-page advertisements in dozens of US papers apologizing to the American public. Unsurprisingly, these achieved nothing. Toshiba today is a pale imitation of its former self. And the compliant Japanese semiconductor industry today no longer poses a threat to the US. Meanwhile, it is widely agreed that the forced revaluation of the Japanese yen, under the Plaza Accord, played a significant part in prompting local measures that led to the containment of Japan's rising economy and Japan's "lost decades" of economic development.

More than a few thoughtful people in Japan must be wondering, as they look at the **DeepSeek** phenomenon, what Japan's future might have been had it enjoyed sufficient autonomy in the 1980s (such as China enjoys today) to see off that intense American intimidation, thus allowing it to make decisions guided by Japan's own national interest.

Japanese sovereignty was then (and still is) hamstrung by the decisive Treaty of Mutual Cooperation and Security between the United States and Japan of 1960, which replaced an earlier version from 1951. The first version, which arose from the formal termination

of World War II in Asia, left Japan as a heavily garrisoned American tributary state. The 1960 treaty rewound some of the extraordinary powers enjoyed by the US (for example allowing the US military to intervene in Japanese domestic disputes) - but it still leaves the US as Japan's formidable managing partner.

One definition of "convergence theory" argues: "As nations move from the early stages of industrialization toward becoming fully industrialized, they begin to resemble other industrialized societies in terms of societal norms and technology. The characteristics of these nations effectively converge. Ultimately, this could lead to a unified global culture if nothing impedes the process."

Under this American formulated convergence concept, it was once hoped that China would be steadily drawn toward adopting Western political precepts as it advanced economically. Both former US president Bill Clinton and former British prime minister Tony Blair thought this would happen.

Nothing as formal and constraining as Japan's 1960 security treaty was envisaged for China. But a softer version, in which it was linked into accepting a US-Western dominated world order, was. Japan's setback confirms why it is fortunate - for China and the world - that this did not happen.

The views do not necessarily reflect those of China Daily.

CHINADAILY

DeepSeek emerges as a wake-up call in the intensifying international AI race

The launch of **DeepSeek**, an AI product from a Chinese tech company, has sent shock waves through the global artificial intelligence landscape. **DeepSeek**'s AI model has topped the list of most downloaded mobile appsacross 140 markets, signaling not just a technological breakthrough but a challenge to the prevailing narrative in the AI sector. In the wake of this, a fierce debate has erupted over the future dominance of AI, with the US and China at the center of the storm. But what **DeepSeek**'s rise truly underscores is that the AI race is far from settled - and the rivalry is not defined by traditional power plays, but by innovation, adaptability and new ways of thinking.

At the heart of the controversy is the success of **DeepSeek**, a product that, by all accounts, defies the status quo. Its rise highlights a pivotal moment: For all the talk of technological superiority, the real competitive edge in AI may not lie in the traditional metrics of speed, scale or dominance, but in how we approach AI development itself. The US, which has long held an advantage in AI through its sophisticated chip technologies and advanced algorithms, has responded to **DeepSeek**'s rise with strategic measures to curb China's development - including restrictions on chip exports. These moves, however, may be missing the point.

DeepSeek's success is largely due to its use of open-source technology. This has allowed the product to bypass the high costs of licensing fees that traditionally accompany proprietary software. It also means that **DeepSeek** can be accessed by a wide range of users - from small businesses to individual consumers - without the hefty price tag that typically comes with advanced AI solutions. By employing a new, more efficient approach to training its models, **DeepSeek** minimizes unnecessary computations, lowering operational costs and making it an attractive, cost-effective alternative to other leading AI products, including those developed in the US.

It's not just about lowering costs; it's about rethinking the very structure of AI development. Historically, the prevailing belief has been that only large-scale, resource-intensive projects could lead to AI breakthroughs. Yet **DeepSeek**'s approach suggests otherwise. It leverages fewer resources to deliver greater outcomes,

challenging the conventional wisdom that success in AI must involve massive, all-encompassing systems. This shift - a move toward more sustainable, open-source models - could be a game changer for the industry.

The implications of **DeepSeek**'s success extend beyond the realm of competition between China and the US. This moment underscores the importance of moving beyond the zero-sum thinking that often defines geopolitical conflicts. The idea that one country's gain must come at the expense of the other is counterproductive, especially when it comes to something as complex and multifaceted as AI. The global AI race is not a simple competition of nations; it is a far more-fluid, dynamic contest that involves collaboration, shared knowledge, and, increasingly, open-source innovation.

Yet, despite its impressive rise, **DeepSeek**'s position in the market is far from secure. As much as the product has disrupted the conventional AI landscape, it is still a relative newcomer. Its real-world applications are still in the early stages, and the long-term question remains: Can **DeepSeek** scale effectively, remain profitable, and drive sustainable value? For now, it stands as a cost-effective alternative, but whether it can challenge the dominant players on a long-term basis remains an open question.

It is also important to recognize that **DeepSeek** does not represent a clean break from the past. While its algorithms are innovative, it still relies on American chip technology and software. The breakthrough, then, is not a complete departure from US dominance but rather a rethinking of how AI can be developed and distributed. **DeepSeek**'s success lies in its ability to combine these elements in an innovative way - leveraging open-source technology and a more efficient approach to model training. It's a new strategy, but it's still operating within the framework established by American technological advances.

This is where the narrative of a Sino-American AI rivalry falls short. While **DeepSeek** has indeed upended expectations, it does not signify China's technological ascendancy over the US. In fact, it illustrates a more nuanced reality: The future of AI may not be about which country's technology prevails, but which companies and developers can make the most effective use of existing resources. **DeepSeek**'s open-source model means that the product's future success will ultimately be determined by how well it can be utilized by developers and businesses, regardless of national origin.

In this sense, the real competition in AI is not over national dominance, but over who can innovate most effectively within an increasingly open and collaborative global ecosystem. This is where the US risks losing the plot: The focus on restricting access to critical technologies and shutting down the competition might be shortsighted. The real value of AI lies in its potential to be adapted and improved upon by anyone, anywhere. If the US clings too tightly to the notion that its technological superiority must be maintained at all costs, it may overlook the much broader and more impactful development of AI as a truly global, open-source phenomenon.

In fact, the rise of **DeepSeek** suggests that the US government's efforts to restrict China's access to chips might not have the desired effect. **DeepSeek** has demonstrated that AI can be built on low-end chips, with a focus on efficiency and innovation rather than sheer computational power. This not only challenges the idea that advanced chip technology is the ultimate determinant of success, but also signals that the future of AI development will be shaped by resourcefulness and creativity, not by monopolies on hardware and software.

The AI race between China and the US is likely to continue, but it will not be won by imposing restrictions or by trying to obliterate the competition. The future of AI is not about dominating the field, but about innovating within it. Those who recognize this and adapt accordingly will lead the way.

News feed for website 20250224

DeepSeek　a tipping point for new scientific research paradigm: academician

After the 2024 Nobel Prizes in Physics and Chemistry were awarded to scientists who made significant breakthroughs at the intersection of AI and fundamental sciences, there are scientists exclaiming that human scientific research may have reached a pivotal moment where scientific research landscape may adopt a new AI-driven scientific research paradigm.

This year, **DeepSeek**, a rising force in AI, is rapidly expanding its presence across diverse industries, with a growing number of companies exploring the potential integration of its advanced models. In a recent interview with the Global Times, a Chinese academician said that the emergence of **DeepSeek** has been demonstrated as a tipping point for this fresh scientific research paradigm.

Scientific research paradigm refers to a framework or set of concepts, theories, methods and standards that define how scientific research is conducted within a particular field.

"I strongly advocate for the spirit of open source, which represents a meaningful contribution to society and the world — whether by an individual, an institution, or a nation.

"The widespread adoption of DeepSeek's free, open-source large language model in this era let us figure that the concept of 'open source' can no longer be confined to just "open-sourced code," said Wang Jian, an academician of the Chinese Academy of Engineering and president of Zhijiang Lab.

Wang told the Global Times at a recent symposium themed on AI for Science, organized by the World Internet Conference Specialized Committee on AI and Alibaba Group.

The most valuable assets and knowledge derived from "open source" now extend far beyond source code, Wang noted. Today, even more valuable resources and knowledge have become accessible for everyone. For instance, many important research papers are even no longer being published in traditional journals that are widely regarded as authoritative.

DeepSeek could be said as a tipping point for people to embrace this new scientific research paradigm, which Wang described as "open resource innovation."

He called it an accessible approach that could redefine the future of scientific research. Under this approach, the previous barriers to conducting scientific research — whether domestic or international — will be torn down. "Disparities in access to shared resources will not hinder the potential of equally creative minds."

"The term 'AI-driven research paradigm' understates the profound disruption that AI is bringing to science," Wang said. AI is not merely a tool — it is a revolutionary force driving a new scientific revolution.

During the symposium, other Chinese scientists also shared their points of view on AI-driven scientific research paradigm.

Zeng Yi, a professor at the Chinese Academy of Sciences and director of the Center for Long-term AI, said that AI is still a seemingly intelligent information processing tool that continues to make many mistakes that humans do not make.

We may still be quite far from achieving AI that has true scientific significance and the general AI that we aspire to, Zeng noted.

In reality, AI has been already integrated into scientific research institutions at home and abroad. Ye Jieping, a vice president of Alibaba Group and head of Data to Intelligence Lab, revealed that Alibaba Cloud has cooperated with top scientific

research institutions at home and abroad with its products.

Back in April 2024, the AI working group of the National Astronomical Observatories of the Chinese Academy of Sciences has released a new generation of astronomical large model — "Xingyu 3.0."

Being the first application of large models in the field of astronomical observation, "Xingyu 3.0" is built on the Alibaba Cloud Tongyi Qianwen (Qwen) open-source model and has successfully integrated with the telescope array at the Xinglong Observatory of the National Astronomical Observatories.

Ye also said that a team led by professors from Sun Yat-sen University's Medical School, in collaboration with Alibaba Cloud's research team has achieved a significant breakthrough in virus identification using AI.

They discovered a previously undetected viral "dark matter" that traditional research methods failed to find. Their findings, which include the identification of 180 supergroups and more than 160,000 RNA viruses globally, were published in the journal Cell, paving new avenues for virology research, media reports said.

China has taken "AI for Science" as a national special initiative. In 2023, to implement the national "New Generation Artificial Intelligence Development Plan," China's Ministry of Science and Technology, in collaboration with the National Natural Science Foundation, has launched a special initiative called "AI for Science," according to the Xinhua News Agency.

This initiative integrates key issues in fundamental disciplines such as mathematics, physics, chemistry and astronomy, focusing on research needs in key areas like drug development, gene research, biological breeding and new material development, thereby establishing a cutting-edge scientific research and development system driven by AI, the report said.

CHINADAILY.COM.CN

2025 a crucial year for AI applications

The Government Work Report on Wednesday highlighted new achievements including integrated circuits, artificial intelligence (AI), quantum technology, and other areas.

In fact, a new wave of AI technology, led by large language models, has been sweeping across the globe since 2023, prompting many countries to make AI development part of their national strategy, with the United States adopting the "All in AI" strategy to dominate the global AI industry. China, too, has expedited its AI development, launching the "AI plus" initiative and implementing policies to make AI a core engine of development for new quality productive forces.

Previously, China's large AI models had certain limitations in terms of computing power and data. But innovators such as **DeepSeek** have recently made significant progress in AI reasoning through reinforcement learning, pioneering a new direction for AI. By embracing an open-source approach, Chinese innovators have broken the technological barriers of leading models, accelerating the commercialization of large models. This breakthrough is not only a technological leap for Chinese AI companies vis-a-vis US giants such as OpenAI, it also narrows the gap in AI capabilities, dispelling concerns over chip limitations and showing China's ability to develop a global technology paradigm.

With the widespread adoption of AI applications such as **DeepSeek**-R1 and Nano AI Search, smart technology including AI is gradually becoming accessible to all. Also, an increasing number of local governments and businesses, including small and medium-sized enterprises, are adopting large model systems to accelerate industrial applications and digital transformation.

The global competition for large models has entered a critical stage, and to gain an advantage in this competition, China should continue to achieve more breakthroughs in core technologies and their applications. Thanks to its diverse industries and development environments, China has a unique advantage in using large models to

power a new industrial revolution. I believe 2025 will be the year of AI applications, with the key to success lying in seizing the opportunities created by **DeepSeek**, and combining local advantages with different application scenarios to stay ahead in the global AI competition.

DeepSeek has triggered an application explosion by making industries more efficient, reducing costs and reconstructing products. In fact, startups empowered by **DeepSeek** are seizing the new opportunities, creating an "iPhone moment" for industries. Based on **DeepSeek**'s capabilities, breakthroughs can be achieved in six fields.

The first application of large models will lead to "universal intelligence" for all. Given **DeepSeek**'s open-source and low-cost features, individuals can now own large models and become "super individuals".

The second is "intelligent everything". As AI transforms smart hardware, and large models shrink in size, AI devices - from smart-connected cars to personal computers and mobile phones - will become the standard. And with AI's help, the scope of smart hardware application will also expand.

The third is the empowerment of traditional industries to "digitally transform and innovate". Large models' multi-modal capabilities can process and generate data from images, videos and audio clips or pieces, transforming unstructured data into knowledge. This will prepare the ground for large models in business applications, boost core competitiveness and expedite the digital transformation of traditional industries.

The fourth is "future industries". With lower costs and reduced computing power requirements, large models can be used in intelligent devices like robots. For instance, predicting driving sequences for fully autonomous cars or the movement of robots enhances embodied intelligence.

The fifth is "scientific research". **DeepSeek**'s strong inference model can help users leverage professional knowledge in scientific fields for reinforcement learning, creating

specialized scientific models. Large models are changing how fundamental scientific problems are studied, and addressing issues such as energy development.

The sixth is "AI security". As **DeepSeek** expands, challenges like hallucination and prompt injection attacks arise. Injection attacks occur when attackers exploit weaknesses in how software or systems handle user input prompts. By cleverly crafting malicious input, they trick the system into performing unintended actions, with the goal of accessing sensitive information, disrupting operations, or gaining unauthorized entry. To ensure the application of large models in enterprises, they need to be linked to specialized knowledge databases and IT systems, which in turn could increase security risks.

However, to deal with such issues, 360 Security Group has introduced a new solution- "model-driven security" - to address potential security issues arising out of large model applications. The 360 group also has formed a large model security alliance, which includes industry partners, research institutions and end-users, to resolve security issues and build a collaborative model for the AI security industry.

The author is founder and chairman of Chinese cybersecurity company 360 Security Group, and a member of the 14th National Committee of the Chinese People's Political Consultative Conference.

CHINADAILY.COM.CN

DeepSeek a wake-up call for global AI industry

In the ever-intensifying global race for artificial intelligence supremacy, the United States has long been the dominant force. But anyone still operating under the assumption that China is merely playing catch-up needs to wake up. China isn't just competing; it is innovating, and it is doing so in ways that could fundamentally reshape the global AI landscape.

The latest example is **DeepSeek**, a Chinese AI startup that has achieved something remarkable - high-performance AI with dramatically lower costs and resource consumption.

DeepSeek's breakthrough should be a wake-up call for those who continue to dismiss China's technological rise as derivative or State-subsidized mimicry. What this company has accomplished is more than just a technical feat; it is an alternative blueprint for the future of AI, one that is more efficient, open and sustainable. If the US and the rest of the world fail to acknowledge and engage with this kind of progress, they risk being left behind.

For many years, much of the AI world has revolved around a simple equation: more money plus more computing power equals better AI.The largest US tech firms such as Google, OpenAI and Meta have thrown billions of dollars into training increasingly powerful models on massive clusters of high-end graphics processing units or GPUs. It is a brute-force approach that has worked, but it also might be unsustainable both economically and environmentally.

Enter **DeepSeek**. This startup, founded in 2023, has taken a different path. Instead of relying on the usual hardware arms race, Deep-Seek optimizes its software and algorithms to reduce computational needs. Earlier this year, the company unveiled **DeepSeek**-R1, a cutting-edge AI model trained on just 2,048 Nvidia H800 GPUs, a fraction of what companies like OpenAI use. The cost? Only $5.6 million. Compare that to the over $100 million routinely spent by the leading US companies, and the

implications become clear: China is not just building AI capability, rather it is doing it in a smarter way.

More importantly, **DeepSeek** has committed to open source much of its technology, a move that stands in sharp contrast to the increasingly closed models developed in the West. This openness potentially fosters more collaboration, accelerates innovation, and democratizes access to AI values that the US tech industry itself once championed.

For too long, the conversation around China's AI progress has been framed in adversarial terms as a driver of geopolitical competition rather than a technological revolution that benefits all of humanity.

But that mindset is limiting and, frankly, outdated. The truth is that China has become an essential player in the global innovation ecosystem, not just as a selective competitor, but as a true contributor.

Consider the broader AI landscape. China has produced some of the most sophisticated AI applications, from Baidu's Ernie model to Huawei's AI-driven chip optimizations. Its researchers regularly publish world-class papers in top AI journals and are invited to speak at major international AI conferences. And its vast domestic market allows for rapid deployment and testing of AI at a scale unmatched anywhere else.

DeepSeek's success is a wonderful example of some important broader trends. By proving that AI breakthroughs do not require endless financial resources, the company is challenging the status quo not just in China, but globally. It shows that AI can be more accessible, environmentally friendly and inclusive.

What lies ahead

The knee-jerk reaction from some corners of Washington and Silicon Valley has been to dismiss or downplay **DeepSeek**'s achievements. Many naysayers have already downplayed **DeepSeek**'s approach. That would be a mistake. The US still leads in

foundational AI research, but if China continues to innovate at this pace, that US lead could shrink very quickly.

Instead of trying to stifle China's AI progress through restrictions and bans, the smarter move would be to engage with it. There is room for collaboration, particularly in areas where AI poses shared challenges: ethics, safety, bias mitigation and climate impact. **DeepSeek**'s efficiency-first approach should be seen as an opportunity for AI development everywhere, not just in China.

Moreover, if the US really wants to stay ahead, it needs to rethink its own AI strategy. Realistically, throwing massive resources at bigger, more expensive models is not a viable long-term solution. What **DeepSeek** has done is optimizing software to do more with less; its approach should inspire similar efforts in AI development in the US.

The AI revolution is not going to be won or lost by a single country. It is too big, too complex and too important for that. The future of AI should be a collaborative effort, not a zero-sum game. China is no longer just following in the footsteps of the US; it is carving its own path and, in some ways, potentially leading the way.

The sooner the rest of the world acknowledges this, the better. AI progress is not about the dominance of one nation over all the others. Ultimately, it is about technological advancement that benefits everyone. If **DeepSeek**'s innovation regarding AI has any lasting meaning, it is that the next phase of AI development will be cheaper, more efficient, and more open. And that is something worth paying attention to for the US and many other countries.

The author is nonresident fellow of the Quincy Institute for Responsible Statecraft, a think tank based in Washington, DC, the United States. The views do not necessarily reflect those of China Daily.

CHINADAILY

Embarking on AI path with Chinese style

Wider applications in NEVs, retail and healthcare to unleash creativity of digital economy

China's progress in artificial intelligence has jolted the tech world, with the meteoric rise of Chinese AI large language model **DeepSeek** set to challenge Silicon Valley's dominance due to the former's cost-effective and open-source approach, which is inspiring wider application of the technology by companies across various sectors.

Humanoid robots from Unitree Robotics, performing a synchronized yangge dance during the nationally televised Spring Festival Gala - China's most-watched TV show - showed their elegant technical charm.

"Making a friend", a Chinese livestreaming studio, reportedly sold products worth 330 million yuan ($45.4 million) on March 8 by using **DeepSeek**, claiming in a Weibo post that "it is the result of our deep exploration and innovative application of AI technology".

Premier Li Qiang said in the Government Work Report, delivered during this year's two sessions, that China's technological capabilities continue to rise, and called for unleashing the creativity of the digital economy.

Under an AI Plus initiative, Li said: "We will support the extensive application of large-scale AI models and vigorously develop new-generation intelligent terminals and smart manufacturing equipment, including intelligent connected new energy vehicles, AI-enabled phones and computers, and intelligent robots."

Ubiquitous AI

Beijing resident Wang Hui owns a Nio electric vehicle, equipped with automatic driving assistance functionality.

Wang said that after getting on an expressway, she once switched to automatic assisted driving for a try.

"As long as you hold onto the steering wheel and keep your eyes straight, it's really easy to drive for hours without feeling tired," she said, noting that once, when a car in front of her came to a sudden stop while she was lost in thought, her Nio also came to a sudden stop thanks to its automatic emergency braking.

"It really gave me a great impression," she said.

A survey conducted in Wuhan, Hubei province, showed that more than 90 percent of respondents believe autonomous driving is safer than human driving.

NEV maker BYD announced in February that it is equipping its entire lineup with its Advanced Driving-Assistance System. Among its functions, the system enables vehicles to drive themselves on expressways and to park automatically.

The Beijing Economic-Technological Development Area recently announced that it had officially upgraded its intelligent patrol system by integrating unmanned patrol cars and robotic dogs with AI algorithms and big data analysis, to provide 24-hour full-coverage patrols throughout the area.

According to Baidu, a leading AI company with a strong internet history, AI can cover several categories - rule-based AI, machine learning, deep learning, natural language processing, computer vision, speech recognition, robotics technology, expert systems and evolutionary computing.

AI is vital to improving production efficiency and quality of life, as well as bolstering economic development, scientific research and technological innovation, in addition to elevating industrial transformation and environmental protection, said Ma Xiangbin, a Beijing-based data analyst.

According to Zhou Bowen, director of Shanghai's Pujiang Lab, AI has two dimensions - speciality and generality. And Guo Wei, chairman of Digital China, believes that in future AI development, the key lies in achieving both.

"In the digital transformation of enterprises, we not only need to maintain the versatility of large language models, but also tailor it to the needs of specific industries and enterprises across multiple aspects, including computing power, models, enterprise knowledge and intelligent agents, to achieve the 'integration of generalization and specialization'," said Guo at a seminar held at Cambridge University on March 13.

When Guo founded Digital China in 2000, he wanted it to help bolster the country's digital transformation.

Riding on the wave of China's industry transformation, the company has emerged from the periphery to the forefront of the IT sector, said Guo in the foreword to his book The Power of Time, the English version of which was launched at this year's London Book Fair.

With over 6,000 employees, including some 2,600 engineers, Digital China achieved an annual revenue of $16.5 billion in 2023.

"Today, AI-powered data-cloud integration is the future direction of digital technology development," Guo said.

Redesigning businesses

"AI has already achieved great success and played a significant role in the field of scientific research," Guo said, adding that the continuous evolution and interaction of technological paradigms, business models and management methods, is the core driving force for building new engines in the digital era.

According to Ma, Chinese companies have showcased a wide array of cutting-edge products integrating AI into every aspect of connectivity and smart devices.

AI technologies have evolved into "fundamental infrastructure and a core capability that fully enables economic and social transformation", said He Biao, executive director and CEO of China Mobile, during the 2025 Mobile World Congress in Barcelona, Spain, in early March.

"We must recognize that developing specialized models is not an easy task," as it entails large-scale investment, Guo said, noting that "For most industries, enterprises, and even entire cities, such investment seems too heavy."

In a bid to allow more enterprises to embrace the achievements of AI, a feasible path has to be sought, he said. Digital China has released its own Smart Vision, an AI native empowerment platform intending to better interact with its 30,000 plus business eco-partners and over 300 tech eco-partners.

It integrates four powerful features - computing power management and scheduling, knowledge governance, model training and management, and AI-native application development - creating an iterative AI development environment for enterprises.

Wider applications

Headquartered in Tianjin, Tasly Pharma is a globalized Chinese medicine enterprise, with over 20 research centers worldwide and 11 production bases throughout China.

Dedicated to cracking the digital code of life medicine, Tasly has completed its intelligent transformation with the help of Smart Vision, trying to set up a new benchmark in the pharmaceutical sector.

Tasly established its Botong Q&A system, which can effectively convey knowledge of traditional Chinese medicine with an accuracy rate of over 90 percent, helping its sales staff members quickly meet customer needs.

Meanwhile, it can also support its 20,000 employees spread across 26 provincial-level regions in their daily work, in addition to optimizing its internal management processes and rules.

Smart Vision has released its **DeepSeek** version, aiming to break the four core pain points - data security anxiety, innovation adaptation dilemma, lack of application scenarios, and high trial-and-error costs and computing power costs - accelerating the deployment of **DeepSeek** for enterprises.

In addition to the pharmaceutical industry, Smart Vision has also witnessed achievements in real estate, e-commerce shopping and retail banking, Guo said.

Partnering with a retail e-commerce shopping platform, Smart Vision has also achieved precise identification of more than 10 types of purchase intent in e-commerce business. And in the retail banking business, Smart Vision has helped significantly improve customer experience and operational efficiency, he said.

Path with Chinese style

Ma stressed that the popularization of AI computing power will greatly activate China's innovation capability in AI applications, presenting both opportunities and challenges.

As a major country in data supply and consumption, China has created enormous

opportunities for the sustainable development of AI, he said.

"We have seen the innovative capabilities demonstrated by **DeepSeek**, and amid its peers, it has embarked on a path with Chinese characteristics," Guo said, adding that through a "less is more" approach, it lowered technical barriers for businesses with its open-source format and drastically reduced costs.

"This is also **DeepSeek**'s most significant value - driving the inclusivity of AI," he added.

David Stillwell, a professor of computational social science and deputy director of the MBA program at Judge Business School, University of Cambridge, said the success of China's AI models broke the assumption that powerful chips are must-haves in creating powerful AI.

"The brilliant thing about **Deepseek** is it makes its methods available publicly," said Stillwell. "I spoke to computer scientists who spent the weekend looking at the research paper from **Deepseek**, and found it has genuinely come up with new ways of doing things that have made it possible with fewer chips."

Stillwell added that since the vast majority of their research scientists have been trained in China, it shows that China has the expertise to create cutting-edge algorithms.

"This is good news for the world, because I think a world with only US control and power with AI is very dangerous," he said. "I hope that Europeans are also inspired by this because it will be good if there was more AI being developed in the UK and other places in Europe as well, so there isn't total control over this technology by one company or just one country."

Alan Macfarlane, emeritus professor of anthropological science, life fellow of King's College, Cambridge, and a fellow of the British Academy, said Chinese civilization is not confrontational and aggressive, which is vastly different from the Western approach.

Macfarlane said if China can utilize artificial intelligence and successfully address the potential social issues that AI brings, then the outlook on the future will be optimistic.

"Therefore, I believe the Chinese people will certainly go out on a different road for AI development - a path with its own characteristics," Guo said.

Contact the writers at tanguoling@chinadaily.com.cn

CHINADAILY

AI success signals new tech shift among startups

As a technology industry reporter for over a decade, I have been closely monitoring the latest developments and trends in the fast-changing tech sector. Chinese artificial intelligence startup Deep-Seek recently became a buzzword and captured widespread attention during the ongoing two sessions.

I marveled at **DeepSeek**'s opensource models' performance in mathematics and natural language reasoning. They are on a par with leading models from US-based OpenAI but at a fraction of the cost typically spent by foreign counterparts.

Last week, an AI agent named Manus created by another Chinese AI startup called Monica.im rapidly gained traction on social media platforms with its ability to handle complex tasks like screening resumes, analyzing stocks and creating websites. The AI agent is more advanced than a chatbot because it doesn't only provide suggestions or answers, but delivers tangible results.

What surprised me even more was that the two companies made significant technological breakthroughs within a very short period, as they had been established no more than three years ago.

China has attached great importance to the development of AI, a strategic emerging field in which major economies are scrambling to gain a competitive edge. AI is set to play a pivotal role in driving industrial transformation and upgrading.

According to the Government Work Report delivered at the opening meeting of the third session of the 14th National People's Congress, the country will continue to pursue the AI plus initiative and support the extensive application of large language models.

I have interviewed many national legislators and political advisers, and they are very concerned about how to make **DeepSeek** and fast-developing AI technology better empower all walks of life and bolster the deeper integration of cutting-edge digital technologies with a wide range of industries, facilitating the shift of growth drivers from old to new ones.

They told me that the meteoric rise of **DeepSeek** has showcased China's immense potential in bolstering technological innovation, signaling a profound shift in the global AI landscape. It has subverted the traditional AI development paradigm and will accelerate the penetration of AI technology into various sectors.

Zhou Hongyi, a member of the 14th National Committee of the Chinese People's Political Consultative Conference, believes China's AI industry has ushered in a milestone breakthrough. The emergence of **DeepSeek**'s AI model signifies that China is evolving from a "follower" to a "leader" in AI, making a historic leap.

Zhou, who is also founder and chairman of Chinese internet enterprise 360 Security Group, perceives that 2025 will be the year of AI applications, and the key to success lies in seizing the opportunities created by **DeepSeek** and combining local advantages with different application scenarios to stay ahead in the global AI competition.

With the wide application of AI technology, challenges like hallucination and content security arise. Zhou called for efforts to establish a security governance system related to AI models, and an industry alliance to ensure the safe use of AI in various fields.

Zhong Zheng, a deputy to the 14th NPC and vice-president of Midea Group, said the company has integrated **DeepSeek**'s AI models into its businesses and developed its industry-specific models, with AI technology used in intelligent manufacturing, smart home, robotics and healthcare segments.

Zhong suggested stepping up research and development investment in AI, especially in core technologies in key fields, establishing a data security and privacy protection system, and strengthening the training of high-caliber AI talent.

Lou Qinjian, spokesman for the third session of the 14th NPC, said the technological breakthroughs made by Chinese companies such as **DeepSeek** fully demonstrate that an innovative, open and sharing approach to increase people's well-being is the right choice.

Lou mentioned that **DeepSeek** follows an open-source technological path that has facilitated the broader application of AI technologies worldwide and contributed China's wisdom to the world. "**DeepSeek** shows China's innovative and inclusive approach to sci-tech development," he said.

After talking with NPC deputies and members of the CPPCC National Committee, I have a deeper understanding of the AI industry. I firmly believe the growth potential of China's economy will come from technological innovation, and Chinese AI companies can lead the global AI industry. These companies' continuous advancements in AI will bolster the evolution of the global AI ecosystem in an open and collaborative manner, and inject new momentum into global economic recovery.

Contact the writer at fanfeifei@chinadaily.com.cn

US Commerce dept reportedly mulls DeepSeek ban; move indicates US anxiety over China's AI advancement: expert

The US Commerce Department reportedly has informed staffers in recent weeks that the Chinese AI model **DeepSeek** is banned on their government devices. When asked for comment, Chinese Foreign Ministry spokesperson Mao Ning said on Tuesday that China opposes overstretching the concept of national security and politicizing trade and tech issues. We will firmly safeguard the lawful rights and interests of Chinese enterprises.

Chinese expert said that since **DeepSeek** is an open-source model, banning it, if implemented, would be more symbolic than practical.

US Commerce department bureaus informed staffers in recent weeks that DeepSeek is banned on their government devices, Reuters reported, citing a message it received and two people familiar with the matter. The message claimed that the move is "to help keep Department of Commerce information systems safe."

The Reuters report also noted that it "could not immediately determine the extent of the ban throughout the US government."

The Global Times sent an email to the US Department of Commerce to confirm the report, but as of press time on Tuesday, the department had not provided a comment.

If the move is taken eventually, it would not be a surprise, as the US government has been considering a ban on DeepSeek, with some American companies lobbying for such a move, Li Baiyang, an associate professor of intelligence studies at Nanjing University, told the Global Times. However, since DeepSeek is an open-source model, banning it would be more symbolic than practical, he said.

On March 7, Reuters reported that the Trump administration "is weighing a ban" on DeepSeek from US government devices over so-called "national-security concerns," cited a person familiar with the matter.

DeepSeek is an open-source model and remains committed to technology sharing and this benefits developers in the US and countries worldwide, making a complete ban nearly impossible, Li said.

"Ironically, DeepSeek indirectly supports American companies that advocate for open source. DeepSeek is part of a vast open-source ecosystem online. Would the US ban everything built on DeepSeek?" Li asked.

Whether the US is still deliberating or has already taken actions, the media reports indicated it has deep anxiety over China's AI advancements. With DeepSeek as a typical example, Chinese AI enterprises have triggered significant unease among US companies and policymakers, said the expert.

In addition to a potential ban on DeepSeek, some US lawmakers are reportedly mulling other measures. GeekWire, a US technology news website, reported on Monday that Senator Maria Cantwell is pushing for "technology NATO" to counter China.

"We believe that innovation matters more than the tariffs in a fight [on] who's going to win in aerospace or agriculture or software or any of these issues," Cantwell claimed. "It is like we are in this horse race, but the president wants to put 25 pounds on our horse and make it harder."

Cantwell proposed that the five countries, such as the US, India and Japan, "could agree to rules on enforcing privacy and eliminating government backdoors in products." She claimed that "No one in the world should buy technology from companies that do not meet those standards… there would be a very large world community countering China, instead of us spending taxpayer dollars to rip out Huawei," according to GeekWire.

The idea of a "technology NATO" seems more like hype, as such cooperation appears unrealistic. Take AI as an example, many countries, including the UK and France are actively developing their own sovereign AI models and products, prioritizing independent growth over deep collaboration with allies, said Li.

A Chinese expert told the Global Times that he noticed that Cantwell's opposition to the tariff war, however, her push for a "Technology NATO" fundamentally serves the purpose of "countering China" and hyping "China threat" rhetoric.

Such rhetoric highlights how certain individuals within Washington's political circle are increasingly clinging to outdated anti-China mindset while attempting to create eye-catching new vocabulary, the expert said.

With technological advancements, particularly AI's inherently open-source nature, any attempts to restrict or suppress technologies progress are unlikely to succeed and may even backfire, said Li.

International observers give thumbs-up to China's AI innovation at China Development Forum

Riding on the global fanfare over Chinese tech start-up **DeepSeek**, artificial intelligence (AI) has unsurprisingly become a buzzword at the China Development Forum (CDF) held in Beijing on Sunday and Monday, with international observers and multinationals speaking highly of China's AI contribution to the global economy while expressing full confidence in the world's second-largest economy.

"**DeepSeek** has created an ingenious way to make these models low cost, and its successes are very exciting, because it brings the cost of AI down. China's contribution to the development of AI is significant. There's a great deal of innovation in addition to **DeepSeek**. Many Chinese large language models are appearing right now. They're performing very, very strongly," Jeffrey Sachs, a professor at Columbia University, told the Global Times during the forum.

"China will definitely be a pioneer in the application of AI across the whole economy," Sachs said, highlighting the rapid uptake of Chinese AI systems in cities and economic sectors across China.

In its pursuit of high-quality development, China regards science and technology as the primary productive force, and relies on innovation to open up new areas in development and cultivate fresh driving forces, according to the Xinhua News Agency.

This year's Government Work Report said that China will advance integrated and clustered development of strategic emerging industries, carry out demonstration initiatives on the large-scale application of new technologies, products and scenarios, and promote the safe and sound development of commercial space, the low-altitude economy and other emerging industries.

"From a developmental perspective, a new wave of technological revolution and industrial transformation is underway. China has achieved notable progress in frontier

areas like AI, new energy and advanced manufacturing. Meanwhile, the country's 'engineer dividend,' coupled with its large market and renewed capital investment in emerging industries, will provide substantial impetus to the economy," Jacky Zou, chairman-elect of KPMG in China, told the Global Times on the sidelines of the CDF.

"We are confident that the integration of technological innovation and industrial innovation in China will drive the economy toward greater prosperity," Zou said.

Amid China's continuous tech innovations over recent years, many multinationals have strengthened their confidence in China and are keen to explore new opportunities in the huge market.

For example, German carmaker BMW recently said that it will work with Chinese tech giant Huawei to develop an in-car digital ecosystem specifically tailored for the Chinese market.

Jon Abrahamsson Ring, CEO of Inter IKEA Group, told the Global Times during the CDF that China is in many ways leading in the AI sector. "We have great development in some of our production techniques. AI is enhancing that as well," he said.

"Many foreign companies have tremendous experience in China, and they know how to develop innovation in China that they can take to other parts of the world. So, China is no longer an imitator, and China is now seen as an innovator," John Quelch, executive vice chancellor of Duke Kunshan University, told the Global Times on the sidelines of the forum.

As a result, there are a lot of multinational companies that are not only looking to China as a market but also as a source of innovation, Quelch said.

Amid growing competition in AI development, international observers also emphasized the need to enhance collaboration between China and the US in the field of AI.

"The competition is a healthy competition as long as it doesn't become militarized or turn into some hostility. But competition of who can build the better AI systems, that's healthy competition. And so far, it's leading to increased efforts by Chinese companies, by American companies, by Chinese scientists, by American scientists, and the whole world benefits from that kind of competition," Sachs said.

"DeepSeek, I have it on my phone. It's a smart app," Graham Allison, a professor at Harvard University, told the Global Times at the forum. As for whether there will be a confrontation between China and the US in AI, Allison believes that China and the US will figure it out their ways.

DeepSeek's AI model breakthroughs and China's other tech advancements have drawn a flurry of positive reactions from leading US tech firms, including its AI counterparts and leaders of tech giants.

OpenAI CEO Sam Altman described DeepSeek's R1 model as "impressive," particularly in its performance relative to cost. In response to this new competition, Altman announced that OpenAI would accelerate the release of improved models, Xinhua reported.

Google CEO Sundar Pichai also joined the chorus of praise, acknowledging DeepSeek's "very, very good work" and suggesting that lowering AI costs benefits both Google and the broader AI industry.

China is an active advocate and practitioner of AI global governance, Foreign Ministry spokesperson Guo Jiakun said during a regular press conference in January.

"China will continue to work with all parties to embrace openness, connectivity and equality instead of building walls, decoupling and discrimination, and create an open, inclusive and non-discriminatory environment for AI development that is beneficial to all, and make sure that all countries can access the benefit of AI," Guo noted.

News feed for website 20250129

DeepSeek launches new AI model as Trump cautions of 'wake-up call' to US industry

Chinese artificial intelligence (AI) startup **DeepSeek** on Tuesday launched a new open-source multimodal model, following the buzz generated by its cost-effective open-source reasoning model, **DeepSeek**-R1, which competes with rivals like OpenAI but at a significantly lower cost, sending ripples through the US stock market the day before.

According to information on the AI community platform Hugging Face on Tuesday, **DeepSeek** has released the open-source multimodal AI model Janus-Pro, an upgraded version of its earlier Janus model, which significantly enhances multimodal understanding and visual generation capabilities.

Its Janus-Pro-7B AI model outperformed OpenAI's DALL-E 3 and Stability AI's Stable Diffusion in a leaderboard ranking for image generation using text prompts, Reuters reported on Tuesday, according to a DeepSeek's technical report the Global Times read on Github, a proprietary developer platform.

The latest development came after earlier in January the company released the latest open-source model DeepSeek-R1, which has achieved an important technological breakthrough - using pure deep learning methods to allow AI to spontaneously emerge with reasoning capabilities.

As a rapidly growing competitor to leading AI tools like OpenAI's ChatGPT, Google's Gemini, and others, the Chinese AI startup has garnered runaway attention in recent weeks.

US President Donald Trump said on Monday that Chinese startup DeepSeek's

technology should act as spur for American companies and said it was good that companies in China have come up with a cheaper, faster method of artificial intelligence, Reuters reported Tuesday.

"I've been reading about China and some of the companies in China, one in particular coming up with a faster method of AI and much less expensive method, and that's good because you don't have to spend as much money. I view that as a positive, as an asset," Trump said, according to Reuters.

"The release of DeepSeek, AI from a Chinese company should be a wakeup call for our industries that we need to be laser-focused on competing to win," Trump said in Florida, according to the report.

The remarks also came as the news around DeepSeek sent shockwaves through the AI industry, with Nvidia bearing the brunt of the sell-off. The chipmaker, a linchpin of the AI supply chain, lost over $500 billion in market value, plummeting 16.86 percent in a single day. Other major tech players, including Alphabet and Microsoft, also declined, though Meta managed to trade in positive territory, Xinhua reported.

Nvidia issued a statement on Monday after its shares tumbled, noting DeepSeek's advances show the usefulness of its chips for the Chinese market and that more of its chips will be needed in the future to meet demand for DeepSeek's services.

"DeepSeek's work illustrates how new models can be created using that technique, leveraging widely-available models and compute that is fully export control compliant," Nvidia said in its statement.

OpenAI Chief Executive Officer Sam Altman welcomed the debut of DeepSeek's R1 model in a post on X late on Monday. "Deepseek's r1 is an impressive model, particularly around what they're able to deliver for the price. we will obviously deliver much better models and also it's legit invigorating to have a new competitor! we will pull up some releases," Altman said.

The success of DeepSeek showed that the Biden administration's four-year crackdown on China's AI and computing power has not only failed but has also spurred the country to forge a unique path for AI development, achieving significant progress in autonomous AI development, Ma Jihua, a veteran telecom industry observer, told the Global Times on Tuesday.

"While the global AI community has been focused on increasing computing power, China has been pioneering a path through algorithm optimization, opening up a new approach that is cost-effective and equally efficient. This development holds significant importance for the global AI landscape," Ma noted.

"However, with the emergence of DeepSeek and the rapid advancement of China's AI industry, there is now greater potential for complementary cooperation between China and the US. Both countries can leverage their unique strengths, making collaboration more promising than ever before," Ma said.

Industry observers reached by the Global Times previously said while China and the US, as the two leading powers in the global AI field, compete in the AI industry, there is also significant room for cooperation, especially in AI governance.

CHINADAILY

With DeepSeek , balance of tech power is clearly shifting

Recently, when I realized that even my 60-year-old father was using **DeepSeek**, I knew something had changed fundamentally.

My dad, a cautious man by nature, is no fan of digital trends. He rarely watches short videos and has never been intrigued enough to download Douyin or Kuaishou. His time online is mostly spent browsing news and current affairs - no flashy distractions, just information.

So, when I found him enthusiastically tapping away on his phone one evening, asking DeepSeek for the latest market updates, I paused.

In China, DeepSeek is somehow finding its way into the most unlikely hands - from healthcare to capital markets to daily routines, it has found its niche everywhere.

People are using it to search for information, ask questions, chat, organize work - and, believe it or not, even tell fortunes.

That was the moment I realized the world had changed. Technology, once distant and complicated, has become something familiar, something human. And behind this technology, China is closing its gap with the United States in terms of AI development.

The 2025 Stanford HAI Report on AI, released recently, is packed with statistics and projections about global AI trends, but one headline stands out: The performance gap between top Chinese and US AI models has narrowed considerably.

The world's balance of technological power is shifting, and DeepSeek is partly the

reason.

Two years ago, I remember writing a story asking "When will China have its own version of ChatGPT?"

That seemed like a distant dream, an ambition that would take years to materialize. But in 2025, that dream has become a reality.

According to the Stanford University report, the performance gap between top Chinese and US models, which had been a staggering 20 percent in 2023, has shrunk to nearly nothing - 0.3 percent in 2025.

Open-weight models, like Deep-Seek, have made jaw-dropping progress.

The gap between open-weight and closed-source giants, which was 8 percent in 2024, has dropped to just 1.7 percent in 2025. In the tech world, those numbers are nothing short of revolutionary.

Of course, the US still holds the lead when it comes to the big names in AI.

In 2024, 90 percent of the world's most well-known models had been developed by commercial firms, with the US contributing 40 of them and China only 15. But what is undeniable now is the fact that the gap between the best models is evaporating.

In 2024, the difference between the best and the 10th-best model was 12 percent. Today, that difference has shrunk to just 5 percent, signaling a convergence in AI capabilities. We are no longer trailing behind.

And as if that isn't enough, Deep-Seek's growth trajectory has been staggering. The numbers don't lie.

According to analytics from aitools.xyz, DeepSeek has overtaken OpenAI's ChatGPT in monthly website visits.

In February alone, it recorded 525 million visits, surpassing ChatGPT's 500 million. For a product that had only launched its V3 large model a few months earlier, these numbers are mind-blowing.

By March, DeepSeek had already captured 6.58 percent of the global AI tools market. To put that in perspective, ChatGPT still led with 43 percent, but DeepSeek had already approached AI tool Canva (8 percent).

It is clear - this isn't just a domestic phenomenon anymore. Deep-Seek has gone global, and it is only getting started.

Watching my father use DeepSeek made me realize that technology is no longer a foreign language. It is something we can all speak.

A silent revolution has taken root, quietly changing how we live, work, and interact with the world. And as I thought about those 525 million visits, I couldn't help but wonder - just how many fathers are embarking on this AI journey?

Containment of China tech will be futile, expert says amid reported ban of DeepSeek

As some US politicians push to ban Chinese AI startup **DeepSeek** from government devices and amplify so-called security concerns, global tech experts are increasingly focusing on the groundbreaking advancements the software could bring to the world, with **DeepSeek** set to become a central topic at the upcoming AI Summit in Paris. Some analysts said that the global recognition of **DeepSeek** highlights the clear truth that efforts to contain Chinese technologies are futile and technological breakthroughs will inevitably overcome political barriers.

Even as DeepSeek shakes up the AI sector with its breakthroughs, US politicians are considering a ban on the app from government devices. The latest move came Thursday as the Associated Press reported that Representative Josh Gottheimer, a Democrat from New Jersey, and Representative Darin LaHood, a Republican from Illinois, introduced the "No DeepSeek on Government Devices Act." They cited concerns over the Chinese government's potential use of the app for "surveillance and misinformation" as the reason to block it from federal networks.

Certain countries, most of which are US allies, are reportedly blocking access to or restricting the use of DeepSeek citing so-called "security concerns." In response, Chinese Foreign Ministry spokesperson Guo Jiakun said at a press conference on Thursday that the Chinese government attaches great importance to data privacy and security and protects it in accordance with the law. "We have never asked and will never ask any company or individual to collect or store data against laws."

China has all along opposed moves to overstretch the concept of national security or politicize trade and tech issues, and will firmly protect the lawful rights and interests of Chinese companies, Guo said.

These countries' perception of "security risks" primarily stems from political bias. It is evident that Western societies find it challenging to accept high-tech products from

China, Li Baiyang, an associate professor of intelligence studies at Nanjing University, told the Global Times.

Continuing its longstanding pattern of smearing China and in line with these US politicians' anti-China narrative, a VOA report in Chinese language alleged that DeepSeek could potentially become a tool for "speech control" and "public opinion manipulation."

The so-called claim of "speech control" is completely baseless and absurd, said Li, noting that DeepSeek offers a different approach by providing a transparent chain of thought (COT) in its reasoning process, and "this level of transparency leads to greater clarity and stronger explaining ability, which would help mitigate the risk of bias."

In response to a question regarding DeepSeek and AI cooperation between China and the US, Fu Cong, China's permanent representative to the UN recently also said that technological containment and restrictions do not work. This is a lesson the whole world, especially the US, should learn.

"From Huawei to TikTok, and now to DeepSeek - how many more does the US want to impose a ban [on]?... "We don't need more bans," Fu pointed out, noting that China and the US, as two leading nations in AI, cannot afford not to cooperate.

Liu Dingding, a technology industry observer, told the Global Times that the arguments behind some countries' moves, including Italy's ban and Australia's claims of data security concerns, are mere pretexts. The true motivation lies in how DeepSeek's formidable capabilities have upended the West's established power dynamics in this field.

For years, we were conditioned to believe AI advancement required massive computing power, vast chip reserves, and institutional monopolies. Now, breakthroughs achieved through cost-effective, open-access models have shattered this paradigm - effectively dismantling the old order dominated by vested interests, Liu Dingding said.

'Breakthrough will unlock political blockades'

In an explanation of the proposed banning act, the US politician LaHood stated that the technology race with China is "not one the United States can afford to lose" and claimed that "it is critical that Congress safeguard Americans' data and continue to ensure American leadership in AI," AP reported.

The phrase "cannot afford to lose" vividly illustrates the fundamental mindset of some US politicians — leveraging various policies and regulations to maintain its dominance in the field of AI, even when it comes to open-source large models that could benefit the general public, said Li, noting that for the US, preserving hegemony and monopolies in the AI sector takes precedence over enabling the public to access the latest technological innovations.

Unlike the political decision to ban access to or restrict the use of DeepSeek, tech experts and industry leaders are more readily embracing the AI platform. For instance, according to a report from Reuters on February 3, DeepSeek's emergence is changing the landscape for AI, offering companies access to the technology at a fraction of the cost, according to interviews with more than a dozen startup executives and investors.

Europe's tech startups had struggled to adopt the new technology at the same rate as US rivals, which have easier access to funding. But executives say DeepSeek could be a game changer, said the Reuters report.

Some media also noted that DeepSeek would be a focus at the 2025 AI Action Summit, which is scheduled to kick off on February 10.

An article released on the website of New America, an American think tank, which talked about the upcoming summit noted that "some American policymakers are responding to Chinese AI advancement not with competitive innovation, but with digital isolationism that could fragment the global AI ecosystem even further."

It also noted that "DeepSeek appears to have achieved this feat while operating under American semiconductor sanctions… DeepSeek claims to have managed with just 2,000 [chips to train]. If true, this represents more than mere technical ingenuity—it suggests that attempts to maintain technological supremacy through export controls may be fundamentally misguided."

Judging from the widespread recognition from the tech community, it is clear that the move to ban DeepSeek pushed by some US politicians is primarily a political decision against China, not simply a technology issue, showing the double standard on how Chinese technology related issues are handled in the US, Li said.

However, despite the various methods employed by the US to contain Chinese technology, significant technological breakthroughs will inevitably make political blockades futile, as such advancements are unstoppable, Li said.

DeepSeek empowers judicial administration system

Several jurisdictions in China have started deploying **DeepSeek**'s large language models to revolutionize legal processes. From retrieving laws and regulations within seconds to generating visual analysis reports for case evaluations and assisting prosecutors with sentencing and fine range assessments, **DeepSeek** is expanding its capabilities in the judicial system.

A justice bureau in South China's Guangdong Province said **DeepSeek** has demonstrated great performance since it fully integrated into its judicial administration system.

The Zhanjiang Municipal Bureau of Justice launched the city's first advanced application of AI models recently, with its Kunpeng Matrix being connected to the DeepSeek AI system. Empowered by DeepSeek, the bureau aims to significantly enhance judicial service efficiency while ensuring data security.

Case distribution efficiency has tripled, and it only takes three seconds in retrieving more than 100,000 laws and regulations and 50,000 judicial cases. The system has also boosted the efficiency of generating administrative reconsideration decisions by 80 percent, with a 75 percent automation rate for producing legal compliance review opinions. Additionally, it accurately identifies key points of disputes in 85 percent of cases and automatically generates visual analysis reports, according to the bureau.

Not only has Zhanjiang adopted DeepSeek's large language models, but a growing number of jurisdictions across China are also introducing this advanced technology.

The Jinghai District People's Procuratorate in North China's Tianjin Municipality on Wednesday said that the DeepSeek-R1-70B large model was successfully deployed on its local server. The procuratorate hailed "the model, with its powerful reasoning ability of 70 billion parameters, a 10-billion-level AI tool that can be applied to judicial

practice."

To ensure the model's compatibility with prosecutorial work, Jinghai has trained it by using core judicial case data. This approach has enhanced the model's accuracy in legal applications.

In dangerous driving cases, the system can automatically compare and analyze cases from the database, generating sentencing and fine ranges, which provides effective reference for prosecutors to quickly assess cases, the procuratorate said.

Additionally, it said that databases covering fraud cases, contract fraud cases and official document writing have been constructed, allowing the model to deeply learn the characteristics and patterns of the procuratorate's work.

"These personalized databases encompass a wealth of case information, legal provisions and practical experience in prosecutorial work, providing precise data support for the AI model and gradually building a personalized AI system tailored to Jinghai's prosecutorial needs," said Zhao Jijun, a deputy chief prosecutor of the Jinghai District People's Procuratorate.

The Zhanhua District Justice Bureau in Binzhou, East China's Shandong Province, also uses DeepSeek to assist in handling administrative reconsideration cases.

In handling administrative review cases, reviewers are leveraging DeepSeek to streamline their workflow. After thoroughly analyzing case details, reviewers utilize the AI system to quickly search for relevant laws, regulations and key judicial precedents related to disputed issues, the bureau said it a statement on Monday.

After drafting a decision — with all privacy-sensitive information redacted — reviewers submit the document to DeepSeek for further analysis. The AI system is able to evaluate the draft, assess the clarity of its logical structure, the accuracy of its legal foundations and the appropriateness of its conclusions. It then cross-references its

findings with the results of traditional manual reviews, according to the bureau.

This integration of AI not only streamlines workflows but also sets a new standard for precision and efficiency in legal administration, marking a **transformative shift** in how judicial systems leverage technology to uphold justice, Li Zonghui, a vice president of the Institute of Cyber and Artificial Intelligence Rule of Law affiliated with the Nanjing University of Aeronautics and Astronautics, told the Global Times.

While some procuratorates are already in the process of empowering their judicial administration with DeepSeek, many others are gearing up to follow suit.

The officers from Northwest China's Shaanxi Provincial Procuratorate recently studied the basic principles, functional features and operational techniques of DeepSeek at a training session. They conducted detailed demonstrations of its powerful capabilities in legal research, official document writing, legal document preparation and new media content creation. They proposed pathways for the localized deployment of DeepSeek within the procuratorate.

"DeepSeek can really help, reduce the burden of work and improve efficiency," Yang, an officer from a Hebei-based procuratorate, told the Global Times. Some of his colleagues have also proposed to integrate DeepSeek into their own procuratorate, Yang said.

However, Li also noted that since AI technology remains imperfect and prone to errors, the judicial system must be cautious about over-reliance. This is particularly important in the context of criminal cases, where careful evaluation of each case's unique circumstances is essential.

What US should grasp from DeepSeek 's technological leap

The Chinese AI firm **DeepSeek** has recently garnered significant attention in the global technological landscape. It has developed AI models that not only rival but, in some cases, surpass those of leading American companies. This achievement is particularly noteworthy as it has been accomplished despite hardware constraints, through the application of innovative algorithms and efficient engineering design.

However, this has raised concerns in the US, not only regarding the so-called national security but also about American hegemony in the technological field. Access to **DeepSeek** technologies has been blocked in the Pentagon and NASA. A senator even proposed jail time for individuals who download **DeepSeek**.

Still, with DeepSeek serving as a microcosm of China's technological advancement, the US anxiety and various crackdown measures only serve as a testament to the resilience and adaptability of Chinese innovation in the face of external pressures. DeepSeek's success illustrates the "effect" of Washington's technological blockade against China.

Taking chip export restrictions as an example, the US believes that Nvidia's high-end chips (such as the H100) are key to training large-scale AI models. By restricting China's access to these chips, the US aims to slow down the development of AI technology in China.

However, DeepSeek has not only developed advanced AI models on performance-limited chips through optimized algorithm design and resource allocation but it has also significantly reduced costs. This demonstrates that technological innovation does not solely rely on high-end hardware. It can also be achieved through various paths, such as algorithm optimization, improved computational efficiency and utilizing open-source technologies.

In fact, past technological successes in the US have followed such diverse paths, but

Washington forgot about this when launching its containment strategy against China. It has been blinded by a desire for sustaining hegemony.

The current US strategy to curb high-end technology in China can be classified as a continuation of a "Cold War mentality." This mind-set, reminiscent of the ideological and technological competition of the Cold War era, holds that implementing technological blockades, resource restrictions and economic isolation can stifle a strategic opponent's rise. This strategy is based on two significant misjudgments: the belief that China's technological progress can be halted through such measures, and the assumption that the global technological landscape remains under the control of a few dominant players.

First, China is an economically powerful country deeply embedded in globalization. It is the global manufacturing center and the largest creator and consumer of data, possessing the world's most active digital economy market. From production to application, China's technological development has always been integrated with both domestic and international markets, and over the years, it has nurtured a large pool of technical talent.

Second, Washington has misjudged the current international technological ecosystem. The world has undergone profound changes; China is not only an essential powerhouse for the world economy but it has also formed deep economic ties with many countries, along with technological and talent connections. In the era of the global internet, the diffusion of technology is more complex to control than at any time in history.

Even if specific high-end hardware and software are restricted, China can still achieve technological development through open-source communities and its own engineering capabilities.

China is the world's most significant data producer and the most prominent internet market with data serving as the "fuel" for AI training. Chinese companies can leverage rich application scenarios to accumulate key data in natural language processing, computer vision and industrial applications. This endogenous cycle of market and technology provides lasting momentum for China's AI innovation.

In this context, attempting to curb technological development by restricting hardware is akin to blocking a main river while ignoring the flow of countless small streams. When companies face resource constraints, they often spark greater technological innovation, as demonstrated by the DeepSeek team's strong adaptability, which reflects the Chinese idiom: "finding a new path."

The core issue of Washington's strategy to curb China lies in a flawed "power-hegemony" logic, which fundamentally overlooks the complex realities of globalization and the characteristics of China's growth. This situation resembles the traditional Chinese game of Go, where one player tries to block their opponent's liberties, only to forget that the opponent had already taken control of the board yesterday. The game will ultimately demonstrate that hegemonism's arrogance and misjudgment of reality will continually undermine Washington's foundational path of strategic development.

The author is a senior editor with the People's Daily, and currently a senior fellow with the Chongyang Institute for Financial Studies at the Renmin University of China. dinggang@globaltimes.com.cn. Follow him on X @dinggangchina

CHINADAILY

DeepSeek shrugs at Sputnik metaphor

After **DeepSeek**'s groundbreaking debut, some commentators likened its significance to a "Sputnik Moment", highlighting its epochal impact. But the state-of-the-art Chinese-made generative AI model itself seems unimpressed by the analogy.

Intriguingly, when asked about its view on **DeepSeek** marking a "Sputnik Moment" in AI, the model acknowledged the symbolic importance of the technological breakthrough and a shifting competitive landscape, saying China has risen from being a "follower "to a "parallel runner" or even a leader in certain AI domains. Yet it emphasized the need to "avoid being swayed by l**abel-based narratives**", urging people to "stay calm amid possible overpraise or rhetoric meant to **talk China down**" and stressing that "**the inclusive nature of technology is of more historical significance than narratives of mere competition**".

Of course, the model's response does not represent the official stance of the Chinese AI company. Nevertheless, it offers valuable insights. As an algorithmic synthesis of comprehensive online discourse analysis, the answer carries symbolic weight.

Sputnik, the first artificial satellite launched by the Soviet Union in 1957 - along with the country's intercontinental missile tests that same year and Yuri Gagarin's Vostok 1 spaceflight four years later - constitutes what historians call the "Sputnik Moment". That marked a pivotal shift in defense technology and arms race during the Cold War. The 83.6-kilogram satellite orbiting Earth delivered a psychological blow to and put strategic pressure on the US, because it meant the US lagged behind the Soviet Union in critical space technology.

The space race that ensued not only intensified Cold War rivalries but also catalyzed, even if unintentionally, a new technological era centered on space exploration. Though driven by competition, breakthroughs in aerospace, computing, and materials science laid the foundation for modern infrastructure such as global communications and weather monitoring, profoundly influencing socioeconomic progress.

Labeling current developments as a "Sputnik Moment" may not inherently carry malice, but it **aligns with Western media's penchant for dramatizing events**. While the Cold War is history, the vision of a shared human future endures. If DeepSeek signals a new phase in AI development and competition, let us hope that **innovation will bring transformative benefits to humankind's broader well-being.**

Some Western media outlets have also likened DeepSeek's rise to an "earthquake", claiming it has "lifted the veil of secrecy shrouding AI", "collapsed the US narrative of computational supremacy" and "shattered Western illusions of containing China". Such rhetoric inevitably evokes China's recent advancements in the sixth-generation fighter aircraft, Huawei's semiconductor breakthroughs and its unparalleled tech-manufacturing ecosystem.

For the Chinese public weary of "small yard, high fence" restrictions and "decoupling" attempts, the technological and cultural milestones around Chinese New Year have indeed been a morale booster. But one thing is certain - attempts to "contain China" will be futile, because its rise is unstoppable. With a 5 percent growth rate, China leads the world's major economies and continues to account for about 30 percent of global growth despite the economic challenges at home. Simultaneously, the country is becoming a hub for top global talents and innovations, steadily advancing toward the frontiers of science and technology.

More encouragingly, DeepSeek's feedback reflects a growing, measured confidence within China's public discourse. As one Chinese economist noted, DeepSeek's success is not about "China surpassing the US", but rather "open-source models surpassing closed systems". This open ethos, mirrored in China's expanding unilateral visa-free policies, signals a maturing embrace of global collaboration.

DeepSeek's co-founder Liang Wenfeng describes his entry into AI as a natural progression for an **engineer driven by curiosity about machine learning's limits.** The model embodies boundless exploration and relentless innovation. Liang once said, "Our criteria for talent have always been passion and curiosity ... Many care more about research than money." Such values will have profound implications for China's tech

trajectory.

To conclude, a poignant remark from DeepSeek-R1 to a user bears repeating: **"The long march of technology** has no finish line, only successive starting points. Maintaining 'crisis awareness while leading' far outweighs basking in 'applause while catching up' - for truly great innovations are born not in celebratory toasts, but in laboratories where the champagne stays unopened."

The author is chief research fellow, China Watch Institute, China Daily.

DeepSeek proves 'small yard, high fence' cannot hinder innovation: Global Times editorial

China's artificial intelligence (AI) company **DeepSeek** has launched its latest large model, **DeepSeek**-R1, which has achieved breakthroughs in several areas at an unexpectedly low cost, gaining popularity among users in multiple countries. This is a positive development in the field of AI, but some sectors and individuals in the US have shown hostility and aggression toward **DeepSeek**. However, if the US government attempts to block it with tariffs, export controls, or intellectual property claims, such actions would not only hinder the overall progress of AI technology but also be detrimental to the healthy and orderly development of AI technology in the US itself.

The emergence of DeepSeek actually proves that, under the guise of so-called national security, attempts to monopolize technology and suppress China's technological progress are ultimately doomed to failure. Since 2022, the US government has restricted the export of Nvidia's high-end chips to China in an attempt to delay China's AI development through the "small yard, high fence" strategy. However, DeepSeek achieved a breakthrough under low computational power, which once again validates the paradox of "sanctions driving innovation."

As economist Tyler Cowen has stated, although the chip ban delayed China's access to hardware, it forced the development of more efficient alternatives, creating "unintended secondary consequences." Moreover, this phenomenon of "technological equality" undermines the US strategy centered on chip control. Other countries could emulate DeepSeek's model, compelling the US to reassess the cost-benefit balance of its sanctions.

The birth of AI software carries national attributes, yet the benefits derived from technological achievements belong to all of humanity. Internal divisions have emerged within think tanks regarding the US' China strategy: one faction advocates for collaboration to harness "synergies," while the other insists on escalating confrontation and "decoupling." However, Microsoft CEO Satya Nadella and other industry leaders acknowledge that the breakthroughs of DeepSeek will make AI more accessible. If the

US insists on a zero-sum game, it will accelerate its own isolation. Ultimately, technological competition without established rules will only evolve into "confrontation." Only through technological cooperation can we seek the welfare of all humanity.

Using 20th-century geopolitical methods to address the technological revolution of the 21st century will only cause the US to miss valuable development opportunities. Whether it focuses on blockades and encirclements or seeks new ways to stand out from the competition will lead to entirely different outcomes.

It is important to recognize that the pressure brought by DeepSeek is likely to become a catalyst for technological advancement - Microsoft and OpenAI are accelerating model iterations, Meta announced optimizations for training energy consumption, and even some technologically closed-off tech giants of Silicon Valley are beginning to reassess their open-source strategies. Who can say that within the self-reform of these American tech giants, a new breakthrough won't emerge? At the same time, it is certain that "decoupling" from China will inevitably lead to backlash against American companies.

In recent years, despite facing external blockades and crackdowns, China has still achieved remarkable technological accomplishments. This warrants reflection for certain individuals in Washington: What have the attempts to hinder China's progress through restrictions and suppression brought to both China and the US? The chip restriction legislation has repeatedly harmed American tech companies, the Wolf Amendment has created barriers for US space research, and the blockade against Huawei has not stopped its pace of research and innovation. This truth, repeatedly proven by history, has once again been demonstrated to Washington by DeepSeek today: never underestimate the intelligence and ingenuity of the Chinese people, and never underestimate China's steadfast determination for opening-up and self-improvement.

Now, in light of tech advancements like DeepSeek, some in the US continue to cling to a mind-set of blocking the technological progress of other countries, revealing their anxiety about maintaining hegemony and their short-sighted strategies. From a political economy perspective, sanctions have failed to curb innovation; instead, they have catalyzed alternative pathways. From the standpoint of the international trade system,

unilateralism has accelerated the restructuring of rules and the revolution of supply chains. Washington should recognize that a "small yard, high fence" approach cannot obstruct China's pace of innovation. In the advancement of AI technology, China and the US are at the forefront. The two countries can explore cooperation in areas such as formulating AI ethical standards, cross-border data governance, and joint responses to cyberattacks, which would benefit both nations and the world.

News feed for website 20250303

China’s Yiwu merchants leverage AI innovations including DeepSeek to help reshape e-commerce

In Yiwu city, the heart of China's small commodities trading hub, located in coastal Zhejiang Province, merchants are now at the forefront of an AI-driven business model innovation that is powered by **DeepSeek**.

Sun Lijuan, head of Yiwu Hongsheng Toy Co, is among the first batch of the merchants to use the AI platform installed at the trading hub.

Since the Yiwu market adopted DeepSeek’s latest AI model earlier this year, Sun’s business has flourished, thanks to AI-generated multilingual videos that serve as a powerful marketing tool.

Sun shared with the Global Times three video clips generated by AI technology, in English, Spanish and Arabic versions, respectively. According to Sun, the AI-generated videos not only assist her in content creation but are also available in different languages. Moreover, the efficiency of AI allows her to update her videos on a daily basis.

"The effect of AI-generated videos is remarkable. Many people leave messages on my Douyin account inquiring the products. What impressed me most was that at the start of the year, a customer from Iraq, attracted by my social media videos, placed an order worth nearly 500,000 yuan ($68,645),” Sun told the Global Times on Sunday.

Fu Jiangyan, a 20-year veteran engaging in sock business, has also leveraged the latest AI technology to grow her business.

For the past 7 years, Fu has consistently made videos to promote her socks to businessmen worldwide. In addition to domestic sales, she has received customers from the Middle East, South America, and South Africa.

Fu told the Global Times that, in the past, promoting products on international social media platforms was a time-consuming and energy-intensive task for her. There were language barriers and other difficulties in content creation. However, with the continuous progress of the AI technology, she has observed that latest AI inference models are becoming significantly smarter and more sophisticated.

Now, by simply speaking a few words or typing the keywords, Fu can create high-quality product videos in 36 languages in minutes. The videos, accompanied with market-specific music, have gained significant traction on TikTok. One of her videos garnered over 54,000 views, leading foreign customers to believe she “is multilingual.”

The experiences of Sun Lijuan and Fu Jiangyan epitomize an ongoing marketing trend, as Yiwu merchants embrace AI-generated solutions. The rapid rise of DeepSeek in China is fuelling broader AI adoption and driving local economic growth in Zhejiang and other provinces in the country.

China's foreign trade sector is being reshaped, powered by AI innovations. Small commodities trade represented by Yiwu, through the application of AI in product promotion and customer communication, has broken through the language and cultural barriers, significantly ramping up trade efficiency and business competitiveness.

In Yiwu, approximately 30,000 merchants now use AI tools daily, with local AI apps developed by the market seeing over 1 billion cumulative uses, according to data released by Zhejiang China Commodities City Group on February 21.

Yiwu merchants’ speedy adoption of AI technology is largely due to local support. Chen Chaojun, the product manager at the Yiwu market AI product line, told the Global Times that, since October 2023, the Yiwu International Trade Market has introduced varied AI innovation service platforms and rolled out a barrage of AI applications.

At the beginning of this year, Yiwu International Trade Market decided to integrate DeepSeek models into its own AI service platform, offering merchants a powerful tool for video creation.

"We aim to empower all merchants by leveraging AI technology, creating more convenient products, and helping them effectively adapt to AI solutions. Our vision is to transition the entire market from traditional e-commerce to an **AI-driven e-commerce model,**" said Chen.

Yiwu also provides free one-on-one guidance for merchants and regularly hosts AI-related training sessions. "In these courses, we provide detailed insights on how to leverage AI technology and the specific advantages it can bring to doing businesses. For example, some courses focus on how to utilize latest DeepSeek models to optimize business operation," Chen explained.

A Corpus

International
New York Times

How Chinese A.I. Start-Up DeepSeek Is Competing With Silicon Valley Giants

The company built a cheaper, competitive chatbot with fewer high-end computer chips than U.S. behemoths like Google and OpenAI, showing the limits of chip export control.

The day after Christmas, a small Chinese start-up called **DeepSeek** unveiled a new A.I. system that could match the capabilities of cutting-edge chatbots from companies like OpenAI and Google.

That alone would have been a milestone. But the team behind the system, called **DeepSeek**-V3, described an even bigger step. In a research paper explaining how they built the technology, **DeepSeek**'s engineers said they used only a fraction of the highly specialized computer chips that leading A.I. companies relied on to train their systems.

These chips are at the center of a tense technological competition between the United States and China. As the U.S. government works to maintain the country's lead in the global A.I. race, it is trying to limit the number of powerful chips, like those made by Silicon Valley firm Nvidia, that can be sold to China and other rivals.

But the performance of the **DeepSeek** model raises questions about the unintended consequences of the American government's trade restrictions. The controls have forced researchers in China to get creative with a wide range of tools that are freely available on the internet.

The **DeepSeek** chatbot answered questions, solved logic problems and wrote its own computer programs as capably as anything already on the market, according to the benchmark tests that American A.I. companies have been using.

And it was created on the cheap, challenging the prevailing idea that only the tech industry's biggest companies — all of them based in the United States — could afford to make the most advanced A.I. systems. The Chinese engineers said they needed only about $6 million in raw computing power to build their new system. That is about 10 times less than the tech giant Meta spent building its latest A.I. technology.

"The number of companies who have $6 million to spend is vastly greater than the number of companies who have $100 million or $1 billion to spend," said Chris V. Nicholson, an investor with the venture capital firm Page One Ventures, who focuses on A.I. technologies.

Since OpenAI sparked the A.I. boom in 2022 with the release of ChatGPT, many experts and investors had concluded that no company could compete with the market

leaders without spending hundreds of millions dollars on specialized chips.

The world's leading A.I. companies train their chatbots using supercomputers that use as many as 16,000 chips, if not more. **DeepSeek**'s engineers, on the other hand, said they needed only about 2,000 specialized computer chips from Nvidia.

The constraints on chips in China forced the **DeepSeek** engineers to "train it more efficiently so it could still be competitive," said Jeffrey Ding, an assistant professor at George Washington University who specializes in emerging technology and international relations.

Earlier this month, the Biden administration issued new rules that aim to keep China from obtaining advanced A.I. chips through other countries. The rules build on multiple rounds of earlier restrictions that prevent Chinese companies from being able to buy or make cutting-edge computer chips. President Trump has not yet indicated whether he will the rules or rescind them.

The U.S. government has tried to keep advanced chips out of the hands of Chinese companies over concerns they could be used for military purposes. In response, some firms in China have stockpiled thousands of chips, while others sourced them from a thriving underground marketplace of smugglers.

DeepSeek is run by a quantitative stock trading firm called High Flyer. By 2021, it had channeled its profits into acquiring thousands of Nvidia chips, which it used to train its earlier models. The company, which did not respond to requests for comment, has become known in China for scooping up talent fresh from top universities with the promise of high salaries and the ability to follow the research questions that most pique their interest.

Zihan Wang, a computer engineer who worked on an earlier **DeepSeek** model, said the company also hires people without any computer science background to help the technology understand and be able to generate poetry and ace questions on the notoriously difficult Chinese college entrance examination.

DeepSeek does not make any products for consumers, leaving its engineers to focus entirely on research. That means that its technology is not hemmed in by the strictest aspect of China's regulations on A.I., which require consumer-facing technology to comply with the government's controls on information.

The leading American companies continue to advance the state of the art in A.I. In December, OpenAI unveiled a new "reasoning" system called o3 that exceeds the performance of existing technologies, though it is not yet widely available outside the company. But **DeepSeek** continues to show that it is not far behind. This month, it released an impressive reasoning model of its own.

(The New York Times has suedOpenAI and its partner, Microsoft, accusing them of copyright infringement of news content related to A.I. systems. OpenAI and Microsoft have denied those claims.)

A crucial part of this rapidly changing global market is an old idea: open source software. Like many other companies, **DeepSeek** has open sourced its latest A.I. system, meaning that it has shared the underlying code with other businesses and researchers. This allows others to build and distribute their own products using the same technologies.

While employees at big Chinese technology companies are limited to collaborating with colleagues, "if you work on open source, you work with talent around the world," said Yineng Zhang, lead software engineer at Baseten in San Francisco who works on the open source SGLang project. He helps other people and companies build products using **DeepSeek**'s system.

The open source ecosystem for A.I. gathered steam in 2023 when Meta freely shared an A.I. system called LLama. Many assumed that this community would flourish only if the companies like Meta — tech giants with massive data centers filled with specialized chips — continued to open source their technologies. But **DeepSeek** and others have shown that they, too, can expand the powers of open source technologies."

Many executives and pundits have argued that the big U.S. companies should not open source their technologies because they could be used to spread disinformation or cause other serious harm. Some U.S. lawmakers have explored the possibility of preventing or throttling the practice.

But others argue that if regulators stifle the progress of open source technology in the United States, China will gain a significant edge. If the best open source technologies come from China, they argue, U.S. developers will build their systems atop those technologies. In the long-run, that could put China at the heart of A.I. research and development.

"The center of gravity of the open source community has been moving to China," said Ion Stoica, a professor of computer science at the University of California, Berkeley. "This could be a huge danger for the U.S.," because it allows China to accelerate the development of new technologies.

Hours after his inauguration, President Trump rescinded a Biden administration executive order that threatened to curb open source technologies.

Dr. Stoica and his students recently built an A.I. system called Sky-T1 that rivals the performance of OpenAI latest system, called OpenAI o1, on certain benchmark tests.

They needed only $450 in computing power.

They did this by building on top of two open source technologies released by the Chinese tech giant Alibaba.

Their $450 system is not as powerful as OpenAI's technology or **DeepSeek**'s new system. And the techniques they used are unlikely to yield systems that exceed the performance of the leading technologies. But the project showed that even operations with minuscule resources can build competitive systems.

Reuven Cohen, a technology consultant in Toronto, has been using **DeepSeek**-V3 since late December. He says it is comparable to the latest systems from OpenAI, Google and the San Francisco start-up Anthropic — and much cheaper to use.

"**DeepSeek** is a way for me to save money," he said. "This is the kind of technology that someone like me wants to use."

PHOTO: **DeepSeek**'s engineers said they needed only about 2,000 specialized computer chips from the U.S. chipmaker Nvidia, in comparison to the as many as 16,000 chips needed by major American companies. (PHOTOGRAPH BY Marlena Sloss/Bloomberg FOR THE NEW YORK TIMES)

The New York Times

How Did DeepSeek Build Its A.I. With Less Money?

The Chinese start-up used several technological tricks, including a method called "mixture of experts," to significantly reduce the cost of building the technology.

Last month, U.S. financial markets tumbled after a Chinese start-up called **DeepSeek** said it had built one of the world's most powerful artificial intelligence systems using far fewer computer chips than many experts thought possible.

A.I. companies typically train their chatbots using supercomputers packed with 16,000 specialized chips or more. But **DeepSeek** said it needed only about 2,000.

As **DeepSeek** engineers detailed in a research paper published just after Christmas, the start-up used several technological tricks to significantly reduce the cost of building its system. Its engineers needed only about $6 million in raw computing power, roughly one-tenth of what Meta spent in building its latest A.I. technology.

What exactly did **DeepSeek** do? Here is a guide.

How are A.I. technologies built?

The leading A.I. technologies are based on what scientists call neural networks, mathematical systems that learn their skills by analyzing enormous amounts of data.

The most powerful systems spend months analyzing just about all the English text on the internet as well as many images, sounds and other multimedia. That requires enormous amounts of computing power.

About 15 years ago, A.I. researchers realized that specialized computer chips called graphics processing units, or GPUs, were an effective way of doing this kind of data analysis. Companies like the Silicon Valley chipmaker Nvidia originally designed these chips to render graphics for computer video games. But GPUs also had a knack for running the math that powered neural networks.

As companies packed more GPUs into their computer data centers, their A.I. systems could analyze more data.

But the best GPUs cost around $40,000, and they need huge amounts of electricity. Sending the data between chips can use more electrical power than running the chips themselves.

How was **DeepSeek** able to reduce costs?

It did many things. Most notably, it embraced a method called “mixture of experts.”

Companies usually created a single neural network that learned all the patterns in all the data on the internet. This was expensive, because it required enormous amounts of data to travel between GPU chips.

If one chip was learning how to write a poem and another was learning how to write a computer program, they still needed to talk to each other, just in case there was some overlap between poetry and programming.

With the mixture of experts method, researchers tried to solve this problem by splitting the system into many neural networks: one for poetry, one for computer programming, one for biology, one for physics and so on. There might be 100 of these smaller “expert” systems. Each expert could concentrate on its particular field.

Many companies have struggled with this method, but **DeepSeek** was able to do it well. Its trick was to pair those smaller “expert” systems with a “generalist” system.

The experts still needed to trade some information with one another, and the generalist — which had a decent but not detailed understanding of each subject — could help coordinate interactions between the experts.

It is a bit like an editor’s overseeing a newsroom filled with specialist reporters.

And that is more efficient?

Much more. But that is not the only thing **DeepSeek** did. It also mastered a simple trick involving decimals that anyone who remembers his or her elementary school math class can understand.

There is math involved in this?

Remember your math teacher explaining the concept of pi. Pi, also denoted as π, is a number that never ends: 3.14159265358979 …

You can use π to do useful calculations, like determining the circumference of a circle. When you do those calculations, you shorten π to just a few decimals: 3.14. If you use this simpler number, you get a pretty good estimation of a circle’s circumference.

DeepSeek did something similar — but on a much larger scale — in training its A.I. technology.

The math that allows a neural network to identify patterns in text is really just

multiplication — lots and lots and lots of multiplication. We're talking months of multiplication across thousands of computer chips.

Typically, chips multiply numbers that fit into 16 bits of memory. But **DeepSeek** squeezed each number into only 8 bits of memory — half the space. In essence, it lopped several decimals from each number.

This meant that each calculation was less accurate. But that didn't matter. The calculations were accurate enough to produce a really powerful neural network.

That's it?

Well, they added another trick.

After squeezing each number into 8 bits of memory, **DeepSeek** took a different route when multiplying those numbers together. When determining the answer to each multiplication problem — making a key calculation that would help decide how the neural network would operate — it stretched the answer across 32 bits of memory. In other words, it kept many more decimals. It made the answer more precise.

So any high school student could have done this?

Well, no. The **DeepSeek** engineers showed in their paper that they were also very good at writing the very complicated computer code that tells GPUs what to do. They knew how to squeeze even more efficiency out of these chips.

Few people have that kind of skill. But serious A.I. labs have the talented engineers needed to match what **DeepSeek** has done.

Then why didn't they do this already?

Some A.I. labs may be using at least some of the same tricks already. Companies like OpenAI do not always reveal what they are doing behind closed doors.

But others were clearly surprised by **DeepSeek**'s work. Doing what the start-up did is not easy. The experimentation needed to find a breakthrough like this involves millions of dollars — if not billions — in electrical power.

In other words, it requires enormous amounts of risk.

"You have to put a lot of money on the line to try new things — and often, they fail," said Tim Dettmers, a researcher at the Allen Institute for Artificial Intelligence in Seattle who specializes in building efficient A.I. systems and previously worked as an A.I. researcher at Meta.

“That is why we don’t see much innovation: People are afraid to lose many millions just to try something that doesn’t work,” he added.

Many pundits pointed out that **DeepSeek**’s $6 million covered only what the start-up spent when training the final version of the system. In their paper, the **DeepSeek** engineers said they had spent additional funds on research and experimentation before the final training run. But the same is true of any cutting-edge A.I. project.

DeepSeek experimented, and it paid off. Now, because the Chinese start-up has shared its methods with other A.I. researchers, its technological tricks are poised to significantly reduce the cost of building A.I.

The Washington Post

Will China's open-source AI end U.S. supremacy in the field?

It has become almost a cliché to say that the artificial intelligence landscape is changing fast. But in recent days, even those on the cutting edge of AI research were taken by surprise — by a Chinese company.

Last week, the AI company **DeepSeek** released its R1 reasoning model, which is on a par with OpenAI's o1 (and much better than the ChatGPT models) across a variety of logic tasks, including math and coding. The cost of running it is also much lower, only about 2 percent of what OpenAI charges. And on Monday, **DeepSeek** released Janus Pro, a model small enough to run on your laptop that can generate synthetic images, which it claims outperform OpenAI's Dall·E 3. **DeepSeek**'s speed of AI innovation is taking the world by storm.

What's even more remarkable is that **DeepSeek**'s entire collection of models is open-source — which in this case means they have open weights that anyone can reproduce and build on top of.

It's a peculiar moment when a Chinese company becomes the de facto open-source leader, while most major American firms, with the exception of Meta, continue to keep their methodologies tightly under wraps. In fact, this is a growing trend for Chinese AI companies — from start-ups such as Minimax to tech giants such as Alibaba — that are giving developers worldwide free access to their AI models.

Until now, closed-source models such as OpenAI's o3 and Anthropic's Claude 3 Opus were considered the industry standards with the most advanced capabilities — and they were built in the United States. Open-source and Chinese models were thought to be months behind. But **DeepSeek**'s R1 and Janus Pro show just how quickly the tides of technological supremacy can turn. The introduction of these models has roiled stock markets and caused U.S. tech stocks to plunge. The balance of power now appears to be shifting along two key axes: one between the United States and China, and another between closed- and open-source models.

Defenders of closed-source models are betting that they can preserve their capability gap by protecting their model weights and training methodologies. Open-source advocates, on the other hand, argue that transparency — allowing others to build on their work — can enable these systems to rapidly catch up with larger, closed models. If the open-source thesis is correct, this would turn the AI ecosystem on its head. Open-source models are generally cheaper to use, so when two equally capable models are available — one open, one closed — the open-source model is likely to gain wider adoption, giving it a strategic advantage.

The United States already has the best closed models in the world. To remain competitive, we must also support the development of a vibrant open-source ecosystem.

The race between open- and closed-source AI, as well as between the United States and China, does not yet have a clear winner. But there is clearly mounting pressure on America's Big Tech players if **DeepSeek** can compete with them using far fewer resources. Export controls were aimed at choking off China's access to the most advanced computer chips, impeding its ability to keep pace. But in fact, the relative dearth of high-performing chips in China might have pushed the nation's companies and researchers to be more efficient and led them to uncover new methodologies that significantly reduce training costs. For example, **DeepSeek** demonstrated that large model training could be made more efficient by bypassing the traditional supervised fine-tuning stage. They even created R1-Zero, a model that omits this step in AI training, to challenge the research community's assumptions about fine-tuning's indispensability.

DeepSeek's success has also called into question the importance of pretraining, which involves training ever-larger models that predict the next word based on vast amounts of text. This process requires enormous up-front investment in graphics processing units (GPUs) and data — so much data that OpenAI co-founder Ilya Sutskever recently noted we might soon exhaust all the data available on the internet.

But there is another, emerging way to improve models' performance. Introduced with OpenAI's o1 model in December, this approach enables models to perform reasoning through self-reflection, similar to how humans reason, using intermediate steps and self-correction to reach a final answer. The training recipe for this approach had previously been closely guarded by OpenAI. **DeepSeek** blew the lid off that by publishing a paper detailing how it works, allowing others to implement the process.

DeepSeek even demonstrated that you can do this much more cost-effectively by taking a publicly available base model such as Meta's Llama 3 and teaching it to reason through reinforcement learning — a trial-and-error process with human-devised feedback and rewards. Over time, the models seem to spontaneously learn how to reason, backtrack when they hit dead ends and explore novel approaches. This method eliminates the need to expensively pretrain a new base model, and its implications for AI innovation are profound. Traditionally, even the top-funded university labs have struggled to contribute to AI research due to computing and data limitations. With **DeepSeek**'s breakthrough, the moat surrounding large, well-funded companies might be shrinking.

It is unlikely that American frontier model companies will change their business models anytime soon, nor is it immediately clear that they should. Open and closed competition will most likely find a natural equilibrium, with a range of different offerings and price points for different users.

But **DeepSeek**'s release marks a turning point.

The path forward for American innovation involves not just ramping up open-source development but also encouraging the sharing of training methodologies and increasing investment in AI research and development — exemplified by the White House's recent announcement of the Stargate Project, which aims to spend $500 billion on AI infrastructure over the next four years.

America's competitive edge has long relied on open science and collaboration across industry, academia and government. We should embrace the possibility that open science might once again fuel American dynamism in the age of AI.

Eric Schmidt, former CEO and chairman of Google, is co-founder of Schmidt Sciences and chair of the nonpartisan think tank Special Competitive Studies Project. Dhaval Adjodah is co-founder and CEO ofMakerMaker.AI.

The New York Times

DeepSeek 's A.I. Breakthrough, Explained

DeepSeek, a Chinese tech start-up, shocked the booming field of artificial intelligence last month when it released a chatbot to compete with the likes of Microsoft, Google and Facebook. **DeepSeek**'s success suggested cutting-edge A.I. could be produced without the most advance American chips, and set off minor panic among tech investors.

Kevin Roose has been chronicling this formative period of A.I. at The New York Times through his column, The Shift, and his podcast, "Hard Fork." But this week he joined "The Daily" to discuss the significance of **DeepSeek** and the state of the A.I. race between China and the United States. Here is an edited and condensed excerpt from his interview with the host of the episode, Natalie Kitroeff.

How did this giant A.I. tech freakout begin?

The freakout started in earnest with a Chinese A.I. company called **DeepSeek**. **DeepSeek** had released a new A.I. model. Models are released all the time; generally, they don't make international news. But this model was different in a few ways. One of them was that it just appeared to be a really good model, better than the leading Chinese models at the time, and on par, or close to on par, with the leading American ones. The **DeepSeek** app goes to number one on the App Store charts. It vaults ahead of ChatGPT, and other better-known apps. And the more notable thing, the thing that really caused the American A.I. industry to start to panic, was how cheaply this model was apparently built.

We think that this model costs **DeepSeek** about $5.5 million to train. Now, that might sound like a lot of money, but it's really not, compared to what many American A.I. companies are spending. Meta said that it was spending $65 billion; Microsoft said it was spending $80 billion. And OpenAI had just announced this giant partnership where they were planning to spend as much as half a trillion dollars to build the infrastructure for A.I.

On top of that, **DeepSeek** says that they built their model without access to the latest and greatest American A.I. chips, which up until now were thought to be necessary to build the most powerful models.

Investors start saying, Wait a minute, if it only costs $5.5 million to train a leading-edge A.I. model, then what the heck are all these American companies doing spending hundreds of millions of dollars, or even billions of dollars, to train roughly equivalent models? So the stocks of many of the American tech companies started to fall.

Can we trust **DeepSeek**'s claims about how they pulled this off?

There are a lot of people who are skeptical of what **DeepSeek** has claimed. In particular, the cost of the model, $5.5 million, might not be the real figure; it doesn't include all of the research and the engineer salaries and things that went into it. So the real cost is probably significantly higher than that.

But there are questions: Did they smuggle in very powerful chips that would have actually allowed them to build a model this good? Is the Chinese government funneling money to them and not telling us about it? There are lots of theories.

But as time wears on and experts start digging through the details, they're coming to the conclusion that maybe the cost is a little higher than **DeepSeek** claims -- maybe they have a few more chips than they're telling us about -- but in general, it seems like they actually did build a really good model using some very clever engineering techniques.

Kevin, you've been covering this world for a long time. Does this show you that more money doesn't necessarily mean more innovation in the world of A.I.?

I think it threw into question this fundamental assumption that only the big dogs could play in A.I., that you had to be Microsoft or Amazon or Google if you wanted a chance to build state-of-the-art A.I. models. What the **DeepSeek** story suggested is that there may be a whole other world of competitors trying to stay close to the frontier, and that they might not have to have the resources of one of the world's largest corporations to do it.

But there was one other piece of this that I think suggests that the A.I. race has entered a new phase. **DeepSeek** did something that a lot of American companies have been hesitant to do: They released their A.I. models as open-source software, meaning that anyone on the internet can download and use them. It is software that can be reused and remixed and improved upon by anyone.

When **DeepSeek** released its models this way, they sent a message to the world that says, we are serious here about competing, and we're so serious that we're going to give away our models for free so that anyone who wants to can make them better. All of a sudden, it just flipped the entire A.I. race onto its head and really sent it into a new gear.

The Washington Post

DeepSeek has created a 21st-century Sputnik moment

Is this a Sputnik moment? The world has reacted with astonishment to the release of a disruptive AI model from Chinese company **DeepSeek**, which appears to be able to perform as well as or, in some cases, better than ChatGPT and other cutting-edge models put out by U.S. companies. Americans had assumed their massive lead in funding, access to high-quality chips and innovation would keep them well ahead. That assumption now looks like hubris.

The episode is in some ways a much bigger deal than Sputnik. Sputnik was about the Soviet Union's space program competing with that of the United States. Few thought the Soviet economy in general was more technologically advanced than America's. But **DeepSeek** is a private Chinese company that demonstrated its stunning prowess on the cheap in the most important technology for the future. It's not exactly clear just how much **DeepSeek**'s model actually cost, to what extent it needed to use U.S. models for training and whether there was any closet Chinese government help. But given the enormous efforts that the U.S. government has made over the past few years to preserve its advantage — chip bans, export controls, etc. — **DeepSeek** has made a remarkable achievement. It suggests to me two lessons and two questions.

The first lesson is that, over time, open artificial-intelligence systems are likely to outperform closed systems. (An open system is like Lego blocks with instructions; a closed one is the built Lego structure with the instructions kept secret.) Many have pointed out that **DeepSeek** used Meta's open-source Llama model to train. It also used Qwen, a family of AI models, also open-source, put out by the Chinese technology giant Alibaba. While **DeepSeek** is currently the best, China's big technology companies have been releasing a number of AI models, mostly open-source, that are getting better and better. If the history of technology is any guide, the ability to see the innards of these models and understand their reasoning should lead to greater and faster technological innovation than using closed models that others cannot use for collaboration.

Second, constraints can be useful, as former Intel CEO Pat Gelsinger has noted. Just as art sometimes flourishes in repressive environments, in which restrictions force artists to be creative, so also engineers often operate best under constraints. Forced to use second-tier chips, Chinese engineers produced creative workarounds. This is not just true with **DeepSeek**. In 2023, Chinese telecommunications giant Huawei released a smartphone with a seven-nanometer chip, a kind that had been explicitly banned by U.S. export controls. There is some evidence that, after years of sclerosis, China's chipmakers have responded to U.S. bans by becoming much more innovative.

In a fascinating interview last year, Liang Wenfeng, the CEO of **DeepSeek**, argued that his engineers were more motivated by doing research than making money, and appeared to contrast that attitude with the one prevalent in Silicon Valley, which is all about maximizing revenue, providing cloud services and generating cash flow. Demis Hassabis, who leads Google's DeepMind and also shared the 2024 Nobel Prize in chemistry for AI-related scientific breakthroughs, is said to have fought to keep his team in London, far from Silicon Valley, so that it can focus on basic research.

The first question that **DeepSeek** raises is: Can the United States stop China from advancing along the technological frontier? Some argue that **DeepSeek** shows that export controls work: Its model needed many Nvidia chips, which it managed to procure before export bans were fully in place. Soon, China will not have access to the best chips and will suffer even more from the ban.

But as we have learned with the rounds and rounds of global sanctions against Russia, the world economy is large and porous. Stuff gets through. And China is not Russia. It is a vast, technologically sophisticated economy with millions of software developers and hundreds of high-quality firms in the technology space. Human talent on that scale will find ways to innovate, even if those measures keep China slightly behind.

The second question: What is the cost of this approach? If technology bans and export controls at best keep China behind a year — maybe just several months — is that gain worth the cost? That cost is Chinese retaliation, limiting the United States' access to key materials that it needs for high technology. More important, a decoupled global economy also creates a closed ecosystem in which U.S. technology companies will not face competition from the best. Is Tesla going to innovate at the highest level if it is not facing its strongest Chinese rival?

A technology decoupling means that AI will become the central part of a new global arms race, totally unregulated and unconstrained, with the world's two largest economies hurtling toward superintelligence no-holds-barred, and incorporating it into all military applications — including nuclear weapons. If artificial intelligence is as revolutionary a technology as predicted, having it unleashed in every realm of human life with absolutely no guardrails points to a scary future — one far more dangerous than anything people imagined because of the Sputnik satellite.

The Washington Post

In wake of DeepSeek 's rise, three policy arguments have gained traction

DeepSeek is reframing the AI policy debate.

After the whirlwind of excitement and consternation around **DeepSeek**-R1, the Chinese AI model that achieved a stunning breakthrough in machine reasoning and rocketed to the top of U.S. app charts, the dust is settling on a reconfigured AI policy debate.

Few would dispute President Donald Trump's assessment that the app's success should serve as "a wake-up call" for a U.S. tech sector that aspires to dominate the global AI industry. While American tech behemoths were pouring billions into the world's most powerful systems, a Chinese start-up operating on a relative shoestring budge**t appears to have surpassed the top U.S. open-source language models** and matched leading proprietary models in key respects.

Not everyone agrees on how U.S. policymakers should respond, of course. Whether you think **DeepSeek** proves that U.S. export controls on AI chips are fruitless or that they should have been ratcheted up sooner probably depends on how you felt about export controls to begin with. Still, interviews with six experts representing a variety of interests revealed common ground on a few points.

Here are three policy arguments that appear to have gained traction in the wake of **DeepSeek**'s rise:

1. U.S. AI policy should focus on promoting innovation rather than eradicating risk.

Two years ago, the debate over AI policy in the United States was dominated by concerns that runaway machine intelligence could extinguish the human race and calls to pause or rein in its development. While "AI doomers" haven't gone away, fears of existential risk are giving way in Washington to fears of being beaten by China.

DeepSeek's success is a reminder that "American leadership in AI technology is not at all guaranteed," said Gregory C. Allen, director of the Wadhwani AI Center at the Center for Strategic and International Studies, a bipartisan think tank. "There is effectively no margin to slow down."

That doesn't mean the United States can't regulate AI in the interest of safety, Allen added. Historically, safety standards around technology such as electricity "actually accelerated deployment" because people could trust it not to burn their house down.

Matt Perault, who recently joined the influential venture capital firm Andreessen Horowitz as head of AI policy, said policymakers should regulate harmful uses of AI

models rather than the development of the models themselves. "Our hope is that going forward there will be less burden on the innovation and more focus on the consumer protection side," he said.

Rumman Chowdhury, chief executive of the nonprofit Humane Intelligence, said "placing simplistic constraints" on models "simply creates a market for building within those constraints," which will soon be outdated. But she said a "more durable" approach would be "requiring rigorous test and evaluation methods designed around real-world outcomes and applications - the same way other high-risk/high-potential technology is tested."

2. Advances in AI can come from unexpected sources, underscoring the importance of competition and the value of open-source approaches.

A person familiar with the Biden administration's approach to AI policy, speaking on the condition of anonymity because of fear of reprisal from the Trump administration, rejected the idea that AI regulations such as President Joe Biden's now-rescinded executive order were to blame for the United States not producing a **DeepSeek** of its own so far. "What limits have we really placed on these model developers?" the person said.

The real lesson is that former Federal Trade Commission chair Lina Khan was right, the person argued: "Lean companies scrapping to innovate create better products for cheaper," so "breaking up the chokehold five companies have on AI and innovation is the key."

Jennifer Huddleston, senior fellow in technology at the free-market Cato Institute, agreed competition is key. But she said **DeepSeek** has exploded the notion that "AI is already monopolized" by a handful of tech giants. Rather, it shows how open-source approaches can lower barriers to entry - as long as regulators let them flourish.

If anything, "What you should regulate is forcing people to open-source stuff more," suggested William Falcon, CEO of Lightning AI, a platform for developers to build and deploy AI models. If OpenAI had maintained the open approach upon which it was founded, he said, "we wouldn't be in this situation."

Falcon added that **DeepSeek** shows there is an important role for U.S. competition policy in preventing deals between tech giants that lock smaller players out of the market for the high-end chips needed to develop leading AI models.

3. AI's future might not hinge on feeding it ever more energy and computing power, after all.

Trump's approach to AI policy so far has focused on loosening regulations and ramping

up energy production to meet the industry's booming demand for chips and data centers, despite growing environmental concerns. While alarm over Chinese AI breakthroughs may win him some allies for a lighter touch, **DeepSeek**'s less resource-intensive approach to model development calls into question the need for vast quantities of power.

"**DeepSeek**'s results demonstrate that the U.S. Big Tech narrative that the expansion of energy production is what's required for them to lead in a global 'AI race' is utter hogwash," said Margaret Mitchell, chief ethics scientist at the AI company Hugging Face. "It speaks to the siloed groupthink myopia that plagues Silicon Valley."

http://www.washingtonpost.com

WP20250216techbrief-deepseekpolicy

The Washington Post

Tech CEOs try to reassure Wall Street after DeepSeek shock

SAN FRANCISCO — Days after the overnight success of Chinese chatbot **DeepSeek** wiped a trillion dollars off the value of U.S. tech stocks, software CEOs are telling investors that the artificial intelligence revolution is still on track.

On earnings calls Wednesday, the leaders of Meta and Microsoft said they still plan to spend tens of billions of dollars this year on new chips and data centers for AI. They said the huge investments can still pay off in a world where upstarts like **DeepSeek** give away cutting-edge AI software that others can build on.

Both CEOs also indicated that they expected capable AI software to be increasingly available at low cost or free — a trend that could put pressure on companies dependent on charging others to access private AI models.

"**DeepSeek** has had some real innovations. … Obviously, now all that gets commoditized," Microsoft CEO Satya Nadella said on an investor call Wednesday after his company posted its latest quarterly results.

Nadella said wider access to AI models would encourage more use of the technology, increasing demand for Microsoft's cloud business. "People can consume more, and there will be more apps written," Nadella said. "This is all good news as far as I'm concerned."

Nadella also said his company, OpenAI's primary partner and largest investor, is hosting **DeepSeek**'s R1 AI model for cloud-computing customers to try out or build upon.

Meta CEO Mark Zuckerberg was also upbeat on an investor call after his company's quarterly results Wednesday. The way **DeepSeek** released the AI model powering its blockbuster chatbot app for others to download and modify without charge validated Meta's decision to give away its own AI technology, he said.

Zuckerberg said that the latest version of Meta's free Llama AI model is competitive with leading proprietary rivals, but that the next release will take the lead. He also said Meta is trying to learn from **DeepSeek**'s technology.

"There's a number of novel things that they did that I think we're still digesting," Zuckerberg said. "And there are a number of things … that we will hope to implement in our systems."

Meta has set up "war rooms" internally to analyze **DeepSeek**'s technology — a measure

the company often takes when competitors such as OpenAI, Anthropic or Google release new AI models, according to a person familiar with the matter who spoke on the condition of anonymity to discuss private company initiatives.

DeepSeek, founded by AI engineers in China who previously worked on algorithms for trading stocks, said technical breakthroughs allowed it to build an AI chatbot with capabilities similar to the best offered by U.S. companies for a fraction of the cost.

The company's app went viral this past weekend, sending shock waves through Silicon Valley, Wall Street and Washington.

Tech stocks fell on Monday as investors questioned whether U.S. companies had lost their lead in the AI race and wasted some of the billions of dollars being invested in AI data centers and chips to stock them. Shares in Nvidia, the semiconductor company whose chips are vital to AI projects, dropped nearly 17 percent.

By market close Wednesday, the tech-heavy Nasdaq composite index had recovered some of Monday's losses but was still down compared with last week.

DeepSeek's technology earned widespread recognition from AI insiders this week, but some whose apps were displaced by the Chinese start-up in app store rankings said they could stay ahead.

"**Deepseek**'s R1 is an impressive model, particularly around what they're able to deliver for the price," OpenAI CEO Sam Altman said Monday in a post on X. "We will obviously deliver much better models and also it's legit invigorating to have a new competitor!"

OpenAI said Wednesday that the company had evidence that **DeepSeek** violated its terms of service by using responses from the ChatGPT developer's AI offerings to help train its own chatbot, undermining the idea that Chinese developers had built a highly capable AI all on their own.

The stock market often sells tech stocks when an innovation comes out that could force companies to lower prices, said Andrew Feldman, CEO of AI computer chip company Cerebras. But such sell-offs inevitably prove to be short-sighted, he said, because lower prices increase the possible uses of software, and demand shoots up. "The first thought was, this makes the market smaller. In every instance, that was wrong."

AI analysts have also questioned **DeepSeek**'s claim of spending only a few million dollars to train one of its earlier AI models, saying that figure didn't account for other costs such as buying or renting computer chips or running the software after it was finished.

With numerous AI chatbots now available, many U.S. companies are targeting more sophisticated applications of the technology.

Zuckerberg said on Meta's investor call that he expects it will be possible next year to build an AI tool that "has coding and problem-solving abilities of around a good mid-level engineer," adding that it could become "one of the most important innovations in history."

Microsoft and Meta both said they will charge ahead with deep investments in AI hardware and data centers.

Meta advised investors that its capital expenditures will grow in 2025 in part because of AI spending, to between $60 billion and $65 billion.

Microsoft will continue with its previously disclosed plan to spend as much as $80 billion on AI infrastructure this year. Nadella said it was necessary to provide computer resources for other companies to use AI tech to build their own applications. "AI will be much more ubiquitous," he said.

Meta's stock rose 2.3 percent in aftermarket trading, while Microsoft's fell 4.6 percent. The software giant reported lower than expected revenue in its cloud division, though Nadella said on the investor call that the company's AI-related revenue was growing quickly.

THE WALL STREET JOURNAL.

What to Know About China's DeepSeek AI; The Chinese upstart says it has trained high-performing AI models cheaply, without using the most advanced chips

DeepSeek has Silicon Valley in awe and investors in a frenzy.

The Chinese artificial-intelligence upstart has shot to prominence after saying it had trained high-performing AI models cheaply, without the most advanced chips.

Tech stocks sank Monday as investors fretted about the implications, wiping some $1 trillion from the stock market's value. Nvidia, which makes the chips at the heart of the AI boom, closed down 17%. Nvidia and other stocks that swooned recovered some ground Tuesday.

Here's what you need to know about **DeepSeek**:

What is **DeepSeek** and why am I hearing about it now?

DeepSeek is a Chinese AI company, which just over a week ago launched its latest AI model, which it calls R1. The company said the model was particularly good at problem solving, performing on par with OpenAI's o1 reasoning model—but at a fraction of the cost per use. A **DeepSeek** app is currently top in iPhone download rankings for the U.S.

Why are investors worried about **DeepSeek**?

The conventional thinking was that AI companies needed expensive, leading-edge computer chips—such as those made by Nvidia—to train the best systems. That has justified huge spending by the biggest U.S. tech companies, such as Alphabet and Meta Platforms.

Just last week, companies including SoftBank, Oracle and OpenAI pledged to spend $500 billion to build new AI infrastructure in a venture they call Stargate.

DeepSeek's use of less advanced chips—combined with innovative model-training techniques—is now raising questions about the investment case for stocks seen as big winners from AI.

In addition, **DeepSeek** released its R1 model as open source. That means other companies can pick up and adapt the model for their own use, potentially opening the door for other cheap AI alternatives.

Why is **DeepSeek** relying on cheaper technology?

It is hard for **DeepSeek** to buy cutting-edge chips because of U.S. export controls, intended to hinder Chinese organizations from developing innovative AI for military purposes.

That **DeepSeek** appears to have been able to achieve state-of-the-art performance suggests that those export controls may be ineffective—either because U.S.-designed chips aren't necessary to make the best AI models, or because those chips are somehow making it to China in sufficient quantities anyway.

Who is behind **DeepSeek**?

DeepSeek grew out of a hedge fund co-founded by Liang Wenfeng that uses AI to find profitable trades in financial markets. Liang, a math geek who caught the investing bug, started writing AI algorithms to pick stock as a student. He founded his hedge fund, called High-Flyer, with two college friends in 2015. It now manages some $8 billion, making it one of China's largest quantitative funds.

Can I invest in **DeepSeek**?

No. **DeepSeek** is a closely held Chinese company led by Liang, which isn't traded on the stock market.

How good is **DeepSeek**?

The researchers behind **DeepSeek** say that they tested R1 against some of the top AI models from OpenAI—and found that it was very competitive. Those evaluations include one developed by OpenAI itself that includes computer-programming tasks that an AI model must complete on its own, such as patching a bug in a given piece of software. R1 performed on par with a version of OpenAI's reasoning-focused model, called o1, and outperformed an earlier one called o1-mini.

DeepSeek published costs for using R1 that were an order of magnitude below those charged by U.S.-based companies for their most sophisticated models.

Users have said R1's writing and problem-solving skills are impressive but some note that the model performed worse than rivals on specific types of problem solving. In coming weeks, more third-party testing should give a better understanding of how well R1 really performs. And users can test it out themselves, too.

What makes **DeepSeek** work well?

In a paper published last week, the Chinese researchers behind **DeepSeek** said their

new model would sometimes suddenly stop and realize it should re-evaluate its initial approach to a problem, and allocate more thinking time to do so. They described the behavior as the model having an "Aha!" moment.

"Rather than explicitly teaching the model on how to solve a problem, we simply provide it with the right incentives, and it autonomously develops advanced problem-solving strategies," the researchers wrote.

What have U.S. AI companies said about **DeepSeek**?

OpenAI CEO Sam Altman on Monday called R1 "an impressive model, particularly around what they're able to deliver for the price," in a post on X. He also said that it was invigorating to have a new competitor and that his company would move up some of its product releases.

Why is Nvidia taking such a big hit?

Nvidia has been one of the biggest winners in the AI boom because its chips have almost exclusively powered the training and in many cases the day-to-day running of the most powerful existing AI models. Nvidia—and its investors—have bet heavily that new generations of those cutting-edge chips will be necessary to develop the most powerful AI models. **DeepSeek**'s success suggests that Nvidia's lead on AI chip development may not be as big as thought, or as crucial to developing new AI models.

In a statement, Nvidia called **DeepSeek** "an excellent AI advancement" and said the work required for it to come up with answers, called inference, "requires significant numbers of Nvidia [chips] and high-performance networking."

Is **DeepSeek** a disaster for stocks linked to the AI boom?

Not everyone thinks **DeepSeek** has upended the AI-infrastructure industry. While **DeepSeek** might have found a way to cut AI training costs, AI demand keeps surging, and tech companies still need more computing power, wrote Stacy Rasgon, a Bernstein semiconductor analyst.

"Is **DeepSeek** doomsday for AI buildouts?" Rasgon and his colleagues wrote in a report on Monday. "We don't think so."

What does **DeepSeek** mean for the global AI race?

DeepSeek's success building an AI model could rebalance the global playing field when it comes to AI development—and that has cheered some countries outside the U.S.

Government officials in France, for instance, said Monday that **DeepSeek** shows that

agile companies with clever techniques still compete in the AI race, even if they have less money or limited access to the best AI chips. In other words, opportunities remain for those outside of the U.S. to catch up to Silicon Valley.

"The message is that we can compete," said an official at France's Élysée Palace, noting that raw computing power may no longer be the determinant of who wins in AI.

To be sure, **DeepSeek** also is a warning to other parts of the world. French startup Mistral AI has made its name on being a smaller, more efficient competitor to U.S. companies like OpenAI. Now it will have to keep up with **DeepSeek** and others that use its models, too.

This explanatory article may be periodically updated.

https://x.com/NJTRANSIT_NJCL

THE WALL STREET JOURNAL.

Six Takeaways From a Monumental Week for AI; DeepSeek 's rise, Nvidia 's decline and a blockbuster bet on OpenAI 's decline

Artificial intelligence has been a fast-moving, high-drama industry since OpenAI launched the viral chatbot ChatGPT a little more than two years ago and awakened the world to the technology's potential.

But nobody has seen a week like the past one: **DeepSeek** , a disruptive new Chinese AI company, emerged seemingly out of nowhere; the world's most valuable company lost nearly $600 billion of market value in a day; and it emerged that the developer of ChatGPT was in talks for a fundraising round that would value it at an eye-popping $300 billion.

Now that the week is over and we have had a moment to process, here are the most important things we learned:

DeepSeek is a coup for China and a new approach to AI

Most people heard of **DeepSeek** for the first time in the past week, but tech geeks had it on their radar for months. The Chinese startup—launched by an engineer who ran a hedge fund —released a series of AI models nearly as good as the best that Silicon Valley has to offer.

DeepSeek isn't just good. Thanks to some widely praised engineering breakthroughs , it was made at a fraction of the cost and in a fraction of the time of those made by Silicon Valley tech giants. Those breakthroughs allowed it to be made in China, a country that many experts thought was behind the U.S. because of export restrictions on powerful AI chips. And **DeepSeek** , it was made at a fraction of the cost and in a fraction of the time of those made by Silicon Valley tech giants. Those breakthroughs allowed it to be made in China, a country that many experts thought was behind the U.S. because of export restrictions on powerful AI chips. And gave its models away , as open-source code, which helped make them immediately popular among consumers, businesses and developers.

DeepSeek 's rise made investors skeptical of Nvidia 's rise made investors skeptical of

As buzz about **DeepSeek** 's latest model grew and its app shot to the top of the download and performance charts, Wall Street panicked. If AI can be made more simply, investors figured, maybe the world won't need as many pricey chips. Shares of Nvidia , which was the world's most valuable company just a week earlier, plunged 17% Monday , as part of a market wipeout that erased some $1 trillion of stock value.

SHARE YOUR THOUGHTS

What is your biggest takeaway from this week's developments in the AI industry? Join the conversation below.

Nvidia , like other tech companies, said that **DeepSeek** 's ascendance would increase overall demand for AI and boost demand for its products. But Nvidia stock recovered only slightly by the end of the week, signaling that investors are still wondering whether Nvidia 's power as the computational arms dealer atop the AI boom has been diminished .

Chip export controls on China aren't stopping its AI ascendance

The U.S. in recent years has tightened restrictions on shipments of chips to China , aiming to limit development of the most advanced AI tools. Nvidia responded to the controls by producing less-powerful chips for the Chinese market. **DeepSeek** has said it used some of those chips to develop previous AI models.

Many in Washington, D.C., are pressuring President Trump to take action to keep the U.S. ahead in an AI arms race. And members of Congress are advocating for a ban on exporting H20 chips to China.

DeepSeek may be succeeding by free-riding on OpenAI 's work

As American technologists began investigating how **DeepSeek** got so good, the word "distillation" started popping up. It is a technical term for an AI model that becomes intelligent by asking another model questions and learning from its answers.

DeepSeek said it distilled from an open-source model released by Meta Platforms and from one of its own. But some technologists think it also may have distilled from other proprietary models whose terms of service forbid distillation. OpenAI said Wednesday it is reviewing indications that **DeepSeek** did just that to its systems. If that is the case, it would mean that American investment is benefiting China's new AI star.

DeepSeek didn't respond to requests for comment.

DeepSeek 's strategy puts Silicon Valley's at risk

A growing chorus in Silicon Valley is questioning whether it still makes sense for the biggest AI developers, which are collectively losing billions of dollars a year, to keep spending gobs of cash developing advanced technologies. Now that **DeepSeek** has proven how successful distillation can be, investors expect many startups that could never afford to develop complex AI models to ape the Chinese company's approach.

That could be great for consumers who may get more AI at low or even no cost. But it could dissuade leading AI companies from building the next cutting-edge model, out of fear that their work will quickly be distilled and benefit competitors.

Despite **DeepSeek** 's threat, SoftBank is making a huge bet on OpenAI is making a huge bet on

OpenAI Chief Executive Sam Altman praised **DeepSeek** for "impressive work" in a post on X but said that his company is "excited to continue to execute on our research road map."

On Thursday, The Wall Street Journal reported that a powerful partner is standing behind Altman. SoftBank , the Japanese tech and investment conglomerate led by Masayoshi Son , is in talks to invest $15 billion to $25 billion in OpenAI .

That money would be part of an investment round of up to $40 billion, from numerous backers, that would value OpenAI as high as $300 billion. In October, OpenAI was valued at $157 billion. The increase is a loud endorsement by Son of Altman's spend-big-to-dominate strategy.

As the wild week for AI ended, Altman threw one last bomb. In an "ask me anything" session on Reddit on Friday afternoon, the CEO said his company should consider giving away its AI models, just as **DeepSeek** does.

THE WALL STREET JOURNAL.

How China's DeepSeek Outsmarted America; AI startup developed a top system by relying on inexperienced engineers and a loophole in U.S. export controls

SINGAPORE—**Take a team of young Chinese engineers, hired by a boss with disdain for experience. Add some clever programming shortcuts, and a loophole in American rules that allowed them to get advanced chips.**

That is the formula China's **DeepSeek** used to shock the world with its artificial-intelligence programs.

Conventional thinking held that developing leading AI required loads of expensive, cutting-edge computer chips—and that Chinese companies would have trouble competing because they couldn't get those chips. **DeepSeek** defied those predictions with a resourcefulness that led to a $1 trillion bloodbath on Wall Street and is spurring Silicon Valley to rethink its approach.

The Chinese company has also delivered a wake-up call to Washington , according to President Trump, whose administration is set to decide in the coming months what to do about Biden-era policies limiting China's access to the best chips for AI.

DeepSeek 's leader, Liang Wenfeng , built his company in the tech hub of Hangzhou, the same city where tech giant Alibaba is based. The AI company grew out of a hedge fund co-founded by Liang that uses AI to find profitable trades in financial markets.

In an interview with a Chinese publication in 2023, Liang said most technical positions were filled by fresh graduates or people with one or two years of experience.

Experience, he said, was a potential obstacle. "When doing something, experienced people will tell you without hesitation that you should do it this way, but inexperienced people will have to repeatedly explore and think seriously about how to do it, and then find a solution that suits the current actual situation," Liang said.

What they came up with is now being studied by Silicon Valley's best and brightest.

Until recently, the pioneering AI models that lie behind programs such as OpenAI's ChatGPT were trained on a vast compilation of text, images and other data. They employed specialized algorithms to find patterns that a chatbot could use to hold a conversation.

DeepSeek 's tactic was to cut down on the data processing needed to train the models, using some inventions of its own and techniques adopted by similarly constrained

Chinese AI companies .

Imagine the earlier versions of ChatGPT as a librarian who has read all the books in the library, said Lennart Heim, who researches AI at the think tank Rand. When asked a question, it gives an answer based on the many books it has read.

This process is time-consuming and expensive. It takes electricity-hungry computer chips to read those books.

DeepSeek took another approach. Its librarian hasn't read all the books but is trained to hunt out the right book for the answer after it is asked a question.

Layered on top of that is another technique, called "mixture of experts." Rather than trying to find a librarian who can master questions on any topic, **DeepSeek** and some other AI developers do something akin to delegating questions to a roster of experts in specific fields, such as fiction, periodicals and cooking. Each expert needs less training, easing the demand on chips to do everything at once.

DeepSeek 's approach requires less time and power before the question is asked, but uses more time and power while answering. All things considered, Heim said, **DeepSeek** 's shortcuts help it train AI at a fraction of the cost of competing models.

"Engineering is about constraints," former Intel Chief Executive Pat Gelsinger wrote on X. "The Chinese engineers **had limited resources, and they had to find creative solutions.**"

Ingenuity explains only part of **DeepSeek** 's success.

The other part is the rocky introduction of U.S. export controls, which gave **DeepSeek** a window to buy powerful American chips.

The Biden administration in 2022 put in place controls on chips exported to China. U.S. companies that wanted to sell to China first needed to throttle a chip function called interconnect bandwidth, which refers to the speed at which data is transferred.

In response, Nvidia , the world's leading designer of AI chips, came up with a new product for China that complied with this parameter—but compensated for it by maintaining high performance in other ways. That resulted in a chip that some analysts said was almost as powerful as Nvidia 's best chip at the time.

U.S. officials vented publicly and privately that while Nvidia didn't break the law, it broke the spirit of it. The government had hoped that industry leaders would be collaborative in designing effective export controls on fast-changing technology, said a former senior Biden administration official.

SHARE YOUR THOUGHTS

What does **DeepSeek** 's success mean for the future of the AI industry? Join the conversation below.

An Nvidia spokesman said Monday that "**DeepSeek** is an excellent AI advancement" that demonstrated an innovative AI technique while using computing power "that is fully export-control compliant."

A year after the initial controls, the government tightened the rules. Still, that left an opening of about a year for **DeepSeek** to buy Nvidia 's powerful China-market chip, called the H800. In a research paper published in December, **DeepSeek** said it used 2,048 of these chips to train one of its AI models.

Since the rules were revised in 2023, Nvidia designed a new export-control-compliant chip for China that is significantly less powerful than the H800.

Some American AI industry leaders are skeptical that DeepSeek has revealed all of its secrets. They said Chinese researchers could have stockpiled leading-edge Nvidia chips before the U.S. restrictions, or used workarounds such as accessing Nvidia-enabled computing power from countries outside the U.S. and China. The Biden administration in its final days implemented new rules to address such blind spots.

DeepSeek didn't respond to requests for comment.

THE WALL STREET JOURNAL.

How DeepSeek 's AI Stacks Up Against OpenAI's Model; Chinese startup's AI model, R1, goes head-to-head with OpenAI's capabilities. But they are also very different.

It's impossible to look at the Chinese artificial intelligence startup **DeepSeek**'s new AI model without comparing it against OpenAI, the dominant American rival.

DeepSeekhas touted its latest AI model, R1, as being particularly good at problem solving, performing on par with OpenAI's o1 reasoning model—but at a fraction of the cost per use. A **DeepSeek** app currently tops iPhone download rankings for the U.S.

OpenAI said Wednesday it is investigating whether **DeepSeek** trained its new chatbot by repeatedly querying its AI models.

Just as **DeepSeek** and OpenAI are very different companies, R1 and o1 are also different technologies. Here's a look at five ways the technologies share similarities and are different.

Wall Street Journal owner News Corp has a content-licensing partnership with OpenAI.

How **DeepSeek** works

DeepSeek reduced the data processing needed to train models, using its own inventions as well as techniques adopted by similarly constrained Chinese AI companies, The Wall Street Journal earlier reported.

In addition to cutting down on data processing—offering massive savings in time and computing costs—**DeepSeek** uses a technique called "mixture of experts." **DeepSeek** and some other AI developers do something akin to delegating questions to experts in specific fields. Each expert needs less training, easing the demand on chips to do everything at once.

"The techniques they implemented aren't new but applying them at the scale they did, with the conviction they had was novel," said Luke Arrigoni, CEO of Loti AI, an AI-based internet privacy platform.

The Chinese company's approach requires less time and power before a question is asked of the AI model, but uses more time and power to answer. The model shows how it reached an answer through "chain-of-thought" reasoning, a technique in which the technology gets better at a complex task one step at a time, according to Lin Qiao, CEO and co-founder of AI startup Fireworks AI.

OpenAI's o1 model uses chain-of-thought reasoning but doesn't show users what is happening behind the scenes, Qiao said. Taking it a step further, the reasoning **DeepSeek**'s model produces can be used to train a smaller AI model, she added.

Both o1 and **DeepSeek**'s R1 are capable of what are considered "reasoning" tasks, like writing a business plan or creating a crossword puzzle.

Performance

Researchers behind **DeepSeek** say they tested R1 against some of the top AI models from OpenAI and found it was very competitive. The evaluations included one developed by OpenAI involving computer-programming tasks an AI model must complete on its own, such as patching a bug in software.

R1 performed on par with OpenAI's o1 and outperformed an earlier model called o1-mini.

Qiao said members of the open-source community have already created a much smaller version of R1, which can be used on mobile phones and tablets.

Some users have said R1's writing and problem-solving skills are impressive but note the model performed worse than rivals like OpenAI's o1 on specific types of problem solving.

OpenAI CEO Sam Altman on Monday called R1 "an impressive model, particularly around what they're able to deliver for the price," in a post on X. He also said it was invigorating to have a new competitor and his company would move up some of its product releases.

Cost

DeepSeek said it achieved results on par with OpenAI's at lower cost and without top-performing chips. Some estimates have posited **DeepSeek** needed only around $5 million worth of chips to train one of its earlier models, but that ignores the cost of the research and experimentation for its development, Bernstein Research analyst Stacy Rasgon said in a research note.

It isn't clear how much computing power **DeepSeek** used for the more advanced R1 model.

In contrast, OpenAIhas said training its GPT-4 model cost more than $100 million, and future AI models are expected to push past $1 billion.

For OpenAI's next model, called GPT-5, a six-month training run can cost around half

a billion dollars in computing costs alone, based on public and private estimates.

Privacy and security

Users of **DeepSeek**'s latest flagship model, called V3, have noticed it refuses to answer sensitive political questions about China and its leader Xi Jinping. In some cases, the product responds in line with Beijing's propaganda rather than including the perspective of government critics, as ChatGPT does.

Still, R1 is freely available to download and use so some users feel more comfortable using it on their own servers, or those hosted by U.S. companies. The AI startup Liner is open to using **DeepSeek**'s R1, its Chief Executive Luke Kim said, because it is open-source and changing out AI models is easy.

By comparison, OpenAI has said it has a "new safety training approach" forcing its o1 model to adhere to company guidelines. OpenAI said it aims to prevent "jailbreaking" of AI models, and has formal agreements with the U.S. and U.K. AI safety institutes. Jailbreaking AI models involves manipulating them or trying to bypass their safety controls.

Open-source versus proprietary

DeepSeek has released the "weights," or numerical parameters, behind its R1 model for the public to freely use, download and modify. But it stopped short of releasing training data behind it, leading some to say the model isn't fully "open-source."

The Chinese company released a report detailing how it trained its model, which AI experts say helps developers decipher how **DeepSeek** accomplished its innovation.

The release of model weights also means developers can download the model to use. Hugging Face, which operates an open-source model-sharing platform, said the R1 models created by its community had been downloaded 3.2 million times.

Unlike **DeepSeek**, OpenAI's o1 is proprietary, meaning consumers and businesses pay the company to use its model and services. While some companies prefer to use proprietary technologies—because they are vetted by their builders and come with built-in cybersecurity controls—others prefer open-source technologies because they are easier to customize and control.

THE WALL STREET JOURNAL.

Don't Look Now, but China's AI Is Catching Up Fast; Startups use workarounds to challenge OpenAI in some areas despite lack of leading-edge chips

SINGAPORE—Chinese startups show signs of catching up with America's leading artificial-intelligence models more quickly than many in the industry had expected, despite the restrictions China faces in buying advanced chips .

DeepSeek , a startup funded by one of China's most successful hedge-fund managers, released a preview version of its latest large language model in November. It said the program's abilities compared favorably with OpenAI 's reasoning model called o1, which came out in preview form in September.

Other Chinese companies have made similar claims in recent weeks. Moonshot AI , a startup backed by Chinese internet giants Alibaba and Tencent, said it developed a model specializing in math with capabilities close to o1, while Alibaba said one of its own experimental research models outperformed the preview version of the U.S. model on math.

The companies haven't published papers describing their models, and evaluating the claims is difficult because there isn't a single agreed-upon test of an AI model's abilities . Still, some U.S. specialists said they were impressed.

China is "catching up faster," said Andrew Carr, a former fellow at OpenAI and currently an AI entrepreneur. He said **DeepSeek** researchers trying to replicate OpenAI 's reasoning model "figured it out within a few months, and frankly many of my colleagues are surprised by that."

One test used for comparison is the American Invitational Mathematics Examination, which is designed to challenge the brightest high-school math students.

DeepSeek said its model bested OpenAI 's on the AIME. An experiment by The Wall Street Journal using 15 problems from this year's AIME found that OpenAI 's o1 preview model got to the answers faster than **DeepSeek** , Moonshot and the experimental Alibaba model. In one word puzzle involving strategy in a hypothetical two-player game, the OpenAI program gave the answer in 10 seconds while **DeepSeek** took more than two minutes.

Getting the correct answer on the first try is still a feat because word problems often stump AI programs .

Chinese AI developers have faced U.S. restrictions on access to the world's most advanced AI chips, including those from chip leader Nvidia , since 2022. The Biden

administration in December again tightened export control rules.

But the developers have found workarounds.

At Moonshot, the startup backed by Alibaba and Tencent, founder Yang Zhilin has said the company is focusing on reinforcement learning, which mimics humans' trial and error. The approach might use computing power less intensively in improving performance.

Since late last year, AI developers have increasingly been using a technique called "mixture of experts," or MoE, in which an initial routing mechanism directs the problem to a specialized expert model like a head chef directing a spaghetti order to the kitchen's Italian cook. This process also eases the demands on chips.

Tencent said its MoE model, released in November, delivered performance comparable to a Llama 3.1 model introduced in July by Facebook owner Meta Platforms . Researchers who reviewed papers published by the two companies said Tencent's model was likely trained with around a 10th of the computing power Meta used.

DeepSeek started as the AI research unit of High-Flyer, a quantitative hedge-fund manager with $8 billion in assets that is known for leveraging AI to trade. In 2021, **DeepSeek** connected around 10,000 of Nvidia 's A100 chips to form a cluster for AI training, which it called Fire-Flyer 2.

In a paper published this August, **DeepSeek** said Fire-Flyer 2 achieved performance close to an Nvidia system containing similar chips, but the Chinese system cost less and consumed less energy. **DeepSeek** 's May paper on its MoE model , which incorporated a technique to process data more efficiently, was widely noted in the industry.

"One way China will get around export controls—building extremely good software and hardware training stacks using the hardware it can access," Jack Clark, co-founder of AI startup Anthropic , wrote in his blog, referring to **DeepSeek** 's cluster. "Made in China will be a thing for AI models, same as electric cars, drones, and other technologies," he wrote.

Many Chinese AI developers have found ways to access restricted Nvidia chips, including through trades with middlemen and overseas data centers .

Nonetheless, the lack of cutting-edge chips is painful to the Chinese startups, according to Chinese executives, and the gap is poised to widen. Nvidia customers are preparing to deploy its latest AI data-center chip , called Blackwell, at significant scale .

SHARE YOUR THOUGHTS

How should the U.S. respond to Chinese advances in AI technology? Join the conversation below.

Elon Musk 's xAI has constructed a data center with 100,000 Nvidia chips and recently raised $5 billion to do more. Amazon Web Services plans to build a massive AI supercomputer with hundreds of thousands of its homegrown chips.

DeepSeek , which focuses on open-source models, emphasizes math and coding. Moonshot has gained popularity among Chinese consumers with its ChatGPT-like chatbot Kimi and is known for its ability to handle long-form text.

Chinese AI startups are currently valued at a fraction of U.S. companies such as OpenAI —which was recently valued at $157 billion —because financiers are unsure about their ability to monetize their advances. Fierce competition has led to a price war among AI model vendors.

Beijing-based Zhipu AI , which was valued at around $3 billion in its latest fundraising round this month, has pushed back its plan to go public as soon as the second half of 2025 after investment bankers told the company it was unlikely to get the valuation it wanted, people familiar with the matter said. Zhipu showcased its AI agent in late November and released a video-generating model similar to OpenAI 's Sora in July.

Howard Huang, a former AI-infrastructure executive at a Beijing-based AI-model company, compared the Chinese industry to people trying to **dance while wearing shackles**. "Focusing on what we have been good at is the only opportunity to survive, and probably to win," he said.

THE WALL STREET JOURNAL.

Is Chinese AI All It's Cracked Up to Be?

Is **DeepSeek** an avatar of revived innovation in China or a Beijing-coordinated deepfake? The surge on Chinese stock exchanges at the artificial-intelligence company's market entry pushed the idea that China could pose a serious challenge to U.S. tech. But early evidence suggests that challenge has a shoddy foundation, which Washington could undermine with effective policy.

China's AI advances rely heavily on American tech, data and expertise. Both **DeepSeek** and Ant Group, the other Chinese firm making a stir, present their new AI products as open-sourced, sophisticated competitors to U.S. models. But **DeepSeek** allegedly relied on illicitly acquired data along with technical expertise from Microsoft and other U.S. tech leaders.

The New York Post reported that Microsoft's Chinese research labs helped train four key **DeepSeek** researchers, three of whom spent five to 10 years working at the lab. Anonymous sources told Bloomberg that Microsoft's security researchers also observed people they believed may be connected to **DeepSeek** -- in Bloomberg's words -- "exfiltrating a large amount of data using the OpenAI interface." OpenAI itself has alleged that the Chinese company used the American firm's proprietary models to train its own systems. The U.S. Commerce Department is also reportedly investigating **DeepSeek** for possible use of Nvidia chips subject to American export controls. **DeepSeek** hasn't commented on these allegations.

Considering Beijing's hostility to the U.S., it's alarming how much access Chinese tech firms and researchers have to American expertise. The chief technology officers of Alibaba and Baidu, as well as the founder of TikTok, worked at Microsoft's Chinese labs alongside U.S. experts. Chinese mobile telephone operators Xiaomi and Oppo last year began sensitive research and business collaborations with Google and Apple involving AI. Respectively the third- and fourth-largest handset vendors worldwide, Xiaomi and Oppo both use Google's Gemini on their smartphones sold outside China.

The West also gives Chinese tech companies crucial financial support, with investors lured by what Franklin Templeton analyst Christy Tan calls the "Xi put." Foreign investors are confident Beijing has committed to a Chinese version of the "Fed put," the U.S. central bank's previous tendency to boost American tech stocks with easy money aided by massive fiscal stimulus.

The stock-market jump at **DeepSeek**'s unveiling also got a boost from Xi Jinping's highly choreographed event embracing Ant Group founder Jack Ma, whose firms had been under government assault since his 2020 tirade criticizing Beijing. The People's

Bank of China poured in liquidity last December when it shifted monetary policy from "prudent" to "moderately loose" for the first time in 14 years.

On the regulatory side, Beijing has issued guidance to "undervalued firms" -- whose stock values were well under their book value and didn't reflect their market potential -- to take steps to increase shareholder returns by buying back their own shares. Authorities have also directed domestic banks -- beneficiaries of China's growing trade surplus -- to make funds available to stockbrokers by collateralizing their shareholdings and authorizing loans to firms buying back their own shares. On top of this very convoluted subsidy, Beijing in late March announced it would inject $69 billion into China's largest banks to help supply loans to stockbrokers.

Yet the Chinese economy remains anemic. The Rhodium Group estimates real growth was between 2% to 3% in 2024, well below the official number. They project 2025 growth will be slightly above 3% but assume Beijing will raise debt financing to its official 4% target and that the trade surplus will stay above $1 trillion. Fitch Ratings estimates that the overall Chinese government budget deficit in 2025 could be as high as 9% of gross domestic product -- when all hidden local government debt and social financing is included -- as Beijing struggles with persistent deflation and falling tax revenue.

Weak growth and Chinese tech's reliance on the U.S. presents an opening for Washington. The Trump administration should take five steps. First, tighten export controls on technology and expertise related to AI or national defense. America should also coordinate export controls with allies on semiconductor production and equipment.

Second, work with Congress to limit Chinese access to U.S. financing, with stronger outward investment controls and limited access to listing on American stock exchanges.

Third, impose sanctions on Chinese banks. Washington has largely not pursued them, though reporting indicates Chinese banks have facilitated and financed illicit commerce such as technology transfer to Russia, drug trafficking and money-laundering, as well as the purchase of sanctioned Iranian and Russian oil.

Fourth, **show Chinese tech companies reciprocity.** China effectively bars most American firms from its markets by either forbidding them or making entry contingent on ridiculous requirements, such as revealing source code. Washington should bar firms tit-for-tat, especially in response to intellectual property transfers demands from China.

Finally, enlist allies in the fight. The administration has competing foreign-policy priorities, but limiting China's ability to compensate for losing the U.S. market would measurably enhance success. Early reactions to President Trump's April 2 tariff announcement, however, signal his administration is off to a poor start at building support among allies.

Such a strategy could undercut the liquidity bubble supporting Chinese shares and its ability to acquire advanced technology, data and expertise without the vast capital investment needed by Western firms to innovate.

THE WALL STREET JOURNAL.

Silicon Valley Is Raving About a Made-in-China AI Model; DeepSeek is called 'amazing and impressive' despite working with less-advanced chips

SINGAPORE—A Chinese artificial-intelligence company has Silicon Valley marveling at how its programmers nearly matched American rivals despite using inferior chips.

AI models from **DeepSeek** , the Chinese company, have zoomed to the global top 10 in performance, according to a popular ranking, suggesting Washington's export curbs are having difficulty blocking rapid advances in China.

On Jan. 20, **DeepSeek** introduced R1 , a specialized model designed for complex problem-solving.

"**Deepseek** R1 is one of the most amazing and impressive breakthroughs I've ever seen," said Marc Andreessen , the Silicon Valley venture capitalist who has been advising President Trump, in an X post on Friday.

DeepSeek 's advances sparked a selloff led by chip shares early Monday on concerns over whether the huge spending by U.S. tech giants on leading-edge semiconductors and other AI infrastructure was justified. The tech-focused Nasdaq fell 3% and Nvidia slid more than 10%.

DeepSeek 's development was led by a Chinese hedge-fund manager, Liang Wenfeng , who has become the face of the country's AI push. On Jan. 20, Liang met China's premier and discussed how homegrown companies could narrow the gap with the U.S. 's development was led by a Chinese hedge-fund manager, Liang Wenfeng , who has become the face of the country's AI push. On Jan. 20, Liang met China's premier and discussed how homegrown companies could

Specialists said **DeepSeek**'s technology still trails that of OpenAI and Google . But it is a close rival despite using fewer and less-advanced chips, and in some cases skipping steps that U.S. developers considered essential.

DeepSeek said training one of its latest models cost $5.6 million, compared with the $100 million to $1 billion range cited last year by Dario Amodei , chief executive of the AI developer Anthropic , as the cost of building a model.

Barrett Woodside, co-founder of the San Francisco AI hardware company Positron, said he and his colleagues have been abuzz about **DeepSeek** . "It's very cool," said Woodside , pointing to **DeepSeek** 's open-source models in which the software code behind the AI model is made available free.

Users of **DeepSeek** 's latest flagship model, called V3 and released in December, have noticed that it refuses to answer sensitive political questions about China and leader Xi Jinping. In some cases, the product gives responses in line with Beijing's official propaganda rather than including the perspective of government critics, as ChatGPT does.

"The only strike against it is some half-baked PRC censorship," said Woodside , referring to the People's Republic of China, but he said this could be removed because other developers can freely modify the code.

DeepSeek said R1 and V3 both performed better than or close to leading Western models. As of Saturday, the two models were ranked in the top 10 on Chatbot Arena , a platform hosted by University of California, Berkeley , researchers that rates chatbot performance. A Google Gemini model was in the top spot, while **DeepSeek** bested Anthropic 's Claude and Grok from Elon Musk 's xAI .

DeepSeek grew out of the AI research unit of High-Flyer, a hedge-fund manager with $8 billion in assets that is known for leveraging AI to trade.

"When humans make investment decisions, it's an art, and they just do it by the seat of their pants. When computer programs make such decisions, it's a science, and it has the optimal solution," said Liang in a 2019 speech.

Born in 1985, Liang grew up in China's southeastern province of Guangdong. He went to China's prestigious Zhejiang University and specialized in machine vision. A few years after graduation, Liang founded High-Flyer with two college friends in 2015.

Liang prefers to be thought of as an engineer rather than a trader, according to people close to him. His High-Flyer was a pioneer in China in applying deep learning to computerized trading. The technique, modeled on the human brain, allows computers to analyze more diverse types of data.

While **DeepSeek** 's flagship model is free, the company charges users who connect their own applications to **DeepSeek** 's model and computing infrastructure. An example is a business that wants to tap the technology to give AI answers to customers' queries.

Early last year, **DeepSeek** cut its prices for this service to a fraction of what other vendors charged, prompting the industry in China to start a price battle.

Anthony Poo, co-founder of a Silicon Valley-based startup using generative AI to predict financial returns, said his company moved to **DeepSeek** from Anthropic 's Claude model in September. Tests showed **DeepSeek** performed similarly for around one-fourth of the cost.

"OpenAI 's model is the best in performance, but we also don't want to pay for capacities we don't need," said Poo.

At their Jan. 20 meeting, **DeepSeek** 's Liang told Chinese Premier Li Qiang that while Chinese companies were working to catch up, American restrictions on the export of advanced chips to China were still a bottleneck, according to people familiar with the meeting.

In 2019, High-Flyer began building a cluster of chips for AI research, in part with funds generated by its finance business. The company has said it later built a bigger cluster of around 10,000 Nvidia graphics-processing units that can be used to train large language models.

Only a handful of companies in China had computing infrastructure powerful enough to develop such models by late 2022, when OpenAI released ChatGPT.

DeepSeek said in a technical report that it used a cluster of more than 2,000 Nvidia chips to train its V3 model, compared with tens of thousands of chips for training models of similar size. A few U.S. AI specialists have recently questioned whether High-Flyer and **DeepSeek** are accessing computing power beyond what they have announced.

Some external researchers said the **DeepSeek** model lacks certain capabilities of its more expensively trained rivals in keeping track of the context of long conversations, for example.

For its latest reasoning model released Jan. 20, **DeepSeek** skipped a process known as supervised fine-tuning, in which programmers feed in the knowledge of human experts to give the model a head start. **DeepSeek** said its model, designed to solve tricky math word problems and similar challenges, was comparable to OpenAI 's reasoning model o1 even though it omitted supervised fine-tuning and focused on reinforcement learning—essentially directed trial and error.

Jim Fan, a senior research scientist at Nvidia , hailed as a breakthrough the **DeepSeek** paper reporting the results. He said on X it reminded him of earlier pioneering AI programs that mastered board games such as chess "from scratch, without imitating human grandmasters first."

Zack Kass, a former executive at OpenAI , said **DeepSeek** 's advances despite American restrictions "underscore a broader lesson: Resource constraints often fuel creativity."
This article was updated early Monday. It originally published on Jan. 25.

WSJ PRO PRIVATE EQUITY

Garcia's Take: DeepSeek Seen as Boon to AI Market; Private-equity leaders are standing by their mega bets on data centers and other AI-related infrastructure, averring that DeepSeek will help rather than hurt them

Chinese startup **DeepSeek** stunned markets last month with the unprecedented efficiency and shoestring cost of its artificial-intelligence models. But those advances are likely to accelerate—not undermine—the need for AI-related infrastructure over the long run, say leaders of large private-equity firms that have wagered big money on data centers and other assets in the sector.

In late January, **DeepSeek** unveiled an AI reasoning model competitive with similar systems developed in the West, but that requires less energy and fewer processors. Those advances struck fear in investors who wondered whether the AI-driven demand for electricity and computing power expected might turn out to be lower than foreseen.

Publicly traded private-equity and credit investment firms—Ares Management , Blackstone , Blue Owl Capital , Brookfield Asset Management and KKR & Co. , among others—have poured billions of dollars into businesses tied to data centers and power generation to capitalize on the AI boom in recent years. Blackstone alone manages $80 billion in data-center holdings, including leases, and describes itself as the world's largest data-center investor. That faith might have seemed woefully misplaced after **DeepSeek** 's arrival.

On recent earnings calls , equity analysts peppered the leaders of those firms with questions on **DeepSeek** 's impact on their AI bets. Here are some of their answers:

Efficiency gains are normal and encourage adoption of new technologies

"It would be crazy to assume, with a technology as large and as fast-growing as artificial intelligence, that there would not be efficiency gains," said Bruce Flatt , Brookfield 's chief executive. "Those efficiency gains are very expected and as they will … potentially bring down the cost of artificial intelligence, they're only going to make that product more available to a wide variety of users."

Earlier this month, Brookfield said it plans to invest as much as €20 billion, or roughly $21 billion, by 2030 to support development of artificial-intelligence infrastructure, including data centers, in France alone.

AI isn't the only driver of data-center demand

Some executives also highlighted that data centers—and the power plants that keep them running—are also needed for other things, such as cloud-computing services. And

DeepSeek 's breakthroughs in training AI models to handle data are likely to drive up the use of the same models with new information, or inference, they added.

"If you look at the demand for computing [power] and the multitrillion-dollar opportunity that we're excited about and others too, 75% of that was already anticipated to be for inference and to be for just cloud-computing," said Marc Lipschultz , co-CEO of Blue Owl . "When we get into [what] **DeepSeek** changed, the fundamental need for raw computing power for training models, we're really talking about modulation around that last 25%."

Last month, Blue Owlacquired data-center investment specialist IPI Partners, adding more than $11 billion to its assets.

Demand far outpaces available capital anyway

Even with efficiency gains, the demand for infrastructure to support generative AI systems such as ChatGPT will still require more investment than markets can provide today, said Michael Arougheti , Ares Management 's CEO.

In October, Ares agreed to acquire the international business of real estate and infrastructure investor GLP Capital Partners . The unit, GCP International , managed assets of around $44 billion at the end of June, including data centers, across markets such as Europe, Japan, Brazil and Vietnam.

"The magnitude of the opportunity relative to the amount of capital is so significant that even if you saw a pushing out of that pipeline, it's still undercapitalized," he said. "We're still extremely enthusiastic about the opportunity."

Location and customers matter

Arougheti and leaders at other firms said their data-center businesses often concentrate their investments around large cities and seek long-term supply agreements with big technology companies. That can protect their investments against declines in demand.

"We do not build data centers speculatively anywhere in the world," said Jonathan Gray , Blackstone 's president. "We have a very prudent approach when we think about data centers."

Despite the upbeat comments, most executives said they would keep a close eye on how AI technologies evolve.

"We expect this theme to continue to be really important for us," said Craig Larson , head of investor relations at KKR , referring to AI. "We'll continue to watch developments very closely."

THE WALL STREET JOURNAL.

DeepSeek 's Breakthrough Sparks National Pride in China; Homegrown AI company's success is hailed as a win over U.S. export controls on chips

In China, **DeepSeek**'s sudden shot to fame with artificial-intelligence models rivaling American ones has inspired a moment of national pride.

In a week where attention on **DeepSeek**'s low-cost AI models caused a bloodbath on Wall Street and propelled **DeepSeek**'s app to the top of iPhone download rankings in the U.S., China was celebrating. Emojis of "**DeepSeek** pride," often with smiling cats or dogs, flooded Chinese social media, adding to the festive Lunar New Year atmosphere.

Chinese state media, as well as tech and business leaders, raved about **DeepSeek**.

"We need to believe that the moon in other countries is not necessarily rounder: Whatever others can do, we can also do it and even do it better," read a profile of **DeepSeek**, published by the government of Zhejiang province where the company is located.

Local media reported that the small Guangdong province hometown of **DeepSeek** founder Liang Wenfeng has become a hot destination for tourists during the weeklong Lunar New Year holiday.

In China, the buzz around **DeepSeek** was a timely confidence boost as the Chinese leadership faces prolonged economic gloom and potentially another trade war with a Trump administration threatening more tariffs.

Feng Ji, co-founder of Game Science, the developer of popular videogame "Black Myth: Wukong," hailed **DeepSeek**'s advancement as one that can change "a nation's fortune."

"So lucky, so happy! Such a shocking breakthrough came from a pure Chinese company," he wrote on the Chinese social-media platform Weibo.

Several state-media outlets, including China Daily, went so far as to repost a clip from "The Daily Show" where host Jon Stewart facetiously asked: "Has Chinese AI put American AI out of a job?"

Zhou Hongyi, chairman of Chinese internet-security firm Qihoo 360, said China has already caught up with the U.S. in the AI race. "**DeepSeek** will definitely be a key member of China's **'Avengers team' in countering the U.S.'s AI tech dominance**," he said in a video posted on his verified account on Weibo.

U.S. export controls on high-technology equipment and high-performance chips to China have hampered China's ability to advance its technologies, although there have been loopholes that allowed Chinese companies to get some access to such technology and chips. Washington is trying to close those loopholes.

Beijing has sharply criticized the controls, calling them malicious attempts to suppress China.

Elsa Kania, an adjunct senior fellow at the bipartisan think tank Center for a New American Security, said Beijing's rhetoric around **DeepSeek**'s success suggests a sense of pride and vindication, with state media conveying it as a triumph that a Chinese company has achieved technology advances despite U.S. export controls.

"But there's also a sober recognition that U.S. export controls that have been trying to exploit chips as a chokepoint will continue to have major impacts," Kania said. "This is a breakthrough, but not a game changer in terms of the fundamentals of the competition."

DeepSeek has faced questions over whether it made its quick advances by copying rivals' models. ChatGPT maker OpenAI said it is investigating whether **DeepSeek** trained its new chatbot by repeatedly querying the U.S. company's AI models. **DeepSeek** hasn't commented.

SHARE YOUR THOUGHTS

What will be the impact of **DeepSeek**'s success on China's tech battle with the U.S.? Join the conversation below.

Also discussed is **DeepSeek**'s reticence to dive into topics that are politically sensitive in China. When The Wall Street Journal this week asked it questions on topics that are routinely censored within China, including the so-called taboo "three Ts": Tiananmen Square, Taiwan and Tibet, it returned more limited and often propaganda-infused answers.

Meanwhile, an investigation by Cyabra, a disinformation-detection firm, found that some of the hype about **DeepSeek** was driven by accounts it identified as fake. Cyabra, which examined conversations around **DeepSeek** on several social-media platforms during the week ended Tuesday, said it had identified 12% of the profiles engaging with the topic on X as fake, using tactics such as synchronized posting and repeating content.

Cyabra said the patterns and tactics employed by the fake profiles closely align with those observed in previous influence operations linked to China. Rafi Mendelsohn, Cyabra's chief marketing officer, said there is a very strong chance that these accounts were created by the Chinese government to increase positive discourse around

DeepSeek and drown out negative content.

A spokesman at the Chinese Embassy in Washington dismissed allegations of a state-led effort to promote positive **DeepSeek** content as groundless. "We always oppose attempts to manipulate social media to spread disinformation," said the spokesman, Liu Pengyu.

After **DeepSeek** said on Monday that it was the victim of "large-scale malicious attacks," Chinese social media was rife with speculation that the U.S., or **DeepSeek**'s U.S. rivals, were behind the attack. Some analysts have said the disruption to **DeepSeek**'s services could have been caused by a rise in user demands. **DeepSeek** said on its website Thursday that a fix had been implemented.

THE WALL STREET JOURNAL.

DeepSeek Scrambles U.S.-China Tech War; The U.S. tried to slow China's tech advances, but DeepSeek showed how hard that is

SINGAPORE—The unexpected success of Chinese AI startup **DeepSeek** has revealed cracks in U.S. efforts to contain China's technology ambitions, challenging both Washington and Silicon Valley to rethink how best to preserve American supremacy.

The Biden administration took what it called **a "small yard, high fence" approach** to the U.S.'s tech rivalry with China: It erected strict barriers to prevent U.S. companies from selling advanced chips and other critical know-how that Beijing could exploit to strengthen its military and surveillance capabilities, but otherwise allowed business to proceed as usual.

Backers of the policy thought it would keep the U.S. ahead in technologies such as artificial intelligence.

But now **DeepSeek** has blasted through the barriers, releasing a low-cost AI model that rivals American achievements. Its success is fueling debate over whether the U.S. needs a new approach, with **DeepSeek** serving as a **Rorschach test for people with differing beliefs about the best way forward.**

Backers of a hard line against China say that **DeepSeek** was able to use deficiencies in the Biden administration's rules to accumulate chips it shouldn't be able to access. The logical way forward, some argue, is for Washington to double down with even tougher rules to ensure Chinese companies can't access advanced U.S. technology in the future.

Others say **DeepSeek** 's progress only encourages China to work harder to innovate while depriving American companies of revenue.

It is a position China itself is now proclaiming. "Trying to curb technological development by restricting hardware is like trying to dam a large river while overlooking the countless streams that feed it," the Communist Party-run Global Times wrote in a commentary on Monday.

There are people from both camps among Trump's advisers, and it remains unclear whose views will prevail with the president, according to industry watchers. Last week, his administration said in a memo that it was reviewing policies to maintain America's leadership in AI innovation and would recommend a strategy in about six months.

"I'm confident in the U.S. but we can't be complacent," David Sacks , Trump's AI and

cryptocurrency czar and one of the three Trump officials leading his AI strategy, wrote in a post on X. He noted that Trump had already rescinded a Biden executive order that required AI developers to report the results of safety tests on systems that posed risks to U.S. national security, the economy, public health or safety.

The Biden order, Sacks said, "hamstrung American AI companies without asking whether China would do the same."

But **DeepSeek** 's breakthrough also gives the China hawks in Trump's administration more ammunition to push their views, said Steve Feldstein, a senior fellow at the Carnegie Endowment for International Peace .

Alexandr Wang , the head of Scale AI , a San Francisco-based AI startup, called for a tightening of U.S. export restrictions to allow the country's companies to maintain their lead in the technology. Yet he also warned that the U.S. needs to avoid leaning on export controls as a crutch, and instead work harder to outrun its rival.

"**DeepSeek** is a wake up call for America, but it doesn't change the strategy," Wang wrote on X. Ultimately, the U.S. just needs to "out-innovate & race faster."

Trump could tighten the screws through additional restrictions on China's access to semiconductors, or by requiring chip companies to add the ability to track the location of export-controlled semiconductors, according to Matt Pottinger , a deputy national security adviser in the first Trump administration who is now head of research firm Garnaut Global.

U.S. officials could also slap stiff penalties on companies to deter them from undermining the controls, he said.

The release of **DeepSeek** 's chatbot app, which hurdled past OpenAI 's ChatGPT to take the No. 1 spot in the Apple Store, helped wipe $1 trillion in market value off stocks such as AI chip giant Nvidia . President Trump referred to it as a "wake up call." Prominent venture capitalist Marc Andreessen described it as a "Sputnik moment," evoking the Cold War tech competition between the U.S. and Soviet Union.

Citing Andreessen's Sputnik remark, Senate Minority Leader Chuck Schumer (D., N.Y.) called for more support to ensure the U.S.'s continued AI dominance.

"Our competitors are going to use every single opportunity they get to overtake the United States' lead on the technologies of the future, particularly AI," he said.

The **DeepSeek** model , R1, matches or nearly matches the performance of the U.S.'s top AI models in solving complex problems, according to third-party evaluations. But it was produced at a fraction of the cost: less than $6 million, according to **DeepSeek** ,

compared with $100 million or more for its American competitors.

On Wednesday, Chinese e-commerce giant Alibaba claimed that a newly released version of its own AI technology surpasses **DeepSeek**'s model across various benchmarks, underscoring the potential for others to catch up.

Part of the challenge for U.S. policymakers is that it is still not entirely clear how much of **DeepSeek** 's success relied on accessing U.S. technologies, and how much came from its own innovations. OpenAI said Wednesday it is investigating whether **DeepSeek** trained its new chatbot by repeatedly querying the U.S. company's AI models .

SHARE YOUR THOUGHTS

What implications does the success of **DeepSeek** have for the Trump administration's China policy? Join the conversation below.

In a research paper from December, **DeepSeek** said it used more than 2,000 of Nvidia 's H800 chips to train one of its AI models. Nvidia had rolled out the H800, a stripped-down version of what was then its most powerful chip, to comply with U.S. export controls that were imposed during the Biden administration to slow China's technological progress. A year later, U.S. officials outlawed the chip entirely, but not after **DeepSeek** had about a year to buy such processors.

Some industry analysts say it is hard to establish without further investigation how many advanced chips the company actually used while training its models.

DeepSeek hasn't responded to multiple requests for comment.

In addition to banning China from buying the world's most cutting-edge chips, and the equipment to make them, the Biden administration added hundreds of Chinese entities to a trade blacklist and introduced investment curbs on Chinese AI, semiconductor and quantum computing companies.

It also initiated a trade investigation into China's production of mature chips, and progressively tightened export limits on AI processors until Biden's last week in office.

Industry researchers such as Dylan Patel, founder of chip researcher SemiAnalysis, say the Biden administration's approach helped slow China's progress in some areas, including developing cutting-edge chip making. Still, Patel said Biden's export-control policies were plagued by delays and loopholes, which allowed the Chinese continued access to banned technologies.

Another challenge for the U.S. is determining **where to draw the line: to only try to**

prevent China from technological advances that could aid its military, or a broader approach that seeks to limit Chinese advances in the commercial realm that pose a threat to U.S. companies.

"I think we may be moving more and more in a direction where **the U.S. government simply decides that the entire Chinese tech ecosystem should not develop certain capabilities,** regardless of the specific national security risks associated with individual companies," said Rebecca Arcesati, senior science and technology analyst with Mercator Institute for China Studies, a German think tank.

THE WALL STREET JOURNAL.

Why 'Distillation' Has Become the Scariest Word for AI Companies; DeepSeek 's success learning from bigger AI models raises questions about the billions being spent on the most advanced technology

Tech giants have spent billions of dollars on the premise that bigger is better in artificial intelligence. **DeepSeek**'s breakthrough shows smaller can be just as good.

The Chinese company's leap into the top ranks of AI makers has sparked heated discussions in Silicon Valley around a process **DeepSeek** used known as distillation, in which a new system learns from an existing one by asking it hundreds of thousands of questions and analyzing the answers.

"It's sort of like if you got a couple of hours to interview Einstein and you walk out being almost as knowledgeable as him in physics," said Ali Ghodsi , chief executive officer of data management company Databricks .

The leading AIs from companies like OpenAI and Anthropic essentially teach themselves from the ground up with huge amounts of raw data—a process that typically takes many months and tens of millions of dollars or more. By drawing on the results of such work, distillation can create a model that is almost as good in a matter of weeks or even days, for substantially less money.

OpenAIsaid Wednesday that it has seen indications **DeepSeek** distilled from the AI models that power ChatGPT to build its systems. OpenAI 's terms of service forbid using its AI to develop rival products.

DeepSeek didn't respond to emails seeking comment.

Distillation isn't a new idea, but **DeepSeek**'s success with it is raising new doubts about the business models of tech giants and startups spending billions to develop the most advanced AI, including Google , OpenAI , Anthropic and Elon Musk 's xAI . Just last week, OpenAI . Just last week, announced a partnership with SoftBank and others to invest $500 billion in AI infrastructure over the next five years.

If those investments don't provide companies with an unbeatable advantage but instead serve as springboards for cheaper rivals, they might become difficult to justify. In the wake of **DeepSeek** , executives and investors in Silicon Valley are re-examining their business models and questioning whether it still pays to be an industry leader.

"Is it economically fruitful to be on the cutting edge if it costs eight times as much as the fast follower?" said Mike Volpi, a veteran tech executive and venture capitalist who

is general partner at Hanabi Capital.

OpenAI CEO Sam Altman on X called **DeepSeek** 's latest release "an impressive model, particularly around what they're able to deliver for the price," and added, "we are excited to continue to execute on our research roadmap." Anthropic CEO Dario Amodei wrote on his blog that **DeepSeek** 's flagship model "is not a unique breakthrough or something that fundamentally changes the economics" of advanced AI systems, but rather "an expected point on an ongoing cost reduction curve."

Tech executives expect to see more high-quality AI applications made with distillation soon. Researchers at AI company Hugging Face began trying to build a model similar to **DeepSeek** 's last week. "The easiest thing to replicate is the distillation process," said senior research scientist Lewis Tunstall.

AI models from OpenAI and Google remain ahead of **DeepSeek** on the most widely used rankings in Silicon Valley. Tech giants are likely to maintain an edge in the most advanced systems because they do the most original research. But many consumers and businesses are happy to use technology that's a little worse but costs a lot less.

President Trump's AI czar, David Sacks , said on Fox News on Tuesday that he expects American companies to make it harder to use their models for distillation .

DeepSeek has said it used distillation on open-source AIs released by Meta Platforms and Alibaba in the past, as well as from one of its models to build another. Open-source AI developers typically allow distillation if they are given credit. **DeepSeek** 's own models are open-source.

NovaSky, a research lab at University of California, Berkeley , this month released technology it said was on par with a recent model released by OpenAI . The NovaSky scientists built it for $450 by distilling an open-source model from Chinese company Alibaba .

The Berkeley researchers released the model as open-source software, and it is already being used to help build more cheap AI technology. One startup, Bespoke Labs, used it to distill **DeepSeek** 's technology into a new model it said performed well on coding and math problems.

SHARE YOUR THOUGHTS

What does the emergence of cheaply produced AI models mean for the future of the AI industry? Join the conversation below.

"Distillation as a technique is very effective to add new capabilities to an existing model," said Ion Stoica , a professor of computer science at UC Berkeley .

Competition in the AI industry is already fierce, and most companies are losing money as they battle for market share. The entry of **DeepSeek** and others that use distillation could drive prices down further, creating a feedback loop in which it is harder and harder to justify spending huge sums on advanced research.

Prices for software developers accessing AI models from OpenAI and others have fallen dramatically in the past year. Open-source AI such as **DeepSeek** 's only promises to lower costs further, according to tech executives.

"It will be harder to justify very large margins for this level of intelligence," said Vipul Ved Prakash, CEO of Together AI , which sells computational services to developers of AI applications.

The Washington Post

Who is the man behind the Chinese start-up rattling Silicon Valley?

Liang Wenfeng's ascent to the top of China's artificial intelligence industry seems almost accidental.

The man behind China's **DeepSeek** - the AI firm that released a chatbot that rocketed to the top of Apple's U.S. App Store over the weekend - is a low-profile entrepreneur with a background in finance, not AI.

Nevertheless, his company has made big waves this month, setting off fears in Silicon Valley and Washington about China's growing AI prowess.

The app offers similar functionality to OpenAI's popular ChatGPT chatbot, answering questions and generating text in response to a user's queries. But **DeepSeek**'s claim to do that with fewer and less advanced chips than American companies need has sent chills through Wall Street: U.S. tech stocks plummeted Monday amid concerns about American firms' ability to compete.

President Donald Trump weighed in: **DeepSeek**'s release, he said, "should be a wake-up call for our industries that we need to be laser-focused on competing to win."

Here's what to know about Liang, the man responsible for that wake-up call.

What is Liang Wenfeng's background?

Liang just turned 40, according to Chinese media accounts. He grew up in Guangdong province, in southern China, where his parents worked as elementary school teachers, according to a local propaganda bureau.

As a child, he was quiet and paid lots of attention to the balance of "work and rest, as if he could learn every subject well without spending a lot of time studying," Liang's middle school teacher told the bureau in an interview published Sunday.

He showed mathematical talent from a young age, added the teacher, identified only as "Mr. Rong," and started learning college-level math in middle school.

Liang has a limited public presence, but Chinese media accounts have reported he studied information engineering at undergraduate and graduate levels at Zhejiang University in Hangzhou, a tech hub in eastern China that is home to Alibaba Group, the Chinese e-commerce giant.

How did Liang get started in AI?

Liang's career started with his work in an entirely different industry: finance.

In 2015, Liang founded High-Flyer, a quantitative hedge fund relying on mathematics and artificial intelligence to develop trading strategies. By 2017, the firm, which now serves more than 10,000 high-net-worth clients, had hired an AI research team and was almost entirely using AI algorithms for its trading, according to its website.

The firm's philosophy, as described on its site, is simple: "We firmly believe that 99% of success comes from sweat, and only 1% comes from talent."

A few years later, Liang took his interest in AI a step further: In 2023, he established **DeepSeek**, a Hangzhou-based company dedicated to developing large language models, according to state media.

DeepSeek and High-Flyer did not respond to requests for comment Tuesday.

How does Liang run **DeepSeek**?

Many of **DeepSeek**'s researchers, according to a review of LinkedIn profiles, are young graduates of China's top schools, such as Peking University.

In a rare interview last year, Liang described to 36Kr, a Chinese tech outlet, what he looks for in employees: "Our selection criteria has always been passion and curiosity," he said. "Many people's desire to do research far exceeds their concern for money."

Liang is humble and very involved in the minutiae of his company's technology development, according to Benjamin Liu, a former **DeepSeek** researcher who is now a PhD student in Singapore.

"He will double-check every detail when we are talking about the training strategy, for example," Liu said in an interview, adding that Liang fosters a free and collaborative company culture.

The firm presents itself as philanthropic.

High-Flyer, Liang's hedge fund, and an unnamed High-Flyer employee have donated more than $80 million to Chinese charities since 2020, including rural development and education organizations, according to the company's website.

Does **DeepSeek** have Chinese government support?

Over the past few weeks, the Chinese government has raced to shine a spotlight on the country's new AI superstar.

On Jan. 20, Liang participated in a high-profile meeting with Li Qiang, China's premier, along with several other experts from other industries, where he shared his insights on

the AI industry, according to state media. Li stressed in the meeting that the government should "focus on breakthroughs in key core technologies and cutting-edge technologies," according to a readout from the state-run news agency Xinhua.

DeepSeek also has been celebrated recently as one of six "little dragons of Hangzhou" by the provincial and city governments, which are eager to use the company to spur the growth of a broader advanced-technology ecosystem in the region.

In an article published Tuesday, state-run CCTV marveled at **DeepSeek**'s popularity, quoting Liu Wei, an AI expert at the Beijing University of Posts and Telecommunications, who said **DeepSeek** shows that firms can "create miracles" with limited computing power.

But that government embrace is new for **DeepSeek**, said Matt Sheehan, an expert on China's AI industry at the Carnegie Endowment for International Peace.

"They were not the 'chosen one' of Chinese AI start-ups," said Sheehan, noting that many other Chinese start-ups received more government funding and contracts. "**DeepSeek** took the world by surprise, and I think to a large extent, they took the Chinese government by surprise."

Sheehan added that for **DeepSeek**, more government attention will be a "double-edged sword." While the company will probably have more access to government resources, "there's going to be a lot of political scrutiny on them, and that has a cost of its own," he said.

What has Liang said about China's AI development?

DeepSeek's new chatbot set off fears in Silicon Valley this week about the potential for China to lead the global AI race, even as Washington attempts to constrain its development of the cutting-edge technology.

The Biden administration introduced a series of measures, including sweeping export controls on specific chips, intended to restrict the Chinese AI industry. It's still unclear what the Trump administration's approach to China tech policy will be, though last week the new president revoked a Biden-era executive order that sought to reduce the risks posed by AI.

Liang has expressed optimism about China's ability to challenge U.S. giants such as OpenAI - that is, if Chinese companies start to truly innovate, rather than imitate their U.S. competitors.

"China must gradually transition to being a contributor, rather than continuing to ride on the coattails of others," he said in the 36Kr interview.

"We believe that China's AI cannot remain a follower forever," he added. "Often, we say there's a one- or two-year gap between Chinese and American AI, but the real gap is between originality and imitation. If this doesn't change, China will always be a follower."

The Washington Post

The DeepSeek app is impressively strange. Here's what the fuss is about.

For the past few days, the tech industry has fully embraced its inner Jan Brady — it's all about **DeepSeek**, **DeepSeek**, **DeepSeek**.

But what does that actually mean for you?

In the short term, you've got at least one more buzzy AI chatbot to talk to — or ignore entirely. But the eruption of this Chinese start-up onto the wider AI stage could have lasting effects on how quickly and efficiently AI tools are developed.

We'll keep an eye on all that for you. In the meantime, it's worth breaking down just what all the commotion is about — and what **DeepSeek** can actually do.

What's it like to use **DeepSeek**? Honestly, it's a lot like any other AI chatbot — minus some flashy features, such as a realistic voice interface or the ability to generate images on the fly.

You might also notice some hiccups or delayed responses. By Monday night, the app's responses slowed to a crawl and, for a while, even stopped entirely because of a crush of user traffic.

Even so, there are a few niceties here, like a search tool that compiles (sourced) information from across the web into neat answers. It, for instance, correctly contextualized President Donald Trump's recent firing of 17 inspectors general and rightly identified a few of them — even when I got the number wrong in my query.

Using **DeepSeek**'s search tool is a must if you — for some reason — insist on getting your news from AI. That's because the app admits its models were trained on

information no newer than July 2024; responses about anything more recent require some help from the web.

You can also use **DeepSeek**'s app to summarize documents you upload to it or to interpret text in front of your phone's camera or in images you upload.

It's pretty good at this stuff, except for when it isn't.

Consider this photo I took of the Bay Bridge in San Francisco. It's nothing special, but I wondered whether **DeepSeek** could make out the "Pier 221/2" on the side of the building.

Instead, it's convinced something in the image says "www.997788.com 中国收藏热线" and "XINJIANG." Xinjiang is a region in northwestern China.

Huh?

DeepSeek didn't reply to a request for comment.

Oh, and a quick reminder since we're talking about giving **DeepSeek** files to parse: In addition to things you upload, data like your chats, device details and even "keystroke patterns" ultimately wind up on servers in China.

As with other AI apps, like ChatGPT, you can switch between models. The default experience quickly spits out detailed answers, but **DeepSeek**'s new R1 model — branded under the "DeepThink" banner in the app — is more illuminating. The answers it produces are often similar and are generated more slowly, but you get a better sense of the process behind generating those responses.

Ask the standard model about "Tank Man," for instance, and the app quickly refuses to play ball. But when you ask the same question with DeepThink enabled, you can briefly see the service puzzling through its answer:

"Okay, so I need to figure out who Tank Man is," the app seems to remark to itself. "Let me start by recalling what I know." By the time it generates the text "Tank Man is related to some historical event in China. Maybe the Tiananmen Square …" some inbuilt controls seemingly kick in and attempt to direct the conversation elsewhere.

(In case you were wondering, asking it questions about Taiwanese independence also prompts some forceful nationalist answers.)

So, yeah: Mainland China tendencies aside, the experience is … pretty good? Other services like ChatGPT still have a lead in certain features, and if you're a devoted user of other AIs, I don't see much reason to switch. (For now, anyway.)

So why did **DeepSeek** blow up the way it did?That kind of depends on where you're coming from.

For many normal folks, the first sign of furor came from headlines pointing out that **DeepSeek**'s iPhone app — released Jan. 10 — had rocketed to the top of Apple's free apps list, outshining AI stalwart ChatGPT and Meta's Threads.

That's not entirely a surprise. It's reasonably full-featured, it provides seemingly solid answers — though they're always worth double-checking — and it doesn't nag you to pay for a subscription.

For those more closely dialed into the industry, the commotion around **DeepSeek** isn't really because of the app. It's the origins of the large-language models that power it.

The Washington Post takes a closer look at it in this FAQ, but long story short, the

Chinese start-up claimed in a recent paper that it trained its AI model with older, slower Nvidia chips and low investment — under $6 million.

If those claims are accurate, it's proof that a company can develop an impressive AI model without the cutting-edge hardware and costs incurred by companies such as OpenAI. (For scale, OpenAI CEO Sam Altman once said the company's GPT-4 model — released in 2023 — cost "more than" $100 million to train.)

This low-cost, high-impact approach to training AI had even Trump offering faint praise for the Chinese start-up, saying he viewed it as "a positive."

"The release of **DeepSeek**, AI from a Chinese company, should be a wake-up call for our industries that we need to be laser-focused on competing to win," he said in Miami on Monday.

Naturally, we'll keep tracking **DeepSeek**, how the rest of the industry responds, and what you need to know about all of this. If you haven't quite had your fill, though, check these links for more coverage from The Post and beyond:

Here's a broader Post breakdown of the **DeepSeek** saga, in handy FAQ form.

The son of elementary school teachers, **DeepSeek** founder Liang Wenfeng is now a major player on the AI scene. Learn more about him here.

Meanwhile, leaders in Washington and Silicon Valley are taking stock of the splash **DeepSeek** has made.

Nvidia calls **DeepSeek**'s work "excellent," even though it erased about $600 billion from the company's market cap. [Bloomberg]

Former Intel CEO Pat Gelsinger has ditched OpenAI in favor of **DeepSeek** at his latest venture. [TechCrunch]