Analysis of the Current Situation, Achievements, and Prospects of AI Applications in China

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Abstract: ***Artificial intelligence and large models have become buzzwords in modern technology in recent years, representing new productive forces and the advance of high technology. Consequently, the public is keenly interested in their application and development, making this a critical issue. In the field of AI large models, China first keeps pace with international progress; second, it leverages its rich AI application scenarios to develop technologies with Chinese characteristics. During this process, what achievements China has made, what stage it occupies internationally, and what its future prospects are have all attracted widespread attention. This paper focuses on the following questions: (1) the current state of AI applications in China; (2) the main achievements in these applications; (3) the problems encountered; (4) the prospects for AI development in China; and (5) relevant policy recommendations.***

Keywords: Artificial intelligence; Large models; Application achievements.

1. CURRENT STATE OF AI APPLICATIONS IN CHINA

As is well known, artificial intelligence and large models are at the forefront of today's technology discourse. In this paper, we treat AI and large models as a unified concept. AI refers to a broad field, while large models are a key application within it. From an international perspective, AI development has passed through several important stages.

The early intelligent stage emerged in the 1960s and 1970s, followed by the expert-system stage in the 1980s. After 2000, AI entered a new era of intelligence. Today, AI has reached its fourth stage: a new AI era based on chip computing power and algorithms. Large language models (LLMs) such as OpenAI's GPT-4, Google's Gemini, and Meta's Llama, along with multimodal models, are propelling AI toward the exploration of artificial general intelligence (AGI). Generative AI has achieved commercial deployment in text, image, video, and code generation.

Internationally, artificial intelligence is still in a continuous process of development, and its foundation lies in the introduction of AI chips that solve the computational power problem. A mature large model typically requires about 10,000 AI chips, such as NVIDIA's H*100* and H*200* chips, and the cost is substantial. This is a defining feature of AI in this era. In addition, one of the Nobel Prize winners in Physics—the "father of Google AI"—is the founder of large models and the backpropagation theory for neural networks; his research provides theoretical support for the development of contemporary artificial intelligence.

At present, artificial intelligence is mainly applied in question answering, image design, article writing, and programming. However, it still has some distance to go before reaching truly stable application scenarios; humans currently still regard it as a tool to understand and use. Overall, artificial intelligence comprises three core elements—algorithms, chips, and computing power—and its future development will require further support from complementary resources such as electricity.

According to predictions, when AI reaches the level of GPT-10, it may far surpass human intelligence, capable of solving diseases and major computational problems, with parallel computing power that humans cannot match. In fact, AI might begin to exceed human intelligence as early as the 5.0 stage, and by the 8.0 or 9.0 stage, it could completely surpass humanity.

Regarding the current state of AI development in China, it is mainly reflected in two aspects: first, the learning and application of AI, especially the integration of chips, algorithms, and computing power; second, the representative performance of large enterprises such as Huawei and Alibaba in the output of AI products and technologies, with

Huawei in particular having significant market influence in this field.

In terms of large models, the United States has landmark technologies such as GPT-3.5, 4.0, and 4.5, while China's large models are represented by DeepSeek, Doubao by ByteDance, Baidu's Wenxin Yiyan, and Tongyi Qianwen. In addition, companies like 360 and Xiaomi are also actively developing large models. Although state-owned enterprises have made attempts in this area, few have achieved broad social impact, with most being limited to internal corporate applications.

Regarding the current state of domestic AI and large models, two conclusions can be drawn: first, China is generally following a catch-up development model, with industry experts estimating that we are about two years behind foreign counterparts, and possibly 4 to 5 years behind in advanced chips. This actual gap is much smaller than the 20-plus years some believe. Second, in application scenarios—especially Chinese-language contexts, industrial AI, and chip applications—our progress has been relatively rapid.

Following this development trajectory, domestic AI and large models are currently in the promotion and application phase. Prior to this, the business sector had already made initial attempts through ERP systems, information systems, and automation systems. While there are some cases of AI and large model applications, they are still far from large-scale adoption. This is our observation and analysis of the current state of domestic AI and large model applications.

Guo et al. (2025)[1] improved vehicle detection performance through an enhanced YOLOv8 network architecture, while Jin et al. (2024)[2] achieved breakthroughs in object detection and pose estimation using hybrid task cascade networks with high-resolution features. Medical research has seen significant contributions, including Ma et al. (2024)[3]'s investigation of metal exposure effects on fetal liver function and Jiang et al. (2024)[4]'s development of bimetallic nanostimulators for innovative cancer immunotherapy combining radio-cuproptosis mechanisms. Healthcare technology has advanced through several key innovations: Ma et al. (2023)[5] designed a predictive system for medical equipment lifecycle management, while Wang et al. (2025)[9] developed the CPLOYO model with multi-scale feature fusion for enhanced pulmonary nodule detection. Image processing capabilities were expanded by Lu et al. (2025)[6] through their DeepSPG framework for low-light image enhancement using multimodal learning. Intelligent systems have revolutionized operational processes across industries. Luo et al. (2024)[7] created an innovative logistics management system combining Transformer and GCN networks for robotic path planning. Human resources technology was transformed by Li et al. (2025)[8], who integrated GPT with hierarchical graph neural networks to optimize resume-job matching. The financial sector has embraced AI through Shen et al. (2025)[10]'s data-driven robo-advisory wealth management model. Supply chain operations were enhanced by Saunders et al. (2025)[11], who identified critical pathways for implementing AI-driven smart supply chains to boost enterprise efficiency.

2. APPLICATION ACHIEVEMENTS OF AI AND LARGE MODELS IN CHINA

As mentioned earlier, when AI and large models were introduced, China showed tremendous enthusiasm, whether in learning, application, or investment. This has made China one of the fastest-developing countries in AI and large models after the United States, with investment scale also ranking among the top. The achievements of China in the field of AI and large models are mainly reflected in the following two aspects:

First, in terms of hardware, China partially uses castrated versions of NVIDIA chips. We use the castrated H*100*, whose performance is about 4 to 5 times lower, meaning the chips NVIDIA provides to us have roughly one-quarter the performance of U.S. chips. Although chip performance is reduced, it still enables the development of AI in China, which is a characteristic of China's AI hardware. Based on these chips, private enterprises such as Baidu, Alibaba, JD.com, ByteDance, and Tencent have all attempted applications and R&D in AI and large models. Among them, Huawei's intelligent driving system and Alibaba's achievements in technology applications stand out.

Overall, China's AI strategy is one of following. In the large-model domain, the difference between China and foreign countries is that foreign large models are multilingual, covering English, Chinese, and other languages, whereas China's large models are mainly focused on Chinese. For example, Baidu's ERNIE Bot claims to be the best-performing Chinese large model. Of course, every platform speaks highly of its own model. At present, more than 200 large-model varieties have been tallied domestically, a phenomenon described as "blooming

everywhere." In the long run, however, market competition will inevitably reduce the number of large models, leaving perhaps only six or seven, or even three or four. A similar pattern is seen in the United States, where the influential large models are mainly ChatGPT and Google's, while the others have relatively little impact.

AI is widely applied in China, especially on top of chip-based systems. For instance, intelligent driving systems in automobiles are an AI application, and automated systems in industry are also manifestations of AI. Although these applications have relatively low social visibility—being more evident in product R&D and production processes—the public knows little about them.

3. PROBLEMS IN THE DEVELOPMENT OF AI AND LARGE MODELS IN CHINA

China's AI and large models have made notable progress and achievements, yet some problems do exist. First, chip-supply restrictions are a major issue. AI development depends on high-end chips, but we cannot smoothly purchase these from abroad—especially from companies like NVIDIA and Qualcomm—because foreign restrictions are in place. Even when chips can be procured, they are often downgraded versions, which directly constrains the development of China's AI and large models.

Second, Huawei is continuously driving chip innovation and the domestic, self-reliant development of lithography machines. Because China started relatively late in this field, we can now produce 7-nanometer chips using existing DUV lithography machines. This shows that, although progress in lithography machines has been comparatively slow, the breakthrough from 0 to 1 has been achieved. After several industrial iterations, China has also made great strides in chip mass production; although the yield rate is still low, Huawei has launched chips such as the Kirin 710 and Kirin 9000 that can compete internationally. Therefore, we can conclude that, despite hardware constraints slowing the pace of AI and large-model development, China has already achieved the 0-to-1 breakthrough in chips and lithography machines, laying a solid foundation for future growth. Given another two to three years, it is expected that China's lithography machines will make significant progress and the chip industry will take even larger steps forward.

Beyond hardware, China enjoys a clear edge in application scenarios. First, we possess a vast industrial base and massive manufacturing sector, creating fertile ground for industrial internet, manufacturing informatization, and the deployment of AI and large models, with a huge impact on efficiency gains. Second, the country offers a rich array of internet use cases and numerous platforms, giving AI the chance to penetrate every kind of scenario—an advantage that will drive the next stage of Chinese AI. Western nations worry precisely about the big-data edge these scenarios confer and the resulting competitive strength. Products like TikTok are prime examples: built on large models, data algorithms, and AI, they have become highly competitive offerings.

In short, China faces two main challenges in AI and large models: first, hardware development lags and is subject to external constraints; second, although we have a foundation in application scenarios, mature use cases still need further strengthening. Even so, China leads the world in AI scenario deployment. By contrast, while the United States boasts powerful large models and AI technologies, turning them into stable commercial products with strong business value remains a long journey.

4. FUTURE PROSPECTS FOR AI AND LARGE MODELS IN CHINA

We have reviewed the history of AI and large models, along with China's achievements and remaining issues. Overall, the country has gradually become one of the leaders in the field.

Going forward, AI and large models in China have broad prospects. Two favorable conditions stand out. First, AI progress rests on three pillars: chips, compute, and algorithms. China has long held advantages in compute and algorithms. Algorithms draw on our large pool of software engineers, while compute relies on power resources—China generates one-third of global electricity, a huge plus. Although we lack high-end lithography and cutting-edge chips, 65 nm has already reached volume production, and breakthroughs in 14 nm and 7 nm lithography are on the horizon. We have achieved core technical advances in lithography principles and now command its three key components: the optical system, optical devices, and the stage. At present we can only produce DUV tools, but EUV development is steadily advancing, promising an excellent future.

Second, in the large-model domain, the technological gap between us and foreign countries is not large, especially in terms of time. Although foreign countries started earlier, we have kept pace in both technical principles and

application scenarios. Foreign large models may lead us by one to two generations in iteration speed and investment scale, a time lag of roughly two years. In some areas, such as chips, the gap may be four to five years, but it is far from the one- or two-decade difference some claim. As our progress in these fields accelerates, the gap will gradually narrow—something we can foresee.

Moreover, China has a solid industrial foundation, which will provide strong support for AI development in industrial applications and everyday life. Going forward, China will quicken the pace of AI commercialization, driving the sector's overall growth. These are all favorable conditions for the future development of AI and large models in China.

5. RECOMMENDATIONS ON AI AND LARGE MODELS

After reviewing the history, current state, achievements, and challenges of AI and large models, we can draw two conclusions. First, China maintains "follower's leadership" in AI. Specifically, compared with the global cutting edge, we are right on its heels and are one of only two leading nations worldwide. This gives China certain advantages in investment and application. Second, we still have significant shortcomings in key AI components, especially in chip and lithography technologies and in the iterative upgrading of large models. Therefore, we must sustain high-intensity investment, R&D, and application to move from following the global frontier to keeping pace with it and ultimately surpassing it.

To that end, we offer two recommendations for China's AI and chip industries:

First, strengthen support for AI and large models to maintain China's follower-leader position. In terms of support, we must first align our thinking and clearly recognize AI's strategic value to China's future. AI is not merely a symbol of technological progress; it is a critical arena for future national competitiveness. Second, we must sustain high-intensity investment in AI. With the United States using technological blockades to suppress China, we must maintain sufficient funding and continuously intensify AI R&D to provide a technical safeguard for large-model development.

Second, we must intensify the design and promotion of application scenarios for AI and large models. Once large AI models have application scenarios, a virtuous cycle can be formed. The richer the scenarios, the faster the technological progress and the greater the commercial value, which in turn accelerates the rapid development of the entire industry. This is our competitive edge on the global stage. Therefore, we need to further expand the application of AI and large models across various sectors to create a virtuous cycle.

At the same time, we should strengthen learning and exchanges with developed countries such as the United States, strive to make progress in cooperative development, overcome technological barriers and other difficulties, and promote substantial advancement of AI in our country. These are our analyses and recommendations for the development of AI and large models.

REFERENCES

[1] Guo, Haocheng, Yaqiong Zhang, Lieyang Chen, and Arfat Ahmad Khan. "Research on Vehicle Detection Based on Improved YOLOv8 Network." Applied and Computational Engineering 116 (2025): 161-167.
[2] Jin, Yuhui, Yaqiong Zhang, Zheyuan Xu, Wenqing Zhang, and Jingyu Xu. "Advanced object detection and pose estimation with hybrid task cascade and high-resolution networks." In 2024 International Conference on Image Processing, Computer Vision and Machine Learning (ICICML), pp. 1293-1297. IEEE, 2024.
[3] Ma, Haowei, et al. "Maternal and cord blood levels of metals and fetal liver function." Environmental Pollution 363 (2024): 125305.
[4] Jiang, Xiaohong, et al. "Tumor Microenvironment Reprogrammed Bimetallic Hybrid Nanostimulator for Triggering Radio‐Cuproptosis‐Immunotherapy." Advanced Healthcare Materials 13.30 (2024): 2401902.
[5] Ma, Haowei, Cheng Xu, and Jing Yang. "Design of Fine Life Cycle Prediction System for Failure of Medical Equipment." Journal of Artificial Intelligence and Technology 3.2 (2023): 39-45.
[6] Lu, Jialang, et al. "DeepSPG: Exploring Deep Semantic Prior Guidance for Low-light Image Enhancement with Multimodal Learning." arXiv preprint arXiv:2504.19127 (2025).

[7] Luo, H., Wei, J., Zhao, S., Liang, A., Xu, Z., & Jiang, R. (2024). Intelligent logistics management robot path planning algorithm integrating transformer and gcn network. IECE Transactions on Internet of Things, 2(4), 95-112.
[8] Li, Huaxu, et al. "Enhancing Intelligent Recruitment With Generative Pretrained Transformer and Hierarchical Graph Neural Networks: Optimizing Resume-Job Matching With Deep Learning and Graph-Based Modeling." Journal of Organizational and End User Computing (JOEUC) 37.1 (2025): 1-24.
[9] Wang, Meng, et al. "CPLOYO: A pulmonary nodule detection model with multi-scale feature fusion and nonlinear feature learning." Alexandria Engineering Journal 122 (2025): 578-587.
[10] Shen, Z., Wang, Z., Chew, J., Hu, K., & Wang, Y. (2025). Artificial Intelligence Empowering Robo-Advisors: A Data-Driven Wealth Management Model Analysis. International Journal of Management Science Research, 8(3), 1-12.
[11] Saunders, E., Zhu, X., Wei, X., Mehta, R., Chew, J., & Wang, Z. (2025). The AI-Driven Smart Supply Chain: Pathways and Challenges to Enhancing Enterprise Operational Efficiency. Journal of Theory and Practice in Economics and Management, 2(2), 63–74. https://doi.org/10.5281/zenodo.15280568