

EXECUTIVE SUMMARY

Will China Take Over the Global AI Industry?

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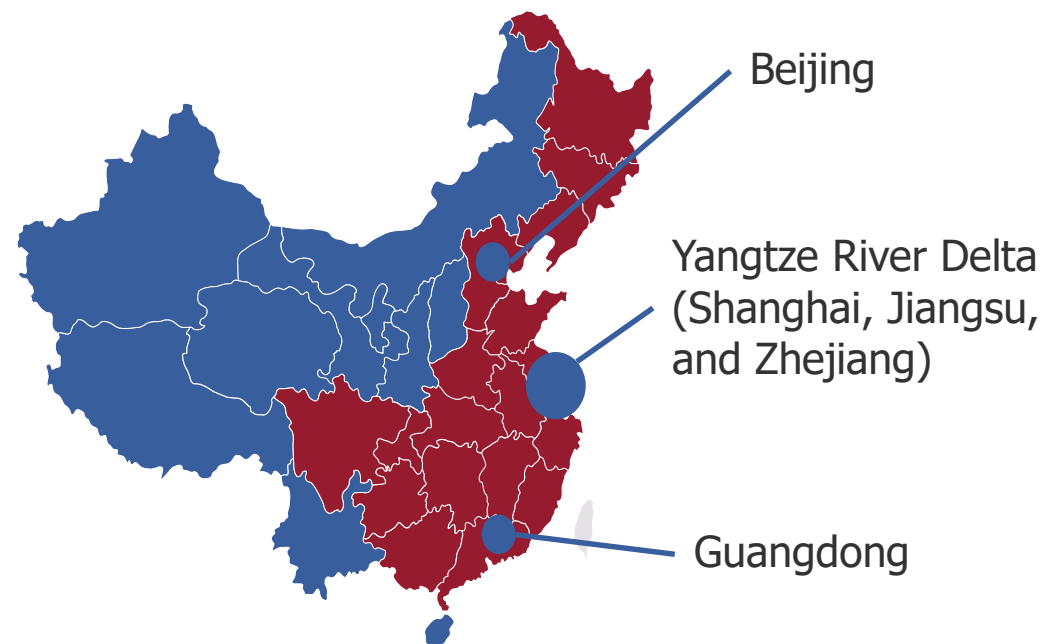
Executive Summary

Activity in China in the area of artificial intelligence (AI) has risen dramatically in recent years. Many newspapers, magazines, and blogs voice the opinion that China will establish itself as a global leader in AI in the next few years. Indeed, preliminary analysis of innovation data like patents, publications, and VC funding supports this thesis.

However, on conducting a deep-dive analysis, we find that, while Chinese AI companies may establish strong roots in neighboring Asia and pose stiff competition in Latin America and Africa, they may not be able to strongly penetrate the U.S. and European markets. This is because Chinese AI companies are not developing cutting-edge AI technologies and are largely focused on applications and industry sectors that are not necessarily a top priority in the U.S. and Europe. Moreover, unlike marketplace platforms, AI solutions are not easily scalable across geographies. Other factors, such as Western society's low level of trust in Chinese companies as well as geopolitics, will also likely play a role.

Clearly, this could mean a mix of opportunities and challenges for Lux clients, depending on their role in the AI value chain. We discuss these in detail toward the end of the report.

AI hotspots in China



Purpose of the full report

Two decades back, China earned its position on the world stage by becoming the world leader in manufacturing. In the process, the country has established itself as the central point for manufacturing supply chains, a fact that is becoming painfully apparent to the global companies as trade wars heat up. Now, based on several metrics like patents, research publications, and VC funding, many believe that China is on a similar track with regard to establishing itself as a global leader in AI.

In the full report, we seek to determine whether China is taking over the world when it comes to data, analytics, and AI. We will be addressing some of the following questions:

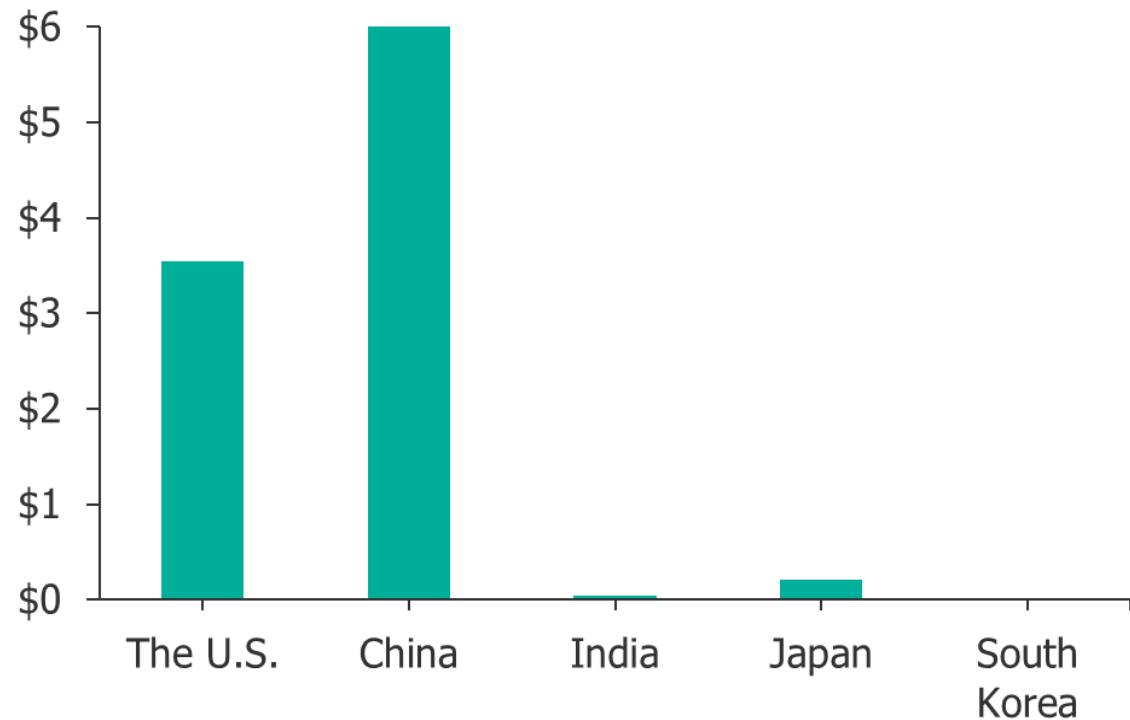
- Has China raced far ahead of the world when it comes to AI innovations?
- Where do China's strengths lie when it comes to the AI ecosystem, technologies, and products?
- What are the key factors driving AI in China?
- What opportunities and threats does China offer for Lux clients interested in AI?
- What does the future look like for China's AI industry? Is China ready to take over the world in terms of AI, and if so, what should clients do?

While second in terms of number of AI companies, China's VC funding data tells a whole different story

We analyzed VC funding for Chinese AI startups in five major technology areas: fundamental AI, natural language processing (NLP), voice recognition, computer vision, and AI processors and edge computing.

From 2014 to 2018, Chinese AI startups received \$6.1 billion in funding – almost 70% more than their U.S. counterparts, which raised a total of \$3.6 billion in the same period. These numbers dwarf the amount of VC funding in other Asian countries, such as Japan, India, and South Korea.

Total VC funding in AI startups (2014-2018)
(Billions of dollars)

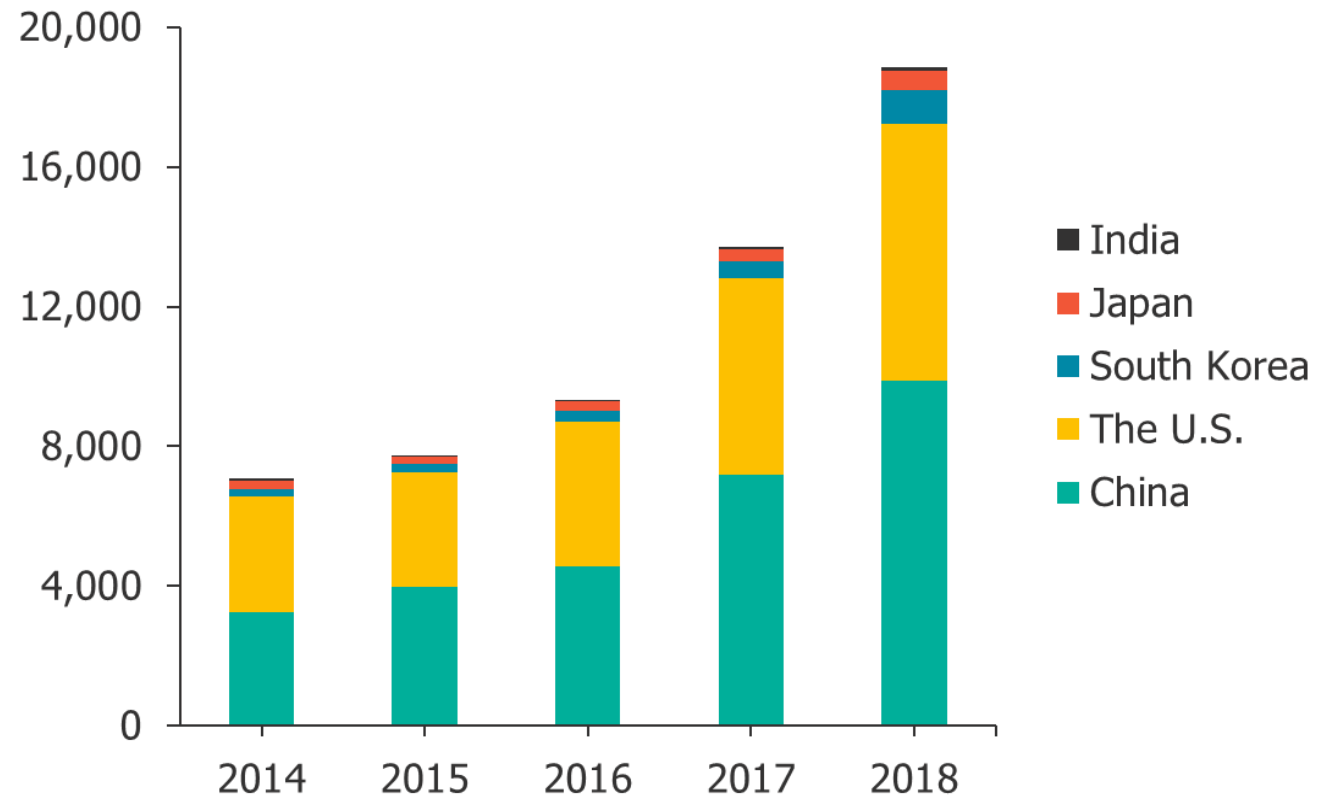


China has surpassed the U.S. when it comes to volume of AI-related patent applications

We counted the total number of AI-related patent applications in five major technology areas: fundamental AI, NLP, voice recognition, computer vision, and AI processors and edge computing.

Patent application data also shows that the country has clearly established itself as a leader in AI not only in Asia but all over the world. The year 2015 was a turning point when China overtook the U.S. in the number of patent applications filed in the area of AI. Since then, there has been no turning back for China.

Number of AI-related patents (2014-2018)



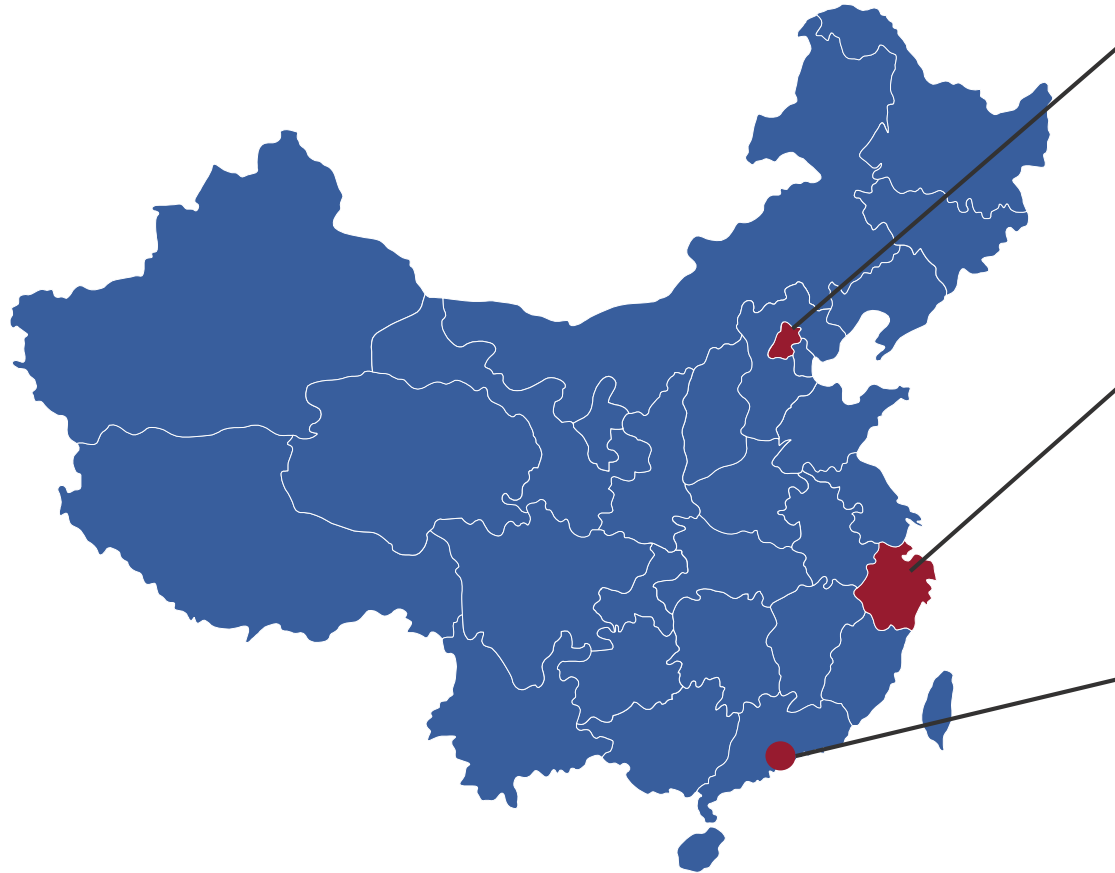
Deep-dive analysis of AI research in China

China publishes more papers in AI than any other country in the world. However, whether a country or an organization is a research leader in a particular area depends on more than just the number of papers published; it also depends on the quality and novelty level of these papers.

To measure the extent of novelty in China's AI research, we turned to AMiner's (a free scientific data platform) recently published data on the "Top 100 Most Cited Scholars in the world in each of the 21 different AI subject areas". To simplify the analysis, we combined these 21 subject areas into seven major categories – fundamental AI, computer vision, NLP and knowledge management, user interfaces, infrastructure, traditional analytics, and others – and analyzed how many of the top-cited scholars in these categories originate from China.

Among the 2,100 spots for top-cited researchers, only 158 were occupied by scholars from Chinese research entities. Of those, 121 spots were occupied by researchers from universities and research institutes, while 37 spots were occupied by researchers from AI companies. Despite publishing a significant percentage of research papers in AI globally (see slide 9), Chinese researchers occupy less than 8% of the spots for top-cited researchers. **In other words, China is still far from becoming the leader when it comes to pursuing novel and influential research in AI.**

More than 65% of the 158 spots are affiliated with research institutions in Beijing, Zhejiang, or Hong Kong



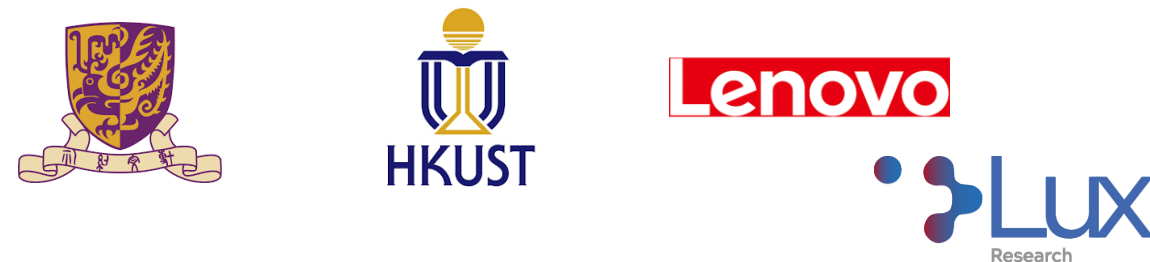
Beijing – 64 spots occupied by six research institutes and nine companies. Key entities include:



Zhejiang – 16 spots occupied by two research institutes and one company. Key entities including:



Hong Kong – 30 spots occupied by four research institutes and one company. Key entities include:



Investors interested in the Chinese AI market will find opportunity in the largely neglected AI platform technologies

Our analysis of VC investments by stage, valuation, and platform technology area suggests that there are still pockets of investment opportunities in the China AI market:

Platform AI technologies	Competition	Market growth rate	Average company valuation	Key players
Fundamental AI	Low	High	Low	4Paradigm
Computer vision	High	High	High	SenseTime , Megvii
NLP	High	High	Medium	iFlytek , Mobvoi
Voice recognition	Medium	Medium	Medium	Elevoc
AI processor and edge computing	Medium	Medium	Medium	Horizon Robotics

NLP and voice recognition applications still have a lot of room for growth

Current applications:

Currently, voice recognition and NLP in China are mainly being used in customer service applications in telecommunications, information technology, e-commerce, finance, and government sectors. Use cases include search result optimization, providing user recommendations, chatbots to service customers in the case of NLP, and voice-directed input in the case of voice recognition.

Emerging applications:

A few NLP companies have started exploring new applications in smart cities, education, and knowledge management. Voice recognition companies, on the other hand, are trying to target applications like smart homes, smart vehicles, personal translators, and smart toys. These markets are heavily fragmented, thereby posing challenges for AI companies to grow fast.

LUX TAKE

Voice recognition and NLP technologies still have huge potential for growth in Chinese markets in the emerging areas mentioned above. Companies like iFlytek have even started [expanding into neighboring Asia](#). However, voice recognition and NLP algorithms, mainly trained on spoken and written Mandarin, are unlikely to perform equally well on European languages, thereby posing a challenge to growth for companies in this space.

Leading companies:



Lax privacy rules coupled with stringent data export policies offer China unique advantages

For a long time, consumer privacy protection laws have been quite lax in China. Recently, the country established the Information Security Technology – Personal Information Security Specification to enforce stricter data privacy. However, guidelines in this specification are categorized as just recommendations and are not mandatory. There are some talks around establishing more stringent privacy regulations, although these remain to be confirmed. **For now, AI companies continue to have a free hand in using consumer data as they please, thus aiding in their growth.**

In addition to continued lax privacy laws, China also launched the Cybersecurity Law in June 2017, which, in a bid to enhance national security, establishes strict regulations around data export. The law requires that providers of public network services (such as telecom, TV and broadcasting, internet, cloud computing, and big data) keep data generated in or collected from China in China. **Clearly, such a protectionist policy will hinder foreign AI companies from operating in China while aiding the growth of Chinese AI companies.**

However, both of these are double-edged swords for Chinese AI companies. On one hand, foreign nations, aware of lax privacy policies, may not allow Chinese companies to operate on their soil. Moreover, if Chinese AI companies want to leverage their mature AI algorithms, they may have to export training data generated on Chinese soil, something that the Cybersecurity Law will hinder.

China's AI sector will continue to grow, but mostly in select industries and applications

On the surface, all innovation-related data indicate that China is poised to take over the world. However, on diving deeper, we find that all the hoopla around AI in China, while true, mostly focuses on a few platform technologies, such as computer vision, voice recognition, and NLP. Applications also focus on a few market segments, such as finance, retail, and government. These aforementioned platform technologies and applications will continue to grow, although some areas like computer vision are already very crowded. However, AI applications in other industry sectors like manufacturing lag behind, as they are not yet an area of strong focus for China.

The U.S.-China trade war has led to a ban on some Chinese companies like Huawei buying hardware and software products from the U.S. Moreover the Committee on Foreign Investment in the United States announced stringent regulations surrounding foreign investment in U.S. technologies. Since then, the U.S. government has eased the ban on Huawei; however, the risk remains that Chinese companies may get locked out of the U.S. technology ecosystem. This forces China to develop these technologies in-house, and indeed, early stories support this theory. For example, Huawei is currently testing the Hongmeng operating system and plans a release in early 2020. The Chinese Ministry of Finance also [recently announced](#) a series of tax breaks for circuit makers and software developers to counter steps taken by the U.S. government. Nevertheless, it may be years before China perfects these technologies.

Increasing local competition, especially in areas like computer vision, is likely to lead to consolidation of Chinese AI companies.



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