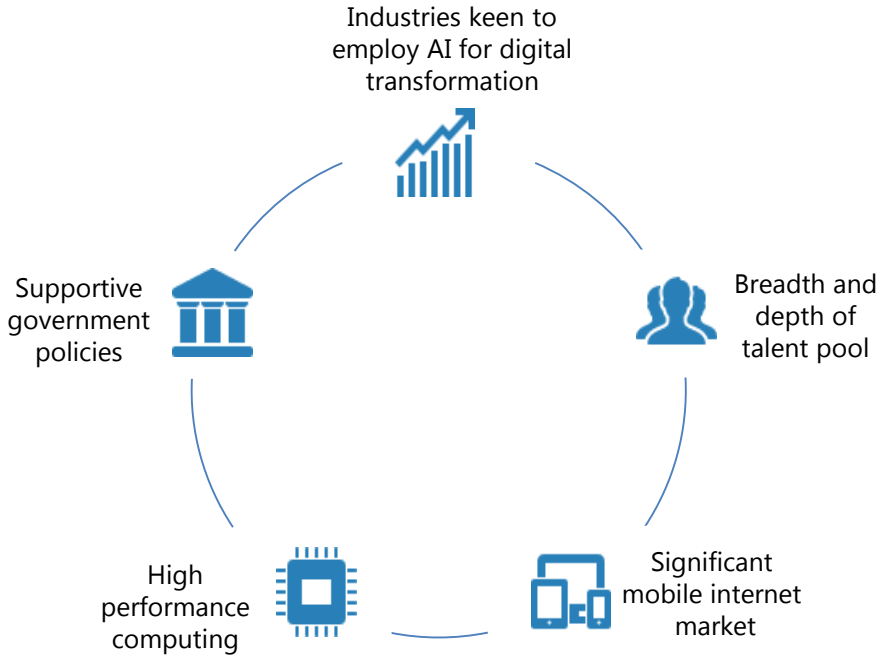
Global AI Hub?

The V Factors Powering China's Rise

July 2017

The V factors driving China's global AI hub evolution

The principal factors enabling China's as a global AI hub include: [1] the presence of industries keen to employ AI for digital transformation, [2] the breadth and depth of talent pool [3] significant mobile internet market, [4] access to high-performance computing as well as [5] supportive government policies. Importantly, factors [1] & [2] avail China with a distinct competitive advantage in its evolution as a global AI hub.



"Whoever wins artificial intelligence will win the Internet in China and around the world...."- **Andrew Ng**

"I see mega-trends that make China an incredible market.....its *an incredible marketplace for talent and in terms of the size of the marketplace*.....we're focusing on autonomous systems. It's a core technology that we view as very important.... *(it's) the mother of all AI projects*" – **Tim Cook**

Source: Vertex Ventures China | This is why China has the Edge in Artificial Intelligence by Lee Kai Fu | Baidu Embraces Artificial Intelligence to Build a Better Search Engine by Bloomberg | Tim Cook Says Apple Focused on Autonomous Systems in Cars Push by Bloomberg | Apple's Cook Says China Is a Huge Opportunity Over Time by Bloomberg

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Factor I: Industries keen to use AI for digital transformation

Growth Catalyst

- When non-AI technology companies grow to a certain size, they typically need to explore using AI in order to upgrade and scale. There are also many traditional Chinese companies lagging behind US enterprises in terms of the level of technological adoption.
- According to a McKinsey survey, AI is *not yet a strategic priority for more than 40 percent of companies in traditional industries in China*. Consequently, many of them are not yet capturing the data they need to support future AI adoption.
- For example, agriculture firms seldom consider recording detailed information about issues such as planting schedules or the impact of weather on output.
- These companies have data and financial heft, and are eager to invest once AI experts present them with business growth opportunities or substantial cost-savings.

Multi-Industry Application(s)

- Demand for AI is expected to be broad-based including State-Owned Enterprises (SOEs) in traditional industries including finance, telecoms, agriculture that favor domestic AI solutions and service providers.
- Other sectors (e.g. education) are also expected be a major potential beneficiary given AI's efficacy. For instance, edtech startup Xuebajun's AI (i.e. Aidam) beat most of the top human students in the math college entrance exam.
- Aidam also *offers machine-marking, personalized guidance and learning, lesson planning and other functional capabilities to assist private tutors*, having the potential to transform the entire educational experience.

AI as Strategic Lever

- The country's tech giants are racing to ramp up their efforts in AI. For instance, Baidu is developing its own autonomous driving system with an AI team of more than 1,300 experts, while Alibaba Cloud's machine-learning platform, PAI is offering AI services to help businesses with data analysis.
- Tencent has also established a dedicated team of 250 scientists and engineers, and invested in Chinese healthcare AI start-up iCarbonX.
- Although many Chinese tech companies have made technological breakthroughs within their fields of expertise, it will take years before the practical application of AI technology is realized.
- Scientists often refer to AI as the core of the next wave of industrialization, and *whoever leads the frontier in the AI industry will have an edge in future growth*.

Economic Multiplier

- According to McKinsey, China has benefited greatly from a "demographic dividend" in the past few decades but is expected to lose that momentum as its population ages.
- Going forward, AI-led automation can provide the Chinese economy *a productivity injection that could add 0.8 to 1.4 percentage points to GDP growth annually*, contingent on the speed of adoption.
- The rise of AI is also likely to create new products and services as well as new occupations and businesses.

Source: Vertex Ventures China | How China is Becoming a World Leader in Artificial Intelligence by China Briefing | This is Why China has the Edge in Artificial Intelligence by Lee Kai Fu | China to Lead the World in Artificial Intelligence, Says Top Microsoft Executive by the SCMP | China's Artificial-Intelligence Boom by The Atlantic | China Outlook 2016 by KPMG | McKinsey

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Factor II: Breadth and depth of talent pool

Applied Research

- Chinese scholars are actively involved in AI research, and approximately 43% of top-notch academic papers relating to AI were published with one or more Chinese authors.
- Chinese researchers are perceived to be pragmatic and look to discovering new use cases for AI vs. fundamental research by their counterparts in the US.

Experience & Expertise

- Experienced, top AI talent in China also appears to be uncommon. Of the 250,000 AI professionals listed on LinkedIn, nearly 50% of those with 10 years of experience or more are in the US. China's share is less than 25%.
- China may need to focus on developing more elite data scientists, particularly in areas of AI where shortages are becoming apparent. At the same time, more business leaders and middle managers may need to acquire technology skills and hone their ability to understand and apply data.
- On the other hand, China has a *deep pool of engineering talent* – an important consideration for the development of AI applications.

Talent Cost & Migration

- Chinese companies such as Baidu have hired some high-profile AI experts from the US, and they see an unprecedented opportunity to hire more talent from Silicon Valley in the wake of US President Donald Trump's immigration policy.
- Some practitioners in the AI industry are paid salaries deemed unfairly high and experts are leaving companies to establish AI startups (e.g. NetPosa).
- About a quarter of US high-tech firms are founded by immigrants.

AI Specialization

- At the application level, China is on a par with other countries in algorithm development.
- In particular, China's AI scientists are *disproportionately specialized* in areas such as *computer vision and voice recognition*, creating gaps in some other areas.
- On the other hand, China lags behind in fundamental research – it has less experienced data scientists and fewer than 30 university research labs focused on AI.

Source: Vertex Ventures China | How China is Becoming a World Leader in Artificial Intelligence by China Briefing | This is Why China has the Edge in Artificial Intelligence by Lee Kai Fu | China to Lead the World in Artificial Intelligence, Says Top Microsoft Executive by the SCMP | China's Artificial-Intelligence Boom by The Atlantic | China Outlook 2016 by KPMG | Google Goes to China, Making Play for Talent and Attention by Fox Business

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Factor III: Significant mobile internet market

Large Mobile Internet Market

- According to the January 2017 China Internet Network Center report, China had 731M internet users, 95.1 % of which are smartphone users as of December 2016.
- 496M Internet users made *digital payments* with their smartphones, and 168M users used smartphones to *hail taxi services*.
- The growth rate of both categories of internet users have exceeded 30% annually.

Data Deluge

- With millions of customers, the sheer volume of internet user data provides China's tech companies with a massive amount of raw material to run their algorithms and refine their AI programs.
- Baidu, Didi and Tencent have all set up their own AI research labs.

App-Based AI Adoption

- Existing internet users constitute a massive market for AI adoption in the future.
- When AI applications are ready, apps such as the *Chinese search engine Baidu*, the third-party payment app Alipay, the *mobile messaging service WeChat*, and the chinese pinyin input system Sougou Input will be able to apply AI technologies through their services.
- For example, Alibaba has applied a face recognition tool in its Alipay app, and 150M users have already started to use this function.

Barriers to Entry

- Chinese tech companies enjoy barriers to entry, given that *much of China's internet sector is off-limits to foreign companies* such as Google and Facebook.
- Chinese tech companies also have exclusive access to Chinese internet users' data, enabling them to test algorithms and consolidate customer cluster(s) - further strengthening their dominant position(s).

Source: Vertex Ventures China | How China is Becoming a World Leader in Artificial Intelligence by China Briefing | This is Why China has the Edge in Artificial Intelligence by Lee Kai Fu | China to Lead the World in Artificial Intelligence, Says Top Microsoft Executive by the SCMP | China's Artificial-Intelligence Boom by The Atlantic | China Outlook 2016 by KPMG | McKinsey | The China Internet Network Information Center

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Factor IV: Access to high performance computing

Hardware Technologies

- China's tech industry continues to find breakthroughs in this field with cities like Shenzhen building an ecosystem that supports AI hardware technologies.
- In particular, specialized processors such as graphics processing units are expected to be increasingly important to AI development given their ability to carry out massive complex computations.
- Stronger control over the supply of core technologies can potentially improve China's future ability to deploy AI systems more widely.

Rapid HPC Development

- Sunway TaihuLight is a massive supercomputer developed by National Research Center of Parallel Computer Engineering and Technology (NRCPC) capable of *delivering 93 petaflops* of performance.
- This is *more than the next five systems combined, and 5.2 times faster than the top US supercomputer* - the Titan system based on Cray and AMD technologies.
- It is powered by ShenWei's SW26010 many-core processor, a chip developed in China.

Chip-Making Capabilities

- Computing power is part of the basic infrastructure underlying AI and hence of significant strategic importance. China has historically been heavily on foreign supplies for microchips.
- For some types of high-value semiconductors, China must rely on imports for virtually all of its needs.
- In 2015, US regulators barred vendors like Intel and Nvidia from selling products to four supercomputing centers in China over concerns that the facilities were working on nuclear programs.
- China understands the importance of developing its own advanced semiconductor, microprocessor and high-performance computing technologies and Chinese officials have promised to spend USD 150B over 10 years to grow the country's chip-making capabilities.

Global Value Chain

- All aspects of the AI value chain, from fundamental research to application development to hardware manufacturing, involve global collaboration.
- In addition to building its own data ecosystem, pipeline of data science research talent and semiconductor industry, China may also need to ensure that its AI industry is built on an open system that is globally integrated.

Source: Vertex Ventures China | How China is Becoming a World Leader in Artificial Intelligence by China Briefing | This is Why China has the Edge in Artificial Intelligence by Lee Kai Fu | China to Lead the World in Artificial Intelligence, Says Top Microsoft Executive by the SCMP | China's Artificial-Intelligence Boom by The Atlantic | China Outlook 2016 by KPMG

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Factor V: Supportive government policies

Policy and Plans

- China's policy efforts to accelerate AI development began in 2014, when President Xi Jinping called for innovation and breakthroughs in science and technology (i.e. including AI) at the opening ceremony of the 17th Congress of the Chinese Academy of Sciences.
- Following 2014, a series of national economic initiatives, including the 13th Five Year Plan (March 2015), Made in China 2025 (May 2016), Robotics Industry Development Plan (April 2016), and Three-year Guidance for Internet Plus Artificial Intelligence Plan (May 2016), all provided guidelines to boost AI R&D.
- On 5 March 2017 - China's highest national meeting included AI in the Government Work Report for the first time signalling Beijing's resolve and prioritization of the AI industry in its economic agenda.

Investment in R&D

- China's success in AI has been partly fueled by the government's overall investment in scientific research at its universities. Over the past decade, government spending on research has grown by double digits on average every year.
- China's top economic planner, the National Development and Research Commission (NDRC), launched a national engineering laboratory for the research and application of 'deep learning', appointing Baidu to lead the lab.
- The creation of a national AI laboratory is just one step taken by NDRC to boost R&D in AI.

Barriers to Entry

- Despite the fact that US companies are now leading AI development around the globe, there are visible barriers to entering the Chinese market. The Chinese market will need local solutions and providers. China is lagging behind in creating a data-friendly ecosystem with unified standards and cross-platform sharing.
- Opening government data sets spurs private-sector innovation. But China has relatively little public-sector data accessible for exploration - China ranks 93rd globally for the openness of government data by Open Knowledge International in 2015.
- Limitations on cross-border data flows is a disadvantage for global collaboration. In contrast, policy around AI in China is relatively more open for experimentation and solutions.

Integrated Circuit Industry Promotion

- The Chinese government published its National Guidelines for Development and Promotion of the Integrated Circuit (IC) Industry in 2014 and the "Made in China 2025" policy.
- The government also launched a national IC investment fund with more than USD 20B raised so far.
- These initiatives are beginning to yield results: in June 2016, China unveiled Sunway TaihuLight, which broke records as the world's fastest supercomputer and contained no US-developed processors.
- The government's up-front investment is a long-term bet that should have a significant ripple effect as it encourages private companies to play an active role.

Source: Vertex Ventures China | How China is Becoming a World Leader in Artificial Intelligence by China Briefing | This is Why China has the Edge in Artificial Intelligence by Lee Kai Fu | China to Lead the World in Artificial Intelligence, Says Top Microsoft Executive by the SCMP | China's Artificial-Intelligence Boom by The Atlantic | China Outlook 2016 by KPMG | McKinsey

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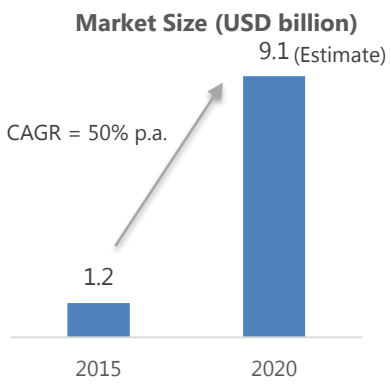
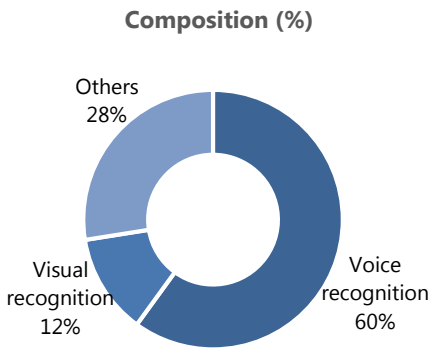
China's AI market is expected to grow significantly with the potential to impact many industries

China's AI Industry at a Glance

- China internet giants Baidu, Alibaba and Tencent are leading the China AI market, while hundreds of start-ups are also establishing services in various AI segments and application areas.
- *Voice and visual recognition* currently accounts for 60% and 12.5% of the total China AI market respectively.
- Manufacturing companies have started to adopt AI to reduce their costs.
- iResearch expects the value of China's AI market to reach USD 9.1B in 2020 by growing at a 50% compound rate annually.
- New industry segments (e.g. drones, robots) and traditional ones (i.e. home appliance, auto and toys) are being transformed by AI innovations.
- As the biggest auto market (21.1M passenger cars sold in 2015), the largest home appliance manufacturer, the largest drone maker (DJI - 70% market share), China is expected to be amongst the most attractive ecosystems for AI startups.





Key industries expected to be transformed by AI include:

Advanced Driver Assisted Systems (ADAS) market is expected to reach USD 37B* in 2020. Autopilot vehicles is forecasted to create another market of USD 87B before 2030.

USD 210B* market for China manufacturers. IHS expects 700M units of smart appliance shipped out 2020.

In 2014, service robots accounted for 16.7% of the USD 35B* global robot market.

Market size of drones is expected to reach USD 12B* in 2020.

Global market for toys was USD 80B* in 2015. 30% penetration would create a USD 26B market for smart toys.

Goldman Sachs expects the market for AR|VR to touch USD 80B, with hardware accounting for USD 45B.

* Exchange rate of 1USD: 6.817 RMB

Source: Vertex Ventures China | Wuzhen Institute | China Daily | US National Science and Technology Council | China's Artificial Intelligence in Danger of Becoming a 'Bubble', Experts Warn by the SCMP | IFR | National Bureau of Statistics of China | Juniper Research | CITIC Research | Microsoft | Digi-Capital

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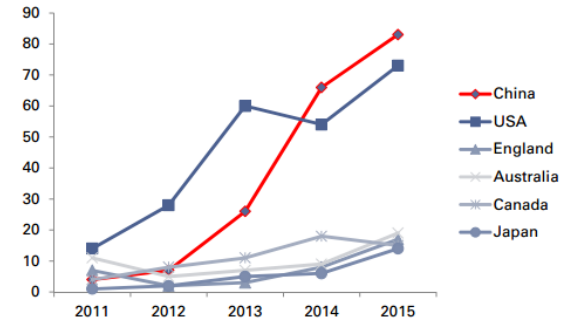
China ranks first for absolute AI citations and third based on publication influence

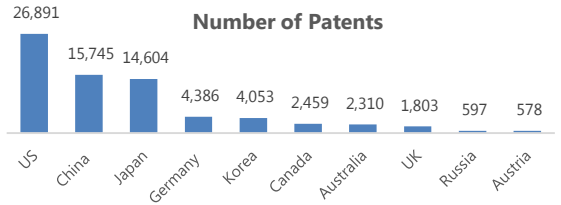
Research Capability

- China has been making rapid progress in AI research. An October 2016 White House report indicated that in 2016, the number of academic research papers published in China in the field of deep learning exceeded the number published by U.S. researchers. China is *ranked first for absolute AI citations and third based on publication influence.*
- A recent Nikkei Asian Review study finds that Chinese patent applications in the segment of AI grew to 8,410 between 2010 and 2014, a 186% increase from the previous five-year period between 2005 and 2009.
- In some cases, AI inventions reported by the US were invented in China first and then later developed overseas. China is quickly catching up in the field of deep learning research. With increasing R&D investment from China's tech giants, this growth rate is expected to continue in the future.

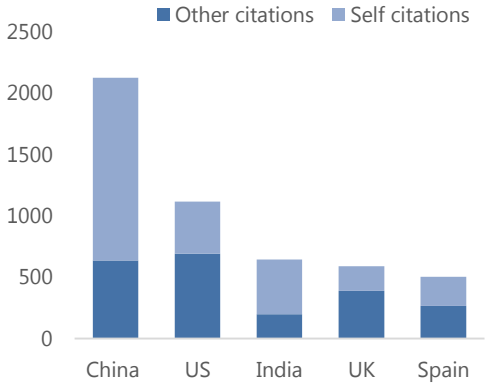
Journal articles cited at least once, mentioning "deep learning" or "deep neural network"



Number of Patents

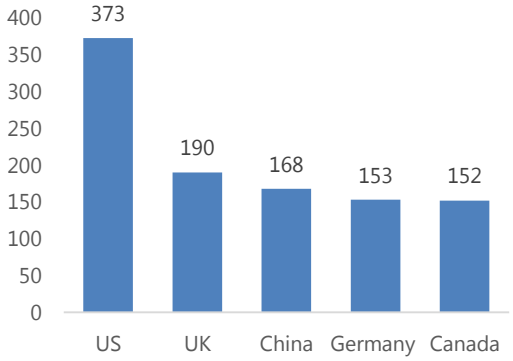


Number of AI Publications Cited



Self-citation occurs when a journal cites another article published in the same journal.

Publication Influence - H-index



The H-index ranks the productivity of scholars and the citation impact their publications. A higher H-index indicates that more publications that are widely cited.

Source: Wuzhen Institute | China Daily | US National Science and Technology Council | Artificial Intelligence: Implications for China by McKinsey Global Institute | Baidu Embraces Artificial Intelligence to Build a Better Search Engine by Bloomberg | SCImago Journal Rank 2015

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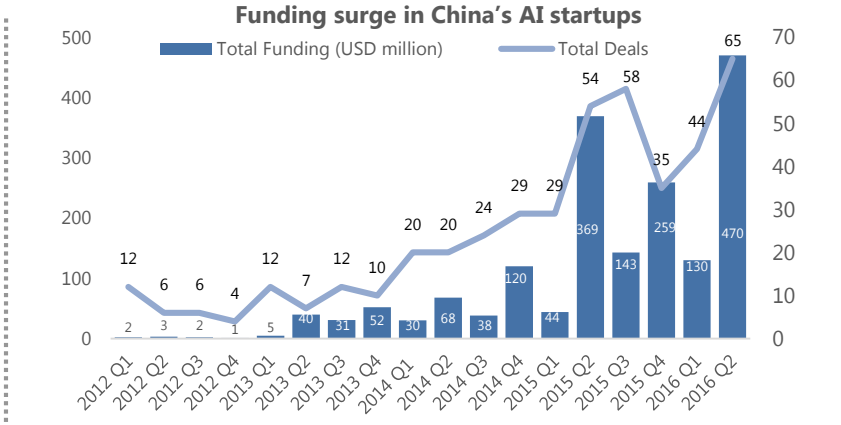
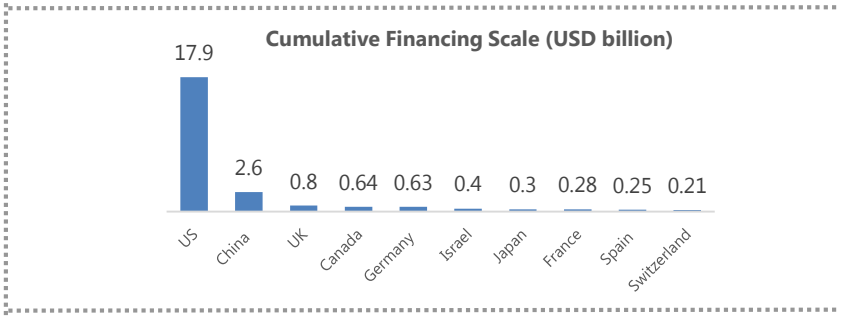
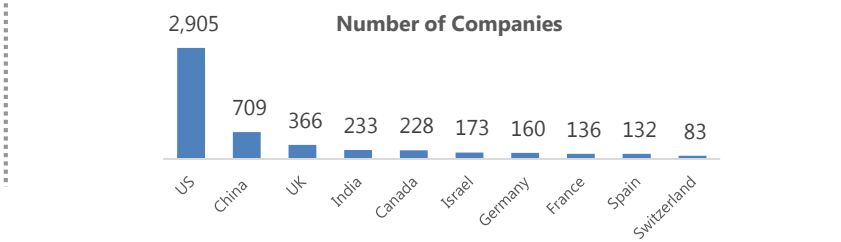
China's AI industry growth is expected to be underpinned by an abundance of funding

Abundance in Funding

- The Chinese market has witnessed a deluge of venture funding in AI startups in recent years. According to Netease, 202 Chinese AI startups raised a total of approximately USD 1B in 2016.
- KPMG's studies also show that venture capital has already shifted from big data towards AI in 2016, and the momentum of investment in the AI industry is projected to continue to grow in the coming years.
- According to Wuzhen Institute, China's total investments in AI enterprises reached USD 2.6B last year, with the US topping that list with an estimated USD 17.9B in investments in the same period.
- Research funding appears to be shrinking in the U.S. and Europe, while expanding in China. There have been reports of researchers *receiving grants 6x larger* than what he might have gotten in Europe or America, enabling them to establish a full artificial intelligence lab with an assistant, a technician and a group of PhD students.
- Numerous provinces and cities are spending billions on developing robotics, and a part of that funding is likely to go to AI research. For instance, the city of Xiangtan, in China's Hunan province, has pledged USD 2B toward developing robots and artificial intelligence.
- Other places have direct incentives for the AI industry. In Suzhou, leading AI firms can receive approximately USD 800,000 in subsidies for establishing a local presence, while Shenzhen is offering USD 1M to support any AI project established there.
- More money is flowing to AI startups especially for angel and series A rounds comprising 90% of all the deals in 2016.
- Valuations appear lofty fuelling concerns that AI is on the verge of becoming a 'bubble' in China as a large influx of money and talent heat the market.







Source: Vertex Ventures China | Wuzhen Institute | China Daily | US National Science and Technology Council | China's Artificial Intelligence in Danger of Becoming a 'Bubble', Experts Warn by the SCMP

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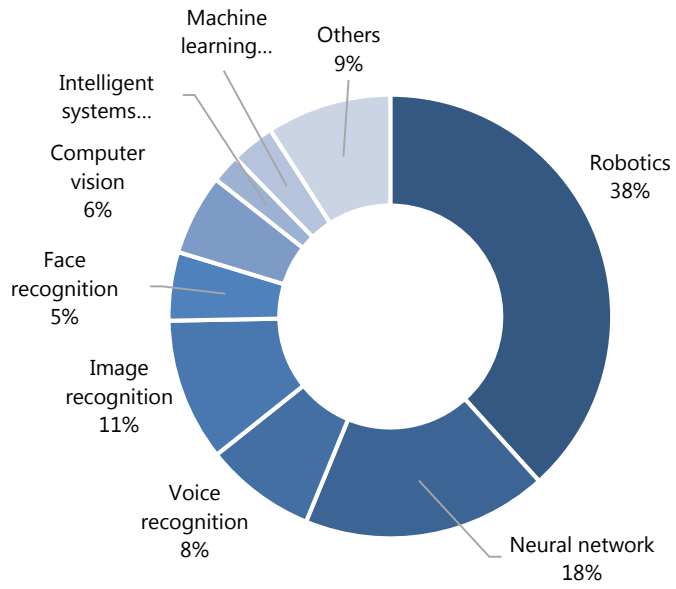
The distribution of AI startups and patent applications in China

Distribution of AI start-ups

- China's AI start-ups are principally concentrated in the economic hubs of Beijing, Guangdong and the Yangtze River Delta area.
- Companies from these three regions account for *approximately 85% of all AI companies* in China.

AI patent applications

- Robotics, neural network, voice and image recognition account for the vast majority of patent applications.
- Since 2011, China has achieved faster patent application progress in the areas of robotics and computer vision.



Source: Wuzhen Institute

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China's AI ecosystem includes large internet enterprises, emerging AI and vertical-focused firms

Application Layer

Robotics
- Geek+
- Rokid
- Turing Robot
- UBTECH

Autonomous Driving
- Baidu
- CALMCAR
- Horizon Robotics
- UISEE

Drones
- DJI
- EHang
- Hover Camera
- Zerotech

Personal Assistant
- Baidu
- Mobvoi

Business Intelligence
- Yonghong Tech
- DataKM

Customer Service
- AiKF

Industrial Applications
- iCarbonX
- Maxent Inc
- Toutiao
- Xuebajun

Technology Layer

Speech Recognition & NLP
- Aispeech
- Baidu
- iFlytek
- Mobvoi
- SinoVoice
- Tencent
- Trio.ai
- Unisound

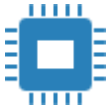
Machine & Deep Learning
- DeePhi Tech
- SeetaTech

AI Platform
- CloudMinds
- 4Paradigm

Computer Vision
- Yitu
- DeepGlint
- Megvii
- Sensetime

Infrastructure Layer

Sensors
- ICE DRINK
- LeiShen Intelligent systems
- SLAMTEC
- Benewake



AI Chips
- Cambricon
- Horizon Robotics

Data
- DataDouDou.com
- Shujutang

Computing
- Alibaba
- Baidu

Source: Vertex Ventures China

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Application Layer: AI augmented with vertical domain expertise can be a meaningful barrier to entry

AI has broad-based applications with rapidly growing adoption across an array of industry verticals. As AI becomes increasingly commoditized with value migration to deep learning, there are certain domains that are specific enough that human capital and *vertical domain expertise can be a meaningful barrier to entry*.

Vertical Applications

Education
- Automate tedious, basic activities like grading
- Enabling individualized learning through customized courses
- Iidentify areas where courses need to improve

Finance
- Scrubbing and packaging satellite images that can be used to inform economic/market forecasts (e.g., images of oil inventory, retail traffic)
- Identifying credit risk and executing limit reductions/closures on accounts that could go delinquent

Logistics
- AI can be seen in the use of robotics and sensors for conveying, stacking and retrieval systems, order picking, checking on stock level
- Algorithms also allow AI to automatically adapt in real-time to events in the supply chains (e.g. the arrival of new orders over the Internet for delivery in a few hours)

Agriculture
- Optimizing seed planting, fertilization, irrigation, spraying, and harvesting
- Sorting fruits and vegetables to reduce labor costs
- Identifying sick livestock based on changes in audio data

Retail
- Enabling image-based product searches
- Enhancing recommendation engine capabilities by leveraging large data sets on sales, inventory, and customer preferences
- Improving online search and customer support
- Predicting product demand and optimizing pricing

Selected Vertex Portfolio Companies in China

Xuebajun is a mobile application that helps students solve homework questions using Scene Text Recognition (STR) Technology and deep learning to improve character recognition rate
(www.xueba100.com)

Maxent provides anti-fraud software as a service based on machine learning techniques
(www.maxent-inc.com)

Geek+ designs and manufactures robots for warehouse automation. Similar to Amazon's Kiva, Geek+ helps customers to improve their order fulfilment efficiency and accuracy, save cost and handle flooding in orders during peak season.
(www.geekplus.com.cn)

Selected Vertex Portfolio Companies Outside China

Taranis is a precision agriculture intelligence platform that helps farmers increase their yields and cut costs using deep learning on proprietary data sets to predict and prevent losses from crop disease and pests.
(www.taranis.ag)

Dynamic Yield delivers an end-to-end platform for personalization in eCommerce, media, travel industry using machine learning to improve targeting capabilities
(www.dynamicyield.com)

Source: Systems of Intelligence: Is This the VC Meta-Thesis We've Been Looking For? By Gil Dibner on Medium

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Technology Layer: 26% of all China AI firms. Mainly engaged in computer vision, machine learning, NLP

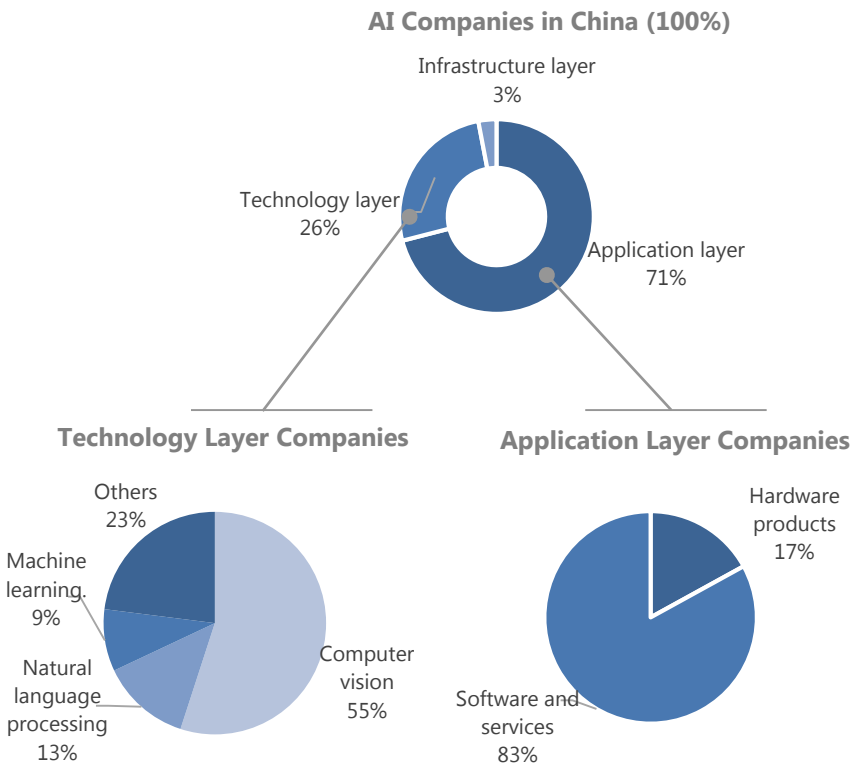
Technology Layer – Specialization

Speech Recognition & NLP **Machine & Deep Learning** **Computer Vision**

China's companies and AI scientists are especially specialized in areas such as computer vision and speech recognition. Selected examples include:

- Mobvoi which is expert in Chinese voice recognition and natural language processing is also developing its self-designed hardware.
- In China, iFlytek's voice assistants that are powering household devices and business software. The Anhui-based company, which specializes in voice and speech technologies, has won many international competitions in speech synthesis and in translation between Chinese and other languages. It also beat Apple in speech recognition in the Chinese language, according to the Chinese Academy of Sciences.
- Baidu is a leader in China's AI efforts. It is working on driverless cars. It has turned an app that started as a visual dictionary — take a picture of an object, and your cell phone will tell you what it is — into a site that uses facial recognition to find missing people, a major problem in a country where child kidnapping has been persistent. It helped a family find a child kidnapped 27 years earlier. DNA testing confirmed the family connection.
- Baidu's speech-recognition software can accomplish the challenging task of deciphering tonal differences in Chinese dialects, and is generally considered best-in-class.

Distribution of AI Specialization – by Companies



Source: iResearch | 中国人工智能产业链分析 | Is China Outsmarting the US in A.I.? By The New York Times

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Infrastructure Layer: Rise of mobile edge computing is expected to drive demand for AI embedded chips

The Rise of Mobile Edge Computing

Autonomous Driving **Drones** **Personal Assistant** **Smart Home**

- The next wave of compute workloads, including 5G, AI, autonomous vehicles, cloud computing and federated learning, is expected to be a disruptive force in driving tectonic shifts in compute architectures.
- We see a wide range of computing architectures, including a shift from homogenous to heterogeneous computing, and from centralized to edge computing.
- In China, edge computing is gaining more traction. **The Edge Computing Consortium** was officially established in November 2016 jointly by Huawei Technologies, Shenyang Institute of Automation of Chinese Academy of Sciences, China Academy of Information and Communications Technology, Intel Corporation, ARM and iSoftStone.
- Government, SOEs and state controlled industries are the biggest tech consumers in China.
- Most technological advancements are funded by the government. With the government's participation, developments in edge computing are expected to gain increasing momentum in China.

AI Embedded Chips

Horizon Robotics is dedicated to providing integrated and openly embedded AI solutions. The Company envisions world's more than 1,000 devices, such as autonomous vehicles, to be equipped with "brains".

Horizon Robotics is a Vertex Portfolio Company (www.horizon-robotics.com)

Nvidia

- 200-300w
- Chip Business
- For servers

Horizon Robotics

- 0.5-2w
- Turn-key solution: chip + algorithm
- On devices

OPEN AI LAB officially established by the ARM Ecosystem Accelerator, Allwinner Technology and Horizon Robotics in Beijing in December 2016.

OPEN AI LAB aims at exploring a new model for cooperation to advance the embedded systems applied in AI in both software and hardware as well as the coordinated development of industrialization of application implementations.

Source: Vertex Ventures China | Barron's | Company Information | AllChinaTech | Google is Testing a New Way of Training its AI algorithms Directly on your Phone by the Verge

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The Vertex View

With strong incentives from the Chinese government, we may well be peering at the golden age for investing in China's AI industry. Looking ahead, it will be important to understand the drivers underpinning China's evolution as a global AI hub and the longer term investment considerations.

As AI becomes commoditized with value migration to deep learning, *AI augmented with vertical domain expertise* will be an increasingly critical "moat". In the final analysis, barriers to entry truly define a firm's differentiation - its distinct opportunity to *create, protect and sustain value*.

This is a core consideration in our AI investments at Vertex and our portfolio companies include **Xuebajun** in education, **Horizon Robotics** in autonomous cars and smart homes, **Maxent** in fraud detection, **Dynamic Yield** in customer personalization and optimization, **Taranis** in precision agriculture and **Geek+** in logistics.

Over the next decade, we believe some of these opportunities may well turn out to be *Systems of Intelligence* companies. So do reach out to us if you've got a plan to create, protect and sustain value behind some highly defensible barriers.

Source: Systems of Intelligence: Is This the VC Meta-Thesis We've Been Looking For? By Gil Dibner on Medium

Thanks for reading!

About Vertex Holdings

Vertex Holdings, a member of Temasek Holdings, focuses on venture capital investment opportunities in the information technology and healthcare markets, primarily through our global family of direct investment venture funds. Headquartered in Singapore, we collaborate with a network of global investors who specialize in local markets. The Vertex Global Network encompasses Silicon Valley, China, Israel, India, Taiwan and Southeast Asia.

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