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智能新时代：创新、赋能、生态
INTELLIGENCE NEW ERA: INNOVATION, ENERGIZATION AND ECOLOGY
WIC 2020

China's New Generation Artificial Intelligence Technology Industry Report 2020

The Development of China’s Artificial Intelligence Technology Industry under New Challenges and Opportunities

Liu Gang, chief economist of Chinese Institute of New Generation Artificial Intelligence Development Strategies

June 24, 2020

Since 2019, a series of events, including **the U.S. technology blockade, the impact of the COVID-19 pandemic and the launch of new infrastructure construction**, have had a profound impact on the development of China's artificial intelligence technology industry.

- The U.S. technology blockade has broken **the global innovation cycle system** of the artificial intelligence industry;
- How to overcome technological weakness, including chips and basic software, and **build an autonomous and controllable global value network and innovation cycle system,** are the new choices for development of China’s artificial intelligence technology industry;
- The sudden COVID-19 pandemic has accelerated the development of China’s artificial intelligence technology industry, and **the upgrading of the consumer internet and the start of the industrial internet** has become the engines for achieving high-quality development;
- The application of blockchain technology and **the construction of new** infrastructures including 5G will accelerate the deep integration of artificial intelligence and the real economy.

I. Sample Screening and Data Collection

Based on systematic surveys and public data collection, this report screens out 5,554 samples, including the 5 types of subjects: 797 artificial intelligence enterprises, investors, university and non-university scientific research institutions, and governments, to establish a sample database of China's intelligent economy.

Data collection includes attribute data and relational data. Among them, the relational data covers three aspects:

- Technology relations: technology input and technology output;
- Core human capital relations: preliminary work and learning experience;
- Investment and financing relations: investment relation and financing relation.

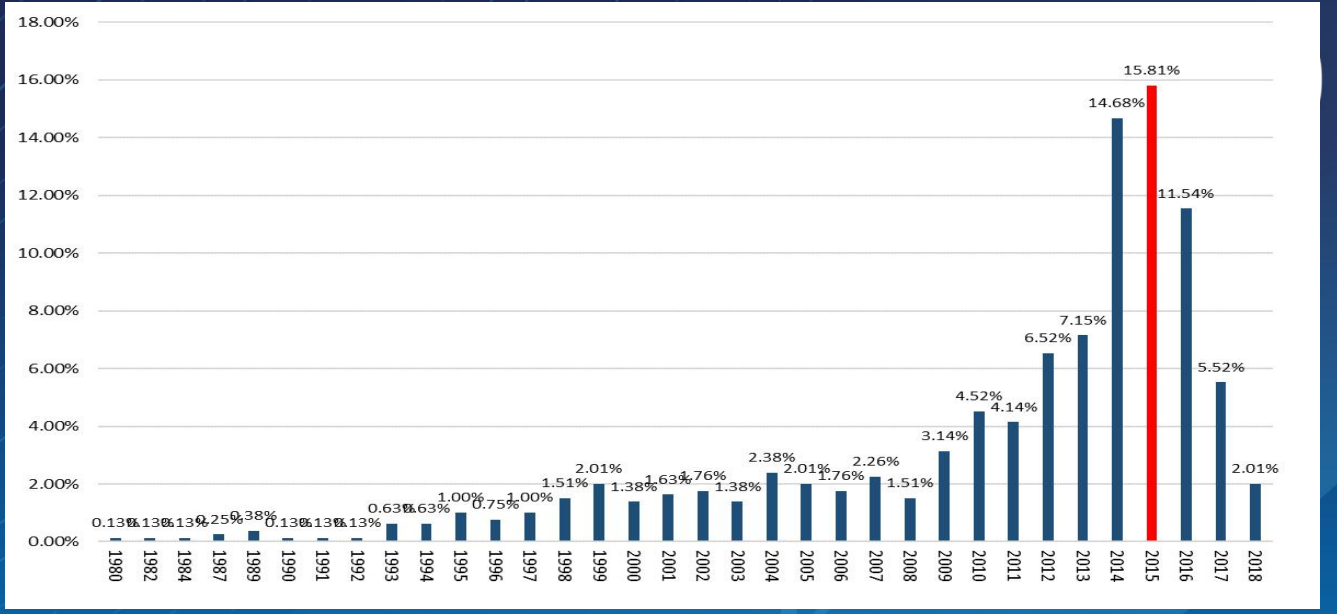
Sample Composition of China's Intelligent Economy Sample Database

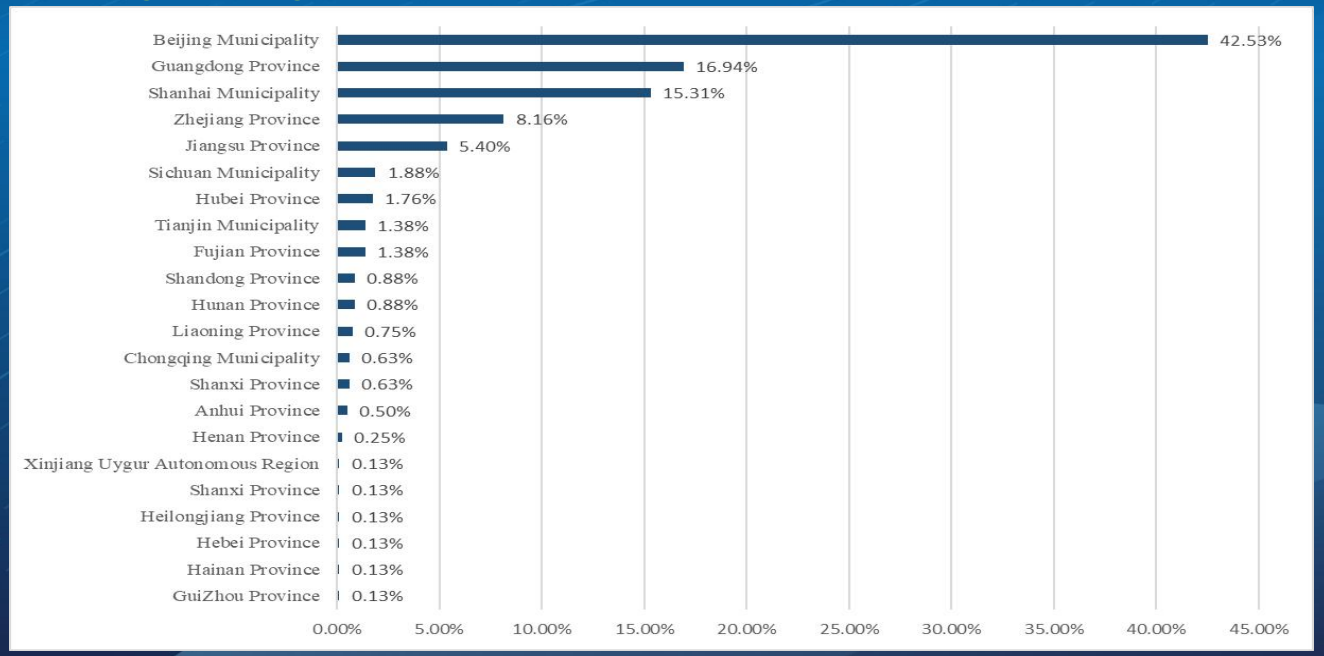
Innovation Subject		2017	2018	2019
Artificial Intelligence Enterprise	Listed Company	124	149	144
	Unicorn Company	146	94	97
	Others	138	502	556
	Total Enterprise Samples	408	745	797
Investor		834	1780	1915
University and Non-university Research Institute	University	73	94	109
	Non-university Research Institute	56	75	103
Linker	Conference	138	823	909
	Industry Alliance	83	117	190
Government	Policy	42	301	577
	Industrial Park	107	163	301
Total		1741	4098	5554

II. The Foundation and Structure of China's Intelligent Economy

1. Intelligence enterprises

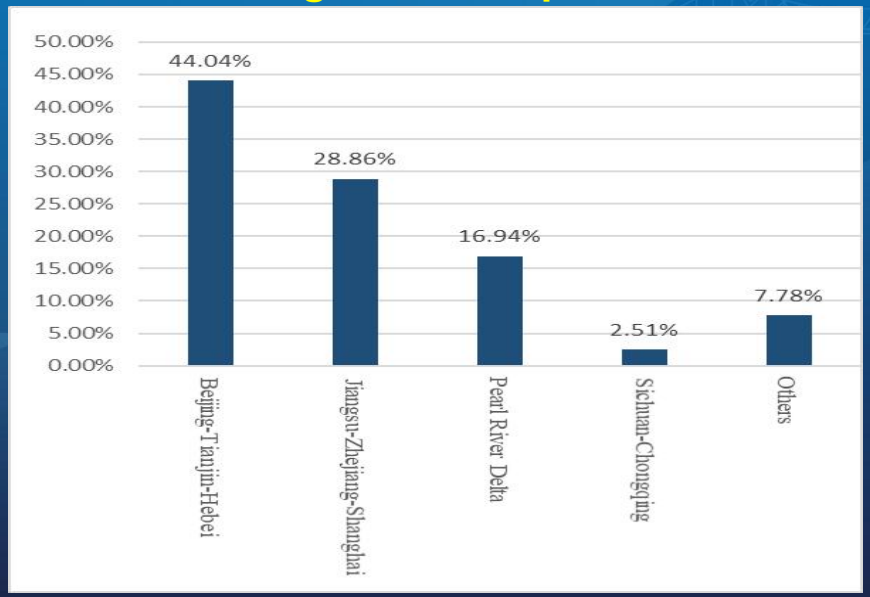
The peak value created by 797 artificial intelligence companies appears in 2015; mainly distributed in Beijing, Guangdong, Shanghai and Zhejiang; among the four metropolitan coordinating region, Beijing-Tianjin-Hebei region ranks first, followed by Jiangsu-Zhejiang-Shanghai region and the Pearl River Delta.





Distribution of 797 artificial intelligence enterprises in provinces, municipalities and autonomous regions

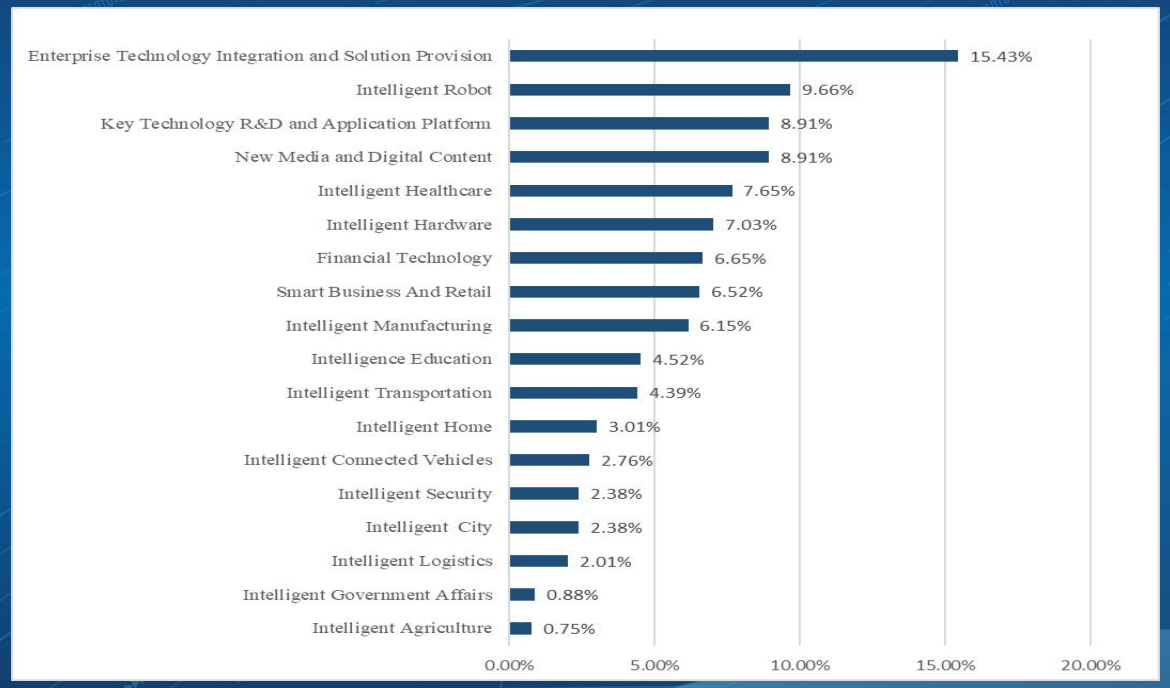
Creation time distribution of 797 artificial intelligence enterprises



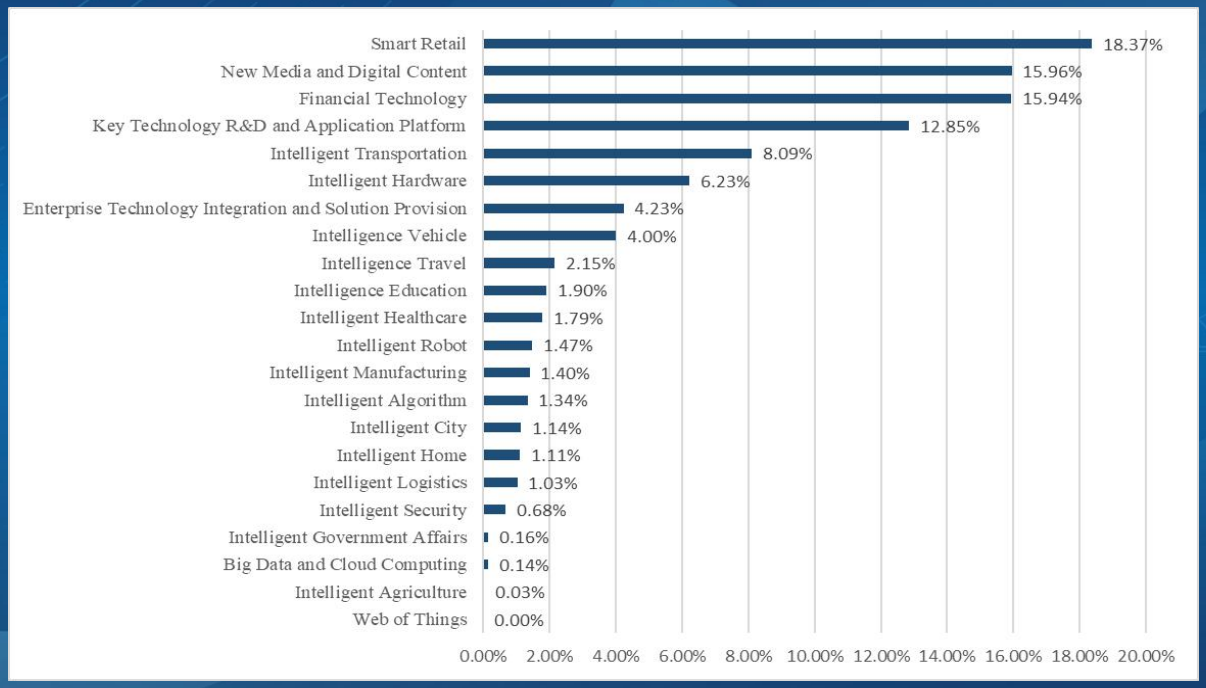
Distribution of 797 artificial intelligence enterprises in national metropolitan areas

Application field distribution:

Artificial intelligence has been applied in 18 fields.

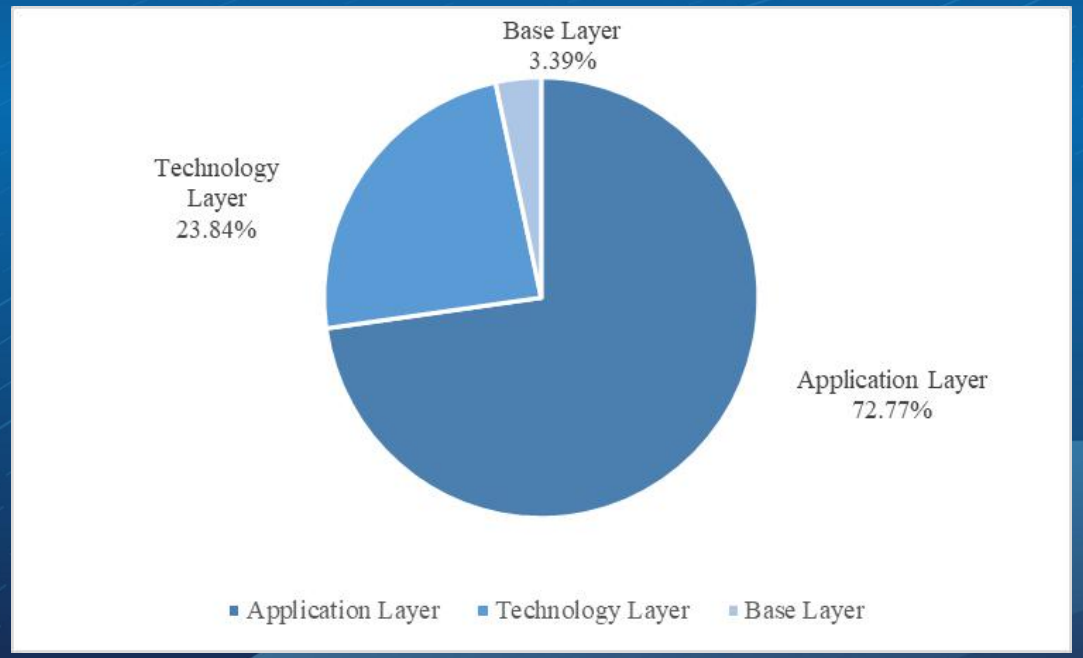


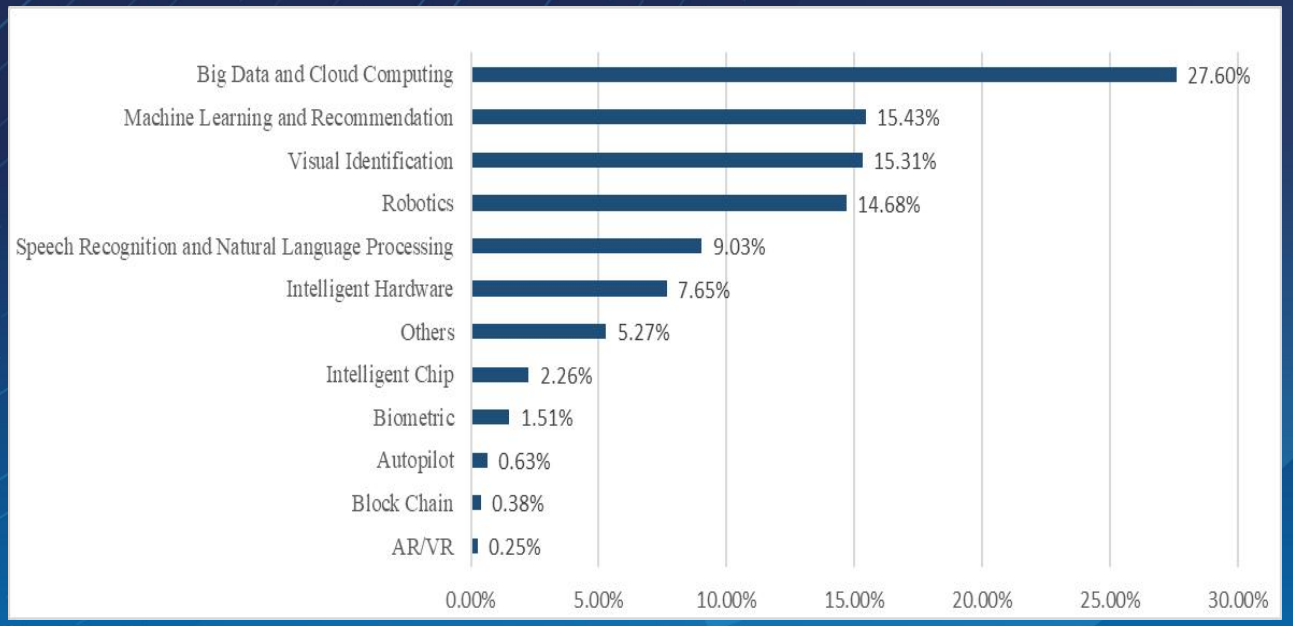
Application field distribution of 797 artificial intelligence enterprises



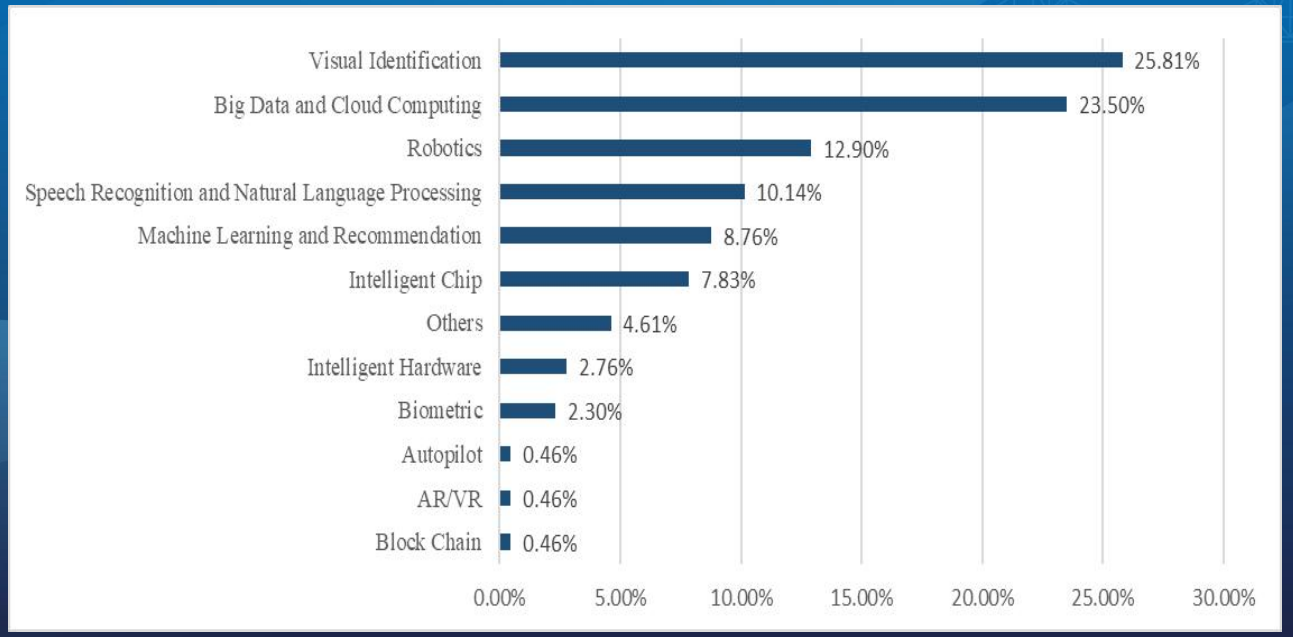
Financing amount proportion in application field of 577 artificial intelligence sample enterprises

Technology distribution：the base-layer accounts for 3.39%,technology-layer 23.84%,and application-layer 72.77%.





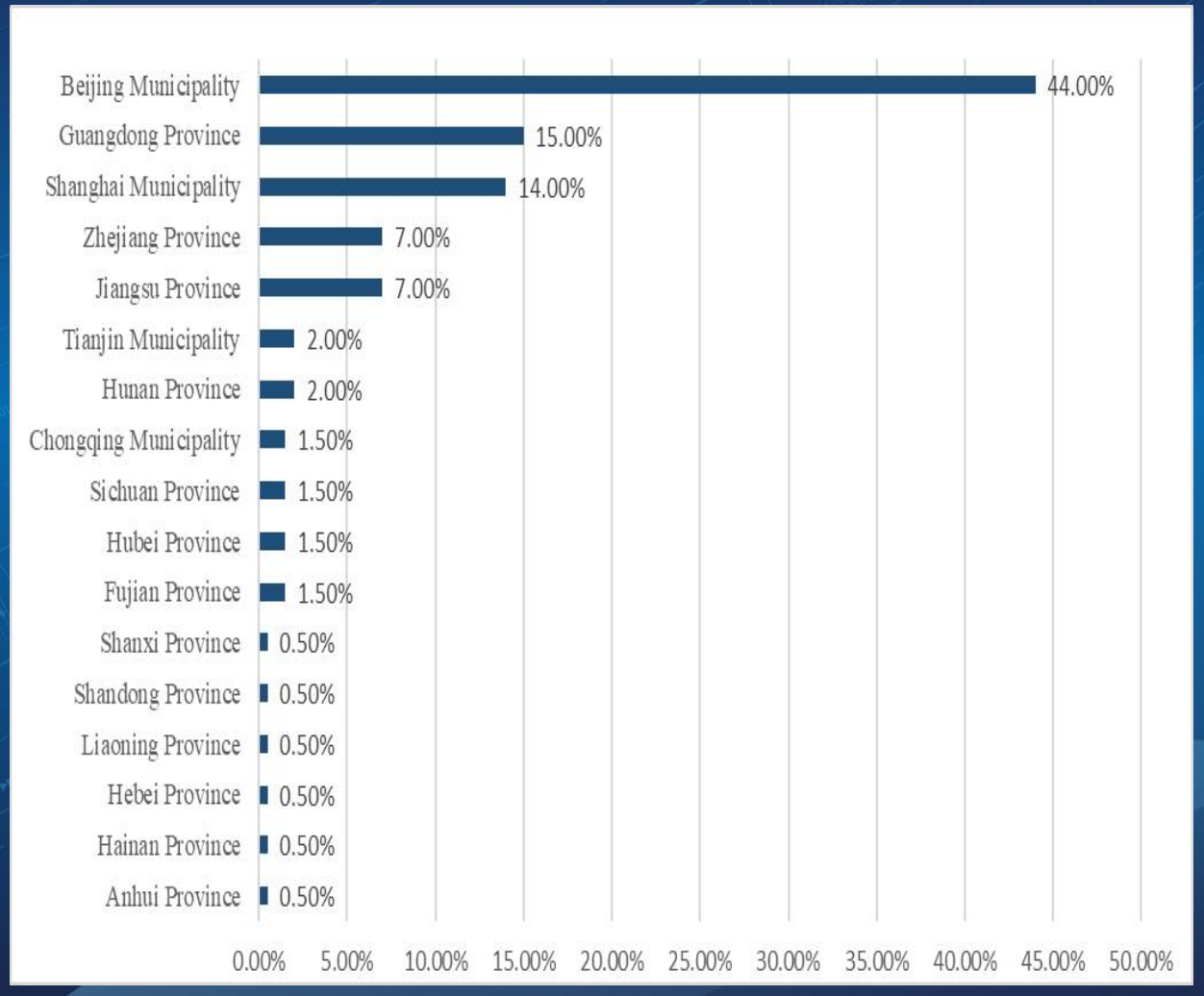
Core technology distribution of 797 intelligence enterprises



Core technology distribution of 217 base-layer and technology-layer intelligence enterprises

Patent quantity and research intensity

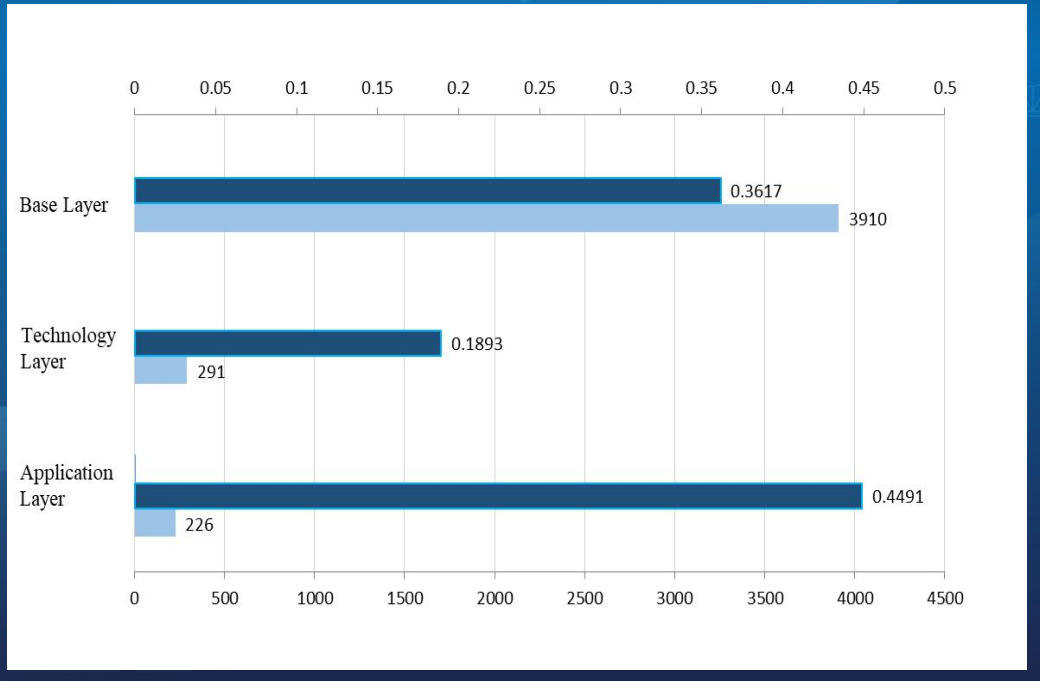
Patent quantity



Reginal distribution of patent quantity TOP200 sample enterprises

Research intensity TOP20 listed company

TOP20 List of Listed Companies	Research and Development Strength	TOP20 List of Listed Companies	Research and Development Strength
Jieshang Visual	82.85%	Tonghuashun	28.56%
Weilai Automobile	80.75%	Huazhong Numerical Control	26.10%
Hengsheng Electronic	43.05%	Meitu	25.05%
Jinshan Software	37.85%	Gaode Infrared	24.72%
Baoqianli	37.02%	Jiuan Medical	24.38%
Yingfusen	35.92%	Shenxinfu Technology	24.16%
Haixin Technology	35.36%	Yuanguang Technology	23.31%
Lvjing Company	34.98%	Jinzhi Technology	22.88%
Hongruan Technology	32.42%	Huiding Technology	22.53%
Xiecheng	29.51%	Iflytek	22.39%



Patent quantity proportion and average patent quantity of enterprises in each layer

2. Academic ecosystem

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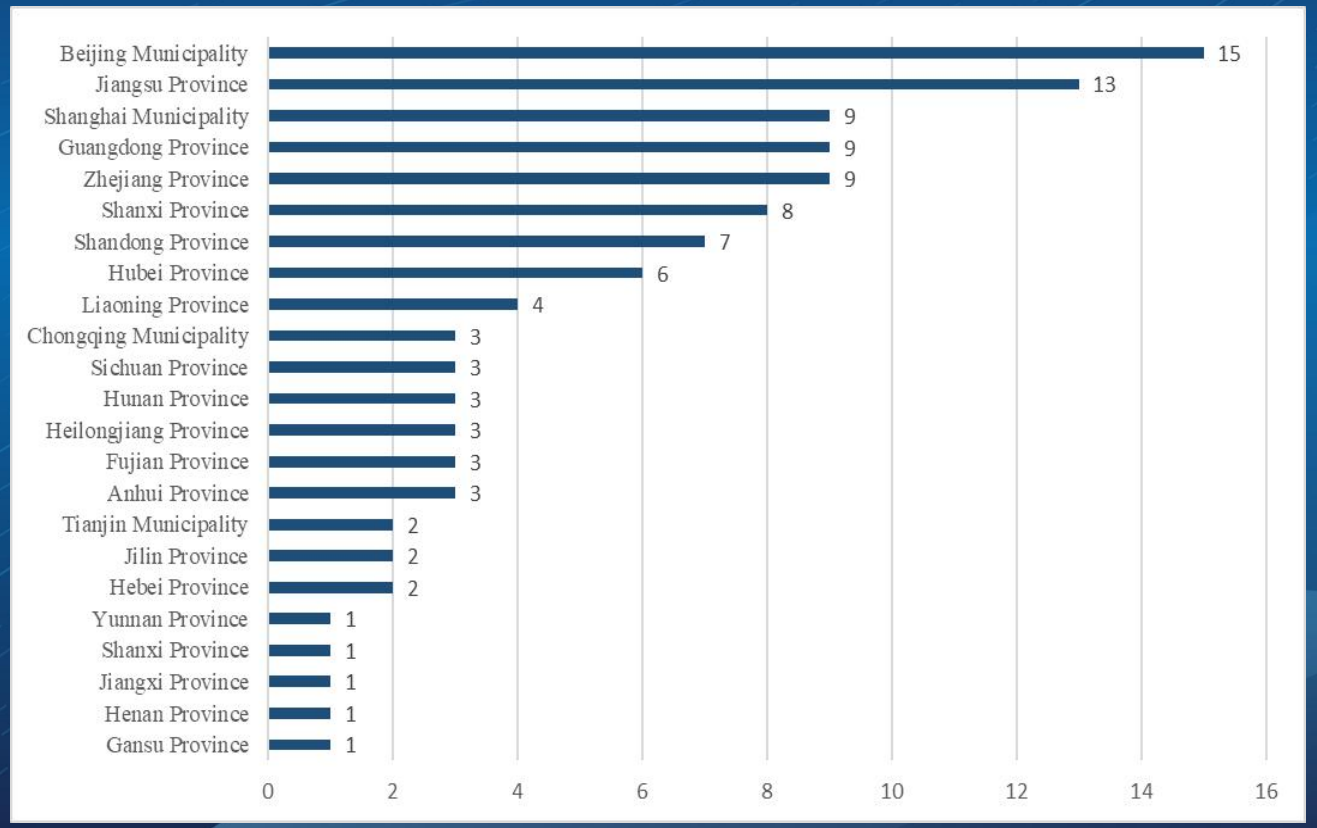
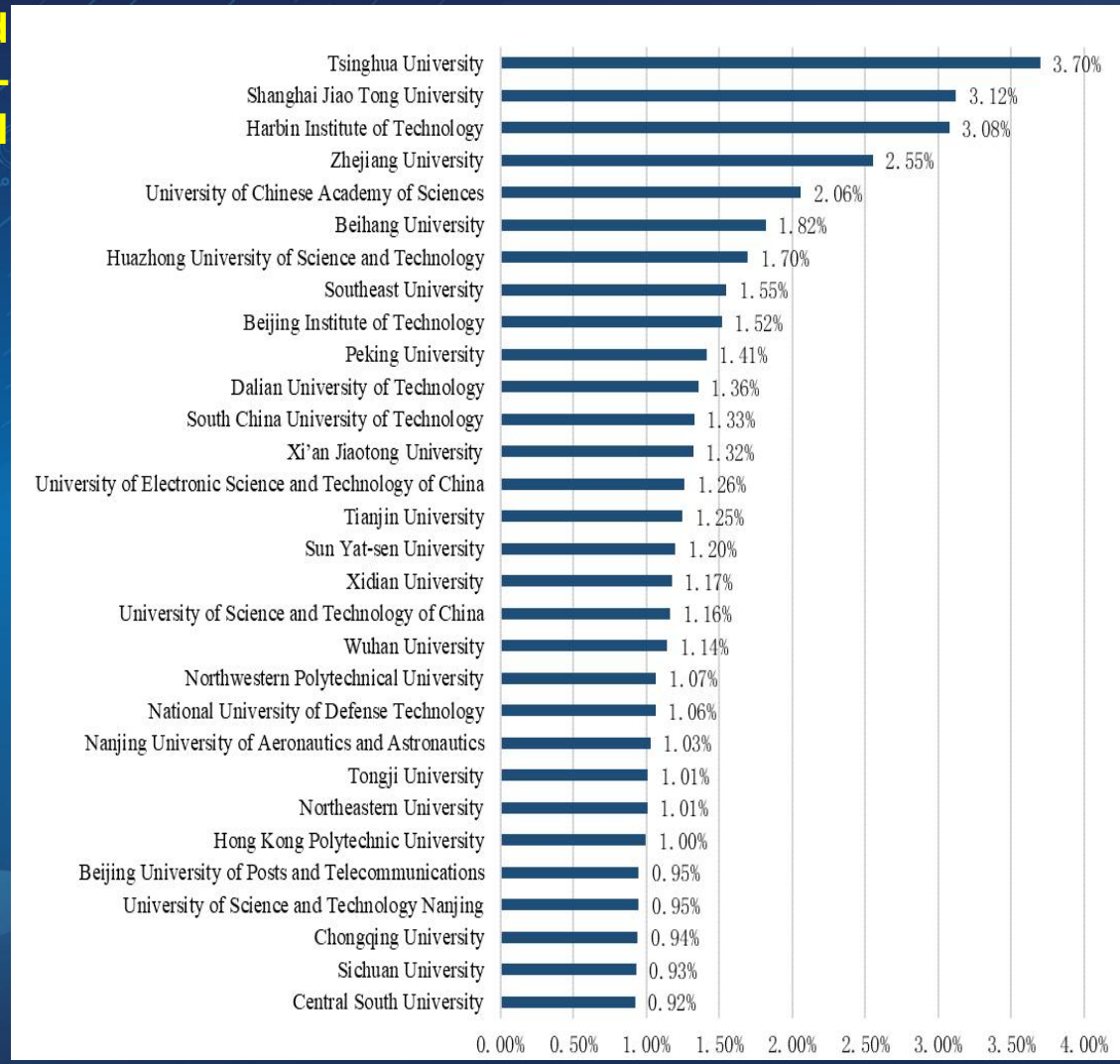
As of December 31, 2019, 109 AI universities in mainland China are detected. At the same time, a total of 103 non-university research institutes in the field of artificial intelligence are detected, compared with the 75 institutes at the end of 2018, an increase of 28.



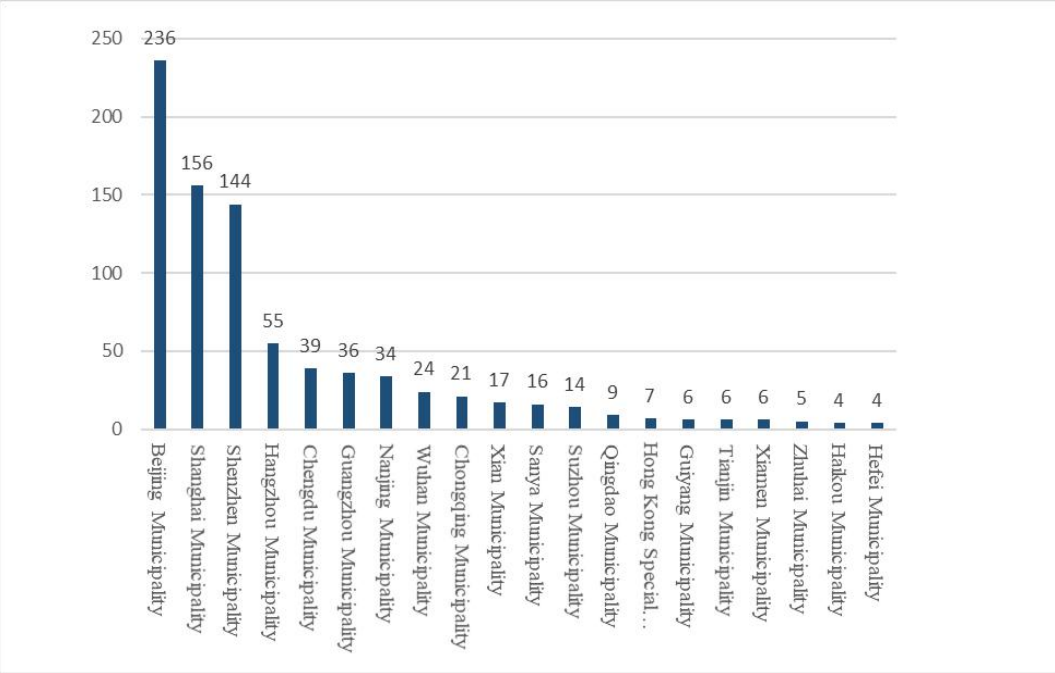
Reginal distribution of 109 China's AI universities



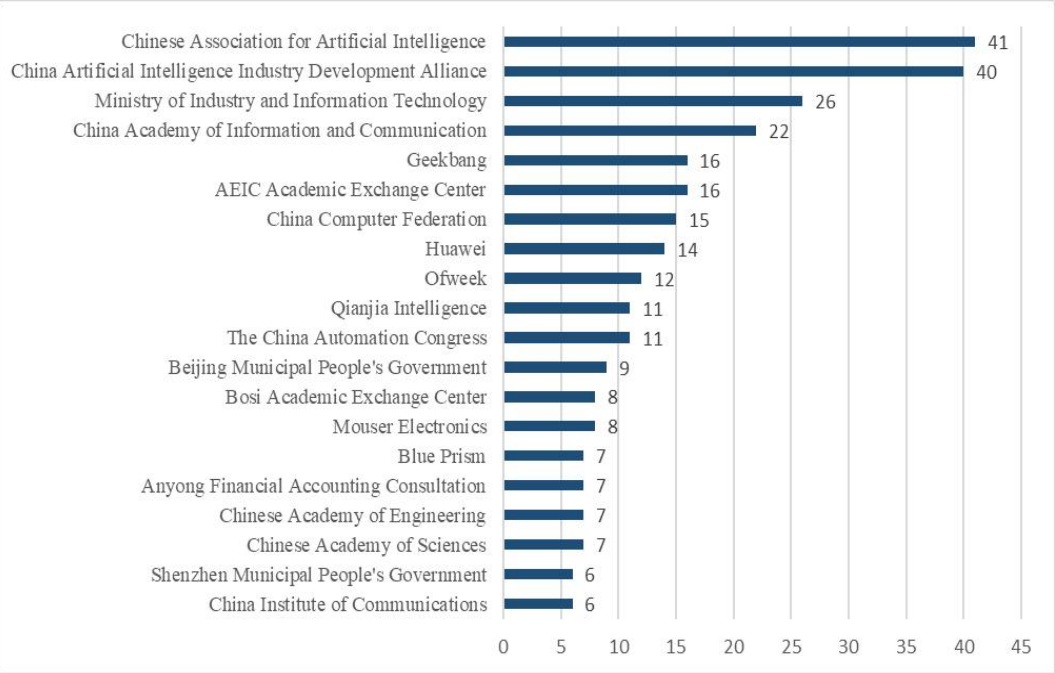
Published international paper number TOP30 universities and their paper number proportions

3. Linker

From January 1, 2019 to December 31, 2019, **909** artificial intelligence conferences are detected by this report, more than the **823** conferences in 2018.



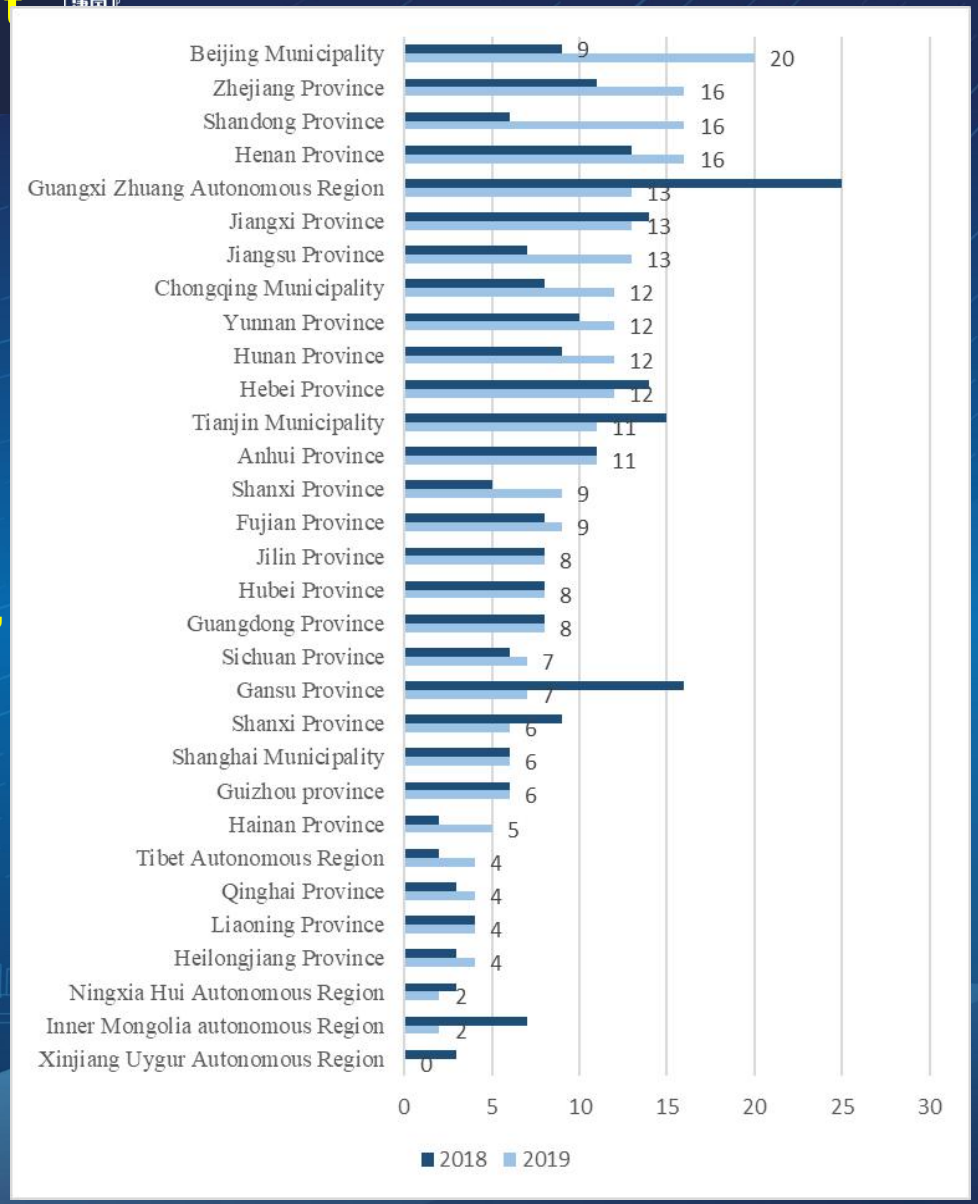
Urban distribution of artificial intelligence conferences held in China in 2019 (TOP20)



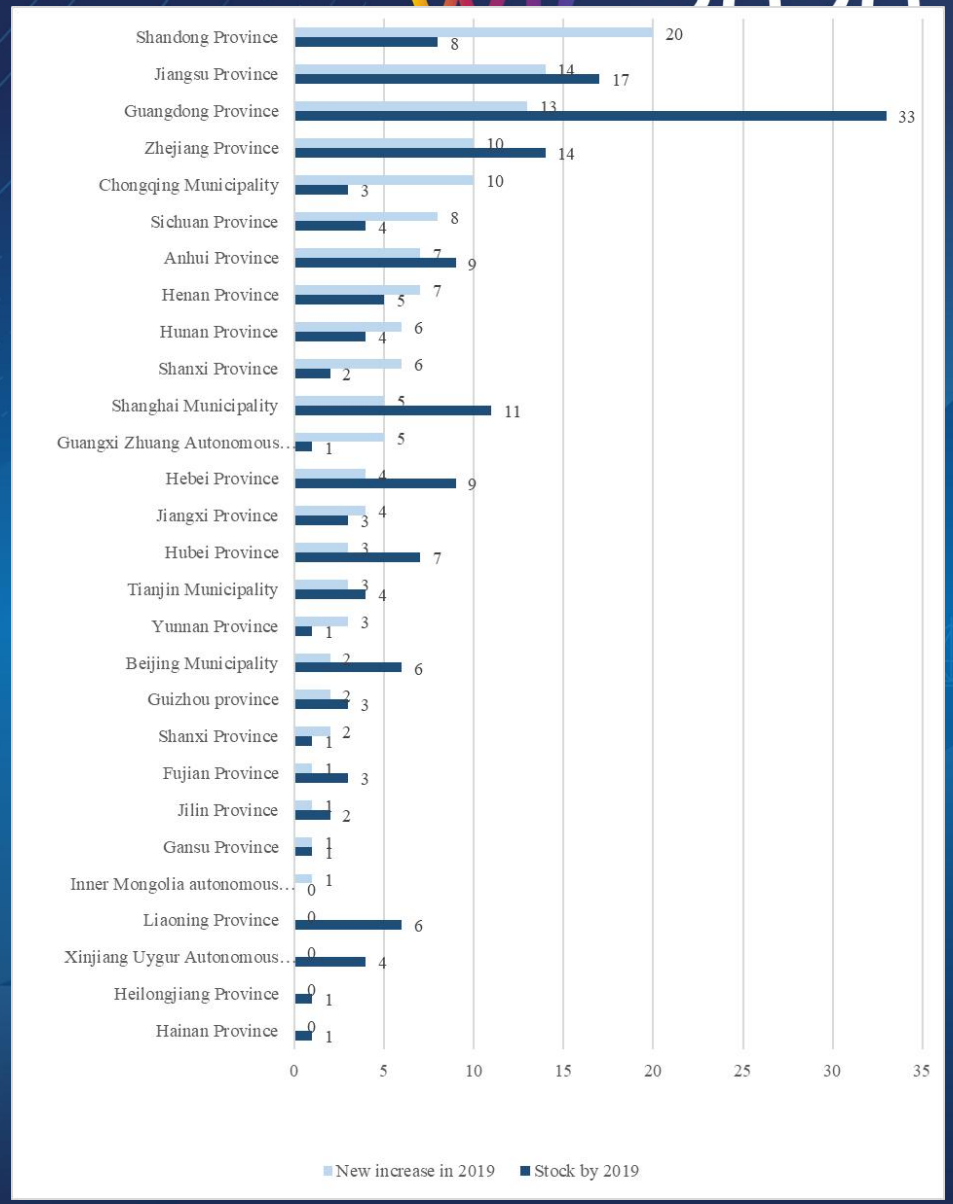
Top20 organizers of artificial intelligence related conferences in 2019

3. Government responses

From January 1, 2019 to December 31, 2019, this report detects a total of 276 artificial intelligence policy documents issued by 31 provinces, municipalities and autonomous regions in China. At the same time, it is detected that a total of 301 artificial intelligence industrial parks were planned and constructed by provinces, municipalities and autonomous regions across the country, and 138 were added in 2019 compared with 163 industrial parks in 2018.



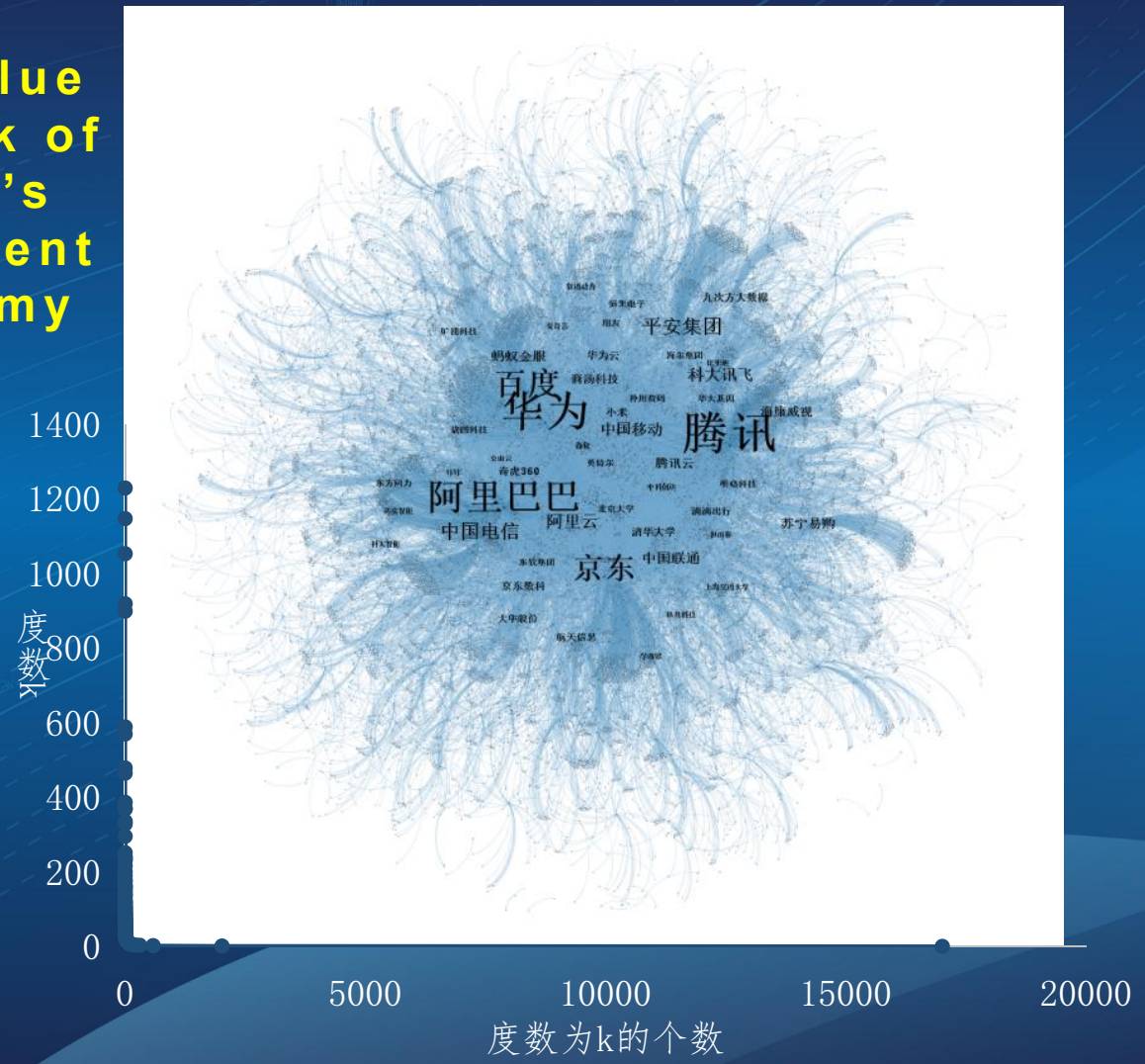
Artificial Intelligence policy numbers published in 2018 and by provinces, municipalities and autonomous regions



Distribution of artificial intelligence industrial parks in by provinces, municipalities and autonomous regions

III. The Driving Force of China's Intelligent Economy

The Value Network of China's Intelligent Economy

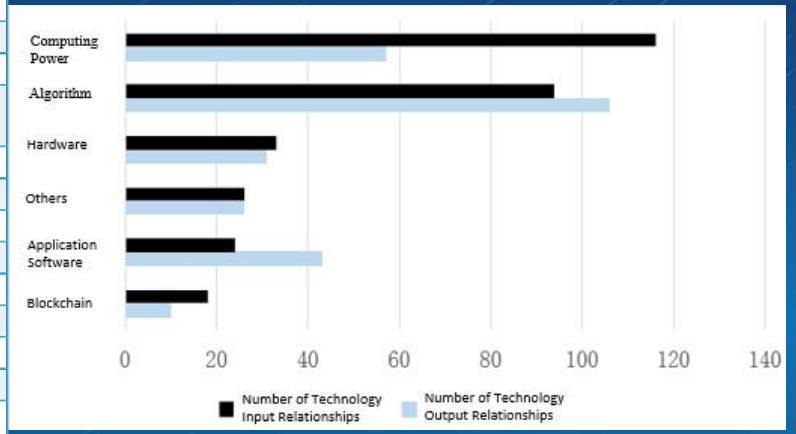


The value network of China's intelligent economy based on the relational data of 797 artificial intelligence enterprises

List of structural statistical indicators of the value network of China's intelligent economy

Statistical indicator	Statistic value
Total Number of Sample Nodes	797
Total Number of Value Network Graph Nodes	21413
Total Number of Value Network Graph Relations	31949
Average Degree	1.492
Average Clustering Coefficient	0.021
Average Path Length	4.407

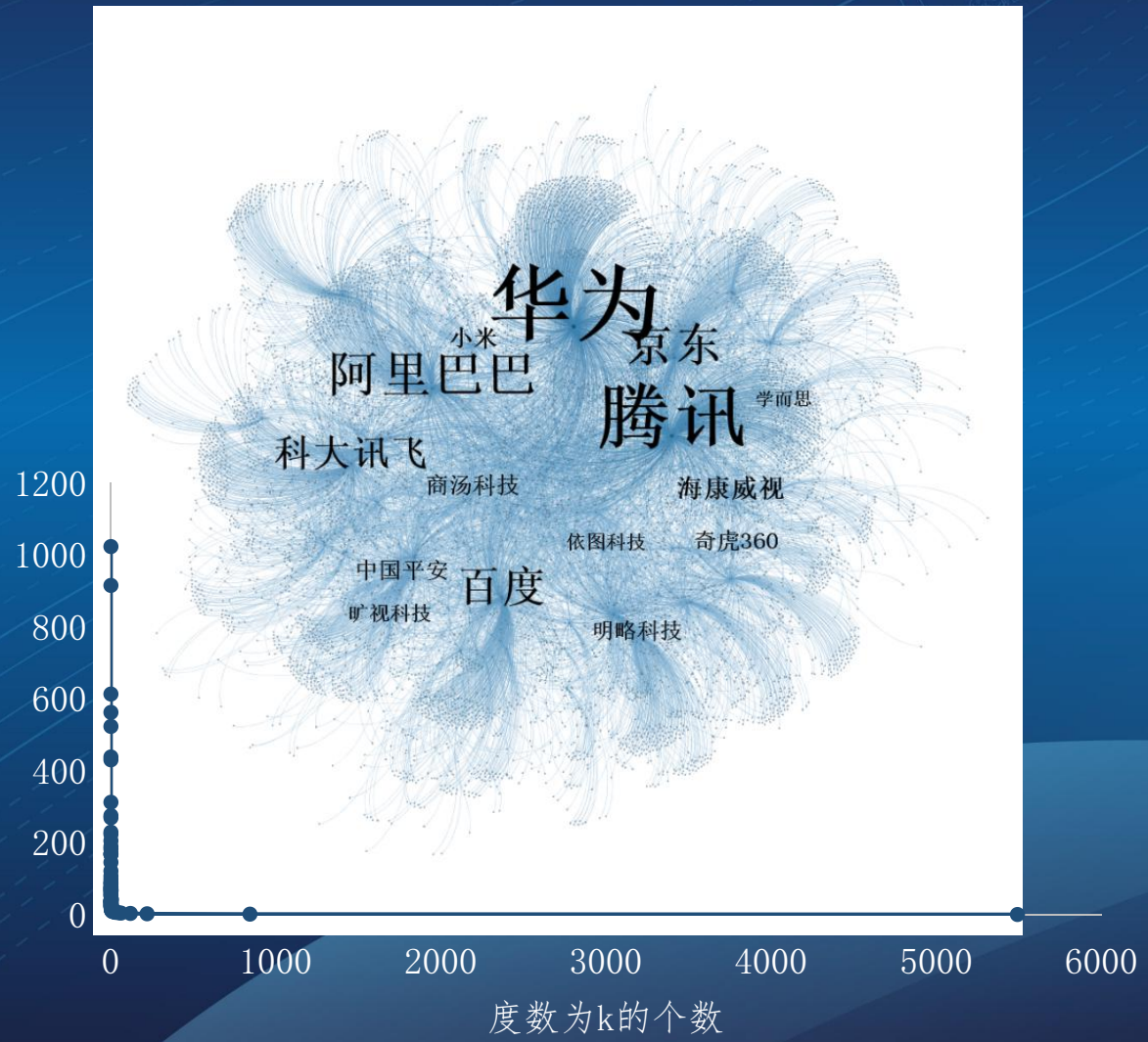
Top30 Relationship Between Nodes	Weighted Degree Center Degree	Top30 Sample Node	Weighted Degree Center Degree
Tsinghua University	350	Tencent	1572
Intel	232	Huawei	1504
Peking University	167	Alibaba	1283
Shanghai Jiao Tong University	120	Baidu	1175
Microsoft	119	Jingdong	1071
Sequoia Capital China	117	China Telecom	711
Zhejiang University	107	Pingan Group	650
Foxconn	94	Alibaba Cloud Computing	564
Nvidia	80	Iflytek	538
Zhenfund	66	China Unicom	536
Matrix Partners China	66	China Mobile	522
IBM	64	Ant Financial	425
Fudan University	62	Suning	414
Venus Tech	61	Tencent Cloud	379
People's University of China	59	Hikvision	375
Qualcomm	58	Shangtang Technology	349
Huazhong University of Science And Technology	51	Xiaomi	303
Chenxing Capital	46	Qihu 360	272
University Of Science and Technology Of China	45	Huawei Clous	258
Harbin Institute of Technology	44	Ninth Power Big Data	249
Nanjing University	40	Jingdong Mathematics	248
Beihang University	39	Didi	245
Beijing Institute of Technology	38	Yitu Technology	218
Tencent Investment	38	Dahua Share	217
Legend Capital	38	Aisino	204
Shumeng Workshop	36	Digital China	201
University of Electronic Science and Technology of China	35	Hengsheng Electron	193
Beijing University of Posts and Telecommunications	34	Ufida	193
China Academy of Communications	34	Neusoft	193
Academia Sinica	33	Kuangshi Technology	179



Group comparison: the relation number of international technology input and output

the Relation of Technology Input TOP30 Sample Node		the Relation of Technology Output TOP30 Sample Node	
Corporate Name	The Number of Technology Input	Corporate Name	The Number of Technology Output
Baidu	149	Tencent	1039
Tencent	115	Huawei	978
Alibaba	113	Jingdong	645
Jingdong	104	Alibaba	602
Huawei	88	Baidu	594
China Unicom	76	Alibaba Cloud	350
Alibaba Cloud	72	China Mobile	294
Tencent Cloud	67	IFLYTEK	289
Didi Taxi	66	China Unicom	288
China Mobile	65	Tencent Cloud	260
Xiaomi	58	China TELECOM	255
Ping An Group	57	Hicloud	224
Hikvision	55	Ping An Group	164
China TELECOM	49	Ant Financial	158
Oriental Pearl Group	47	Qihoo 360	154
YITU Technology	45	Hikvision	147
Digital China	41	SenseTime	137
Dahua Technology	38	YITU Technology	124
ThunderSoft	36	Xiaomi	123
DingTalk	35	Didi Taxi	115
Qihoo 360	32	Dahua Technology	94
UFIDA	32	Kingsoft Cloud Group	89
Ant Financial	31	DingTalk	86
H3C	28	MEGVII	85
Mininglamp	26	USFOUN BIGDATA	81
SenseTime	24	Digital China	80
InSigma	22	H3C	78
vivo	20	JD Digits	76
Neusoft Group	20	Mininglamp	74
JD Digits	20	SIASUN Robot	73

IV. Platform-led Innovation Ecosystem



Class statistics of value network relationship data of 15 artificial intelligence platforms

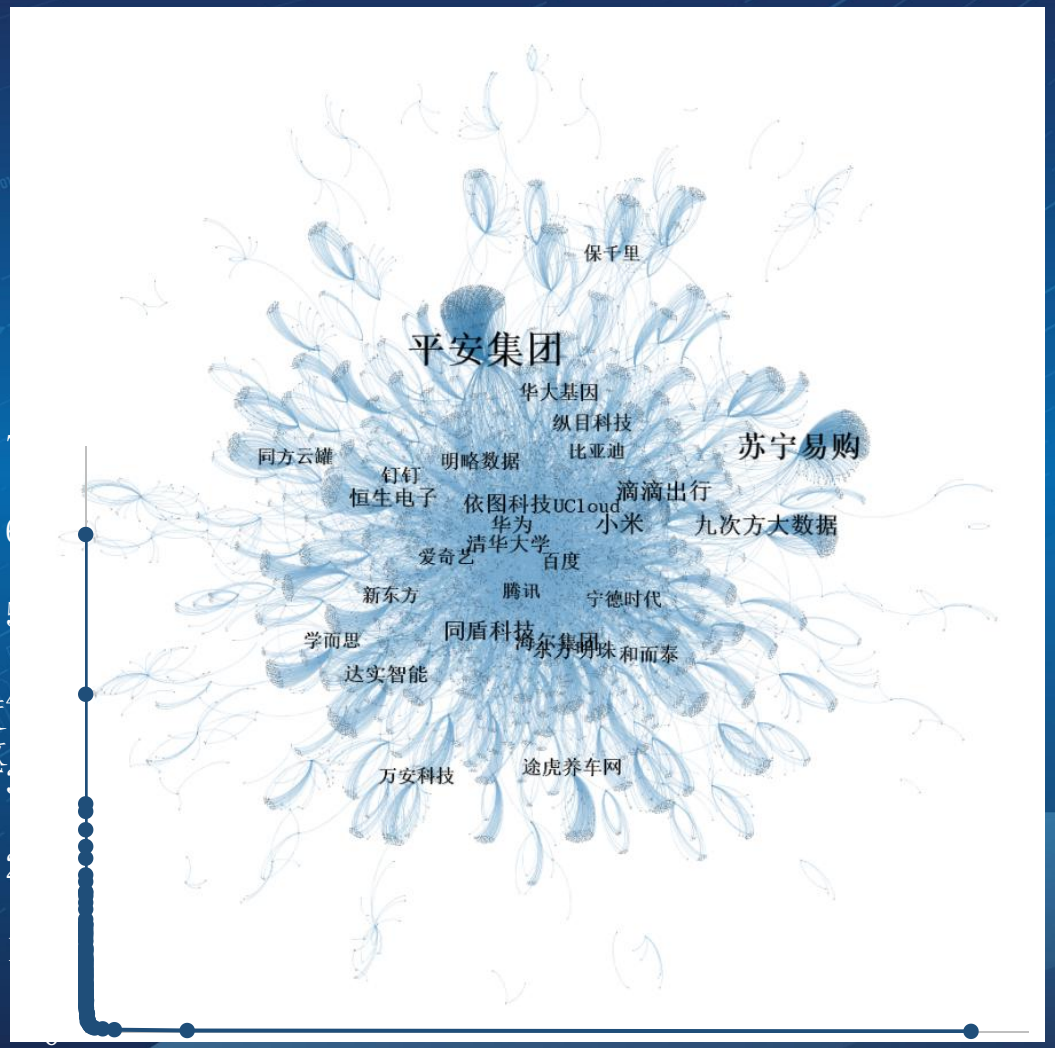
	Category	Relation Number	Proportion
Technology Relation	Technology Input	1095	100%
	Domestic	891	81.37%
	Overseas	204	18.63%
	Technology Output	6417	100%
	Domestic	5871	91.49%
	Overseas	547	8.51%
Human Capital	Previous Learning Experience	307	100%
	Domestic	220	71.66%
	Overseas	87	28.34%
	Previous Working Experience	510	100%
	Domestic	377	73.92%
	Overseas	133	26.08%
Investment and Financing Relation	Investment and Financing Number	2076	100%
	Financing Number	435	20.95%
	Investment Number	1641	79.05%

the Relation of Technology Input TOP10 Domestic Area			the Relation of Technology Input TOP10 Countries and Regions		
Province	The Number of Technology Input	The Proportion of Technology Input	Country	The Number of Technology Input	The Proportion of Technology Input
Beijing	325	29.68%	America	126	11.51%
Guangdong	188	17.17%	Germany	23	2.10%
Shanghai	92	8.40%	England	13	1.19%
Zhejiang	63	5.75%	Singapore	11	1.00%
Jiangsu	31	2.83%	South Korea	8	0.73%
Shandong	20	1.83%	Japan	8	0.73%
Fujian	19	1.74%	Israel	7	0.64%
Shanxi	17	1.55%	Holland	6	0.55%
Anhui	16	1.46%	France	4	0.37%
Sichuan	15	1.37%	Finland	4	0.37%
The Relation of Technology Output TOP10 Domestic Area			The Relation of Technology Output TOP10 Countries and Regions		
Province	The Number of Technology Output	The Proportion of Technology Output	Country	The Number of Technology Output	The Proportion of Technology Output
Beijing	1426	22.22%	America	165	2.57%
Guangdong	972	15.15%	Germany	70	1.09%
Shanghai	522	8.13%	France	40	0.62%
Zhejiang	336	5.24%	England	35	0.55%
Jiangsu	286	4.46%	Japan	29	0.45%
Shandong	224	3.49%	Singapore	24	0.37%
Shanxi	178	2.77%	Switzerland	21	0.33%
Chongqing	177	2.76%	South Korea	18	0.28%
Sichuan	169	2.63%	Holland	17	0.26%
Fujian	159	2.48%	Italy	12	0.19%

the Relation of Technology Input TOP10 Integrative Industrial Sectors			the Relation of Technology Input TOP10 AI Core Industrial Sectors		
Industry	The Number of Technology Input	The Proportion of Technology Input	Industry	The Number of Technology Input	The Proportion of Technology Input
Software and Information Services	97	8.86%	Big Data and Cloud Computing	167	15.25%
Electronic Manufacturing	63	5.75%	AI Platform	125	11.42%
Communications	49	4.47%	AI Technology	89	8.13%
Commercial Service	34	3.11%	Smart Chip	55	5.02%
Internet	22	2.01%	Smart City	37	3.38%
Equipment Manufacturing	16	1.46%	Visual Identity	31	2.83%
Automobile	15	1.37%	Internet of Things	30	2.74%
HealthCare	12	1.10%	Robot	24	2.19%
Finance	11	1.00%	Wise Information Technology of 120	19	1.74%
Transportation	10	0.91%	Blockchain	17	1.55%
The Relation of Technology Output TOP10 Integrative Industrial Sectors			The Relation of Technology Output TOP10 AI Core Industrial Sectors		
Industry	The Number of Technology Output	The Proportion of Technology Output	Industry	The Number of Technology Output	The Proportion of Technology Output
Software and Information Services	335	5.22%	Big Data and Cloud Computing	714	11.31%
Finance	333	5.19%	Smart City	554	8.63%
Communications	293	4.57%	AI Technology	225	3.51%
Automobile	270	4.21%	Wise Education	224	3.49%
Commercial Service	251	3.91%	AI Platform	161	2.51%
Media	241	3.76%	Intelligent Transportation	130	2.03%
HealthCare	220	3.43%	Talent Cultivation	103	1.61%
Transportation	203	3.16%	Wise Information Technology of 120	102	1.59%
Life Services	182	2.84%	Smart Government Affairs	82	1.28%
Electronic Manufacturing	141	2.20%	Intelligent Logistics	73	1.14%

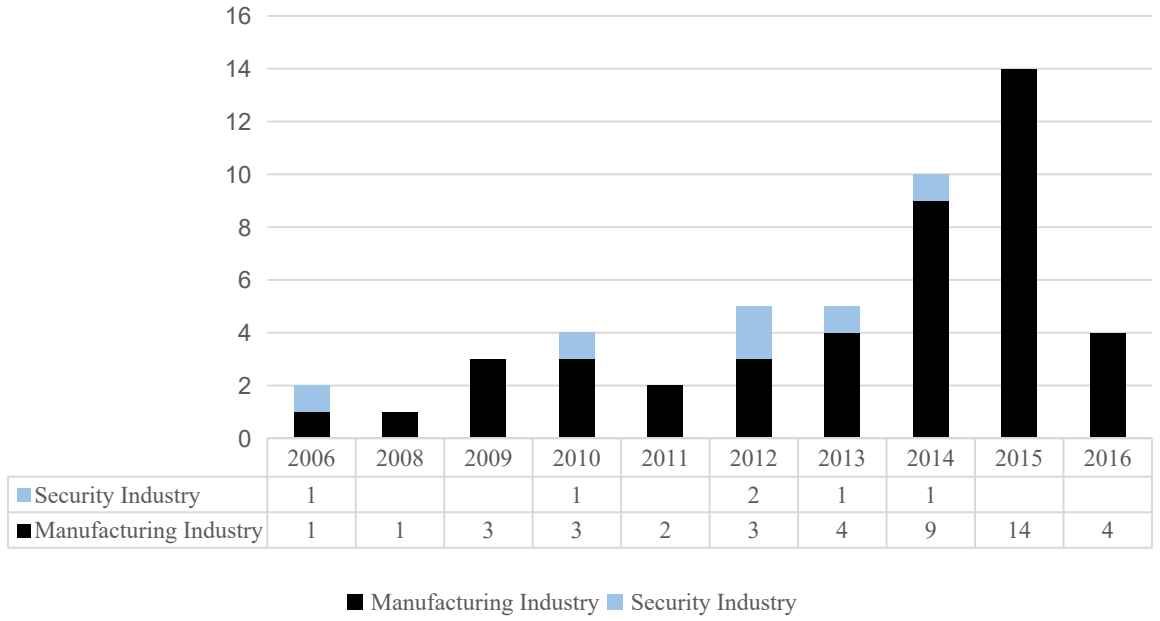
V. Converged Industry Sector

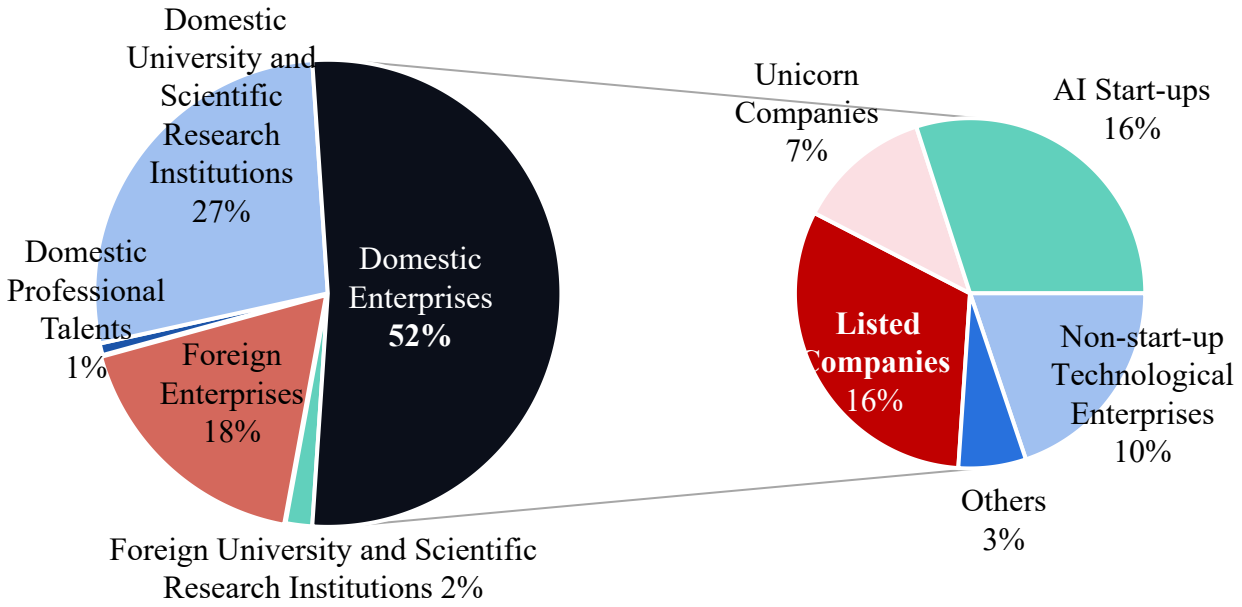
Application-layer Enterprise Value Network

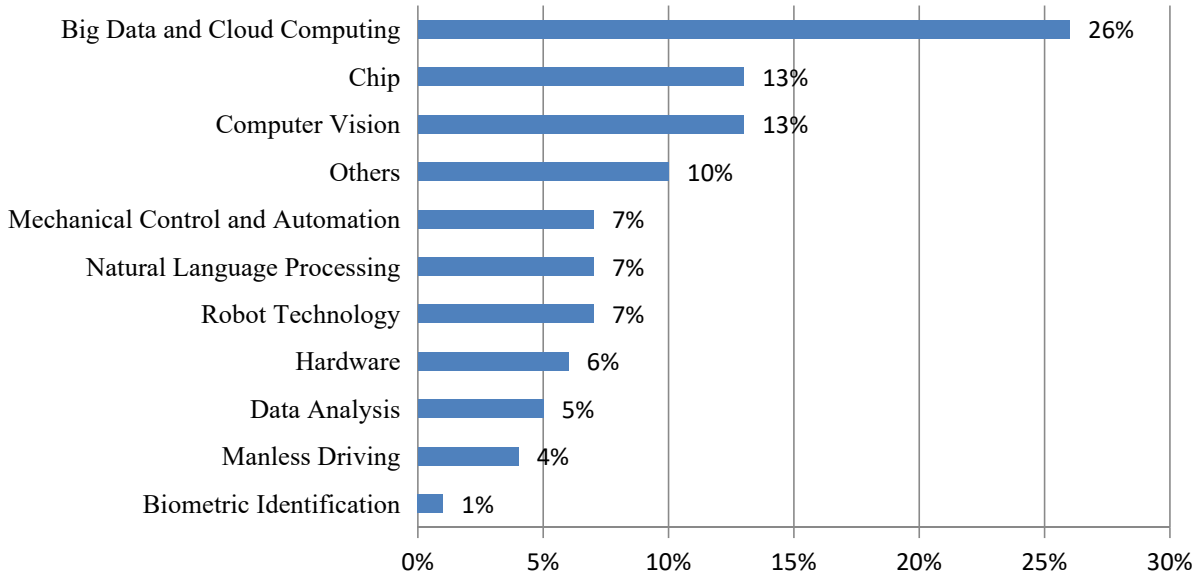


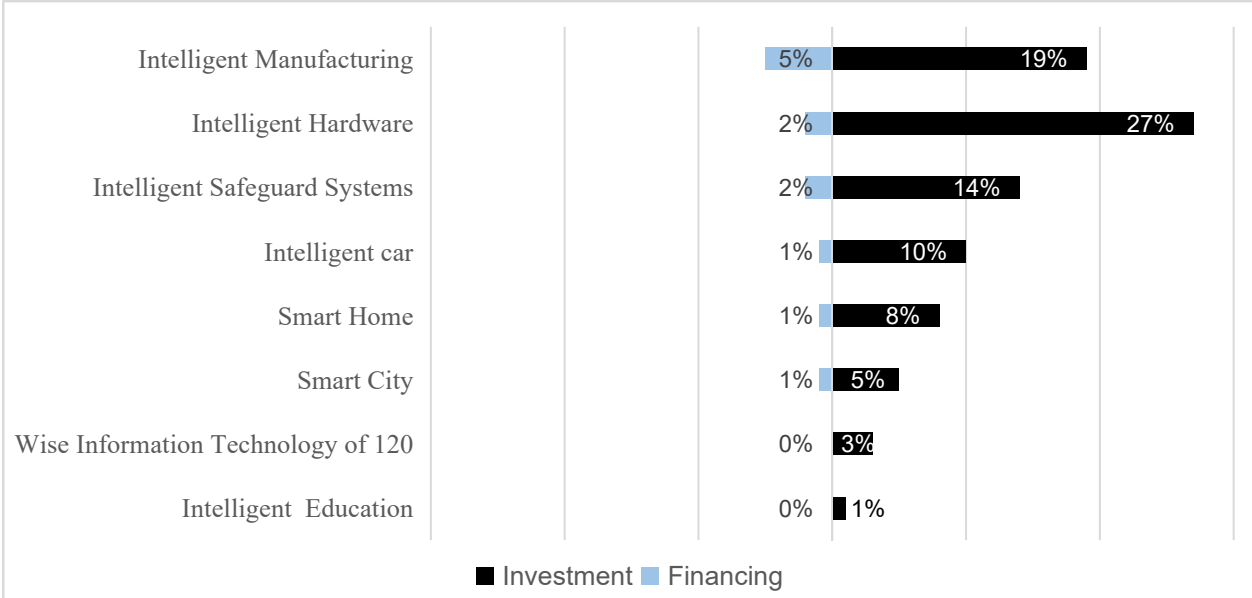
TOP15 Sample Node	Weighted Degree Centrality	TOP15 Relation Node	Weighted Degree Centrality
Ping An Group	595	Huawei	180
Su Ning	404	Tsinghua University	168
Xiaomi	273	Baidu	128
Didi Taxi	264	Tencent	119
USFOUN BIGDATA	242	Sequoia Capital China	88
Tongdun Technology	222	Peking University	87
YITU Technology	208	Alibaba	86
Hundsun	188	Intel	84
Oriental Pearl Group	167	Alibaba Cloud	80
Das Intellitech	163	Shanghai Jiaotong University	63
UCloud	163	China Unicom	57
Haier Group	155	Zhejiang University	56
The Beijing Genomics Institute	147	Matrix Partners China	55
Mininglamp	135	China Mobile	50
HeT	130	ZhenFund	46

The leading role of 50 non-initial AI listed enterprises in the development of the converged industry sector

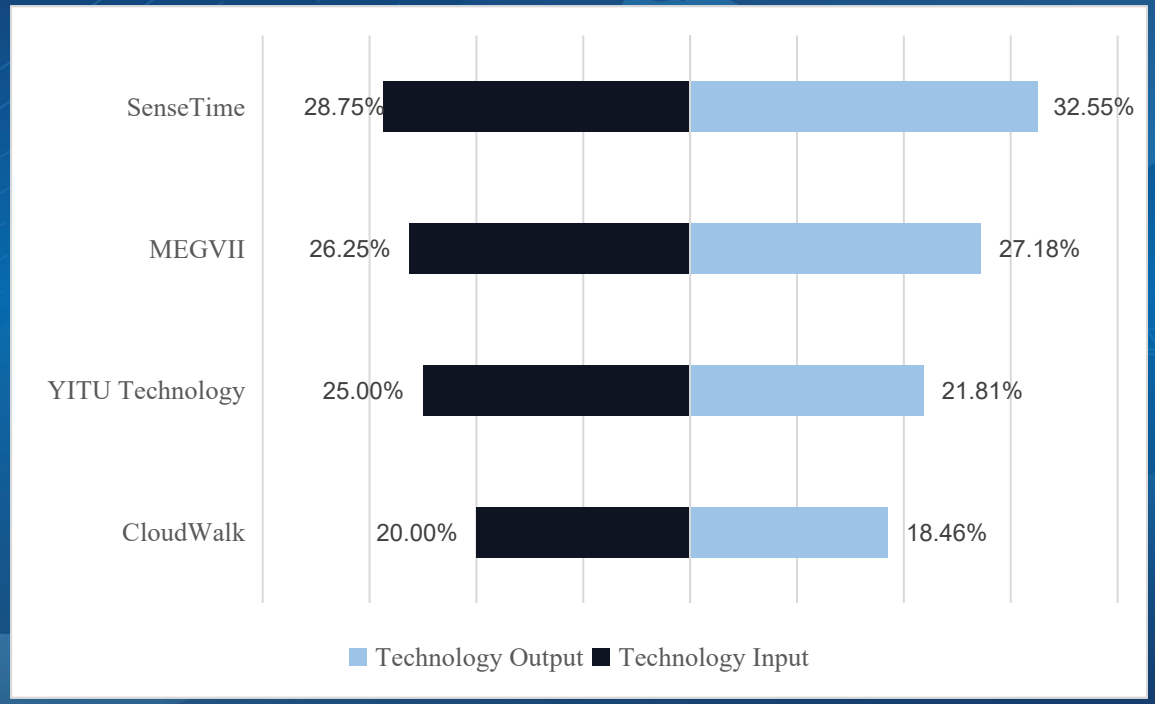








The active anticipation of unicorn companies: SenseTime, Megvii Technology, Yitu Technology and CloudWalk



the Relation of Technology Input TOP5 Regional Distribution

SenseTime		MEGVII		YITU Technology		CloudWalk	
Region	Proportion	Region	Proportion	Region	Proportion	Region	Proportion
Guangdong	21.74%	Guangdong	14.29%	Guangdong	35.00%	Beijng	43.75%
America	17.39%	Beijng	14.29%	Shanghai	25.00%	Guangdong	25.00%
Shanghai	17.39%	Shanghai	9.52%	America	15.00%	America	12.50%
Beijng	13.04%	Sichuan	9.52%	Beijng	10.00%	Shandong	6.25%
Hong Kong	8.70%	Fujian	4.76%	Fujian	5.00%	Shanghai	6.25%

The Relation of Technology Output TOP5 Regional Distribution

SenseTime		MEGVII		YITU Technology		CloudWalk	
Region	Proportion	Region	Proportion	Region	Proportion	Region	Proportion
Guangdong	20.62%	Beijng	28.40%	Shanghai	27.69%	Beijng	27.27%
Shanghai	19.59%	Guangdong	16.05%	Beijng	16.92%	Guangdong	18.18%
Beijng	17.53%	Shanghai	6.17%	Guangdong	16.92%	Shanghai	12.73%
Hong Kong	6.19%	Zhejiang	6.17%	Shandong	7.69%	Shandong	7.27%
America	5.15%	Henan	3.70%	Zhejiang	6.15%	Chongqing	5.45%

SenseTime

The Industry of the Relation Node of the Technology Input TOP5	The Number of Technology Input	The Proportion of Technology Input	The Industry of the Relation Node of the Technology Output TOP5	The Number of Technology Output	The Proportion of Technology Output
AI Technology	5	21.74%	Smart City	10	10.31%
Visual Identity	5	21.74%	Finance	9	9.28%
Smart City	4	17.39%	Wise Education	9	9.28%
Edge Computing	2	8.70%	AI Technology	8	8.25%
Intelligent Hardware	2	8.70%	Visual Identity	6	6.19%

MEGVII

The Industry of the Relation Node of the Technology Input TOP5	The Number of Technology Input	The Proportion of Technology Input	The Industry of the Relation Node of the Technology Output TOP5	The Number of Technology Output	The Proportion of Technology Output
Visual Identity	4	19.05%	Visual Identity	8	9.88%
Intelligent Hardware	4	19.05%	Smart City	8	9.88%
Big Data and Cloud Computing	3	14.29%	Intelligent Safeguard Systems	7	8.64%
Robot	2	9.52%	New Retail	6	7.41%
Smart Chip	2	9.52%	Big Data and Cloud Computing	5	6.17%

YITU Technology

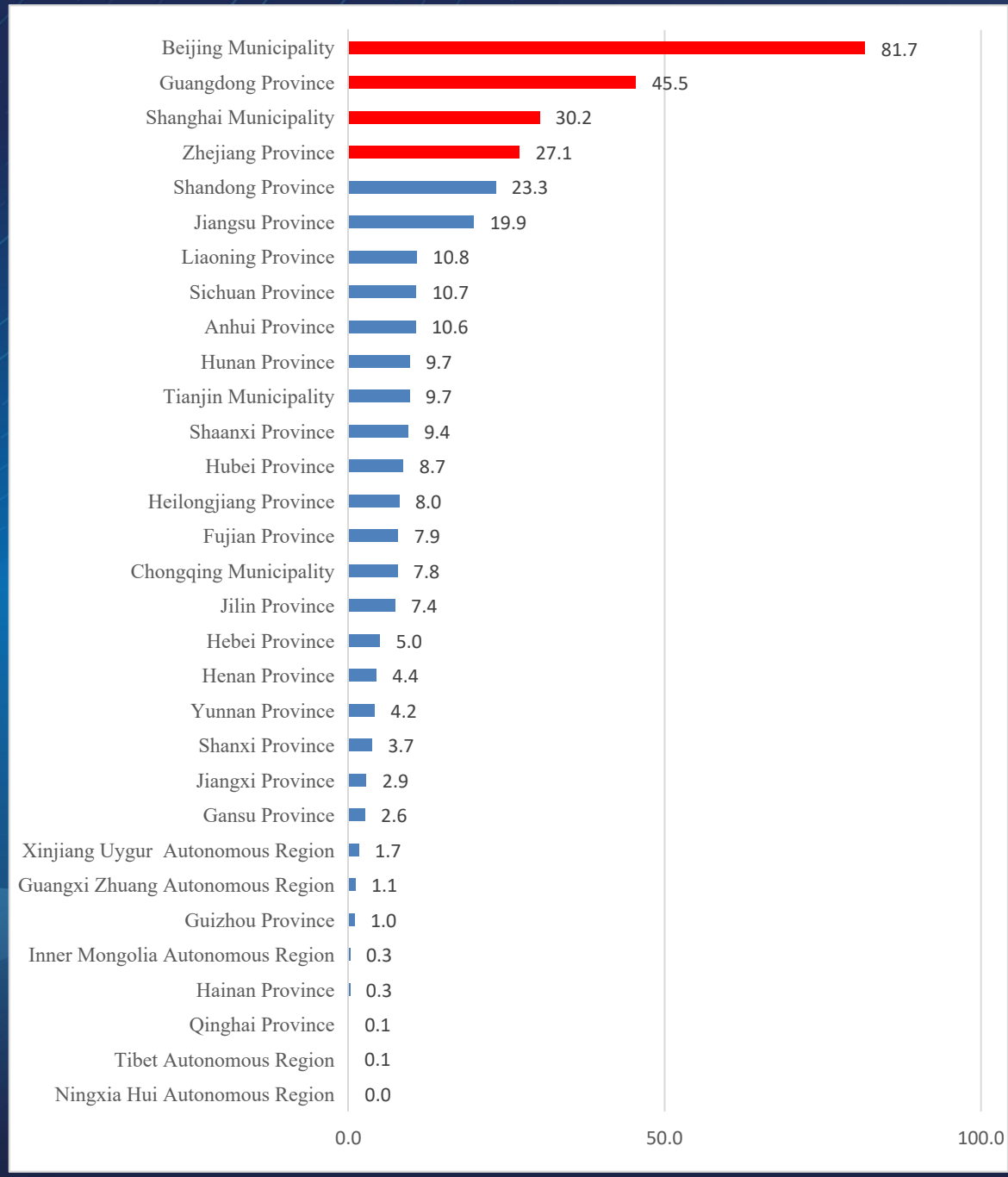
The Industry of the Relation Node of the Technology Input TOP5	The Number of Technology Input	The Proportion of Technology Input	The Industry of the Relation Node of the Technology Output TOP5	The Number of Technology Output	The Proportion of Technology Output
AI Platform	8	40.00%	Intelligent Safeguard Systems	13	20.00%
Smart Chip	5	25.00%	Medical Treatment	10	15.38%
Big Data and Cloud Computing	3	15.00%	Finance	7	10.77%
Visual Identity	2	10.00%	AI Platform	7	10.77%
Wise Information Technology of 120	2	10.00%	Wise Information Technology of 120	6	9.23%

CloudWalk

The Industry of the Relation Node of the Technology Input TOP5	The Number of Technology Input	The Proportion of Technology Input	The Industry of the Relation Node of the Technology Output TOP5	The Number of Technology Output	The proportion of technology output
Big Data and Cloud Computing	5	31.25%	Finance	18	32.73%
Smart Chip	4	25.00%	Big Data and Cloud Computing	5	9.09%
AI Technolo1gy	2	12.50%	Wisdom Finance	4	7.27%
AI Platform	1	6.25%	Transportation	4	7.27%
Visual Identity	1	6.25%	AI Technology	3	5.45%

VI. Evaluation Index Ranking of Regional Industry Competitiveness

One Indicator	Weight	Two Indicator	Weight	Three Indicator	Weight
Enterprise Capabilities	0.4368	Enterprise Size	0.2045	Number of Enterprises	0.1782
				Enterprise Valuation	0.0263
		Enterprise Innovative Capability	0.2323	Average Number of Patents	0.1304
				Number of Base-layer and Technology-layer Enterprises	0.0629
				Technology Output Relation	0.0390
Academic Ecology	0.2127	Innovative Capabilities of AI Universities	0.1084	Number of AI Universities	0.0607
				Number of Domestic Papers in Universities	0.0040
				Number of International Papers in Universities	0.0146
				Number of Patents in Universities	0.0291
		Innovative Capabilities of Non-university Scientific Research Institutions	0.1042	Institutions	0.0607
				Number of Domestic Papers in Institutions	0.0072
				Number of International Papers in Institutions	0.0072
				Number of Patents in Institutions	0.0291
Capital Environment	0.1865	Financing	0.1383	Financing Relation	0.0195
				The Amount of Financing	0.1188
		Investment	0.0482	Investment Relation	0.0482
International Openness	0.0776	Core Human Capital Openness	0.0294	Studying Abroad Experience	0.0091
				Working Abroad Experience	0.0203
		Technology Openness	0.0481	International Technology Input	0.0438
				International Technology Output	0.0043
Linking Capability of Linkers	0.0512	Linkers	0.0512	Number of Meetings	0.0085
				Number of Industrial Alliances	0.0427
Government Responsiveness	0.0352	Government Responsiveness	0.0352	Number of Industrial Parks	0.0293
				Number of Policies	0.0059



Conclusion

(1) Confronted with new challenges and opportunities, China's artificial intelligence technology industry accelerates to step into a new stage dominated by the converged industry sector. The upgrading of the consumer internet and the start of the industrial internet create broader application scenarios for the integrated development of artificial intelligence and the real economy;

(2) The U.S. technology blockade is breaking the global innovation cycle of the artificial intelligence technology industry. Through the combination of independent innovation and open collaboration, building an independent and controllable global innovation network is an inevitable choice for China to develop the artificial intelligence technology industry;

(3) The integrated development of artificial intelligence, as a General Purpose Technology, and the real economy is the formation and evolution of a series of complementary innovations and specialized technology systems. Simple partial technology introduction is difficult to promote the development of the converged industry sector;

(4) Institutional changes, including the sharing of government data and the cultivation of data element market, are the institutional guarantee for the development of the artificial intelligence technology industry.

Thanks