Analysis and countermeasures of the development trend of AI based on patents and policies

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Abstract. Based on the research of global AI patents, policies and sub-study research fields, the development of AI field in China and other countries will be compared and analyzed, so that the development dilemma faced by AI in China and its corresponding countermeasures will emerge.

1. Introduction
Artificial intelligence is the product of social development and technological innovation and AI is an important technical form to promote human progress [1]. The development of artificial intelligence has become the core driving force of the scientific and technological revolution and industrial transformation. Artificial intelligence is having a profound impact on social progress, the economy, and people's lives. In the world economy, artificial intelligence can lead the future as a strategic technology. The development of artificial intelligence is considered to be an important strategy for the world's major countries and regions to enhance national competitiveness and promote national economic growth [2].

2. Patent analysis

![Figure 1. Tendency of annual application for artificial intelligence patents](image-url)

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From the above chart, the number of patent applications has grown steadily overall over the past decade. In addition to a slight decline in 2015, the number of AI patents increased from 2008-2018, and the number of patent applications reached 78,085 items in 2018, three times that of ten years ago [3].

In recent years, the field of artificial intelligence applications has been extensively developed. Speech recognition, robotics, image recognition and face recognition have been commercialized. The concept of driverless and smart medical care has become a hot spot, driving the technical layout of artificial intelligence. At the same time, major countries recognize the importance of artificial intelligence for future technology, and have introduced incentives and policies to seize the technical layout and try to occupy the technical commanding heights.

3. Related policy planning

From 2017 to now, China, America, the European Union and other countries have developed corresponding national strategy and policy-level strategies around artificial intelligence. The top-level strategy in the field of artificial intelligence has been introduced in such a large scale in a short period of time, which is very rare, which shows its importance for future economic and social development. The following table shows the relevant guiding policies issued by countries in the field of artificial intelligence [4].

| Country | Time   | Policy                                      |
|---------|--------|---------------------------------------------|
| Japan   | 2017.03| Artificial Intelligence Technology Strategy |
| China   | 2017.07| A new generation of artificial intelligence  |
| Finland | 2017.12| Finland’s Age of Artificial Intelligence    |
| Italy   | 2018.03| AI White Paper Draft Version                |
| Germany | 2018.07| Key Points of the Federal Government for an |
| EU      | 2018.12| Coordinated Plan on Artificial Intelligence  |
| America | 2019.02| American Artificial Intelligence Initiative |

These policy plans are different and have some common features. For the development of artificial intelligence technology, the commonalities of these policy plans include: focusing on research funding support, including guiding the involvement of social funds; advocating the establishment of specialized research institutions to build artificial intelligence innovation platforms; emphasizing the cultivation of talents, and adding artificial intelligence disciplines and courses. Supporting the development of start-ups in the field, promoting the transformation of results; clearing the key directions, gathering strength and overcome the difficulties. From the perspective of the relationship between artificial intelligence and people, the commonalities include: paying attention to potential security, ethics, law, social fairness, etc.; paying attention to the impact of artificial intelligence on employment; advocating "people-oriented" artificial intelligence.
**Table 2.** The key research and development layout of countries of AI.

| Category                        | America | China | EU   | England | Japan |
|---------------------------------|---------|-------|------|---------|-------|
| Machine learning                | ✓       | ✓     | ✓    | ✓       | ✓     |
| Intelligent sensing             | ✓       | ✓     | ✓    | ✓       |       |
| Image Identification            | ✓       | ✓     | ✓    |         | ✓     |
| Speech Recognition              | ✓       | ✓     | ✓    |         |       |
| Natural language processing     | ✓       | ✓     | ✓    | ✓       |       |
| Knowledge map                   | ✓       | ✓     | ✓    |         |       |
| Human-computer collaboration    | ✓       | ✓     | ✓    |         | ✓     |
| Robot                           | ✓       | ✓     | ✓    |         |       |
| Drone                           | ✓       |       | ✓    |         |       |
| Autopilot                       | ✓       | ✓     | ✓    | ✓       | ✓     |
| AI chip                         | ✓       | ✓     | ✓    |         |       |
| Intelligent basic software      | ✓       | ✓     | ✓    |         |       |

Automated driving, robotics, and brain science have become the key areas for the common layout of countries, and more emphasis is placed on the development of interpretable artificial intelligence. The research focus of the key areas of the United States and China is more advanced and comprehensive. Based on its strong accumulation and talent advantages, it promotes weak artificial intelligence to strong artificial intelligence. The research focus of the UK, the EU and Japan is more focused, and the EU and the UK have more similarities. In addition to autopilot, they all focus on the research in the field of smart energy technology. Japan is focusing on the field of comparative advantage in robotics and autonomous driving, especially in the field of brain information and communication technology.

**Figure 2.** The Technology of Artificial Intelligence Firms In China, 2018

According to the research data of China research institute of new-generation artificial intelligence development strategy, most of China's artificial intelligence enterprises are concentrated in the application layer, while the proportion of technology layer and basic layer is relatively large and y is small. From the perspective of technology type distribution, there are many companies involved in
machine learning big data cloud computing and other fields, and the overall distribution is relatively uniform [5].

4. The problem of China's artificial intelligence industry

4.1. National policies have yet to be implemented, and the industry lacks uniform standards

Although the country has successively introduced a number of planning plans related to the development of artificial intelligence industry, it has not yet formulated a national strategy for comprehensive development of artificial intelligence. Compared with key projects such as “smart manufacturing” and “Internet+”, the development of artificial intelligence needs to solve more basic problems and involve a wider range of research [6]. Therefore, it is more necessary for the state to implement the existing planning plans in an orderly manner. Investing in scientific research, injecting talent dividends, and introducing implementation plans such as “artificial intelligence +” and “+ artificial intelligence” in the future to guide the healthy development of the industry. The artificial intelligence industry needs to solve the standard problem if it wants to grow and develop. With the rapid development of AI industrialization, in the absence of a standardized and common basic standard system, it is inevitable that some enterprises without core technologies will simply speculate on the concept of artificial intelligence and disrupt the market. In order to curb the development momentum of bad money in the market to drive out good money, it is necessary to clarify the connotation of the artificial intelligence industry and establish and improve technical standards for subdivisions such as hardware, data, systems and testing.

4.2. The basic algorithm field needs to be developed

From the basic algorithm, China lacks the original artificial intelligence algorithms, and most of the algorithm development is only perfected under the premise of the existing “deep learning” algorithm. China's progress in the field of basic algorithms has been slow, which indicates that China's R&D and investment in related industries are insufficient. In addition, this also shows that China's theoretical research and practical experience in basic algorithms are relatively backward.

5. Conclusions and recommendations

The development of artificial intelligence industry is the core of global industrial development in the future. To enhance industrial competitiveness, we must first improve the core technology of products and enhance the strategic layout of products of enterprises and industries. These are the active guidance of the government, the regulation of industry standards, and only through the multi-faceted and multi-role of the company's continuous innovation and patent application can industrial integration and industrial upgrading be realized. At present, the development of China's artificial intelligence industry has gradually evolved from basic application-oriented products to cross-industry interactive and smart city types. Therefore, the author suggests that we should comprehensively consider the stage characteristics of China's new generation AI industry and the gap with developed countries. We will further improve the external environment of industrial transformation and upgrading, and continue to improve the level of basic artificial intelligence in China. Algorithm and chip technology focus on solving the basic layer layout of China's artificial intelligence industry.

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