Build an Artificial Intelligence Dataset Center, and Help Weihai Create a New Highland for the Artificial Intelligence Industry

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Abstract:

In recent years, although China's artificial intelligence (AI) industry develops rapidly and talents, capital and technology are highly concentrated, the proportion of AI transformed into application results has been on the low side. The problem ahead of industrial innovation and transformation is prominent, and traditional enterprises are faced with pressure from industrial transformation and upgrading. After the manufacturing industry in China completes industrial automation transformation, such entity technologies as industrial robots and automated production are no longer the only way to achieve intelligent manufacturing, while big data, Internet of Things (IoT), cloud computing and AI deserve to be explored. In particular, the establishment of AI dataset will play an important part in the process of traditional manufacturing moving towards intelligent manufacturing.

This report will focus on the important role of artificial intelligence technology (AIT) in enterprise innovation, and dataset is the key to driving AI industry applications. In the meantime, the importance of building a dataset center in AI industry application scenarios is analyzed, relevant suggestions on how to use AIT to build a fine city is proposed, and finally, the important role of attracting visitors is discussed.

As is known to all, a new global information technology revolution and new industrial changes are underway, and the core development in this era is AIT.

I. The promotion and application of AIT is the inevitable trend of development in the information age

As the global economy enters into the information age, cloud computing, big data and IoT become tools to realize strategic goals. As for how AI better create value in manufacturing, first of all, it's necessary to explore the application of AI in industrial production scenarios, and then realize the intelligentization of the entire industrial production process. AI will bring a new industry vision: the production technology, equipment and operators are combined by AI in a new way, and an efficient and intelligent production mode is realized.

In recent years, intelligentization and Internet-based have been mentioned in the industrial development planning of major countries in the world, and the core of intelligentization and Internet-based is to: use the Internet technology to replace the traditional product orientation by customer orientation, strengthen customer demand forecast and try to engage customers in product R&D, and provide personalized products, services and experience; collect a large number of consumption data to dynamically adjust the production mode in order to quickly adapt to changes in the customer demand, that is, turn mass production into mass customization; finally, marketing, research, production, procurement and other business data within enterprises are utilized to provide the basis for solving business problems and realize enterprises' transparent operation. With the improvement of enterprises' intelligentization and Internet-based, enterprises have had increasingly more data, and these data, in turn, improve the level of enterprises' AI and Internet-based.

II. The core of Made in China 2025 is the wide application of AI

The concept of AI was born in the 1950s. Until the 21st century, with the development of information technology including Internet, big data, cloud computing, etc., AI represented by Deep Neural Network has been developing rapidly, and technical breakthroughs in certain areas have been made. In 2017, AlphaGo, a Go AI program, outperformed world go champion Lee Se-dol. Alpha zero in Go games, Elmo in Shogi games and Ousia in Quiz bowl have defeated human champions respectively. Note that Alphago zero is stronger than Alphago and Elmo is stronger than Ponanza.

It can be seen that the latest AI outperformed human champions in sophisticated games. At this time, the public began to know the power of AI, and realized that it was not a desirable and yet unreachable myth that AI became a cutting-edge technology that changed human society and surpassed the mankind.

Just as the invention of steam engines led to the first Industrial Revolution, the use of electric power brought about the Second Industrial Revolution and computers represented the Third Technological Revolution, AI is leading the Fourth Information Revolution. Faced with new historical opportunities, major developed countries around the world all attach great importance to the potential impact of AI on the overall social and economic development. Developed countries have formulated new industrial development plans one after the other. The United States launched a national strategic plan for advanced manufacturing, Germany officially proposed the concept of Industry 4.0, Japan set up a national strategic conference on AIT and put forward the strategy of "Super Smart Society" (Society 5.0), and China has deployed and implemented the plan of "Made in China 2025". In the new wave of information revolution, various countries are trying to make full use of information and communication technology and cyberspace system to realize the transformation and upgrading of traditional manufacturing, and create a new digital and intelligent industrial ecology.

III. Create a favorable environment for the innovative development of AI in Weihai, and build a new highland for AI development with the joint efforts of industries

To promote the innovative development of AI in Weihai, make breakthroughs in the core AI technology, popularize AI demonstration application and accelerate the construction of AI development highland in Weihai, an AI dataset center can be set up by enterprises in Weihai under the leadership of the municipal government and relevant departments, which will widely absorb enterprises and institutions in Shandong and even the whole country engaged in all aspects of the innovation chain, such as AIT, industry, application, research, investment, financing, etc. in order to make AI-related work in Weihai strong and solid. A development pattern can be initially formed, which is led by Torch Hi-tech Science Park, Economic and Technological Development Zone and other key innovation demonstration zones, and assisted by other zones.

IV. AI will help industrial innovation, transformation and upgrading in Weihai

As an indispensable part of Weihai economy, manufacturing also supports the international competitiveness of Weihai. At the current stage, China's manufacturing is generally faced with the following problems: although the manufacturing scale is the first in the world, it is large but not strong. Enterprises lack the ability to make innovations and are deficient in high-end and high-value products, so they are in the middle and low end state of international industrial division. Therefore, it's urgent for China's manufacturing to transform and upgrade.

As for the important direction of industrial transformation and upgrading in China, it needs to be led by technological innovation, and emphasis shall be placed on the adjustment of industrial structure and development mode under the guidance with the strategy of transformation from old to new drivers. AI is the key to leading industrial transformation and upgrading and an important link in building a new supply-side structure. For example, to promote the transformation from old to new drivers, Shandong Province has determined the development plans for 5 emerging industries, including the new generation of information technology, high-end equipment, new energy & new materials, modern ocean, medical and elderly care, etc. Weihai has proposed the overall strategy of building an international innovative city in marine economy through making the ocean strong with industries and prosperous with science and technology, using the sea in a scientific way, protecting the sea in an ecological way, making the sea alive by opening, revitalizing the marine culture and planning land and marine development as a whole. In order to solve the contradiction between backward capacity and rigid demand surge in the industry, it's urgently necessary to integrate AI with industry demand in a profound way, and use AIT to speed up industrial upgrading in order to realize cross-border integrated development.

V. Based on industrial advantages in Weihai, propose AI innovation industry pilot application scenarios to promote the development of Weihai into a fine city with innovation

Located at the easternmost end of the Shandong Peninsula, beautiful Weihai is China's most convenient access to the sea in Northeast Asia. It has a good foundation for marine economic development, and occupies an important strategic position in promoting the scientific development of ocean, deepening foreign cooperation and opening up and enhancing the comprehensive strength of the ocean. The advantages of economic development in Weihai are as follows: prominent location and resource advantages, good foundation of marine industry and attention on marine scientific and technological innovation. As a strong city in marine economy and marine technology development, Weihai is actively promoting the integration and symbiosis of primary, secondary and tertiary marine industries, integrating and developing marine economy and marine technology, integrating and interacting land and sea resources, and creating a marine economy industry cluster with Weihai characteristics and international competitiveness. Build a new open economy system at a high level to speed up the cultivation of new advantages in international marine cooperation and competition, and open and develop marine economy, marine culture and other fields to create a pioneering zone for the reform and opening up of the marine economy. Through comprehensive marine management, it's actively promoting the coordinated development of the marine economy and resources and environment, building an important marine ecological civilization demonstration zone in the whole country, and creating an excellent city that is suitable for living, employment and business, tourism and education. The planned industrial park has been equipped with marine elements to plan the development path for the marine industry. Based on the geographical advantages of Weihai, promote the transformation and upgrading of sea-related industries and cultivate new drivers for marine economic development.

Weihai is surrounded by sea on three sides with a coastline of nearly 1,000 kilometers, accounting for about 6% of that in the whole country, which has huge potential for the development of marine resources. In 2017, the gross ocean production was RMB 130.754 Billion Yuan, accounting for 37.6% of GDP. The marine characteristics of economic development are very distinctive. As an emerging city with the development goal of building a fine city, it has intensive flow of people, logistics, shipping, capital flow and information, and produces massive data every day, which is a natural testing ground for the implementation of AI application.

According to the development strategy of building Weihai into a fine city, develop the AI innovative industry application scenario construction and implementation plan, promote the first application of new AIT, new products and new models in Weihai industries, speed up the innovative development of Weihai economy, accelerate the conversion of scientific and technological results, and create a new situation with unique characteristics for the innovative application of AI. In the future, based on industrial application, it can be promoted to medical treatment, education, urban management, business and trade, cultural tourism and other fields. In particular, technological innovation in Weihai shall be equipped with AI, so that AI innovative industry application scenarios with unique characteristics can be formed, and AI innovative application demonstration zone will be created. In addition, efforts will be made to cultivate new economic driver of AI.

VI. The urgency of using AI to promote the innovative development of Weihai industries

AI can be successfully used to solve many problems in economic development. In recent years, with the rapid development of cloud computing, big data, IoT and other key software and hardware technologies, digitization and informatization of various scenarios have been greatly promoted, which has created a favorable environment for AI to carry out in-depth industrial practice, and formed an important window period for industrial development. If this window period is missed, it's very likely that Weihai will miss the historic opportunities and even lose the initiative of sustainable development.

VII. Based on technological development of industries and economic development in Weihai, AI related work can be carried out focusing on the following contents

- 1. Construction of a dataset center and cloud technology application in Weihai industries

- 2. Build a data sharing cloud platform in Weihai, so that data will be gradually aggregated from bottom to top, and cross-level, cross-region, cross-system, cross-department and cross-business data sharing and collaborative management will be realized

- 3. Establish data sharing standards and security management mechanisms

- 4. Establish data government-enterprise opening and sharing modes and mechanisms

- 5. Analyze the industry demand, explore the potential value of marine economy big data, and build a sound data-aided scientific decision-making mechanism

- 6. Realize the management of marine industry innovation, marine ecological management, sharing management and other intelligent organizational management

- 7. Create data-driven marine economy intelligent and fine management by means of AI

- 8. Promote data-based precise acquisition, IoT information sharing and other intelligent fields

- 9. Based on the industrial data sharing platform, establish an intelligent monitoring and decision-making platform that covers the marine industry, and realize the coordination with the urban intelligent platform.

VIII. The key to AI applications is the acquisition of dataset

AI is bringing a new earth-shaking change to the manufacturing industry in China, and the core that drives AI applications is the collection and establishment of dataset. Therefore, dataset construction will help manufacturing industry in Weihai to head from the era of traditional automation towards the era of intelligence. AI dataset mainly comes from all aspects of product life cycle, including market, design, manufacturing, service and reuse. There will be data in every aspect, and there will be more data gathered by full life cycle. Of course, cross-border data outside the enterprise and the industrial chain are also nonnegligible and important source of dataset.

We are in an era of data-based and digital transformation, and data are everywhere, so the data-driven ideas and strategies have gradually become a consensus in practice. After manufacturing enterprises use data to improve production, their production cost can be reduced by 10% to 15%, so it's obvious that data are important for manufacturers. In the development process, manufacturers in different industries shall take the corresponding data strategies to gain a favorable position in development and competition.

The data mainly come from the following three aspects: first, production and operation related business data. They mainly come from the scope of traditional enterprise informatization, which are collected and stored in the enterprise information system. Through these enterprise information systems, a large number of product R&D, production, business, customer information, logistics supply and environmental data have been accumulated. Second, equipment IoT data. They mainly refer to the data produced and collected in real time by the production equipment and products under the IoT operating mode, which can reflect equipment and product running status, including operating and running conditions, working conditions, environmental parameters, etc. Manufacturing data refer to such massive data that are rapidly produced by production equipment and products with time series difference. Third, external data. They mainly refer to the data that come from the external Internet related to enterprise production activities and products.

As for the coming intelligent manufacturing, AI system shall carry out uninterrupted, continuous and real-time calculations on process data, control data, alarm data, fault data, operation data, assay data, raw material data, scheduling instructions and market data through online data and online production status. Therefore, the collection and establishment of datasets will definitely play an important role in the future intelligent manufacturing process.

IX. The construction of AI datasets is the basis for carrying out intelligent manufacturing

With the rapid development of information and communication technology, such as the Internet, IoT, cloud computing, etc., the sudden rise in the amount of data has become a serious challenge and precious opportunity faced by many industries. The data that drive AI applications do not come from nothing, and the informatization of traditional industry has always been underway. A large number of data come from R&D, production & manufacturing process and service link. The industrial informatization process has been generating massive data, which mainly come from equipment data, industrial informatization data and industry chain related data.

The construction of datasets is the basis of intelligent manufacturing and also the extension of AI in manufacturing applications. In the information age, the construction and application of datasets will change the operating mode of the industry. To make datasets create value, it's necessary to drive AI to analyze data, and the construction of a dataset platform is the necessary condition for enterprise transformation and upgrading. Analyze the full life cycle of production line through datasets, and drive enterprise development with data. Use data to empower industries, create an IoT platform for manufacturers, and help enterprises solve problems related to management radius, production efficiency, quality control, production schedule, delivery time control, etc.

Datasets are the product of the combination of AI and industry. At the same time, they counteract industrial upgrading and development. These two complement each other, which is of extraordinary significance. In terms of manufacturing, it will be of very strong realistic significance for attaching importance to the construction of AI datasets, summarizing the classification and characteristics of datasets, and looking at and reconstructing the industrial value process from the perspective of datasets promoting their own value.

XI. Build the artificial intelligence dataset center to play an important role in the strategy of actively attracting visitors at home and abroad to Weihai and building a fine city

AI will play an important role in attracting visitors at home and abroad. AI can discover the relationship between many parameters as long as appropriate datasets can be well prepared and created. In other words, we may be able to predict the number of visitors and find which parameters may increase the visitors. The datasets play a key role in machine learning and AI.

The proposed idea is to create an AI dataset center which can help/support visitors to produce his/her dataset for machine learning. The visitors to AI dataset center will stay at Weihai for at least a week for training on beginner's machine learning. The AI dataset center will play a key role in training the visitors and upgrading them into special skilled professionals. The visitors from other provinces or foreign countries can be trained under the blue sky without smog. Visitors will be trained and learn how to create datasets. The special skilled professionals who can create datasets for machine learning are currently highly

demanded in many industry areas.

AI is divided into inductive methods (deep learning) and deductive methods (rule-based reasoning). Both methods are over 99% based on open source, so that modularity and abstraction skills must be obtained in the AI dataset center. The modularity skills are to pick and build suitable open source modules like LEGO-blocks. Abstraction skill is an expert skill where the expert can neglect unimportant parts while the expert must pay attention to critical parts in creating the target AI system. AI experts must have modularity and abstraction skills for machine learning using his/her created datasets. In order to create a dataset, expert's knowledge is indeed needed. The important point is that the visitor must understand the problem in details in his/her professional background area. The AI dataset center will play an important role in helping Weihai promote vocational education & training, reserve international talents and build a fine city.

Conclusion:

The construction of datasets is just a process, and the ultimate goal is to drive the industrial application of AI, which will play a role for manufacturers. Therefore, enterprises need to think calmly and stick to take innovative applications as the driver, in order to maximize the value of data. The increase in the amount of data accumulated by enterprises at an increasingly faster rate will accelerate the introduction of data technology into the production and operation of enterprises. We believe that under the guidance of the strategic policy of building a fine Weihai proposed by General Secretary Xi Jinping, AI will certainly promote the development of scientific and technological innovation and the transformation and upgrading of Weihai industries, enhance the overall level of innovation and product quality of Weihai industries, and create a new situation that guides the AI innovative development in China.