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## Co-innovative training of big data analysis applied talents

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ABSTRACT

Based on such research methods as study of literature, qualitative analysis, interdisciplinary research and systematic study, this article focused on the cultivation of collaborative innovation among application-orientated talents of big data analysis. The purpose is to make big data play a large role in industrial development of the future, cultivate talents of big data analysis the government and enterprises need, and improve the social development. On the basis of analyzing the opportunities and challenges that may appear in talents' cultivation, this article concluded that the collaborative innovation cultivation of application-orientated talents of big data analysis consisted of 6 parts, including the main bodies, internal operation mechanisms, the relationship between the main bodies, innovation policies, domestic environment and international environment. Then, countermeasures were proposed as follows: first, establish a university-leading collaborative innovation mechanism of application-oriented talents of big data analysis; second, build a platform for this purpose; finally, establish practice bases for the talents. The purpose is to train application-orientated talents into having the abilities of big data analysis and technological innovation and to meet the needs of economic and social development in an era of big data.

KEYWORDS

Big data; Applied talents; Co-innovation.
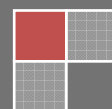
INTRODUCTION

Since the concept of big data has become highly concerned by the scientific community, industry and government departments in recent years, an era of big data with large-scale production and data sharing and applying is being unveiled. As Victor Meyer Schonberg puts it, the big data era opens up a major transformation. It triggers a major change in people's life, work and thinking. And essential change in many areas will therefore occur. To promote the national big data strategy of data China, and promote the development of social change has an urgent need for talents. Facing the unprecedented opportunities and challenges, governments, enterprises and academia need a systemic consideration.

Gartner, a research institution, made a definition of big data: big data is the massive and diversified information assets with high growth rate which needs new processing mode to gain a stronger decision-making power, insight discovery power and process optimization capabilities. The concept of large data was generated in the 1980s. Alvin Toffler views big data as cadenza of the third wave in "The Third Wave". Beginning in 2009, especially in May 2011 when McKinsey published a special report of "Big Data: The next innovation, competition and productivity frontier", big data has become a buzzword in IT industry. Generally speaking, big data appears as data stored in electronic form with geometrical growth rate, a collection of massive data difficult to handle with existing general technologies in the company of computers, Internet, social media, smart phones, etc.

There are four levels of big data characteristics, generally described with four "V": First, the large data volume (Volume). It is amazing that the data level has jumped from TB to PB, EB. The basic unit is Byte, the sequence says: bit, Byte, KB, MB, GB, TB, PB, EB, ZB, YB, BB, NB, DB, to calculate according to the feed rate of 1024 (two of the ten power) 1 TB = 1024 GB, 1 PB = 1024 TB, 1 EB = 1024 PB, 1 ZB = 1024 EB. In April 2014, Pan Kaixi, senior research manager of IDC China Enterprise Systems and Software Research Group, pointed out on the conference of big data reconstructing enterprise intelligence that the data volume will increase 50 times by 2020, reaching 40ZB. Second, the various types (Variety). It Includes both structured data (expedite data), as well as unstructured data (documents, videos, images, audio, data, geographic information, etc.). Third, high speed and efficiency (Velocity). Data processing is fast, followed by the second law which requires to present analysis results within seconds. This feature reflects the essential difference between big data processing technology and traditional data mining techniques. Fourth, low density of value (Value). Vast amounts of data may contain very small amounts of valuable information, how to make efficient extraction of valuable information through technical processing is essential.

CHALLENGES AND OPPORTUNITIES IN BIG DATA ANALYSIS APPLIED TALENTS TRAINING

At the advent of this era, big data analysis applied talents confront with unprecedented opportunities and challenges.

First, big data analysis applied talents face major historical opportunity. With the open of big data era, big data contains great value, is regarded as a new type of strategic resources for promoting economic and social development, and has become an important indicator to evaluate a nation's competitiveness through data scale and its ability to acquire value from data. Therefore, developed countries have upgraded big data to the national development strategies. The first to upgrade big data to national development strategy is the United States. In 2010, United States President's Council on Science and Technology advised the departments of the federal government in the "planning digital future" to develop a strategy to deal with big data. In 2012, the Obama administration released "Big Data Research and Development Initiative" on the White House Website, which regarded big data as " new oil in the future," and proposed to accelerate the pace of innovation through big data in science and engineering, strengthen the homeland security of United States, and transform education and learning mode. In 2010, the British government officially launched open data sites, and all of the raw data in public expenditure since 2005 open to the public. In 2011, the Australian government announced the "National Digital Economy Strategy", in order to make Australia a world leader in the digital economy. In early 2013, the Chinese Academy of Sciences proposed to upgrade big data to the national strategy. As countries around the world paid increasing attention to big data development strategy, Executive Office of the Secretary-General of the United Nations released "Big Data Development: Opportunities and Challenges" in May 2012, providing strategies and advice for correct use of big data, after starting "Global Pulse" Initiative in 2009. Talents are needed to promote national big data strategy. Big data talent has become a shortage of talent around the world, especially big data analysis applied talent, who is an important part of government and enterprises demand for big data talent. In information age, universities have become an important place to cultivate innovative talents, shouldering an unprecedented mission. McKinsey report pointed out that till 2018 big data analysis talents and senior analysts in the US would have a shortfall of up to 190,000. Besides, the businesses in the US also needed 1.5 million talents who could ask the right questions and use the big data analysis results.(As shown in the following pie chart)Thus, big data era provides a rare historical opportunity for universities to train big data analysis applied talents. The Big Data Skills Gap:1.7 Million Workers By 2018 is shown as Figure 1.

Second. Big data analysis applied talents training is faced with two types of challenges. On the one hand, the interdisciplinary structure of big data analysis covers computer science, statistics, economics and management. Namely, in addition to knowledge of computer science, they have to master data mining techniques constituted by data statistics, databases, and artificial intelligence, as well as economics and management in specific application fields. On the other hand, the training of big data analysis applied talents involves multiple industries which needs collaborative training of multi-departments. However, government at all levels provide limited, separate information form without integrating various data resources closely related to people's life such as eating, clothing, housing, outing, pensions, health care, education so as to

build a public cyberspace through computers, mobile phones and other terminals. A serious lack of high-end talents and data analysis applied talents emerges in the big data industry. How to integrate the above disciplines, and how to give a full play to respective departments to achieve collaborative innovation and cultivate big data analysis applied talents needed for economic and social development have become an important social issue.

Big Data Skills Gap:1.7 Million Workers By 2018
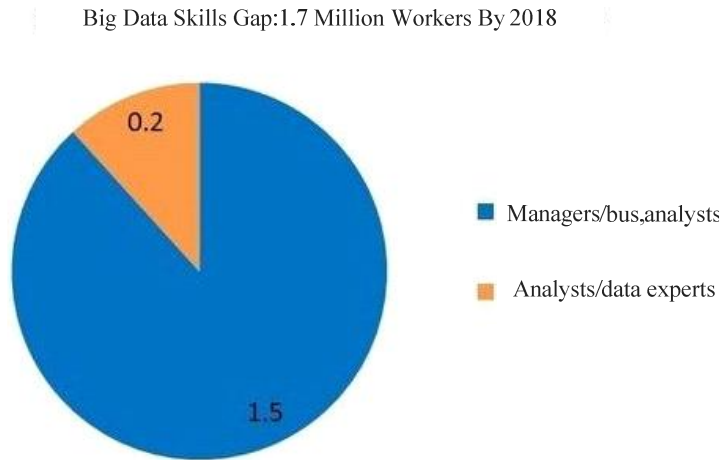
Source: McKinsey Global Institute report: "Big Data: The Next Frontier for Innovation, Competition and Productivity"

Figure 1 : The big data skills gap:1.7 million workers by 2018

SYSTEMS AND COUNTERMEASURES

The proposal of "Collaborative Innovation" provides a direction for talents cultivation. In order to grasp opportunities and meet the challenges in the era of big data, collaborative innovation among administration, practice, production, study and research is highly needed in relevant talents training.

**System of collaborative innovation cultivation**

The system of big data analysis applied talents collaborative innovation cultivation (as seen below Figure 2) has six basic elements: innovators, innovators internal running mechanism, the relationship between innovators, innovation policy, domestic and international environment. The innovators mainly include government, users, enterprises, universities and research institutes, in which enterprise,as the important tool of innovation inputs and outputs, plays a key role. The innovators' internal running mechanism is an important factor which constraints the talent cultivation. The effective coordination between the innovators contributes to save innovation resources, reduce the cost of innovation, raise the rate of innovation and increase efficiency of innovation. Innovation policy refers to the laws, regulations and policies which play a major role in personnel training. Domestic environment, especially the domestic market situation,is the driving force behind innovation. In general, with the change of the market, the innovation activities of enterprises and other innovators are carried out. Now, in situations in which the big data talents are in short supply in worldwide, international environment is not only an important part for the communication between of each country's big data analysis talents, but also an important way for innovators to participate in international competitions and cooperations. As is shown in the following Figure 2:
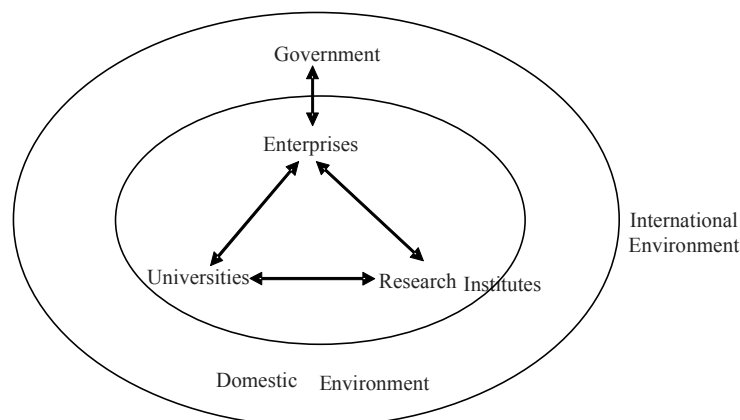
Figure 2 : Big data analysis applied talents training system diagram collaborative innovation

Countermeasures

First, it is a necessity to establish a university-led big data analysis applied talents collaborative innovation mechanism since colleges and universities in the collaborative innovation are mainly responsible for initiating collaborative event, making collaborative rules, regulating collaborative resource and coordinating the conflict between collaborative teams. It is mainly made up of such mechanisms as dynamic mechanism, resource allocation mechanism, benefit distribution mechanism, evaluation mechanism and communication mechanism. The establishment of dynamic mechanisms should be based on solid collaborative innovative ideas and driven by both internal motives of self development and external motives of international environment, policy promoting and market driving. Led by colleges and universities, innovators have established resource allocation mechanisms by integrating organically related disciplines. Various benefit distribution mechanisms which share both benefits and risks through negotiation.. As is shown in the flow Figure 3:
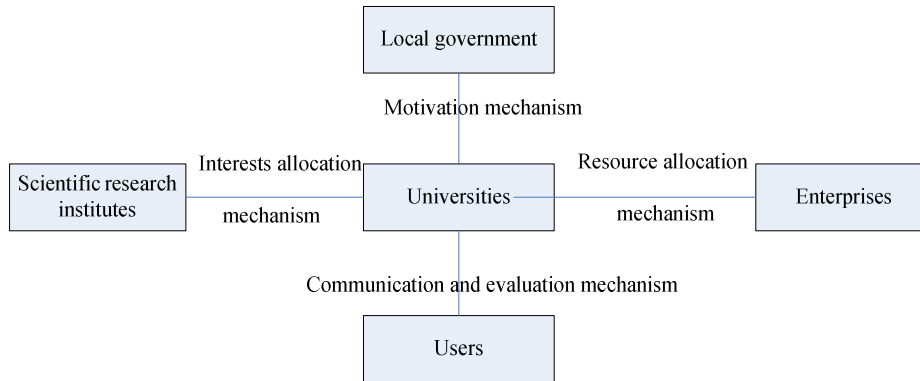

Figure 3 : Big data analysis leading applied talents in university collaborative innovation operation mechanism schematic diagram

Second, the platform for big data analysis applied talents collaborative innovation should be set up. Since governments and enterprises put forward urgent requirements for applied talents, colleges and universities should be collaborative innovation-oriented. Interdisciplinary collaboration is a major form of intramural collaborative innovation including the following forms: set up a platform for by building a big data specialty group, get through the barriers between different disciplines by integrating computer science, statistics, economics and management studies to help students with the basic knowledge and interdisciplinary learning ability. Besides, it provides enough qualified teachers and academic leaders from the relevant departments together to build the big data research team, and teaching reform of the big data core curriculum. It not only needs to learn related disciplines, but more importantly, to master the big data-oriented statistical analysis and data mining techniques, so the collaborative innovation carried out by governments, enterprises, universities and other departments is clearly needed. Every agents involved in the collaborative innovation should jointly develop a training program by international standards, share teaching resources and develop teaching cases so as to expand the theoretical platform. The Large data analysis application type talents of collaborative innovation theoryplatform schematic diagram is shown as Figure 4.
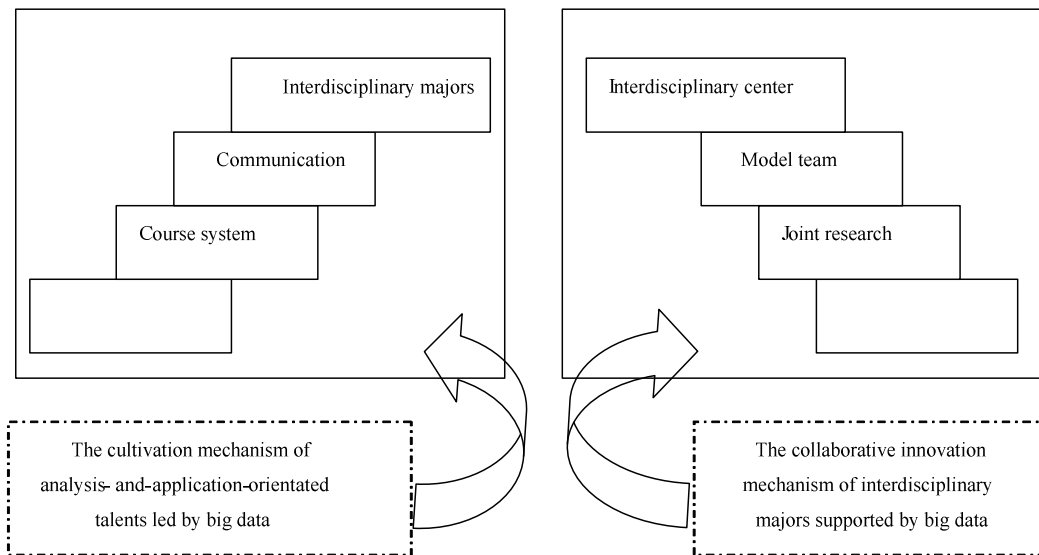
Figure 4 : Large data analysis application type talents of collaborative innovation theoryplatform schematic diagram

Third, the training base should be established in that it is the cradle of big data scientists. The Harvard Business Review points out that the most fashionable job is to be a data scientist in the 21st century. Therefore, the importance of big data talents can be seen from that statement. In the second session of the 12th National People's Congress, Premier Li Keqiang in his government work report pointed out, "the establishment of new industrial entrepreneurial innovation platform rushes in the such aspects as new generation mobile communications, integrated circuits, big data, advanced manufacturing, new energy, new materials, etc. which leads the future industrial development. "To lead the future development of big data, big data analysis applied talents cultivation is the key point. Due to the fact that the big data analysis of application-oriented talents primarily meet the needs of government departments and enterprises, it is an urgency to first build practice bases. As is shown in the following Figure 5:
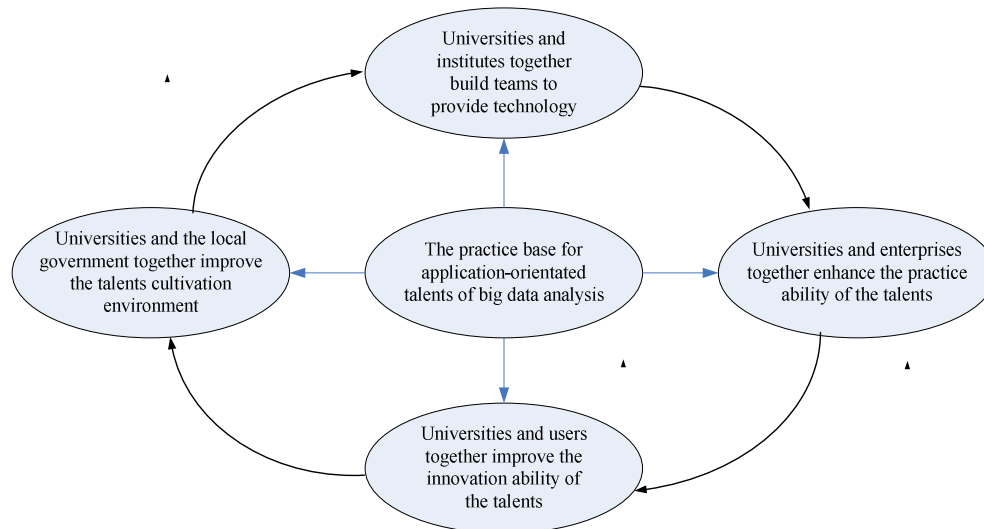
Figure 5 : The political use of IUR cooperative training large data analysis applicationtype talent exercitation base diagram

CONCLUSION

The practice base aims to to build big data scientists incubator by absorbing professional researchers and technical personnels in various big data fields, to provide students with the environment linking theory with practice, and send experienced big data expert to assist students. Only by training talents of technological innovation, can the talents meet the country's economic and social development needs in the big data era.

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