



The Big Data Thinking from the Perspective of Chinese Traditional Philosophy

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Authors' contributions

This work was carried out in collaboration among all authors. Author GS designed the study and wrote the first draft of the manuscript. Authors FR and FY managed the analyses of the study, the literature searches and elaborated further details. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/CJAST/2020/v39i630567

Editor(s):

(1) Dr. Vitaly Kober, CICESE, Mexico.

Reviewers:

(1) Eylem Tataroğlu, Başkent University, Turkey.

(2) Arjita Jain, University of Mumbai, India.

(3) Chandra Shekhar Ghanta, Telangana University, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/56202>

Short Research Article

Received 10 February 2020

Accepted 17 April 2020

Published 23 April 2020

ABSTRACT

We are entering the era of big data. In this epoch, people are required to develop big data thinking gradually. It is a new kind of thinking that is different from people's previous natural thinking. It has the characteristics of data integration, statistic probability, focus on related relationships and intelligence. From the perspective of Chinese traditional philosophy, big data thinking is highly compatible with many elements of Chinese traditional philosophy, such as benevolence, harmony as well as difference and the unity of theory and practice based on empathy. This article discusses and believes that there is an interrelation between big data thinking and Chinese traditional philosophy. The latter has certain reference and guiding significance for the development of big data thinking in the era of big data.

Keywords: Big data era; big data thinking; Chinese traditional philosophy.

1. INTRODUCTION

We are in an information society. The benefits that the information society brings to people are obvious: Everyone has a mobile phone with them, and each office has a computer. These mobile phones and computers are connected to each other, and computer classes in an organization are connected with a local area network. This connection has brought great convenience to people's communication. But people are not paying more attention to the use of this information itself. With the comprehensive and in-depth integration of computer technology into social life, the accumulation of information has reached an alarming degree, and has gradually triggered the change in information technology, which has led to the concept of "big data". This concept was then applied to all areas of human social development. The concept of "big data" is a common understanding that big data is something that people can accomplish on the basis of large-scale data, and these things cannot be done on the basis of small-scale data. Big data is a source for people to acquire new knowledge and to create new values. It is a new way to change the market, the structure of social organizations, and the relationship between government and citizens in society. This is a brand-new start and requires more attention and thinking.

2. THE NEED OF DEVELOPING BIG DATA THINKING

In the human history, even in the rapidly changing modern society, people's understanding of the world is mainly based on surface, sampling and local data. Therefore, such understanding is often simple, superficial, incomplete and even incorrect. With the continuous development of information technology and other technologies, people have gradually entered the era of big data. In this era, it is increasingly possible to obtain comprehensive, relatively complete and systematic data. On this basis, people can further understand and explore the laws of the world, gain knowledge that was not easily available in the past, and seize opportunities that were difficult to reach in the past. In this era of big data, people will develop a new big data thinking to understand the world.

3. BIG DATA THINKING AND ITS CHARACTERISTICS

What is big data thinking? What are its characteristics? First, the characteristics of big data have to be explained [1]. The difference between big data and common data lies in three points: online (available, calculated and used at any time), real-time (ensure its effective analysis value) and the overall data (not the sample, but the whole valid data) [2]. These three points illustrate the basic characteristics of big data. This shows that the big data thinking is a new thinking based on the interconnection of data and the Internet. While previous thinking focused on causality, (conclusions derived from data and logical experience), big data provides us with new ways to solve problems when causality cannot be determined. The information contained in big data can help us find the correlation between different data which, to some extent, could replace the original causality and help us get the answers we want to know. This is the core of big data thinking. The most important feature of big data thinking is that it largely frees people from the pursuit of causality and turns to the discovery and use of related relationships.

Therefore, big data thinking has the following characteristics:

3.1 The Whole Data is Integrated

On the one hand, the amount of data is not only huge, and it can basically include all the data we need, but these data are online in real time. Under the advancement of big data analysis technology, people can quickly and efficiently process these big data and obtain valuable information. While the corresponding previous sample thinking is based on point overview and partial generalization, this overall thinking reflects the objective facts of all the data [3].

3.2 Statistical Probability

In the era of big data, the amount is huge and full of variability [4]. Therefore, people would give up the accurate analysis of small amounts of data in the past and emphasize the possibility of large probability. This does not mean that people abandon the precision of thinking, but increase the fuzzy thinking under big data. This not only saves costs, but also improves the efficiency of analysis and research.

3.3 Focus on Related Relationships

Due to the high emphasis on causality in the tradition of people's learning, that is, people always keep asking "why", causality plays an important role in people's traditional daily thinking. In the era of big data, people can create huge economic or social benefits by analyzing the correlation between different events. The data in the era of big data is very extensive, and the degree of overall social participation is very high [5]. Therefore, the related relationships could be very complicated but also have great analytical values and benefits. Of course, focusing on related relationships does not negate the value of causality. In a sense, causality is a special kind of correlation with a definite correlation.

3.4 Intelligent Thinking

Before the era of big data, people's thinking was a natural, simple, linear, physical and instinctive. Even in the modern society with rapid industrialization, where human-invented machines have made great progress in automation and intelligence, there still present the characteristics of natural thinking. In the era of big data, the thinking of humans and the machines they invent will change significantly. Big data will effectively promote the transformation of machine thinking from natural thinking to intelligent thinking, which is the key and core content of big data thinking transformation. As we all know, the reason why the brain has intelligence and wisdom is because it can comprehensively collect, logically judge and summarize the data and information around it, and also obtain knowledge and insights about things or phenomena [6]. Similarly, in the era of big data, with the breakthrough of the Internet of cloud computing, social computing, and visual technologies, big data systems can also automatically search for all relevant data information, and then become as active and three-dimensional as the "human brain" [7]. It could analyze data logically, make judgments, and provide insights, then there is no doubt that it could have human-like intelligent thinking capabilities and the ability to predict the future. "Intelligence and wisdom" are the salient features of the era of big data. Therefore, people's way of thinking must also shift from natural thinking to intelligent thinking in order to adapt to the development of the era.

4. BIG DATA THINKING FROM THE PERSPECTIVE OF CHINESE TRADITIONAL PHILOSOPHY

The era of big data is the era that people are in now, and we are facing in the future. Therefore, people should gradually cultivate and form big data thinking. Based on the aforementioned characteristics of big data thinking, this article attempts to explore what is the internal relationship between the two from the perspective of Chinese traditional philosophy [8]? This article covers some core content of Chinese traditional philosophy (such as benevolence as the purpose of people's behavior [9]), "harmonious but different" [10] as an important entomological principle, and the unity of theory and practice based on "empathy" in daily life. This article would compare and analyze them with big data thinking.

First, analyze its relationship with big data thinking from the perspective of 'Ren' (仁 meaning benevolence): Ren is the core concept of Chinese traditional philosophy. The good relationship among different hierarchy are called benevolence, "Benevolence means to be glad to love others" [11]. Benevolence is to love others, and it is a sincere love for human society. This shows that Ren is not only the core of the entire social order, but also the fundamental pursuit of human nature. So, how can we get and realize 'Ren', and what does Ren have to do with big data thinking? This relationship can be reflected in the following points: First, the two are consistent in purpose: Both serve the whole of human society. Benevolence is not just the good friendship between individual people, but the harmonious and friendly development of civilization that emphasizes the entire human society. Big data thinking, as far as its fundamental starting point is, serves the whole society. This is of great significance for constructing an overall framework in the era of big data. The most recent challenge for humanity in 2020 became COVID-19. Apple and Google (among others) cooperated to trace people's contact with patients, to provide precise information to the public, by means to effectively preventing the pandemic [12]. On the one hand, the use of big data technology should relieve the disaster [13]; on the other hand, it also violates people's daily privacy, an issue mainly discussed in the west. How to evaluate such an event? If the cause is to fight the COVID-19 pandemic, for the safety and health of people's lives, this is actually a benevolent measure. After solving,

measures like this may be condemnable. Although it is still the use of big data technology in society, there will be diverse evaluations in different contexts. And this standard is benevolence. Benevolence is really for the benefit of humans, for the better social welfare. In the era of big data, the relationship between people is in a sense of integrity (at this point, Ren's thinking is highly compatible with big data thinking). The formation, collection, collation, and analysis of big data are profound Practical significance. In a sense, Ren is the cornerstone of social order in the era of big data and the fundamental moral foundation of big data thinking.

Chinese traditional philosophical thought is full of openness and tolerance, which is also an important reason why Chinese traditional culture is enduring. Among them, 君子和而不同 ("gentlemen seek harmony but not uniformity") is an important principle [14]. This translation reveals the challenges of highlighting the proper meaning by Kongzi / Confucius. He was in his (full) sentence "君子和而不同小人同而不和" referring to friendly relationship with others in interpersonal communication, without the necessity to agree with each other on specific issues. In everyday life, it is common for people to hold different opinions on a certain issue. True friends should reach a consensus by exchanging views and communicating ideas. They do not seek to convince others with their ideas nor do they deliberately hide their different views, but tolerate each other's independent opinions. It is not only imperative for interpersonal communication, but also a vital rule for the development and operation of social relations. It is also a useful principle when people face and deal with different social problems. In modern society, especially contemporary society, tolerance for diversity, recognition and encouragement of differences are important principles of relationships and social order, and the expectations of social development. In the era of big data, respect for diversity and the pursuit of variance are equally important principles. In big data thinking, difference is one of the inevitable characteristics of data and the uniqueness of each data is obvious. But the interrelationship between different open data (that is "harmonious") is the fundamental meaning of data. Therefore, "harmonious but different" is the epistemological rule of big data thinking [15] and it is also the applied behavior rule of people. For example, big data collection on a certain group of people's lifestyle and sports

habits can be used in the field of health care, and even can be used to predict life expectancy. Every individual's data has its basic value, and data sharing greatly increases its comprehensive value. This is not just the value of accumulation, but a new social harmony order based on the consensus of the big data reuse. This unification of openness and inclusiveness is the meaning of the big data thinking, and it is also the basic quality of people in the era of big data.

The value of big data is not only its basic technological value, but more from its reuse value, which will induce more innovative uses and values. This kind of reuse value is based on its mutual relationship. One typical example is data sharing. Although, in the new era, the contents of its opening and tolerance are different, but as a basic epistemological principle and social operating law, "harmonious but different" is completely applicable to the era of big data. Data sharing coincides with this perspective. One can even say that the era of big data is an era full of openness and tolerance. Big data thinking is a thinking with an open and inclusive pursuit. Big data is a kind of data with open and inclusive characteristics.

Chinese traditional philosophical thought does not only pursue the perfection of theory, but also focuses on the unity of theory and practice. This unity of theory and practice is based on empathy. What is empathy? Empathy is the ability to understand others, emphasizing the willingness, emotion, and thinking from another point of view. The combination of knowing and doing emphasizes that with this kind of empathy, we must act, practice, and implement empathy on specific things. Big data thinking also seeks this: People's collection and analysis of big data are based on a need for a specific purpose, or a need for a composite purpose. This need requires different data users to have a common understanding of data, as well as to follow a common conduct rule. In big data thinking, people should have empathy. For example, based on people's willingness of their privacy protection, technology companies often use various anonymity techniques [16]. And this anonymous technology may be cracked and eliminated by big data technology. Based on such considerations, people should have more empathy in big data thinking and more basic concepts of respecting and protecting the privacy of others. From the characteristics of big data thinking, the aforementioned four characteristics

all require the purpose and effectiveness of data processing. This pursuit of purpose and effect is consistent with empathy-based theory and practice, and is completely consistent in internal logic and external effects.

5. CONCLUSION

Based on the above analysis, we could think that Chinese traditional philosophy and big data thinking have certain consistency. This article is only preliminary, and it needs more comprehensive and deeper demonstration. Even so, people can not only look at the consistency between the two thinking, but also take a deeper view that Chinese traditional philosophy has certain reference and guiding significance for the development of big data thinking in the era of big data. Of course, big data thinking is a new kind of thinking. It could not be automatically formed and developed. It requires people to study hard and put into practice [17]. In this way, under the guidance of big data thinking, people can make full use of big data technology to benefit humanity's better tomorrow.

FUNDING

Funded by the Construction Project of Superior Disciplines of Universities in Jiangsu Province.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:

*The peer review history for this paper can be accessed here:
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