PERSPECTIVE

Philosophical Perspective on the Digital Economy

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The digital economy is a new economic era and social form of human society after the industrial revolution and information economy. It creates the free time and free activities needed for human development, provides an exploratory plan for the modern society to move toward the sharing economy, and brings many development relations issues that we need to face and examine objectively. From the perspective of human development, this paper deeply discussed the development progress of digital economy through specific cases. We believe that the digital economy breaks the rigid and rational world of humankind based on causality but makes more possible correlations become the philosophical support behind the digital economy model, thereby creating more possibilities for.

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"If the human has all the rules of nature, then you can predict all future events and retrospectively know all events that have occurred in the past." *Pierre-Simon Laplace, 1749-1827*

Introduction: From Causal Effect to Correlation

HOW to assess whether one event has an impact on another, and to what extent? As the core concept of big data, "all things are connected" refers to the interaction, mutual restriction, and mutual confirmation between things. This reciprocal relationship is called correlation for short. In theory, in the field of data analysis, correlation analysis methods are based on statistical data. According to the "Big Data" Era, even if there is no cause-effect relationship, as long as you find sufficient correlation and use it in the process of dealing with problems, it can play a significant role (1).

Therefore, correlation analysis is the basis of causal analysis, and causal analysis is the deepening of correlation analysis. Big data does not replace causality but provides a broader space for its development. For example, aspirin was only used as a cold medicine initially, but it was later discovered that it effectively prevented cerebrovascular diseases. Through a large number of clinical trials, aspirin has shown a significant correlation in the prevention of cerebrovascular diseases (2). Furthermore, aspirin's pharmacological analysis revealed that aspirin is indeed a drug for treating cardiovascular and cerebrovascular diseases; that is, there is a causal relationship between them (3).

The human resources department often asks: What are the main reasons that affect employees to leave? Is it salary or promotion space? Turning these business problems into data problems is nothing more than evaluating the interaction or correlation between one factor and another. The fact is that things can be described indirectly through objective data. Similarly, most business problems can be defined as problems analyzed through data (4). For example, user shopping behavior can be transformed into a data problem. The statistical analysis overview of customer data, search data, click data, and transaction data are

all behavioral rules and patterns that can be directly seen. A real marketing problem is regarded as a classification forecast. It can be determined whether a customer will buy the company's products and when there will be a demand for a purchase. Business problems can be transformed into different data models, and various data will reflect other business models and information.

Materialist dialectics believes that everything in the world is universally connected, and nothing exists in isolation (5). Things are interdependent and interact with each other, and various elements and analogs of relationships enter each other. In nature, whether it is the Celestial movement or the motion of small molecules, they all follow their internal laws. In life, human behavior also has rules, such as "the 28th law", "broken window effect," "Matthew effect," and so on. Therefore, from national governance, economic development, corporate management, and marketing to individual behavior, all of these have specific laws that can be followed. Business management and marketing are precisely to find the rules of these human behaviors and effectively use these laws to achieve particular business goals. Through an in-depth analysis of big data, we can see the laws of the operation and development of things and use them. This is precisely the key reason why big data can be applied to almost any industry and field (6).

In the era of small data, most things are analyzed from a single target and a single category, so the results may not be accurate and useful. In the era of big data, it is emphasized to analyze data interactively from multiple dimensions to explore internal laws. Therefore, many things and phenomena cannot be explained in the low-dimensional space, but they are well described in the high-dimensional area. The data has already happened. Big data uses past data to explore things' laws and characteristics and analyze future development and trends. Therefore, the purpose of big data is to predict. Based on the prediction results, making corresponding strategic adjustments to items is a decision. If the expected result is not what you want, you need to adjust your strategy to develop the desired direction.

Take Security Governance as an Example

Big data exploration and practice have gone through the development process from the initial design to the current application in various significant industries. The public's perception of big data has also changed from a vague understanding of the present application across multiple office processes. Under such a background, government and enterprise workers are no longer satisfied with big data research but stay on intellectual discernment. On the contrary, they hope to do everything possible to expand the scope of big data applications infinitely to realize office operations' digitization and intelligence in various fields. The following examples illustrate the possibility of the successful application of big data.

From the government's perspective, the most typical department for big data applications is the public security agency. Whether it is general security management or the crackdown on criminal crimes, the application of big data in recent years has been evident to improve public security efficiency (7). What people feel most intuitively is the development and application of big data by general security departments (8). When people need to check in hotels, they have to log in and enter personal information at the front desk; in this case, a face recognition collection system was born. Because in hotels, criminals often use other people's ID cards to engage in pornography, gambling, and drug abuse. The facial recognition collection system can accurately compare the collected portraits with corresponding ID cards by recognizing essential facial information to determine whether the occupants are using their real IDs. The intelligent system, based on a big data information database, instead of relying on the subjectivity and empirical analysis of the hotel's front desk staff, uses big data to obtain high-precision results. It has contributed significantly to reducing the number and frequency of hotel crimes. From the perspective of "people," in fact, the occurrence of many illegal and criminal acts in hotels has a direct causal relationship with human-made operations. The staff did not perform their duties or deliberately ignored certain potential risk factors for temporary benefits that eventually caused great harm. The advantage of big data is that it can cut off the connection between cause and effect, absolutely avoid empiricism, and transmit all crisis factors within the controllable range to the public security terminal in time. The police can respond quickly and effectively stop it.

In addition to public security management, big data has a significant role in the fight against crime. Big data itself is a spark ignited as the Internet continues to penetrate people's lives, especially when mobile networks have become a part of everyone's lives; new types of crimes such as telecommunications and online fraud have also begun to appear. The police department's investigative methods for such cases are just using big data characteristics to integrate the data clues that can be concatenated to find the location of the signal source of the criminals and realize the effective online to offline arrest. Big data also promotes the police to study and analyze criminals' fraud methods and summarize the high-frequency crime methods used in similar cases. This has a significant positive effect on improving people's awareness of risk prevention and strengthening anti-fraud capabilities. In the past, the police used some typical cases to teach the people how to spot criminal deceptions in such cases. However, the rapid development of society has caused criminals to use fraudulent methods endlessly. Therefore, it is not enough to stay on the study of individual cases. Only by using big data to determine criminal fraud law can we help people protect their safety (9).

The application of public security big data is just a microcosm of the times. Big data will indeed extend to all corners of social life, change people's daily traditional cognition, reduce unnecessary mistakes, and make everything more controllable.

Take Google Services as an Example

Prediction of Influenza

In February 2009, a paper published based on the Google data by predicting the outbreak of seasonal influenza (flu) in Nature's journal, which has attracted widespread attention in healthcare (10).

Google predicted the global flu prevalence based on Google search data. Google is trying to understand whether specific search terms' geographic location is related to data from the US Influenza Prevention and Control Center. CDC tracks

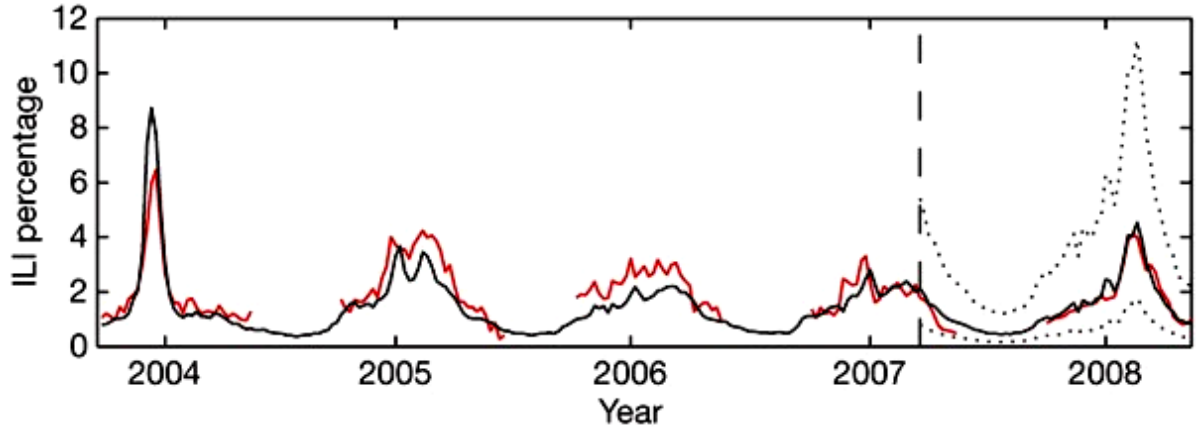

Figure 1. Detecting Influenza Epidemics Using Search Engine Query Data.
Courtesy to Ginsberg et al., Nature 2009; 457(7232):1012-1014. DOI: 10.1038/nature07634.

patients in hospitals and clinics across the country, but their information often lags a week or two, but Google's big data has found real-time trends.

Google Flu Trends uses statistical Google search data to predict the current global flu epidemic level almost real-time. Millions of users around the world search for health information online every week. Using Google search statistics, it can be seen that in the influenza epidemic season, there will be more and more search terms related to influenza.

Google found a close relationship between the number of people searching for topics related to flu and the number of people who have flu symptoms. Of course, not everyone who searches for "flu" was got sick, but there were still patterns when you added up all the search terms related to flu. Google compared the search terms with the existing flu surveillance system and found that the related search terms increase during the flu season. Google can count the frequency of these search terms and predict the influenza epidemic's degree in many countries and regions worldwide.

Figure 1 compares with official influenza surveillance data, showing influenza prediction data based on existing search terms in many countries and regions. Accordingly, the prediction data based on influenza-related Google search terms is similar to the existing influenza epidemic level indicators. Of course, this does not mean that past data is equally applicable to the future.

Existing influenza surveillance is also very important, but most health care institutions are centered in specific countries or regions and are updated at a weekly rate. Google Flu Trends currently provides data to many countries worldwide and is updated daily, so the existing system is continuously improved.

Early awareness of the possibility of infectious diseases can effectively reduce the number of infections. If a new type of influenza virus emerges under certain conditions, a pandemic will occur like in 1918, causing millions of deaths. Through Google's latest flu prediction data, public health workers and medical experts can deal with seasonal infectious diseases more effectively.

Translation Service

After the computer appeared, people naturally became interested in using computers for automatic translation. Subsequently, IBM quickly entered the automatic translation market using its mainframe computer (11). With natural language processing technology that understands the rules of various human languages as the core, for more than 40 years, it has been committed to developing programs that recognize and translate words such as nouns, verbs, and adjectives of the language from the context. To understand the relationship of natural language through the program and decipher its meaning, the translation result is not satisfactory because it is difficult to perfectly embody human complex natural language and translate it into other languages with computer algorithms.

But Google has proposed a solution to this problem in a completely different way. Its machine learning method is based on data rather than let the machine understand the language structure. In public institutions like the United Nations, policies and announcements are published in English, French, Chinese and other languages. As long as these data are entered into Google Translator, it will actively learn the translation mode between different languages based on the data translated into a high level. Google Translator does not understand the language but uses the results of translation to perform mechanical or statistical translation based on existing data. Therefore, the most significant difference between Google and IBM is that it is not programming to let the machine understand the language structure and let the machine learn the language model.

When Google provides early translation, its level is preliminary. But fortunately, Google's translation is getting better every day. The reason is the data entered. Translations of books published online and documents translated into multiple languages have become the basis for Google Translator to improve its accuracy every day. In other words, the more data that appear

online, the more accurate Google translation can get.

Google is a representative company that uses this method to extract meaningful data and realize a virtuous value creation circle. The number of global monthly users of Google's translation service reached nearly 200 million in early 2012. The text equivalent to 1 million books has been translated, and the translation languages have also been expanded to 62 (12). Interestingly, Google's translation service itself does not have a profit model but based on this, a virtuous circle structure of value is being formed. By strengthening other service functions, they indirectly generate revenues such as advertising and income to Google itself.

Philosophical Perspective

In the digital age, correlation gradually replaces causality as the core of people's decision-making. Amazon abandoned the past tagging recommendation system, such as "Because you bought a horror novel, I think I would recommend to you other horror novels"; instead, it switched to a relevance recommendation system based on big data, that is, "Other people bought this book also bought another book, so I want to recommend that book to you too." But it must be realized that the "gain" of improving efficiency through correlation is at the cost of abandoning the causality of "lose."

The goal people pursue changes when they choose correlation rather than causality as the basis for judgment. They no longer seek the optimal solution derived from a clear causal relationship but choose the sub-optimal solution generated by correlation because it is more practical and more comfortable to reach. In the rapid improvement of computer performance, the old method of summarizing the samples' rules and then using the rules to guide behavior is gradually replaced by the new approach. The overall population is precisely the sample.

Under the new method, the order of "idea" and "practice" has been reversed. For example, Wal-Mart observed that the sales of flashlights and egg tarts increased before the hurricane season, and therefore believed that people who bought flashlights were also likely to buy egg tarts. Accordingly, when laying out the shelves, place the egg tarts and the flashlight close together. Because sales of both products have increased simultaneously, Wal-Mart guesses that people will buy both products at the same time (1). When the correlation is put before the causality, people will question the nature of things. Therefore, an item's rationality no longer needs a reason to prove, and the existence of a thing itself is proof of its rationality.

If existence is reasonable, it is no longer necessary to question whether numerology is scientific or not because its existence for thousands of years has become the most potent evidence of numerology's rationality. Taking a step back, even if the existing numerology theory does not effectively explain the relationship between a person's personality and destiny and the birth date, through big data analysis, we can also link birth and personal fortune through the correlation and propose new numerology of the age.

In the digital age, any public information of people may derive a corresponding "numerology." For example, after an extensive collection of information, we can calculate whether people with double-fold eyelid are more likely to make a fortune than people with single-fold eyelid, and thereby deriving "single- and double-fold eyelid numerology." If statistical data clearly shows that an absolute lack of personal information is related to personal fate, this theory can undoubtedly guide reality and improve people's efficiency. When the data shows that people with single-fold eyelids are more likely to get rich, people will be more inclined to choose people with single-fold eyelids when looking for trading partners, thereby increasing the chances of success and profit (13).

If the related relationship in numerology is recognized, then personal information protection will arise from this.

In the context of examining correlation, any information can be used for comparison. When our secrets are linked with birthdays, palmistry, and facial features, protecting personal privacy will require more information to be kept confidential (14). However, the excessive cover-up of personal data will lead to a complete lack of understanding between them. Therefore, some personal information, such as facial features, cannot be hidden. In the digital age, the analysis of the relationship between these parts of personal data makes a person "more transparent," which ultimately leads to the narrowing of individual privacy rights or the reduction of publicly available pieces of personal information.

Concluding Remarks

From the enlightenment of science and rationality to the development of the industrial revolution to the innovation of science and technology, the world progress led by Western society has always been based on the discovery, interpretation, analysis, and application of the laws of event operation as the central axis of development. Therefore, logic, philosophy, and ethics from the past to the present have all used causality as the main chain to form the world of rationality as we know it.

However, is such "causal rationality" everlasting? Through the thinking of "correlation is the development of causality," we have extended the case of security governance and Internet services and found that the world's services and efficiency will be significantly improved by focusing on correlation rather than causality. But at the same time, can those areas that were previously considered irrational and pseudo-scientific, due to the increasing strength of correlation analysis technology, become another kind of disclosure of personal information and privacy? Faced with the detailed analysis of data that the digital economy can bring, will people be happier because of improved social efficiency? Will they be gradually transparent and materialized, or have they become digital samples and objects of analysis?

Hegel ever said, "*The ignorant man is not free, because what confronts him is an alien world, something outside him and in the offing, on which he depends, without his having made this foreign world for himself and therefore without being at home in it by himself as in something his own.*" (15) People who ignore change are ignorant. Even though he has a deep understanding of the past world, has no awareness of the changes in progress, and has no vision of the possible future, he is still ignorant of this society. Therefore, in the face of the benefits and hidden worries that the digital economy can bring, we really cannot answer which one is important and how to choose. Because before answering this question, it is vital to allow the digital

economy's various possibilities to develop, enter our lives, and become a part of society. In the face of change, we cannot judge whether it is good or bad, but we can and must accept and even become leaders and pioneers in the face of change.

References

1. Mayer-Schönberger V, Cukier K. Big data: A revolution that will transform how we live, work, and think. Houghton Mifflin Harcourt. ISBN: 978-0-544-00269-2. 2013.
2. Patrono C, Roth GJ. Aspirin in ischemic cerebrovascular disease: How strong is the case for a different dosing regimen? Stroke 1996; 27(4):756-760. DOI: https://doi.org/10.1161/01.STR.27.4.756
3. Weisman SM, Graham DY. Evaluation of the benefits and risks of low-dose aspirin in the secondary prevention of cardiovascular and cerebrovascular events. Arch Int Med 2002; 162(19):2197-2202. DOI: https://doi.org/10.1001/archinte.162.19.2197
4. Chen H, Chiang RH, Storey VC. Business intelligence and analytics: From big data to big impact. MIS quarterly 2012:1165-1188. DOI: https://doi.org/10.2307/41703503
5. Lefebvre H. Dialectical materialism. U of Minnesota Press. ISBN: 978-0-8166-5618-9. 2009.
6. Zhang X, Wan GH, Zhang JJ, He ZY. Digital economy, universal-benefit finance and inclusive growth. Econ Res J 2019; 54(8):71-86. [Chinese] Available at: http://www.cnki.com.cn/Article/CJFDTotal-JJYJ201908006.htm
7. Stergiou C, Psannis KE, Gupta BB, Ishibashi Y. Security, privacy & efficiency of sustainable cloud computing for big data & IoT. Sustain Comput Info Sys 2018; 19:174-184. DOI: https://doi.org/10.1016/j.suscom.2018.06.003
8. Chen XH. Analysis of technology integration and application innovation trends in the digital economy era. J Central South Univ (Soc Sci) 2018; 24(5):1-8. [Chinese] Available at: http://www.cqvip.com/qk/81829x/201808/676851746.html
9. Li MH. The construction of new civil rights in the digital economy: data resource rights. Soc Sci Yunnan 2020; 2020(4):48-54. [Chinese] Available at: http://www.cqvip.com/QK/91464X/202004/7102446842.html
10. Ginsberg J, Mohebbi MH, Patel RS, Brammer L, Smolinski MS., Brilliant L. Detecting influenza epidemics using search engine query data. Nature 2009; 457(7232):1012-1014. DOI: https://doi.org/10.1038/nature07634
11. Craciunescu O, Gerding-Salas C, Stringer-O'Keeffe S. Machine translation and computer-assisted translation. Mach Translat Comput Ass Translat 2004; 8(3). http://www.mt-archive.info/TranslationJ-2004-Craciunescu.pdf
12. Afshin H, Alaeddini MA. A contrastive analysis of machine translation (Google Translate) and human translation: Efficacy in translating verb tense from English to Persian. Mediterr J Soc Sci 2016; 7(4-S2):40. DOI: https://doi.org/10.5901/mjss.2016.v7n4S2p40
13. Jing WJ, Sun BW. Digital economy promotes high-quality economic development: a theoretical analysis framework. Economist 2019; 2019(2):66-73. [Chinese] DOI: https://doi.org/10.16158/j.cnki.51-1312/f.2019.02.008
14. Chen JJ. Research on personal data protection in the era of digital economy. J Shanxi Polit Law Inst Admin 2020; 33(4):20-23. [Chinese] Available at: https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2020&filename=SXZF202004007&v=O5DQ1sPhv%25mmd2BdjD1cog27TWP2kg7fbUi1NnYP%25mmd2FR3P8cyQiqDEEX1HQl%25mmd2Bypf2%25mmd2BztCJy
15. Hegel GWF. Aesthetics: Lectures on fine art (Vol. 1). Oxford University Press. pp.89. ISBN: 978-0-19-823816-4. 1998.

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