

Application of Computer Aided Numerical Calculation Method and Artificial Intelligence in Technology Innovation Analysis

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ABSTRACT

With the rapid development of the Internet of Things technology and the continuous update and wide application of artificial intelligence technology, the Internet of Things technology and artificial intelligence have gradually penetrated into many industries in human society and have been involved in all aspects of daily life, it has an unprecedented profound impact on human society. Although there are many applications of IoT technology and artificial intelligence in various industries, there are still very few researches on technological innovation. Therefore, this article under the premise of IoT technology and smart environment, use artificial intelligence technology to analyze technological innovation through three aspects of technology finance, and collect technological innovations in the five provinces of Jiangsu, Zhejiang, Anhui, Jiangxi and Fujian the index and technological innovation efficiency value, as well as the relevant index data of technological innovation, are transmitted to the intelligent computing device in the intelligent environment. The final results show that artificial intelligence has a certain positive effect on technological innovation analysis.

Keywords: *Internet of Things, Numerical Computing, Artificial Intelligence, Technological Innovation Analysis*

1. INTRODUCTION

At present, my country's economy has changed from a stage of rapid development to a stage of high-quality development. It is in a major period of transforming the development mode and optimizing the economic structure. Technological innovation has become the main driving force of this process. Economic globalization and a new round of technological revolution have brought undeniable challenges to technological innovation in all provinces of the country. The development of Internet of Things technology has promoted the development of artificial intelligence, and artificial intelligence technology has become more and more mature. Artificial intelligence (AI) is moving forward at a considerable speed [1]. The emergence of artificial intelligence has allowed researchers to discover new methods that can be applied to technological innovation analysis, and the application of artificial intelligence technology has had a positive impact on technological innovation analysis in various industries.

There are also many researches on numerical calculation methods and artificial intelligence in technological innovation analysis in academia. Bergek discussed the interaction between the technological innovation system (TIS) and the broader "context structure" [2], but the use of this research is of little

value, and the use of technical methods is flawed. Based on panel data from 30 provinces in China from 1990 to 2010, Xiong estimated the spatial effects of technological innovation and FDI on regional income inequality [3], but the data collection in this study was too cumbersome and the data was too large. Wen systematically analyzed the green technology innovation of emerging industries and its influencing factors in China [4], but the data indicators of the study were not comprehensive enough and the analysis was too one-sided. Guangyu proposed a comprehensive method for evaluating the efficiency of enterprise technology innovation projects in consideration of the factors that affect the project and the level of enterprise organization [5], but the data collected in this study are incorrect and the results of the study have errors. Walrave developed a system dynamics model that integrates the concept of "innovation power" based on the literature on the innovation system of emerging technologies, combined with the concept of "transition path" developed in the multi-level framework thinking [6]. Zi-Xiang is based on the theory of regional technological innovation system and the status quo of technological innovation, with technological innovation performance as the research object, and puts forward six factors affecting the technological innovation performance of higher vocational colleges [7]. however, the study's description of the method and technology is not clear enough.

Pigozzi put forward a key investigation on the existence and use of the concept of "preferences" in artificial intelligence [8]. Hernández described and critically evaluated the different evaluation methods of artificial intelligence systems and the role of components and technologies in these systems [9], but this method requires too much cost. The purpose of Ince H's research is to investigate the impact of technological innovation and absorptive capacity on innovation [10], but the research is not highly practical.

In order to study the research of artificial intelligence in the analysis of technological innovation, this paper adopts computer-aided numerical calculation methods, and calculates and analyzes various indicators of technological innovation on the basis of the Internet of Things and intelligent environment.

2. PROPOSED METHOD

2.1 Internet of Things

The Internet of Things (IoT) relies mobile networks on the Internet and. It uses physical devices with detection, transmission and calculation functions to connect all independently addressable data to the Internet according to the agreed intelligent communication protocol to realize human The information network of interconnection, perception, transmission and intelligent processing between things and things. The current revolution of Internet, mobile and machine-to-machine (M2M) technology can be seen as the first stage of the Internet of Things [11]. It tends to completely change and connect the global world through heterogeneous smart devices through seamless connection [12, 13]. The architecture of the Internet of Things can be composed of three levels: perception layer (perception control layer), network layer and application layer. The structure is shown in Figure 1.

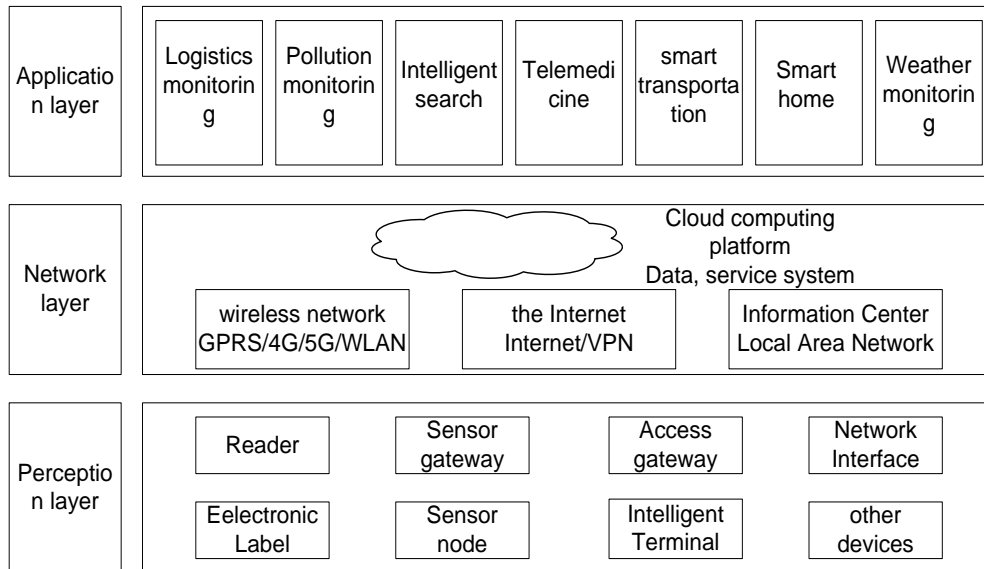


Figure 1. Architecture diagram of the Internet of Things

At present, the Internet of Things technology mainly uses information detection technology and information transmission processing technology to perceive and locate the connected objects of people and things under the network, thereby creating an application local network [14].

The Internet of Things is conceived as a trans-formative method for providing numerous services [15], and its components include: (1) Sensors: Sensor devices usually detect changes in related signals, physical quantities and chemical components generated outside the device through various physical devices, and transmit the collected information to other network nodes for personal use. Sensor devices can be seen everywhere, and can be converted into corresponding electrical signal changes through changes in relative physical quantities. It can be said that the current sensor technology is quite mature and can collect all kinds of

data that people need. (2) Electronic label (ID): Electronic label technology is an emerging industry that only appeared and developed in the last century. It has been widely used in daily life, such as product barcodes, WeChat QR codes, etc. We have used electronic label technology before we know the electronic label.

2.2 Numerical Calculation

The research fields of arithmetic are classified by mathematical formulas, including arithmetic approximation, arithmetic differentiation, arithmetic integration, arithmetic algebra, optimization methods, algebraic solutions of discrete continuous systems, arithmetic solutions of calculation equations, numerical solutions of integral equations, statistical probability, etc. With the widespread application and development of computers, many problems in the field of computing, such as computational economics, computational

chemistry, computational engineering, and computational physics, can be summarized as arithmetic calculation problems. In the process of experimental data processing and analysis, the logical calculation of data is very important.

The main features of numerical calculation are as follows: (1) The final solution of the numerical calculation is discrete data, and there must be errors; (2) Pay attention to the stability of the calculation;

Construct a decision matrix for technological innovation $X = (x_{ij})_{m \times n}$, Use dispersion standardization method to standardize the decision matrix to form a standardized decision matrix $Y = (y_{ij})_{m \times n}$, where:

$$y_{ij} = \frac{x_{ij} - \min_i x_{ij}}{\max_i x_{ij} - \min_i x_{ij}} \quad (\text{Forward}) \quad (1)$$

$$y_{ij} = \frac{\max_i x_{ij} - x_{ij}}{\max_i x_{ij} - \min_i x_{ij}} \quad (\text{Negative}) \quad (2)$$

The calculation method is:

(1) Use the normalized data to construct a matrix $S = (s_{ij})_{m \times n}$:

$$s_{ij} = \frac{X_{ij}}{\sum_{i=1}^m X_{ij}} \quad (3)$$

(2) Calculate the entropy value of the j th index,

where $k = \frac{1}{\ln m}$:

$$e_j = -k \sum_{i=1}^m s_{ij} \ln s_{ij} \quad (4)$$

(3) Calculate the difference coefficient of the j th index:

$$d_j = 1 - e_j \quad (5)$$

(4) Calculate the weight of each indicator:

$$W_j = \frac{d_j}{\sum_{j=1}^n d_j} \times 100 \quad (6)$$

(5) The arithmetic average method is used to finalize the index composition, and the formula is as follows:

$$Z = \sum_{j=1}^n W_j d_j \quad (7)$$

2.3 Artificial Intelligence

Artificial intelligence is an important technology that supports daily life and social activities [16, 17]. It is intelligent, practical and complete. Compared with cloud computing, mobile Internet, Internet of Things, big data and other technologies, although artificial intelligence develops slowly, it has more advantages than other technologies. Due to the outstanding ability of artificial intelligence to deal with complex input-output relationships, it is being developed and developed on a global scale [18]. It combines computer language, statistics, government and other knowledge to take advantage of technological differences, while at the same time it can better interact with other technologies to reflect its technological tolerance. Artificial intelligence has made great progress in recent years [19]. Artificial intelligence technology is now used in various industries. Mobile devices, autonomous driving, access control systems, credit management and cost-effective self-service terminals are all specific applications of artificial intelligence technology. The basis of artificial intelligence is the collection and processing of data. Automatically mine and collect data according to computer algorithms, and analyze and process the data to support computer behavior decision-making [20].

2.4 Analysis of Technological Innovation

Technological innovation is the product of the total influence of technological progress and application innovation. From proposing new ideas to generating financial benefits, this is a comprehensive process, including a series of activities, such as creating new technologies, researching new products, applying new technologies, commercial production and marketing. It involves the commercial application of technology and the purchase of innovative products. Realizing "understanding technological innovation" is essential for advanced teaching and research in science and technology research, as well as media and communication. Science is the foundation of technological invention and technology is the driving force for the survival and development of the industry. Industrial innovation is mainly based on technological

innovation, and technological innovation must be based on scientific discovery.

As an important part of innovation theory, technological innovation refers to the innovation of production technology. It includes not only the development of new technologies, but also innovations in real technology applications.

3. EXPERIMENTS

3.1 Experiment Object

This article analyzes technological innovation in technology and finance, modern manufacturing, and environmental comprehensive index, and understands the application of artificial intelligence in technological innovation analysis.

3.2 Experimental Data

(1) Technology innovation index

This paper analyzes and compares the time and region dimensions of the five provinces, calculates the weight value of each index, and obtains the technological innovation index of the five provinces from 2015 to 2019. The specific data are shown in Table 1.

According to the statistical data in Table 1, the technological innovation index of the five provinces from 2015 to 2019 is between 6.02 and 94.17, and the

technological innovation index is quite different. From the annual data of each province, we can see that the technological innovation index of the five provinces is increasing year by year.

TABLE 1. TECHNICAL INNOVATION INDEX TABLE

province	2015	2016	2017	2018	2019
JS	68.51	70.91	79.73	87.55	94.27
ZJ	43.85	49.25	56.83	63.15	69.98
AH	17.16	18.34	21.81	24.81	25.64
JX	6.12	6.70	9.41	11.47	13.76
FJ	13.23	14.73	17.61	20.27	24.29

4. DISCUSSION

4.1 Technological Innovation Analysis of Science and Technology Finance

This paper uses computer-aided calculation to calculate the technological innovation index of Jiangsu, Zhejiang, Anhui, Jiangxi and Fujian provinces in science and technology finance, and calculates the corresponding parameter years, the pure technical efficiency (PTE), scale efficiency (SE), comprehensive efficiency (ove) and average efficiency (AE) of technological innovation of science and technology finance from 2015 to 2019 are obtained. The final result is shown in Figure 2.

Technical innovation efficiency map

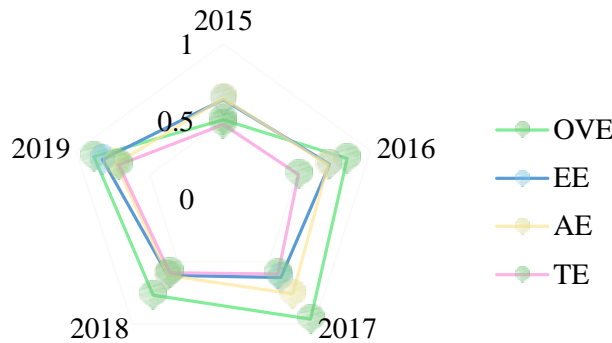


Figure 2. Technological innovation efficiency chart of science and Technology Finance

It can be seen from the data in Figure 2 that the highest comprehensive efficiency of Technology Finance and technology innovation is 0.93 from 2015 to 2019, and the lowest is 0.73 in 2018; Among all the efficiency, the technological efficiency of technological innovation is the lowest, but it has increased significantly in 2019.

4.2 Technological Innovation Analysis of Modern Manufacturing Industry

According to the spatial weight matrix of five provinces from 2015 to 2019, Moran's I index, technological innovation index Z and global Moran index p-values, the spatial spillover effect of technological innovation in modern manufacturing industry is tested. The test results are shown in Figure 3.

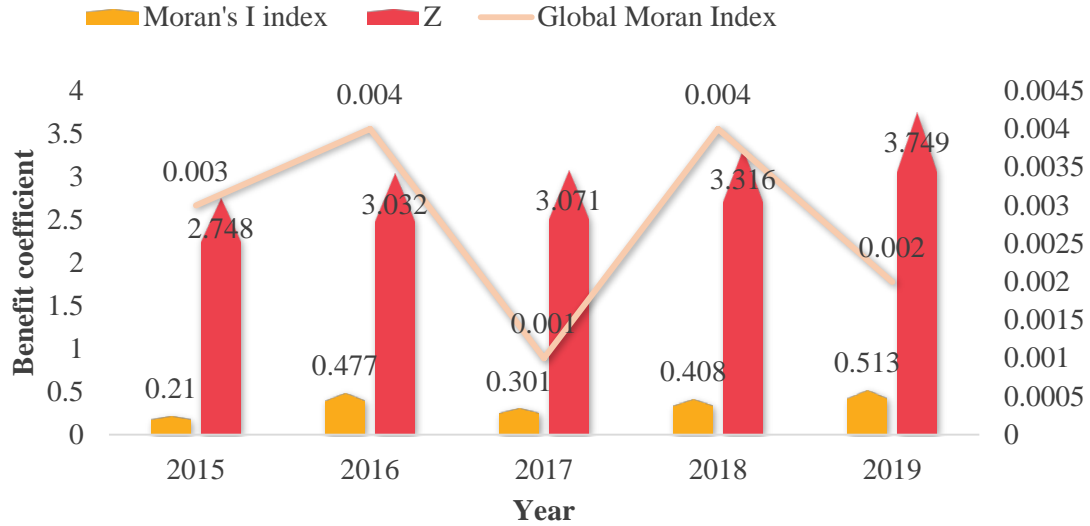


Figure 3. Spatial spillover effect

From the data in Figure 3, Moran's I index values are positive, indicating that the relationship between them is positive correlation, and the global Moran index is less than 0.05, which means that they have passed the test, and there is a space spillover effect of technological innovation.

4.3 Technical Innovation Analysis of Environmental Comprehensive Index

After many experiments, the scores of the environmental comprehensive index of the five provinces are obtained, and the area obtained according to the scores The figure is shown in Figure 4.

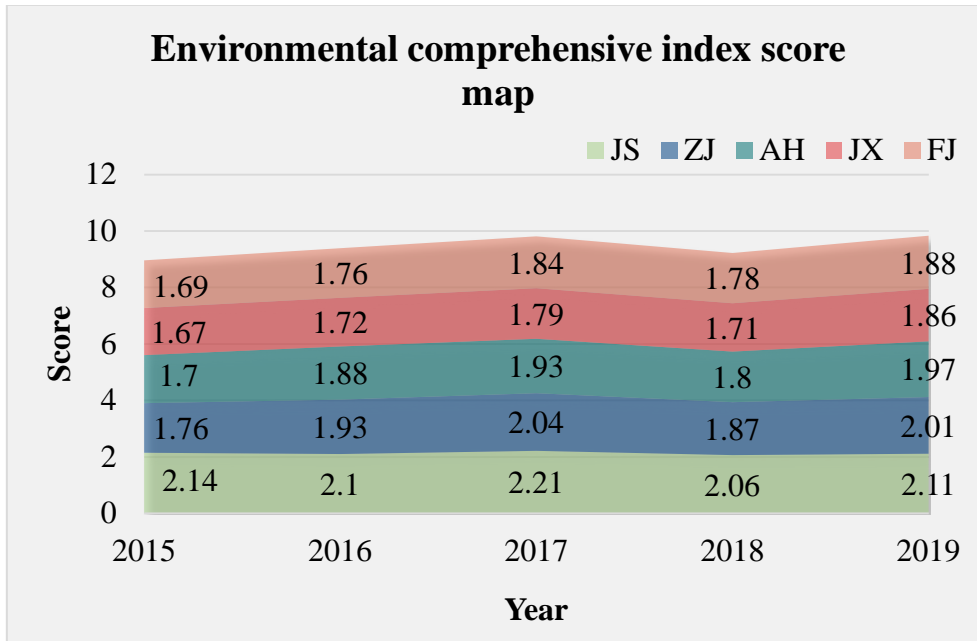


Figure 4. Environmental composite index score chart

According to the data in Figure 4, it can be concluded that Jiangsu's environmental comprehensive index score during 2015-2019 is the highest among the five provinces, while Jiangxi's environmental comprehensive index from 2015 to 2019 is the lowest among the five provinces.

4.4 Application of Artificial Intelligence in Technology Innovation Analysis

After analyzing the technology finance, modern manufacturing industry and technological innovation in the environmental comprehensive index of Jiangsu, Zhejiang, Anhui, Jiangxi and Fujian, we study the

application of artificial intelligence. Compared with the data in Table 1, the results are shown in Figure 5.

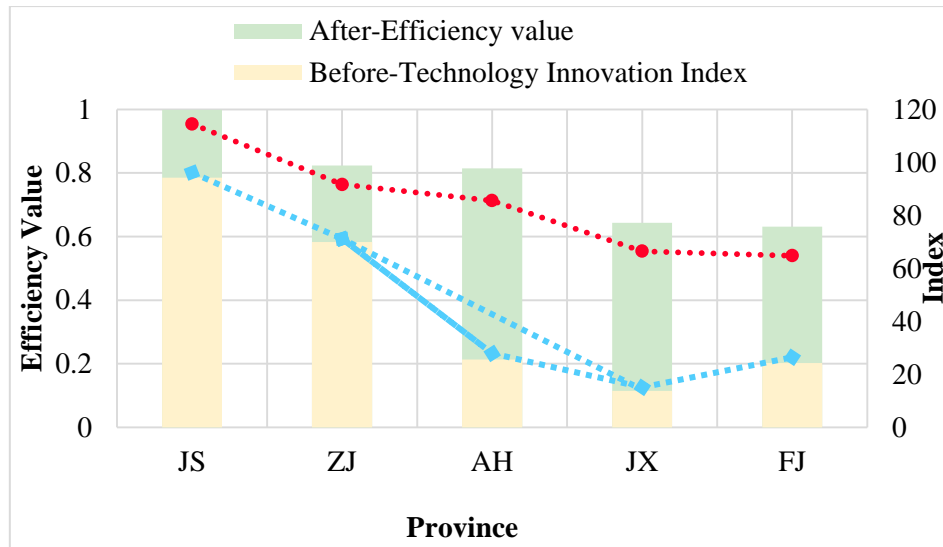


Figure 5. Innovation index comparison

According to figure 5, the technical innovation index and technical innovation efficiency value of Jiangsu, Zhejiang, Anhui, Jiangxi and Fujian in 2019 are compared. It can be seen that artificial intelligence has a certain positive impact on the analysis of technological innovation, and the technological innovation index and technological innovation efficiency value of each province have increased after the application of artificial intelligence.

5. CONCLUSIONS

Artificial intelligence is a newly developed technology in recent years. It is based on the Internet of Things technology, wireless sensor technology and wireless communication technology. It has very important research significance and practical value in daily life, education and scientific research, and medical and military fields. According to the final research results of this article, it can be concluded that the application of artificial intelligence in technological innovation analysis has a great influence on technological innovation analysis.

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