Research on the Application of Artificial Intelligence Technology in Information Visualization Design

Lingzhi Zhao, Taile Ni*, Yu Chen

School of Literature, Journalism & Communication, Xihua University, Chengdu, 610039, China

Keywords: Artificial intelligence; information; visualization; application

Abstract: With the continuous and rapid development of modern information and electronic technology and the continuous rise of emerging information technologies such as big data analysis, artificial intelligence and virtual reality, informatization and visualization will continue to face new opportunities and severe challenges. Visualization, also known as scientific computing visualization, is mainly a computing method, which converts symbols or data into more direct set graphics, so as to facilitate researchers' further observation and utilization. By closely combining the background of the industry and the forefront of industry science and technology, this paper deeply analyzes the basic concept of practical information visualization, combs it, and closely connects it with artificial intelligence technology, focuses on several development trends of enterprise information system visualization, and deeply analyzes the artificial intelligence information technology and its application. Finally, based on the interactive design theory, the development prospect of information visualization is prospected.

1. Introduction

Visualization, also known as scientific computing visualization, is defined as: visualization is a calculation method that converts symbols or data into intuitive geometric figures, which is convenient for researchers to observe the simulation and calculation process [1]. Visualization includes image synthesis, that is to say, visualization is a tool used to interpret the image data input to the computer and generate images from complex multi-dimensional data [2]. Visualization is a graphical representation that describes data information. The purpose of using visualization is to more directly interpret the complex information in the data. Information visualization of data mainly includes seven steps of "obtaining data, analyzing data, filtering data, mining data, displaying data, summarizing data and human-computer interaction" [3]. It can be seen that information visualization technology requires researchers in its field to have considerable professional knowledge and talents. Starting from the acquisition and analysis of data, information visualization researchers need to consider how to interact with data [4]. In the data mining of the intrinsic information of the data and the visualization of the results of the data, information visualization will help researchers in the field to discover the unique characteristics of the data. From the process of information visualization, it is found that the use of visualization to express the inherent beauty of data is also a new type of pattern recognition [5].

With the rapid development of science and technology in recent years, a large number of computer intermediate data need to be processed by visualization technology to achieve the objective of objective analysis [6]. In recent years, the application scope of visualization technology has been gradually expanded, and it has become a hot topic in society. Under normal circumstances, people define visualization technology: it is a technology that can be understood by users more intuitively with high-dimensional and complex data information. Compared with traditional pattern recognition methods, visualization methods have their irreplaceable advantages. This is also the reason and significance of the rapid development of visualization technology and the need for science [7]. Through the application of visualization technology, it is possible to discover its inherent laws in the financial and commercial fields with a large amount of high-dimensional information, so as to provide it with more reliable decision-making guarantee [8].

  DOI: 10.25236/iccem.2021.075

2. Overview of information visualization technology

Visualization technology is information visualization, which shows abstract and tedious data through computer graphics. Through information visualization, people can interact with information, thus helping people to recognize abstract information. Visualization technology uses computer graphics, computer image processing, computer signal processing and other methods to express the internal structure of data, information and knowledge. A good visualization technology can help users to have a qualitative understanding of data, and help users to better carry out subsequent pattern recognition and outlier detection. The main flow of visualization technology includes: filtering, analysis, screening, mining, drawing, refining and interaction. Information visualization integrates the superior technologies of various disciplines. It makes full use of human's sensory ability of vision, analyzes large-scale abstract information, fully displays information from an intuitive visual point of view, and excavates patterns and rules hidden inside information [9]. The transformation from abstract data to visual form is a process of simplifying complexity, especially in the application field of large-scale data, which has more efficient practical value.

Information visualization is a technology that aims at the computer's representation of data information and information transmission between people. Information visualization involves many hot fields of current computers. Such as voice information, video information, image information, text information, signal information, etc. The main process of information visualization is to describe the data, and then use the visualization method to represent the data, so as to mine the intrinsic useful information of the data information. Then, the information is processed by means of feature extraction, feature optimization, pattern recognition and data mining, and the expected model of these information is obtained. Information visualization applies graphics and images, extracts and sorts out feature values of information objects in abstract information, converts these feature values into data structures needed by graphics or images, and maps them to visualization forms [10]. Its intuitive and concise form is used to express the content features and semantics of information objects, so as to transform the tacit knowledge in information objects into explicit knowledge that people can understand more easily. Information objects include text, image, voice and other types. Different visual transformation and mapping methods will be adopted for different types of information objects.

3. Development trend of information visualization

In recent years, with the rapid development of computer simulation technology, a large number of immersive technologies such as virtual reality and augmented reality have emerged, which has become a cutting-edge research direction in the field of human-computer interaction. With the development of immersive technology, information visualization has changed from two-dimensional world to three-dimensional world. The benefits brought by the improvement of dimension are huge. Information is no longer folded and presented in a two-dimensional way. Especially for the information visualization of complex objects, three-dimensional space can present the data itself and data relationship at the same time without making users feel complex and redundant. Visualization technology has been applied to basically all scientific research fields, but there are still many problems to be solved. Firstly, the main research of visualization methods is focused on the early stage of data expression, and a large number of scientists focus on how to better express data. However, in the face of today's massive data, it is far from enough to observe and understand the data. How to classify the visual data and build its visual classification features and pattern recognition model is the research difficulty of this technology.

With the increase of data scale, information visualization is facing great opportunities and challenges. There are a lot of data closely related to us, but it is difficult to get effective visual presentation. The existing traditional visualization methods have become more and more difficult to meet the needs of users. Although there are some research methods on information visualization in technology, the visual presentation of these methods is still slightly complex and not straightforward from the perspective of visual design. The advent of the big data era means that

information visualization for massive data has become the trend of current research and practice.

4. Relationship between artificial intelligence technology and information visualization

4.1. Application analysis of artificial intelligence technology

Since 1970, space technology, energy technology and artificial intelligence have been called three important modern scientific cutting-edge technologies in the world by American scholars. Its main research interests include intelligent robot, speech recognition, image recognition, natural language processing and expert system, etc. Artificial intelligence technology was born in 1956, and the current research focus is machine learning. Machine learning is a science that uses computers to simulate human learning. Some mature algorithms include neural networks, genetic algorithms and so on. Machine learning is used to analyze and mine the knowledge behind a large amount of data, and information visualization technology is used to make the process and results of knowledge discovery easy to understand, and it is possible to understand the relationship and development trend of data. Only in this way can people analyze the data at a higher level and make better use of the data. This will be a major development trend in the future development.

Artificial intelligence technology is the inevitable outcome of the rapid development of modern scientific information technology, and the applications of artificial intelligence related technologies have appeared in different professional fields, such as automation, big data, computer deep vision, automatic unmanned driving and so on. Generally speaking, the main research goal of the technical research direction of artificial intelligence is how to use these machine learning to completely replace those complicated tasks that need to be independently completed by the human brain. In recent years, due to the rapid development of related technologies of artificial machine intelligence, the technology has been widely used in many related disciplines and other cross-disciplines, and achieved remarkable results. As far as scientific theory and technical practice are concerned, artificial intelligence has gradually matured and become an independent technical branch, and its main fields include intelligent machine translation, intelligent automatic control, automatic control program system design, aerospace technology application, and the execution of physical tasks that can not be performed normally or are complex or large-scale in living systems such as organic compounds.

4.2. Artificial intelligence technology promotes information visualization

It is found that the research on information visualization, big data and data has gradually become a hot topic in information visualization. Just big data belongs to the category of artificial intelligence. Information visualization is widely used in many fields, such as natural science, engineering technology, finance, communication, commerce and so on. There are many ways of mass communication in the new economic era, and the traditional communication technology can not fully meet the basic requirements of current mass communication. The traditional communication technology still has deficiencies in modern communication. The rapid advent of artificial intelligence technology has changed our traditional one-way information communication mode and provided more diversified communication options for communication audiences and mass groups. With the continuous improvement of the audience's professional cultural knowledge, it is no longer satisfied with the boring and single way of information communication. Therefore, the visual network communication information design repositioned the communication needs of the whole market, and fully considered the close interaction with the communication audience and the masses in the information design, And in this way to continuously improve its interaction with communicators. The development of national strength and economy is accompanied by the development and maturity of technology. The generation and processing of graphics and pictures are gradually maturing.

With the progress of research and a large number of data display, the research trend of information visualization is on the rise. According to the classification of data types, as shown in Figure 1. Information visualization technology is divided into the following types: two-dimensional

information visualization, three-dimensional information visualization, multi-dimensional information visualization, text information visualization, hierarchical information visualization and network information visualization.

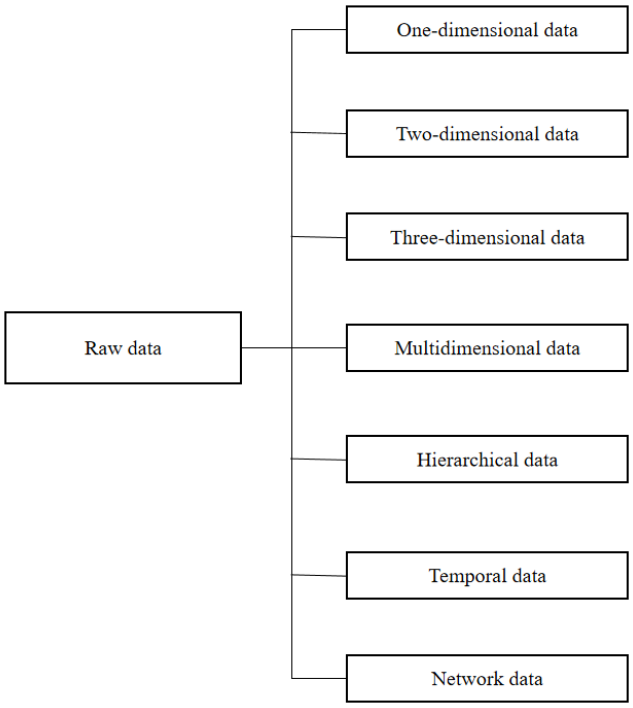

Figure 1 Data classification of information visualization

Information visualization is inseparable from the development of big data analysis and artificial intelligence. The scale of the big data industry is increasing day by day, and the level of data is rapidly rising. The existing multi-dimensional data, multi-variable data, and hierarchical information visualization technology methods cannot meet the needs for efficient and accurate visualization of big data. In addition, with the increase in the amount of data, the quality of the data may become worse, and the usability may become lower. Information visualization also faces the problem of effective information screening. The development of artificial intelligence has made machines more and more close to human intelligence. However, machines cannot replace humans after all. Key information decision-making and judgments require human intervention. The only way to combine the intelligence of humans and machines is through intelligent human-computer interaction. In order to make information visualization more efficient and accurate. Due to the application of artificial intelligence technology, a new information visualization design language has been produced, and the transmission medium has begun to change. The strong support of new technologies such as artificial intelligence has brought a brand new mode of thinking to designers. With the use of new technologies such as artificial intelligence, the information space it disseminates has undergone tremendous changes and has become a dissemination space oriented to the whole. Both artificial intelligence and information visualization refer to the comprehensive processing of data. The development of big data plays a very important role in many industries, especially in the research and development of computer science and network information technology and commercial applications in my country. Provides great entrepreneurial opportunities and development assistance, thereby effectively promoting the further healthy development of computer science and network information technology in our country.

5. Conclusions

The arrival of new media has not only changed people's daily life, working style and spiritual communication style, but also brought infinite development possibilities to modern visual design. Under such favorable environmental conditions, the audience is more inclined to design interactive

information exchange in the interactive process of receiving visual information content dissemination. In the future design of information visualization products, only the promotion of users' visual experience is the first priority, and strengthening the interactive communication between the audience and information dissemination visual information in visual design is a fundamental advantage of visual design. Visualization technology, as an important technology developed under the environment of science and technology, has been widely recognized and utilized by the society at present. It has been combined with virtual reality technology, artificial intelligence technology, economic category and so on, and even closely related with advanced science and technology. As a new technology, information visualization is developing vigorously. It is closely related to virtual reality technology, computer animation technology, artificial intelligence, data mining, digital earth, economic trends, and even attractive frontier disciplines such as human genome project. In order to promote its better development in the future, it is still necessary to actively study the visualization technology, actively integrate it with other sciences, and promote the more effective use of visualization technology. I believe that in the future, visualization technology will have a better development prospect in the development of society, thus contributing to social progress and development.

Acknowledgements

National Natural Science Foundation of China, "Research on the Mechanism and Model of Multi-format Linkage Development of Digital Creative Products" (No.71874142)

References

[1] Wang Rui. Research on artificial intelligence visualization based on knowledge graph[J]. Information Technology and Informatization, 2019, 000(008):184-187.

[2] Zhu Xuefang, Feng Qiuyan, Wang Jinwan. Research on the Application of Digital Information Technology in Epidemic Surveillance and Control[J]. 2021(2020-10):11-17.

[3] Yang Youlin, Hu Xin, Yuan Jingshan. The design and application of hospital artificial intelligence infectious disease early warning system[J]. Chinese Medical Equipment, 2020, 017(005):162-164.

[4] Li Xin. From informational presentation to systematic construction: the construction and development of case retrieval system from the perspective of case application[J]. Journal of Sichuan University (Philosophy and Social Sciences Edition), 2020, 000(002):161-173 .

[5] Ling Xi, Zhao Zhigang, Li Xingang. The application of artificial intelligence technology in the field of pharmacy——a document visualization analysis based on Web of Science[J]. Chinese Pharmacy, 2019, 30(04):6-11.

[6] Liu Yong, Sheng Xiaoting, Li Qing. Visual analysis of the application of artificial intelligence in the field of education in my country[J]. Modern Educational Technology, 2018, 28(10):28-35.

[7] Zhang Zhengang, Huang Jieming, Chen Yihua. Frontier identification and trend analysis of artificial intelligence technology based on patent measurement [J]. Science and Technology Management Research, 2018, 38(005): 36-42.

[8] Li Aixia, Gu Xiaoqing. Learning technology black technology: Will artificial intelligence bring disruptive innovation in education? [J]. 2021(2019-5):12-18.

[9] Ren Liqiang, Guo Qiang, Wang Haipeng, et al. CiteSpace-based artificial intelligence literature big data visualization analysis [J]. Computer System Applications, 2018, 027(006): 18-26.

[10] Zhang Zhenyu, Ren Tengyun, Chen Gang, et al. Construction and Practice of the Intelligent Financial Robot Sharing Center of S Company[J]. Artificial Intelligence and Robot Research, 2020, 009(001): P.32-41.