Information Visualization Interactive Design for the Core Needs of Users

Lin Li

School of Art and Design, Wuhan Textile University, Wuhan, Hubei, 430073, China

Keywords: Big Data, Information Visualization, Interactive Design, Visual

Abstract: After the Internet era, the amount of information brought by big data has increased exponentially, and how to spread information effectively has become a hot spot of current research. As an important means of information dissemination, information visualization has become the mainstream way to disseminate complex data and abstract information. Information visualization can select, deform and replace data, find a matching and easy-to-understand visual form, and use natural interactive methods to help people get effective information. Information visualization transforms data into visual form and provides a good interactive experience, so as to achieve the ultimate goal of "thinking with vision". Compared with text, visualization uses the fast perception ability of visual channel to improve the efficiency of people's observation, recognition and processing information. Based on this, this paper discusses the concept of information visualization, and analyzes how to apply information visualization to the interaction design facing the core needs of users, so as to provide users with a good interactive experience.

1. Introduction

In the information age, with the rapid development of network information technology, a large amount of information is poured into all aspects of people's life and work, which brings great convenience to contemporary people. With the advent of the information age and the rapid development of the network, a large amount of information has poured into all aspects of people's lives. By using convenient and free channels, people can quickly get all kinds of resources they want. If the essence of the Internet is the transmission of information, how to make the transmission of information more effective and more humane is the work scope of interaction designers [2]. Compared with text, visualization makes use of the quick perception ability of visual channel, and improves the efficiency of observing, recognizing and processing information. Designers in the IT field have been deeply aware that unilaterally improving massive information and simple and convenient interfaces can no longer meet the actual needs of the contemporary public. What really needs in-depth thinking is how to make users receive, recognize and use relevant information conveniently and efficiently [3]. Good designers describe complex information clearly so that they can be understood. Engineers and designers gradually realized that simply providing a large amount of information and a beautiful interface does not help people well [4]. The key issue is how to enable people to receive, understand, and use information quickly and easily.

Information visualization is emerging with the massive calculation of commercial data and the large-scale application of data warehouses. The data it processes is abstract data in fields such as finance, commerce, medical care, communications, the Internet, and social management [5]. Information visualization selects, deforms, and replaces data, searches for a matching, easy-to-understand visual form, and uses natural interactions to help people obtain effective information and discover problems. Information visualization is a multi-disciplinary and comprehensive research field, which aims to study a large number of abstract numerical and non-numeric information visual presentations, using graphics and image technology and methods to present them in appropriate visual language [6]. Information visualization is a mapping process from abstract data to a visual form. In the process of drawing the visual attributes of data objects, it is necessary to map non-spatial abstract information into an effective visual form, and improve human perception through human-computer interaction mechanisms. [7]. During the process from the sending end of the information to the receiving end, the visual design of the information is a bridge for effective

  DOI: 10.25236/assah.2020.063

understanding [8]. This article explores the concept of information visualization and analyzes how to apply information visualization to interaction design to provide users with a good interaction experience.

2. The Concept of Information Visualization

At first, information is only a few rough pieces of original data, and the birth of charts is not only the performance of its progress, but also the beginning of graphics. Its purpose is to make the original abstract data easier to be recognized and understood by people. Information visualization is an interdisciplinary field, which aims to study the visual presentation of large-scale non-numerical information resources. The purpose of information visualization is to provide an effective solution for the rational use of information. It screens information, displays it in a visual form through corresponding computer algorithms, and provides a convenient and humane man-machine interaction mode. With the rapid development of science and technology, various complicated graphics emerge one after another, which can show more data and help people to study and discover hidden related problems. The real-time online dynamic interactive visual visualization mode further improves people's ability to explore and process data [9]. In fact, information visualization is the use of computers to fully realize the interactive graphical representation of abstract information, so as to improve users' understanding and cognition of abstract data. The data in information visualization is mainly numbers or symbols, but less entities, which is significantly different from other types of visualization. The first condition of topological design of computer interactive network is connectivity, so when we construct chromosomes, we check the connectivity of each chromosome obtained by genetic algorithm. Most complex optimization design problems are often in the conceptual design stage, and the design intent cannot be completely defined.

The combination of computer technology and computer interaction technology is a system engineering science. Using computers that can work independently and data communication technology can realize the effective connection of information in different regions and different geographical regions, and strengthen communication and cooperation. With the progress of technology and the development of network, various complicated graphics appear constantly, which can present more information and help people to analyze and find hidden problems in information. Information can be either concrete or abstract. With the updating and iteration of technology, human beings have stepped into the information age, and a large amount of information is waiting to be processed, disseminated and received. The appearance of visualization technology is to transform these huge information, data and knowledge into visual forms represented by graphics and images, which can be quickly recognized by people. Information visualization is a mapping process from abstract information to visualization mode. In the practice of creating visualization attributes of data objects, abstract data that is not space should be mapped into effective visualization mode, and human-computer interaction system should be used to strengthen people's self-perception ability.

3. Interactive Design Ideas of Information Visualization under Internet Environment

3.1. Considerations for Interaction Design

Due to the huge scale of data, it is unrealistic to present all the data and information to users without reservation. According to the specific design objectives, the most representative parts should be carefully selected and other parts should be saved to the corresponding paths, so that users can view more data in the future. In the algorithm development of data transformation, engineers can often find unique algorithms and get interesting graphical interfaces. Although this novel interface can reflect the relationship and structure of data and the details of implementation, it is not well accepted by users. Interaction design in information visualization should start from the transformation of original data and run through the whole process of visual transformation and user operation. Only when the presentation model and the user model match each other, such an

interactive interface is easy to use and people-oriented. Data is abstract, so each data should have specific visual elements that can express its own meaning instead of it [11]. You can use simple geometry, clear icons and even photos. Users need the help of certain operations or tools to complete the interaction with the visual interface. These tools should be placed in the most convenient place for easy access. Excellent information visualization mode allows users to find problems or find corresponding rules in time in the interface. Only an interactive design with perfect details can provide users with a harmonious operating experience, so that users can pay close attention to certain activities without interference from the outside world.

3.2. Overall Framework of Interaction Design

On the premise of constructing the information visualization structure, it should be further transformed into the corresponding components in the graphical user interface, which is convenient for users to use. The corresponding components of user interface in information visualization system can be divided into two categories: information transmission visual elements and practical functional visual elements. Users need the help of certain operations or tools to complete the interaction with the visual interface. These tools should be placed in the most convenient place for easy access. Interaction design in information visualization should start from the transformation of original data and run through the whole process of visual transformation and user operation. Interactive information uses interface hierarchical structure to divide complex information into different web pages. In the process of browsing and receiving information, users can either go back to the previous level or face to face and browse to the next level. The key purpose for users to use the information visualization system is to find out the relevant characteristics, forms, directions and changing rules of hidden abstract data information in a short time and efficiently according to the convenient interactive platform, so as to provide favorable references for scientific exploration, software development, engineering construction and important decisions [12]. The change of interactive mode leads to the rapid growth of Internet data at the speed of millions of times, and with the increase of interconnection, the format and form of interactive data generated by computers are constantly updated. The research on the reliability of network topology needs a comprehensive, complete and reasonable analysis from two aspects of network devices and traffic load. The algorithm flow is shown in Figure 1.

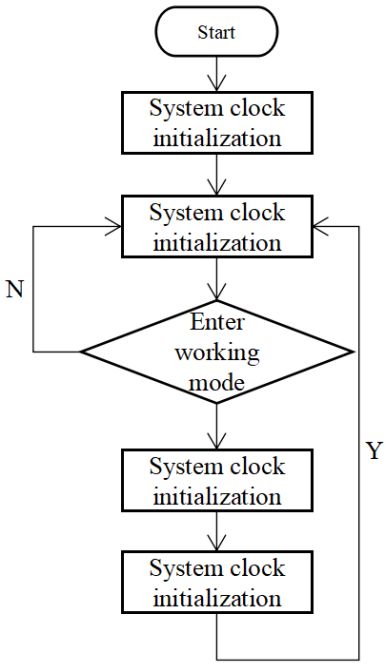

Figure 1 Algorithm flow

Using the two-way interaction process, we can not only present the whole view of the whole information, but also provide users with the information of different nodes, so as to avoid excessive information load. Information is abstract, so every piece of information should have a visual element that best represents its meaning. You can use simple geometric figures, icons or even photos. Users often have specific operation tasks in the process of practical application, which determines that interactive operation should be implemented according to detailed task flow when designing. In practice, it is generally necessary to think about the existing relationship between interactive operation and view, that is, each interactive operation will affect the presentation of current information, and such relationship changes constitute diversified view transformation.

4. Conclusions

Information visualization is playing an increasingly important role at present, and interactive information visualization has been applied in more and more fields as a means of information dissemination in the interface. The key of information visualization is to transform abstract data into appropriate visual forms, and provide corresponding human-computer interaction mechanism for users to effectively understand the inherent features and meanings of these data. Information visualization provides users with a new experience of friendly information browsing and exploration instead of crazy information accumulation. Information visualization needs to solve two key problems effectively, that is, transforming information into visual graphics and users controlling all aspects of the conversion process to obtain information. With the development of technology and the expansion of information, new requirements are put forward for the development of information visualization. This requires engineers and designers to work together in this field and make progress in the exploration. In this information rich society, the research and application development of information visualization technology has fundamentally changed the way we express and understand large and complex data.

References

[1] Yu, Y.Y. (2019). Research on Interactive Design of Information Visualization under Internet Environment. Journal of Heihe University, vol. 10, no. 03, pp. 194-195.

[2] Xu, J.B., Wang, H. (2019). Application Research of Visual Interaction Design of Production Decision Management in Educational Informatization. Design Art Research, no. 2, pp. 55-60.

[3] Zhou, L.L. (2015). Research on Information Visualization Design. Wireless Internet Technology, no. 7, pp. 125-126.

[4] Zhou, N. (2016). Research on visual development of urban public space based on interactive design system. Journal of Chifeng University: Natural Science Edition, vol .032, no. 021, pp. 126-127.

[5] Wang, R.L. (2018). Research on the Experience of Information Visualization Design in Brand Image Communication. Art Education, vol. 329, no. 13, pp. 220-221.

[6] Cao, X.Y., Hao, K. (2015). Analysis of the application of information visualization in web design. China Packaging Industry, no. 18, pp. 97-98.

[7] Zhu, K.Y. (2015). On the interactive design of information visualization in web pages. Science and Technology and Innovation, no. 18, pp. 29-30.

[8] Ji, H.Y., Xi, T. (2017). Application research on information visualization design of smart campus in the era of big data. Packaging Engineering, vol. 038, no. 014, pp. 95-100.

[9] Zhang, Y.H. (2018). Design of visual human-computer interaction system based on single chip microcomputer. Information Communication, no. 7, pp. 76-77.

[10] Tu, L.L., Zhang, L. (2019). Research on Dynamic Visual Language in Information

Visualization Design. Wireless Internet Technology, vol. 016, no. 001, pp. 80-81.

[11] Yang, W.H,. Yang, L.M., Shi, Y.L. (2018). Design and implementation of on-site visual interactive system based on virtual reality technology. Digital Users, vol. 024, no. 002, pp. 26-28.

[12] Zhu, Z.Z. (2019). Exploration and Analysis of Interactive Information Visualization Design Based on Mobile Devices. Art and Design: Theoretical Edition, no. 10, pp. 39-40.