

Research on the Application of Visualization Based on Big Data in the Development of Interdisciplinary Integration in Colleges and Universities

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Abstract: In order to better understand the application of big data visualization in the interdisciplinary development of colleges and universities, an application research based on big data visualization in the interdisciplinary development of colleges and universities is put forward. Firstly, this paper analyzes the development status and existing problems of interdisciplinary integration in colleges and universities, explores the application value of big data visualization in promoting interdisciplinary integration in colleges and universities from the perspective of big data visualization, and puts forward relevant strategies. Secondly, it tells that interdisciplinary integration is an important way for universities to improve their scientific research level and serve the society, and big data visualization plays an important role in promoting interdisciplinary integration. Finally, it summarizes the key elements of interdisciplinary innovation, such as improving platform organization, management system, equipment sharing, and attribution of achievements, establishing an effective implementation path of interdisciplinary innovation, and forming an interdisciplinary innovation system in colleges and universities, which can continuously promote the interdisciplinary innovation of schools and achieve new high-quality development.

Keywords: big data visualization; Cross fusion; University discipline

1 Introduction

With the rapid development of the new generation of information technology, the cross-integration of information technology and disciplines has become a new trend of scientific research innovation and social development in colleges and universities. In recent years, in order to achieve a higher level of talent training, improve the scientific research level and social service ability of colleges and universities, colleges and universities have been exploring the reform of interdisciplinary integration. The new generation of information technology, such as computer and Internet, is combined with scientific research and engineering practice, which makes the interdisciplinary integration of colleges and universities enter a new stage. In the era of big data, how to effectively use big data technology to provide more support for interdisciplinary integration is a topic worthy of study. With the continuous development of big data technology, data visualization has gradually become an important means to promote the cross-integration of disciplines in colleges and universities. Interdisciplinary integration is an important way for colleges and universities to improve their scientific research level and serve the society, and it has become a hot topic in higher

education research. China's higher education is in a critical period of transition from popular education to elite education. The rapid development of scientific research urgently needs colleges and universities to integrate superior resources, actively explore new modes of interdisciplinary development, and promote the reform of talent training mode in colleges and universities. Data visualization technology refers to a technical means to display data in the form of graphics, images and animations. It can make the data show its inherent laws more intuitively, thus making it easier for users to understand and accept. Big data refers to a large, varied and valuable data set, and uses certain technologies and methods to extract valuable information from the data and reveal the laws and trends hidden in the data. In the era of big data, data is growing rapidly. How to master big data quickly and accurately, and how to analyze and utilize it effectively is the current research hotspot. Applying big data visualization to the interdisciplinary development of disciplines in colleges and universities is helpful for scientific decision-making in colleges and universities and promotes discipline construction and development[1-2].As shown in Figure 1:

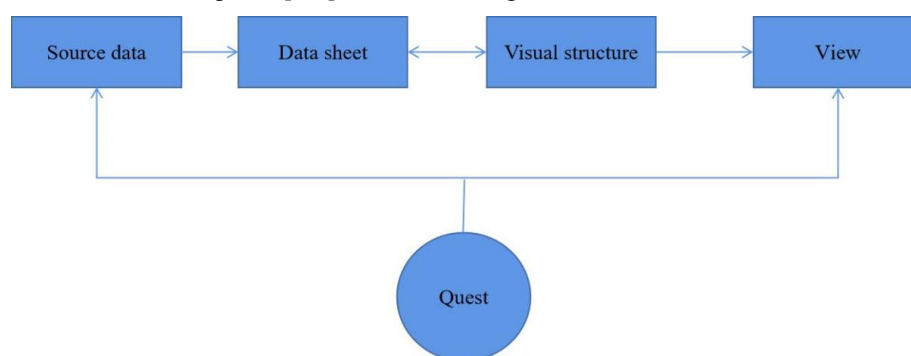


Figure1 Parametric model of data visualization

2 Visual perspective of interdisciplinary integration practice path

Judging from the current situation of interdisciplinary integration in colleges and universities, all colleges and universities are actively promoting interdisciplinary integration. However, due to the influence of the characteristics of disciplines and superior resources, there are some problems such as shallow level and single mode of interdisciplinary integration. Based on the visualization of big data, deepening the interdisciplinary integration of universities from the aspects of data analysis, knowledge mining and collaborative innovation can effectively solve the existing problems and promote the interdisciplinary integration of universities.

In the era of big data, interdisciplinary integration has become an important driving force for a new round of scientific and technological revolution and industrial transformation. Cross-disciplinary integration in colleges and universities is an effective way to realize self-reliance and self-improvement in science and technology and build an innovative country. Colleges and universities should take big data visualization as the breakthrough point, actively explore new modes of interdisciplinary development with the help of big data visualization technology, build information resource sharing mechanisms and collaborative innovation mechanisms, and explore new paradigms of scientific research[3-4].

Interdisciplinary integration is based on the discipline's own development law, using interdisciplinary thinking, methods and means, so that the knowledge between different disciplines can penetrate, support and promote each other, and achieve the integration and leap between different disciplines. Cross-disciplinary integration needs to be carried out on a certain disciplinary platform, which requires colleges and universities to continuously promote the innovation of cross-disciplinary integration mechanism and actively carry out the reform of talent training mode. The deep integration of big data technology and education and teaching is an important means for universities to promote the development of interdisciplinary integration. With the wide application of big data technology in education and teaching, big data visualization technology has become a new hot spot in the reform of talent training mode in colleges and universities. In view of the differences between different disciplines, it is an important way for colleges and universities to improve the quality of personnel training and the level of scientific research by deeply analyzing different majors and exploring the innovation of talent training mode supported by big data visualization technology from the aspects of training objectives, curriculum system and teaching methods[5-6].

3 Analysis of the elements of constructing interdisciplinary innovation system in colleges and universities

Establishing and perfecting the platform organization, management system, capital investment, equipment sharing, personnel employment, assessment and evaluation, achievement attribution and other factors that are suitable for the interdisciplinary development of colleges and universities, and forming an innovative system for interdisciplinary development of colleges and universities is an important foundation for promoting the high-quality development of interdisciplinary integration of colleges and universities. The innovation system of interdisciplinary integration is shown in Table 1. Every element in the interdisciplinary innovation system is an important link to promote interdisciplinary innovation, which requires the top-level strategic design of colleges and universities, the active cooperation of various departments or disciplines, and the reform, optimization and implementation of each element. At the same time, all elements need to be connected and cooperated with each other to provide a solid foundation for interdisciplinary innovation.

Table 1 Innovation system of interdisciplinary integration

Interdisciplinary	Platform organization	management system	capital investment
Fusion innovation	Equipment sharing	Talent employment	Assessment and evaluation

3.1 Platform organization

The interdisciplinary platform organization is an important carrier for universities to promote interdisciplinary integration and innovation. Teachers and researchers who carry out interdisciplinary research come from different departments and disciplines. Interdisciplinary research platform is an important channel to provide academic exchanges, scientific research cooperation and joint training of talents, which is conducive to promoting the continuous

growth and development of interdisciplinary research teams in colleges and universities. Therefore, the first task to carry out interdisciplinary research is to establish a reliable interdisciplinary platform organization. The forms of interdisciplinary platform organization can be divided into “interdisciplinary research center”, “interdisciplinary group” and “interdisciplinary college”, and the system of platform organization can be divided into “solid platform” and “virtual platform”. According to the actual development needs, colleges and universities can establish a platform organization with appropriate organizational forms and systems[7-8].

3.2 Management system

The normal operation of interdisciplinary platform organization and the effective promotion of interdisciplinary integration and innovation need to establish a management system that is suitable for interdisciplinary, and provide effective management system guarantee for interdisciplinary. The management of colleges and universities should strengthen the top-level strategic design, break down the barriers between different departments and disciplines, establish and improve management systems such as equipment sharing, talent recruitment, assessment and results attribution, which are suitable for interdisciplinary research, and establish an interdisciplinary innovation system to bring together equipment resources and researchers scattered in different departments and disciplines, stimulate the enthusiasm of researchers to carry out interdisciplinary research, form a highly cohesive interdisciplinary innovation team, and effectively promote interdisciplinary research[9].

3.3 Equipment sharing

Establishing a high-level instrument and equipment platform is an important foundation to ensure the effective development of scientific research, while interdisciplinary research requires the coordinated use of special instruments and equipment for various disciplines to promote interdisciplinary research in colleges and universities, and colleges and universities should strengthen the establishment of interdisciplinary equipment sharing mechanism and management system. On the basis of the original equipment and instruments, when the school encourages the research teams of various disciplines to share their existing equipment, it should be open to the researchers of other disciplines on the interdisciplinary platform. The school provides unified maintenance service support for shared instruments and equipment, which improves the utilization rate of instruments and equipment, reduces the maintenance cost of the scientific research team to which the instruments and equipment belong, and promotes the transformation of the original department equipment resources from "owned by me" to "used by me" inside and outside the school and at home and abroad.

3.4 attribution of achievements

It is an important achievement management guarantee to establish an achievement attribution management system suitable for interdisciplinary research. Academic papers, scientific research awards, teaching awards, major patent transformation, major horizontal projects and major national project breakthroughs, etc., in the evaluation of professional titles, promotion of school posts, and application of school projects, schools should dilute the signature ranking of the first author and the second author, so that teachers and researchers involved in interdisciplinary research can share the interdisciplinary results. Teachers and researchers who

participate in interdisciplinary research should share the income obtained through transfer, implementation license, fixed-price investment, etc. According to the principle of input-output equivalence, the main employing unit and joint employing unit or relevant participants should negotiate to determine the income distribution ratio, so as to encourage teachers and researchers to actively participate in interdisciplinary research.

4 Analysis of the implementation path of interdisciplinary innovation system in colleges and universities

To promote and ensure the interdisciplinary innovation development efficiently, it is necessary to open up the implementation path of interdisciplinary innovation system construction. Strengthening the top-level design of innovation system, building a suitable platform system, strengthening the guidance of interdisciplinary academic direction, enhancing the interdisciplinary awareness of scientific researchers, attaching importance to the cultivation and introduction of interdisciplinary talents, and establishing an interdisciplinary incentive mechanism are effective implementation paths for establishing and perfecting the interdisciplinary integration innovation system in colleges and universities. The implementation path of interdisciplinary innovation system is shown in Table 2.

Table 2 Implementation Path of Cross-disciplinary Integration Innovation System

Cross-disciplinary integration innovation system	top-level design	Platform physical construction	Student direction guidance	Stimulate enthusiasm
Cross-disciplinary integration and innovation ability improvement	institutional safeguards	Provide channels	Clear direction	Talent base

4.1 Strengthen the top-level design of innovation system

Strengthening the top-level design of innovation system is an important guarantee to promote the establishment of interdisciplinary innovation system in colleges and universities. In the process of interdisciplinary innovation in colleges and universities, schools need to actively play the role of policy guidance, system guarantee, resource support and atmosphere creation. By strengthening the top-level design of innovation system, establishing a scientific and perfect external support guarantee mechanism, building a research platform with perfect basic conditions, and establishing and improving a policy guarantee system that is suitable for interdisciplinary research such as equipment sharing, talent recruitment, fund management, assessment and evaluation, and achievement sharing, a good academic research environment is created for interdisciplinary research. Pay attention to cultivating interdisciplinary research platforms with good research prospects and research foundations. In the initial stage of development, schools can provide sustained and stable support for them through the establishment of policy systems, and provide a relaxed environment for the development of scientific research platforms by extending the assessment period. In the mature stage of development, schools can use the advantages of cross-platform to lead the academic direction and pool resources, further promote the development of surrounding disciplines by expanding

the scope of cross-discipline cooperation, and at the same time, support the development of cross-platform through the development of disciplines.

4.2 Strengthen the construction of a suitable platform system.

Building a platform system that adapts to the characteristics of interdisciplinary research can provide effective channel guarantee for interdisciplinary innovation, and it is one of the key elements to build an interdisciplinary innovation system. According to the type of system, the interdisciplinary platform in colleges and universities includes two types: the solid platform with the nature of the secondary management organization of the school and the virtual cooperation platform that is not included in the organization. According to the characteristics of different types of interdisciplinary research, it is necessary to establish a suitable platform system. For example, the short-and medium-term interdisciplinary research, which is led by technical research projects, is mainly aimed at realizing short-and medium-term interdisciplinary research, and needs a more flexible platform system, which is suitable for establishing a virtual platform system for interdisciplinary research. Long-term interdisciplinary research, which is led by major frontier basic science issues, is mainly aimed at achieving the long-term interdisciplinary research goals and needs more stable institutional mechanisms to ensure the development of long-term interdisciplinary research, which is suitable for establishing an interdisciplinary platform system.

4.3 the establishment of interdisciplinary research incentive mechanism

Strengthening the establishment of incentive mechanism for interdisciplinary research is an important guarantee for interdisciplinary integration and innovation to maintain vitality. Establish a special zone for interdisciplinary research, and reduce the amount of assessment tasks for interdisciplinary researchers; Establish a cross-disciplinary award fund to reward outstanding achievements in cross-disciplinary integration and innovation; Increase the performance of interdisciplinary teachers and researchers, improve the proportion of interdisciplinary research results in the evaluation of school title promotion, share open instruments and equipment with interdisciplinary researchers, and increase the use time of interdisciplinary research instruments and equipment. Colleges and universities can attract more teachers and researchers to join the interdisciplinary research team through the establishment and improvement of the above incentive mechanism, stimulate the enthusiasm and creativity of teachers and researchers to carry out interdisciplinary research, and provide inexhaustible power for the sustainable development of interdisciplinary integration and innovation[10].

5 Conclusion

Visualization of big data is a complex process that can make full use of information technology to promote data presentation, knowledge discovery and intelligent analysis. Therefore, colleges and universities should promote the application of big data visualization in promoting the development of interdisciplinary integration from the following aspects: (1) Strengthen technical support and promote the application of big data visualization in interdisciplinary integration research; (2) Establish the data standard and standard system of interdisciplinary integration; (3) Constructing an open sharing mechanism of interdisciplinary

data; (4) Strengthening the construction of interdisciplinary research team; (5) Improve the knowledge discovery and intelligent analysis platform for interdisciplinary integration. Of course, visual data mining technology is still in the exploratory stage in the development of university informatization. In the future, visual data mining technology will also provide more help for the development of university informatization and truly improve the management and service capabilities of universities.

Acknowledgement: Guangdong educational science planning project, Development dilemma and strategy of Fisheries discipline in Guangdong Ocean University——Comparison with Shanghai Ocean University, (2018GXJK062)

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