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Exploration of the Development of Data Science and Big Data Technology Major

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Abstract: As an emerging interdisciplinary field, the Data Science and Big Data Technology major holds profound significance for societal development. This paper explores the importance of this major and the challenges it faces, including incomplete curricula, weak practical teaching components, and a shortage of faculty. In response to these challenges, strategies and suggestions are proposed, aimed at promoting the continuous development of the Data Science and Big Data Technology major and enhancing China's international competitiveness in this field.

Keywords: Data Science; Big Data Technology; Major; Development Exploration

Introduction

With the rapid development of information technology, data science and big data technology have become a crucial force driving social progress and technological innovation. As an emerging interdisciplinary major, data science and big data technology combine knowledge from mathematics, statistics, computer science, and other fields, providing students with comprehensive data analysis and processing skills. However, despite the rapid development of this major, it also faces multiple challenges. This paper aims to explore the significance of the data science and big data technology major, the challenges it faces, and proposes corresponding strategies and suggestions to offer valuable insights for the continuous development and innovation of this major.

1. Significance of the Data Science and Big Data Technology Major

The Data Science and Big Data Technology major holds profound significance in today's information society. It represents not only technological innovation but also leads and shapes the future direction of societal development. Academically, the establishment of the Data Science and Big Data Technology major fills the gap in China's big data talent cultivation. This major integrates knowledge from mathematics, statistics, computer science, and other disciplines, providing students with comprehensive data analysis and processing skills. By studying this major, students can master the core principles and application methods of big data technology, becoming high-quality talents with interdisciplinary knowledge and practical abilities. Socially, the significance of the Data Science and Big

Data Technology major is even more prominent. With the rapid development of information technology, data has become an essential resource in modern society. Government decisions, business operations, and even personal life increasingly rely on data analysis and application. Graduates of the Data Science and Big Data Technology major form the backbone of this field. By employing big data thinking and technical methods, they can uncover patterns and trends within data, providing more precise and efficient decision support and services for governments, businesses, and individuals. Moreover, the establishment of the Data Science and Big Data Technology major has also propelled the rapid development of related industry[1]. With the continued maturation and widespread adoption of big data technology, more enterprises and organizations have recognized the importance of data and are investing in the development of the big data industry. Graduates of the Data Science and Big Data Technology major play a crucial role in this industry's development. Their participation not only injects new vitality and innovation into the big data industry but also promotes the industry's rapid growth and expansion.

2. Challenges Facing the Data Science and Big Data Technology Major

2.1 Incomplete Curriculum System

The construction of the curriculum system for the Data Science and Big Data Technology major is still in the exploration and improvement phase. Currently, there are some issues in the course offerings:

(1) Content Repetition: Due to the involvement of multiple disciplines such as mathematics, statistics, and computer science, content overlap between different courses is inevitable. This repetition wastes students' time and energy and may confuse and mislead them on certain topics. Therefore, how to integrate and optimize course content to avoid unnecessary repetition is one of the key task in the curriculum system construction of this major.

(2) Course Coordination: The major requires students to have a solid theoretical foundation and broad practical skills, so course offerings should emphasize the combination of theory and practice, as well as the logical progression between courses. However, the current course structure often focuses too much on the completeness of individual courses while neglecting the integration and connection between courses. This hinders students from forming a systematic knowledge framework and skill set, affecting their overall competence and innovation abilities.

(3) Slow Update of Course Content: Big data technology is evolving rapidly, with new theories, techniques, and tools emerging continuously. However, the course content in this major often lags behind the pace of technological development, leading to a disconnect between what students learn and real-world application needs.

2.2 Weak Practical Teaching Components

Practical teaching is an essential part of the Data Science and Big Data Technology major, vital for cultivating students' practical abilities and innovative spirit. However, there are still issues in the practical teaching components of this major:

(1) Insufficient Practical Teaching Base: The major requires high standards for practical environments and resources, including advanced computing equipment, big data platforms, and experimental software. However, many universities have under-invested in the construction of practical teaching bases for this major, leading to a lack of resources to meet students' practical needs, significantly restricting their ability to develop practical skills and innovative thinking.

(2) Disconnection Between Practical Teaching Content and Real Needs: Many universities' practical teaching content tends to focus too much on verifying and consolidating theoretical knowledge while neglecting the cultivation of actual application abilities. This results in students lacking the ability to solve real-world problems during practical exercises, failing to apply the knowledge they have learned in actual work settings. How to design practical teaching content that is more targeted and useful based on real-world application needs is a key issue to address in the practical teaching components of this major.

2.3 Shortage of Faculty

The Data Science and Big Data Technology major requires highly qualified faculty members who possess a solid theoretical foundation and extensive practical experience. However, the current faculty is insufficient to meet the development needs of the major. On the one hand, the lack of teachers with rich

practical experience is a critical issue in the faculty of this major. Due to the rapid development of big data technology, many teachers, while possessing a strong theoretical foundation, lack practical project and industry experience. This leads them to focus too much on theoretical knowledge in their teaching while neglecting the cultivation of practical skills. Therefore, how to train and recruit faculty with extensive practical experience is a crucial task in faculty development for this major. On the other hand, the knowledge structure and teaching methods of teachers also need continuous updating and improvement[2]. Nowadays, many teachers in this major still adopt traditional teaching methods and tools that do not keep pace with the demands of new technologies and knowledge development. This hinders students from mastering the latest technologies and tools, affecting their overall competence and innovation abilities.

3. Strategies to Promote the Development of the Data Science and Big Data Technology Major

3.1 Optimize the Curriculum System

Universities should optimize the curriculum system of the Data Science and Big Data Technology major based on the development needs of big data technology.

(1) Emphasize Practical Applications in Course Design: Reduce the proportion of theoretical courses and increase the proportion of practical courses. Through practical courses, students can better understand and master big data technology, improving their ability to solve real-world problems.

(2) Reduce Redundancy and Strengthen Course Integration: By integrating and optimizing course content, universities can establish a systematic curriculum that avoids confusion and misunderstanding among students.

(3) Speed Up Course Content Updates: Universities should accelerate the pace of updating course content to meet the development needs of big data technology. By regularly revising course outlines and textbooks and incorporating the latest technological achievements and application cases, universities can ensure that the course content remains timely and cutting-edge. In the process of optimizing the curriculum system, universities can also consider introducing interdisciplinary courses such as data visualization, machine learning, and artificial intelligence to broaden students' knowledge base and perspectives. Collaborating with enterprises to develop practical courses would also help students gain a better understanding of real-world application scenarios and needs.

3.2 Strengthen Practical Teaching

Practical teaching is a crucial component of the Data Science and Big Data Technology major. Universities should strengthen this aspect to enhance students' practical abilities and innovative spirit.

(1) Establish Practical Teaching Bases: Universities should provide students with quality practical environments and resources. Practical teaching bases can be equipped with advanced computing equipment, big data platforms, and experimental software, allowing students to engage in actual data analysis and processing tasks. Universities can also collaborate with enterprises to build practical teaching bases, helping students better understand the actual needs and application scenarios of businesses.

(2) Improve Management and Assessment of Practical Teaching: Universities should establish detailed practical teaching plans and assessment standards to ensure the quality of practical teaching. Teachers can be encouraged to participate in the research and reform of practical teaching to enhance its effectiveness and quality. Additionally, universities can consider introducing project-based teaching methods, allowing students to complete specific projects during practical exercises, improving their ability to solve real-world problems[3]. Students should also be encouraged to participate in practical competitions and research projects to cultivate their innovative spirit and practical skills.

3.3 Strengthen Faculty Development

Universities should increase efforts to build a strong faculty for the Data Science and Big Data Technology major, providing strong faculty support for its development.

(1) Recruit Teachers with Extensive Practical Experience: Universities should bring in teachers with rich practical experience to enhance the overall quality of the teaching staff. These teachers can bring practical project experience and industry knowledge, providing students with teaching content and guidance more closely aligned with real-world applications.

(2) Provide Ongoing Training and Development for Current Teachers: Universities should regularly organize professional training and exchange activities to keep teachers up to date with the latest technological developments and teaching methods. Teachers can also be encouraged to participate in research and practice projects to improve their practical and innovative abilities. In strengthening faculty development, universities can also consider establishing incentive mechanisms to encourage teachers to actively engage in teaching research and reform.

3.4 Strengthen Education on Data Security and Privacy Protection

With the development of big data technology and the expansion of its application scope, the issue of data security and privacy protection has become increasingly prominent. Therefore, colleges and universities should strengthen the education of data security and privacy protection for students majoring in data science and big data technology.

(1) Colleges and universities should increase the content related to data security and privacy protection in the curriculum system so that students can fully understand the basic principles and methods of data security and privacy protection. Specialized data security and privacy protection courses can also be opened to provide students with more in-depth learning and practice opportunities.

(2) Universities should cultivate students' awareness of data security and privacy protection. Through classroom teaching, practical training and case analysis, students can realize the importance of data security and privacy protection and master the relevant skills and tools. At the same time, colleges and universities can also organize practical activities on data security and privacy protection for students to improve their practical skills and emergency handling abilities. In the process of strengthening education on data security and privacy protection, colleges and universities can also consider cooperating with enterprises to jointly carry out scientific research projects and practical projects on data security and privacy protection. Through cooperation with enterprises, students can better understand the actual application scenarios and needs, and improve their practical ability and innovation ability.

3.5 Strengthen International Cooperation and Communication

Data science and big data technology is a global field, and international cooperation and exchange is of great significance to promote the development of this specialty. Colleges and universities should strengthen international cooperation and exchange to improve the teaching level of China's data science and big data technology majors.

(1) Colleges and universities can introduce advanced teaching concepts and teaching methods from abroad and learn from their experiences in curriculum, practical teaching, and faculty construction. Through the introduction of foreign advanced teaching concepts and methods, it can promote the teaching reform and innovation of China's data science and big data technology majors.

(2) Universities can encourage students to participate in international academic exchange activities, such as international academic conferences and seminars. By participating in international academic exchange activities, students can learn about international cutting-edge research results and application cases, and broaden their international vision and academic thinking. Students can also communicate and cooperate with their international counterparts to improve their academic level and innovation ability. In the process of strengthening international cooperation and exchange, colleges and universities can also consider establishing cooperative relationships with foreign colleges and research institutions to jointly carry out scientific research projects and teaching cooperation. Through cooperation and exchange with international counterparts, the internationalization of China's data science and big data technology majors can be promoted and China's international competitiveness in this field can be improved.

Conclusion

In summary, the specialty of data science and big data technology has far-reaching significance in today's informatization society, which not only represents the innovation of technology, but also is a kind of leading and shaping of the future direction of social development. However, this specialty also faces many challenges in the process of development. In order to cope with these challenges and promote the sustainable

development of the profession, this paper puts forward a series of strategies and recommendations, including optimizing the curriculum system, strengthening practical teaching, enhancing the construction of faculty, strengthening the education on data security and privacy protection, and strengthening international cooperation and exchange. The implementation of these strategies and suggestions will help promote the further development of the specialty of data science and big data technology, improve China's international competitiveness in this field, and make greater contributions to social progress and scientific and technological innovation.

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