Professional Big Data Technology Training Courses in Universities

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Keywords: Big data talents, Curriculum framework design, Talent knowledge structure and requirements.

Abstract. This paper goal is to build a practical teaching system Proficiency in the technology and core skills of big data collection, processing, analysis and application, high-quality application talents with big data analysis, processing, mining and visualization, big data system integration, management and maintenance capabilities. It can undertake information management, information consulting services, information research, etc. of enterprises, businesses, governments, social organizations, etc., and has application technology for big data analysis, processing, mining and visualization, big data system integration.

Introduction

Along with the new formats and new modes of e-commerce, mobile payment, and sharing economy, a large number of data resources have been generated. Such resources can directly create huge social wealth, or indirectly drive or serve other industries, and multiply their value.

The situation is analyzed to provide evidence for the talent training and training specifications of big data professionals. For general survey analysis, we have the following conclusions:

Big data related positions require certain data analysis, data mining and the ability to manipulate the database. Some big data positions for some professional skills other than professional skills, such as operations management, professional teams, sales training, etc., also have requirements.

Data analysis related positions are mainly concentrated in the mobile Internet, e-commerce, finance and other industries, the number of positions accounted for about 80%.

In addition, according to the survey, the hot cities with large demand for big data talents are mainly first- and second-tier cities such as Beijing, Shanghai, Shenzhen, Guangzhou, Zhengzhou and Hangzhou. The average monthly salary of these cities can reach more than 7,000 yuan. A large number of talents and a generous salary return are the basis and construction basis for the training of data science and big data technology talents in our university.

Second, the demonstration of the talent training model.

Design Ideas for Talent Knowledge Structure and Ability Requirements

The knowledge structure design of data science and big data technology professionals is based on the following two theoretical assumptions:

(1) Human ability is trained in applying knowledge to solve problems in the industry sector.

The realization of capacity development requires a complete knowledge module support. The division of the curriculum modules is vague and the relationship is disordered. From a macro perspective, solving this problem requires restoring the entire expertise chain structure. The method used to restore the knowledge structure of the industry domain is the key to the design of the curriculum system. The main goal of applied talent development is to develop students' practical ability in relevant industry fields, and the ability to apply knowledge to practice.

(2) The ability to apply professional knowledge consists of cognitive ability and practical ability.

The application-oriented curriculum system framework, which is oriented to the cultivation of practical ability, consists of three main lines, which are the business process chain, the capability
component chain, and the course module chain. The goal of the skill level course is to master the various skills to solve problems in the knowledge field. In the course framework system, it often shows the use of tools, curriculum design, and graduation design courses.

Training Objectives and Training Ideas under the Training Mode

The teaching implementation is based on the basic process of learning, the four processes of cognition, solidification, expansion and monitoring.

(1) Cognition, that is, how to help students better understand their professional knowledge. In the design and implementation of the curriculum, the principles of overall cognition + problem orientation + case group and foundation to the upper level are adopted.

(2) Curing, that is, how to help students transform from professional cognition into technical instinct. Knowledge solidification has become a human instinct, with many requirements such as sufficient time, short-term efficiency, and continuous learning. Each course basically complies with these three principles and requirements when teaching implementation.

(3) Expansion, that is, a model with multiple solutions and a combination of patterns to expand the instructional design. The mode expansion is still in the exploratory stage. The main implementation methods are to increase the expansion of case teaching, design post-class expansion work, encourage students to solve multiple problems in the classroom, practice the operation to encourage students to fully think, and apply the combination method to explore new knowledge.

The Overall Framework of the Curriculum System

The curriculum system of data science and big data technology is divided into two parts: theoretical teaching course and practical teaching course. The theoretical teaching curriculum includes the following three types of courses: general courses, basic courses, and professional courses. Professional practice courses include a series of practical courses such as professional course design, experimental courses and practical training courses, professional internships, graduation internships and graduation thesis (design); social practice courses include social investigation, production labor, volunteer service, public welfare activities, and scientific inventions. Social practice activities such as work-study and innovation.

The total credits of the data science and big data technology professional training program are not less than 166 credits (the theoretical teaching content is 1 credit for 16 hours, the practical teaching content is 1 credit for 32 hours), and the accumulated credits for practice and innovation and entrepreneurship mathematics courses are not low. 30% of the total credits.

The Course Settings

The principles of curriculum system construction, humanities and social sciences courses account for about 20%, mathematics and natural sciences courses account for about 15%, practice accounts for about 34%, and subject basic knowledge and professional knowledge courses account for about 31%.
The core curriculum of Data Science and Big Data Technology (the number of suggested hours in parentheses) includes Python language programming (64), parallel computing and distributed systems (48), cloud computing and application technology (64), data warehousing and Data mining (64), big data analysis and application (64), data visualization technology (64), algorithm analysis and design (64).

Teaching Courses

General Studies: addition to the teaching content (including ideological and political theory courses) prescribed by the state, the general curriculum system mainly includes knowledge content in natural sciences, social sciences, humanities, art, sports, and foreign languages.

The Basic Course

The basic course systems of data science and big data technology include professional basic courses such as mathematics, information technology and engineering, data science and big data technology. According to our school's data science and big data technology professional positioning and school characteristics, including the following professional basic courses:

1) Mathematical basic courses cover areas of knowledge such as advanced mathematics, linear algebra, and probability theory;
2) Information technology and engineering basic courses cover knowledge areas such as programming, databases, and computer networks;
3) Data science courses cover knowledge fields such as data collection, data storage, data processing, algorithm basis, and data visualization;
4) Big data technology classes cover knowledge areas such as distributed processing, cloud computing, and multi-architecture database technology.

Professional Courses

Combining domestic industry recommendation opinions, national key undergraduate university big data talent training framework, data science and big data technology professional according to professional school positioning and characteristics, set up 7 professional main courses, including Python language programming, parallel computing and distributed systems, cloud computing and application technology, data warehousing and data mining, big data analysis and application, data visualization technology, algorithm analysis and design. At the same time, open related courses, including web design and website construction, pattern recognition and machine recognition, mobile Internet and mobile application development, cross-disciplinary courses in cross-software design, artificial intelligence, etc., and computer graphics processing, data acquisition technology, etc. The emerging subject curriculum forms a logical expansion and continuity relationship with the professional main courses.

Practical Teaching Course

The practical hours of this major are 714+35w, and the total class hours are 2374+35w. According to 34 class hours per week, the proportion of practical class hours is 53.4%, which meets the national basic standards for computer professional regulations. The majors of data science and big data technology require the establishment of a sound practical teaching system, strengthen relevant practical teaching, cultivate experimental skills and design skills through practical teaching, and cultivate comprehensive practical ability and preliminary scientific research ability to discover, analyze and solve practical problems:

1. Combine the characteristics of data science and big data technology, some professional basic courses and most professional main courses, all set up relevant course experiments. At the same time, professional practice sets no less than 28 credits of course design practice.
2. Graduation thesis (design) and comprehensive training

Graduation thesis (design) and comprehensive training can be completed in a variety of genre forms such as academic papers, system design, project design, research report, project analysis report, and preparation of project documents. The topic selection should strengthen the practical
orientation; the content should comprehensively apply the theory and professional knowledge learned, and meet the professional comprehensive training requirements; the completion process and results display should conform to professional norms. Encourage students to think creatively, and carry out and complete graduation thesis (design) and comprehensive training under the guidance of the instructors according to their own interests and in combination with the problems in management practice.

**The Demonstration of Professional Practice Links**

The design of the practice link of this major aims to cultivate students' management software development application and data analysis and mining capabilities.

At present, data science and big data technology have a sound practice teaching system. It is embodied in the following three aspects:

1. A variety of practical training cases to provide students with an immersive learning environment.

   Each course requires relevant case teaching, including but not limited to examples, small cases, comprehensive cases and other case teaching sessions to help students understand the knowledge and promote students to understand and receive knowledge.

   Cases are usually designed for individual practical problems. The content coverage is narrow and not systematic. For hidden knowledge that is not within the system, it needs to be expanded by other cases to supplement the implementation. Therefore, except for the single case within the teaching materials, teaching, also need to expand through extracurricular activities, extracurricular auxiliary learning materials and other means to ensure the acquisition of hidden knowledge within the system.

2. Ample practical training system for teaching and training, and develop students' practical ability.

   Students practice about 7 kinds of training forms, course experiments, course design, professional internships, graduation design, etc. These classes have accumulated 1100~1500 hours of extracurricular hours.

   Courses and other practical aspects take up more than 50% of the total hours, and at the same time, the teaching assistants such as extracurricular assignments, subject competitions, and professional skills certificates can reach 300-700 hours.

3. Short-term concentration and timely review combined with the course teaching method to help students understand the knowledge of digestion.

   The understanding of knowledge requires a process of cognition and digestion, corresponding to the requirements of learning time blocks. Too short time fragmentation is not conducive to the understanding and digestion of knowledge. In particular, comprehensive and operative case teaching requires a relatively long time block to complete. The traditional 2 hours/class of teaching time is very likely to divide case study into fragmented learning, resulting in inconsistent learning. The probability of this situation is extremely large for a comprehensive comprehensive knowledge course.

**Summary**

This paper applies the big data application technology to the network recruitment data analysis, the current training of data science and big data technology professionals in university is accurate and
consistent with the current big data application industry standards and norms, and matches the knowledge structure and skills of the big data application professionals with the curriculum system design. The talent training mode enables students to be systematically trained in data analysis, data management, data storage, etc., to discover, analyze and solve practical engineering and technical problems. The professional practice link has a sound practice teaching system, and the proportion is set appropriately. The teaching team has formed a team of teachers with reasonable structure, stable personnel, high academic level and good teaching effect, the data science and big data technology professionals training program has reached the national standards.

Acknowledgement
This research was financially supported by the 2017 Higher Education Teaching Research and Reform Project of Guangdong Province, "The Big Data Talent Cultivation Practice Teaching System of Business Schools" (Project No. 2017SJJXGG01), and Characteristic Key Subject of E-commerce Construction Project of Guangzhou College of Commerce Foundation, (Project No.TSZDXK201601).

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