Exploration and Practice of Improving the Effectiveness of Financial Aid Education in Colleges and Universities Based on Big Data

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Abstract. The new aim of Financial Support for Education at colleges and universities is financial aid education. The development of big data technology has brought unprecedented development opportunities for accurate financial aid education in colleges and universities. We design and develop a big data-based analysis and visualization system for students' behavior in colleges and universities, and construct a data-driven four-in-one financial aid education mode of "drawing, deciding, pre-determining, and determining" by mining and analyzing various information of students with financial difficulties, so as to make accurate drawings, scientific decisions, early warnings, and personalized customization for sponsored students, turn big data related financial aid into productivity and facilitate students grow and become talents. It improves the overall efficacy of financial assistance instruction.

Keywords: Big date · Financial Support for Education · higher education · Hadoop · Visualization

1 Introduction

With the advent of cloud computing, big data, artificial intelligence, and other cutting-edge technologies, big data has permeated many fields, including education. The first book to mix big data with education is Learning with BIG DATA: The Future of Education, written by Viktor Mayer-Schonberger and Kenneth Cukier of the United States. It describes the changes that big data brings to education, with a focus on the personalisation, diversity, and predictive capabilities that can be achieved via the application of big data in education [1]. Emily Bates argues that big data may be utilized to solve the issue of student dropouts at U.S. colleges by investigating the causes of student dropouts and consequently decreasing student dropout rates [2]**.** Fan Guanghui et al. used a big data platform to depict students' actions and preferences [3]. Zou Yuxiang investigated the path of developing a crisis event management system for college students in the age of big data, based on big data monitoring and prediction, analysis, and assessment [4] Xiao Kun, Deng Fengguang, Li Xuenong and Ni Yikun did extensive study in student academic alert, campus behavior analysis alert, lost contact alert and online behavior alert using big data analysis [5–8].

X. Yuan et al. (Eds.): ICEKIM 2023, AHCS 13, pp. 1881–1888, 2023.
https://doi.org/10.2991/978-94-6463-172-2_208

It is an inevitable trend in the era of big data to mine and analyze valuable information from the vast amount of education data in order to provide more accurate, scientific, and comprehensive support and services for college students, enhance the quality of education, and assist students in becoming successful. Education data is the new force that is driving innovation in education, and mining and analyzing valuable information from education data is part of this trend. As the new mission of financial aid work in colleges and universities in the new era, it begins with financial aid and transitions into education. The ultimate goal and value of the work that is done in the field of financial assistance at colleges and universities is to improve the efficacy of financial aid education. Big data technology is utilized in order to improve the productivity of student financial assistance work, to improve the accuracy of student financial assistance work, and to increase the effectiveness of financial aid education. All of these goals are accomplished by increasing the precision of student financial assistance work [9].

2 The Significance of Big Data to Financial Aid Education Work

2.1 Big Data Enables "Precise Thinking and Politics"

Science and technology is the primary driver of production. We employ big data technology to continually promote ideological and political education work at colleges and institutions, utilizing a Marxist perspective on technology. As the new goal of financial support for education in the new era, ideological and political education work in colleges and universities focuses on the quality and effectiveness of educating people. We should naturally blend financial aid with education, and then hit on the essential job of talent development. Collect information on the students' families, the amount of time they spend studying each day, their general lives, as well as their behavioral performance in all areas, and delve deeper into useful data chains. Examine and form an opinion about the mental processes, behavioral characteristics, and personality traits exhibited by college students. The provision of high-quality management and services centered on the actual requirements of students, as well as the ongoing improvement of the relevancy and efficiency of the work done in ideological and political education, are both essential.

2.2 Big Data Enables "One Person, One Plan"

Never before has the globe witnessed such significant changes in a single century. In the current era, the living and growing environment of college students have experienced fundamental changes. Under the same historical context, varied family settings and personal experiences have shaped the traits of pupils. In particular, college students who have grown up with the new media have a high yearning for self-expression. This necessitates the use of big data technologies by educators in order to gather and evaluate a variety of information on the everyday lives of students. Concurrently, it is essential to determine their physical quality, psychological quality, overall quality, and professional skill. We shall adjust to the circumstances, the time, and the new circumstances. We employ a "one person, one plan" approach to education for a variety of individuals and foster their overall development and achievement.

2.3 Big Data Enables "Collaborative Education"

Counselors are the backbone of college students' ideological and political education, and they are the organizers, implementers, and teachers of everyday ideological and political education and management. College counselors in the new era must stand in a new historical orientation, which must not only have the work concept and ability of precise education, but also be skilled in the movement of big data, artificial intelligence, and other cutting-edge technologies to help students grow and become successful in the face of the world's hundred-year change. Based on the all-around realistic needs of education objects, it is necessary for counselors and other education teams to collaborate with each other, give full play to each person's greatest advantage, and make effective collaboration in multiple dimensions of education subjects, time, and space to realize "three full education". The prerequisite for effective collaboration is to have a thorough understanding of the education target's information and to share it with one another, allowing educators to quickly and accurately grasp the real-time dynamics of students by jointly analyzing, researching, and visualizing the data presented by students in various aspects. It continually uses its advantages in the first classroom, the second classroom (comprehensive quality), the third classroom (student community), skill contests, internships and jobs, and so on to help students improve and become successful.

3 Design of a Big Data-Based Student Behavior Analysis and Visualization System for Universities

This study combines the professional advantages of big data technology, from the real work of student financial assistance, with the design and development of a big data-based analysis and visualization system of college student behavior, based on the dominant big data Hadoop platform. [10] Using ETL tools, it extracts, cleanses, and transforms data from many platforms and systems before loading it into an Oracle database for storage and administration. Then, it does data analysis and mining through various association rules, classification and optimization, etc., and provides the findings of many elements of student behavior through visualizations such as Echarts (see Fig. 1).

3.1 Development Environment

Development environment includes: (1) Hardware: Enterprise server, processor: 2 x Xeon 64 cores 2.1G Memory: 256G Hard disk: 4T*2 SCSI; (2) Software: Ubuntu 14.04.5, Hadoop 3.3.0, My Eclipse, MySQL.

3.2 Function Introduction

Its primary concerns include system management, the analysis of student data, the analysis of data pertaining to the entire institution, and placing in the top ten. It provides sponsored students with an accurate representation, scientific decision-making, advanced warning, and personalization, among other benefits (see Fig. 2), and it improves the overall efficiency of education regarding financial aid.

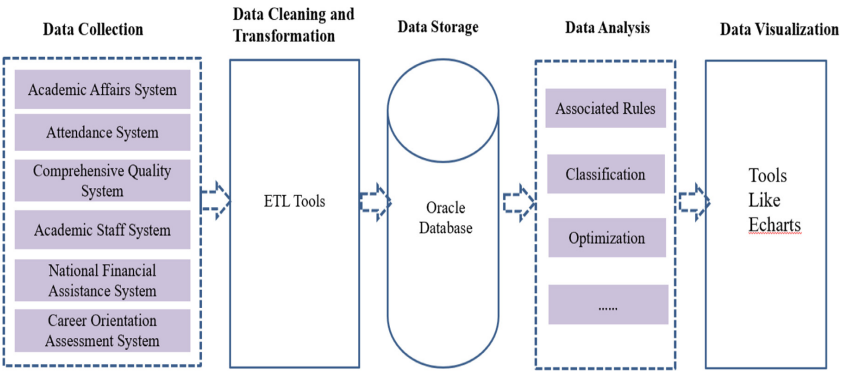

Fig. 1. Big data-based analysis and visualization system of college students' behavior

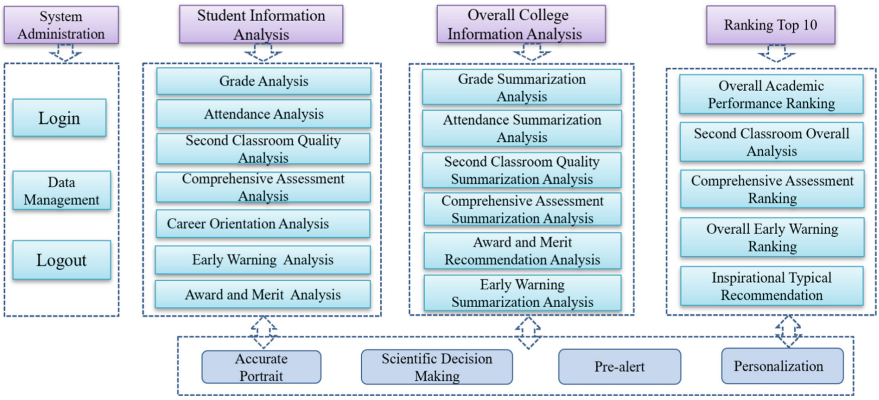

Fig. 2. Functional Architecture of the System

3.3 Functional Implementation

Group Portrait.
Using big data analysis, it investigates the value of data, sorts out data relationships, and realizes multi-dimensional dynamic analysis and large-screen data presentation, therefore inspiring and pushing sponsored students to surpass themselves. It highlights the TOP 10 results on the comprehensive evaluation, the TOP 10 academic accomplishments, and the TOP 10 classroom quality points for the group of sponsored students. It gives an accurate image, diagnosis, and improvement of the student's academic position and engagement in the second grade classroom. The TOP 10 comprehensive assessment scores represent the ten highest comprehensive assessment scores attained by voucher students throughout the program. The complete assessment score is comprised of two components: academic performance and weighted quality points. TOP 10 academic performance, demonstrating the academic achievement of students over the whole professional ranking. The TOP 10 quality points of the second classroom, which indicates

the ranking of the students' total quality points in the entire major, as well as the points earned by students through participation in various activities of the second classroom in modules such as mind, body, and soul, skills, volunteerism, and labor.

Personal Portrait.
It analyzes numerous data on sponsored students from multiple viewpoints and shows personal information, such as place of origin, degree of recognition, academic accomplishment, second classroom quality points, career aptitude, etc. It builds a picture of the pupils by depicting their actions, preferences, etc. It assists students in gaining a thorough and objective perspective of themselves and aids financial aid professionals in managing and assisting exactly. It adapts instruction to the requirements of the learner and offers accurate drip-feeding in order to enhance Financial Support for Education.

Scientific Decision Making.
China's Party and government have given considerable focus to improving and expanding the country's student financial aid policies. With the help of institutions of higher learning and members of the general public, it has established a system for providing financial aid to students. That "no student would be deprived of education owing to family financial difficulties" is a systemic promise under this plan. It has designed a rule base for evaluating awards and merits based on various management systems and methods from the state, government, society, and schools, which provides comprehensive and intelligent analysis of the evaluation conditions and requirements, and provides more accurate, scientific results, as part of the process of fully implementing various forms of financial assistance from the state, government, society, and schools, as well as the selection of various inspirational figures. It builds a thorough database of financial aid categories by collecting and analyzing data on the academic position and everyday conduct of sponsored students. Moreover, it offers targeted responses to the unique drives, requirements, and habits of today's diverse student body. In addition, by pre-processing and data mining, it exposes robust associations between student behaviors including academic success, overall quality of the second classroom, professional aptitude, and sponsorship status. Financial aid administrators are able to make data-driven judgments based on early warnings and notifications about students' conduct.

Pre-warning.
Every financial assistance employee's primary goal and objective is the development and achievement of students. With the development of students as its focal point, the sponsoring organization must take the effort to care for and fully comprehend the dynamics, growth features, and development requirements of the sponsored students. In addition, it necessitates a dynamic surveillance and administration of the whole process of the sponsored students, with care and respect, and regular correction of aberrations, in order to give full assistance for each student on the path to chasing their aspirations. It does data analysis according to various algorithms, such as student disciplinary rule base and grade warning rule base. It assigns appropriate labels to students based on certain algorithms and gives students with grade warning, attendance warning, and disciplinary warning. It not only provides kids from low-income families with specific financial assistance, but also enhances the education of inspiration, honesty, thankfulness, and social

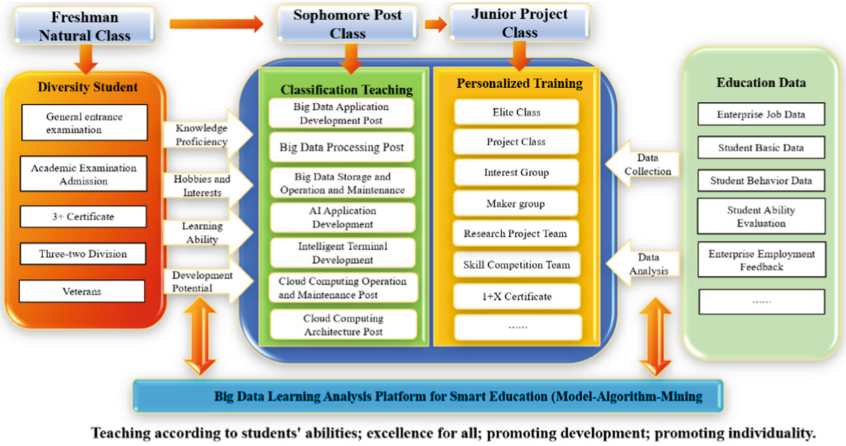

Fig. 3. Personalization based on education big data analysis

responsibility. It actively and conscientiously seeks possibilities to construct diverse platforms through material assistance, moral communication, ability development, behavior coaching, and spiritual drive. It develops a channel of "relief-education-accomplishment-return" that significantly improves the quality and career growth potential of any student with financial challenges.

Customization.

There are several sorts of enrollment in vocational institutions and universities, and the supply of students is complex. Each student has unique skills and attributes. How can the entire educational process be made more precise? Under the "big class enrollment and classification training" model, the first-year natural class is not split. There are several sorts of enrollment in vocational institutions and universities, and the supply of students is complex. Each student has unique skills and attributes. How can the entire educational process be made more precise? Under the "big class enrollment and classification training" model, the first-year natural class is not split into majors and places an emphasis on fundamental ability and quality. To establish a "person-to-job fit," the second-year job class is based on the kind of employment - job criteria. It emphasizes core expertise and extensive quality. To accomplish "mutual matching of person and career," the third-year project class is based on the type of project class (job criteria). It emphasizes both broad vocational and individualized development skills. Students are accurately matched to various occupations and positions through big data analysis. As seen in Fig. 3, it enables students to develop their abilities, shine, and realize their individuality. In addition, it regularly implements the "Comprehensive Quality and Motivation Enhancement Project," the "Second Classroom Quality Enhancement Project," and the "Youth Horse Project." Through activities such as behavior and etiquette training, sunshine and gratitude shaping, quality development, speech and eloquence, red movie-watching activities, and visits to high-tech enterprises, the program cultivates students' comprehensive quality in all aspects to help them compensate for their deficiencies and realize the organic integration of financial support and human education.

4 Conclusion

This paper is adept at utilizing big data for visual presentation, accurate portrait, scientific decision-making, forewarning, and personalization of students who are having financial difficulties because it has designed and developed a big data-based system for analyzing and visualizing the behavior of students in colleges and universities. It promotes accuracy and the scientificization of work related to financial support, it helps students become successful, and it boosts the overall efficacy of education. Additional optimization is necessary with regard to the process of building a rule base and algorithm. In a similar vein, pupils who come from households that struggle financially make up a separate category. To ensure that the rules are applied fairly, it is necessary to take into consideration individual differences, maintain some degree of adaptability, and protect the confidentiality of the pupils.

Fund Project. Special Task Project of Humanities and Social Sciences Research of the Ministry of Education (College Counselors) "Exploration and Practice of Collaborative Education of College Counselors and Professional Teachers Based on Big Data" (Project No. 20JDSZ3043).

References

1. Viktor Mayer-Schönberg, Kenneth Cukier: Walking with Big Data - The Future of Learning and Education. Zhao Z.J, Zhang Y.N, Translation. Shanghai: East China University Press, 2014
2. Emily Bates: UVM Big Data? Aggregating Campus Databases and Creating a Data Warehouse to Improve Student Retention Rates at the University of Vermont. UVM Honors College Senior Theses.2015
3. Fan G.H, Wang W, Wang S, Li A: Exploration and design of university student portrait system based on big data. Technology and Industry Across the Straits. 2020.4: 41-44
4. Zou Y.X: The construction of crisis event management system for college students in the era of big data. Jiangsu Higher Vocational Education. 2020.3:92–97,104
5. Xiao K, Duan Z.Y, Zhu Y.F, Yao J.K, Liu M.G: Early warning application of student behavior prediction in local universities based on big data technology. Digital Technology &Application.2022.11:4–7
6. Yin M.Z: Early warning analysis of college students' academic performance based on big data. Tianjin: Tianjin University of Commerce. 2018.
7. Li X.L and Hao W.Y.: Research on the application of early warning of lost students in col-leges and universities based on big data analysis. Computer Science. 2018.10:41–43
8. Ni Y.K, Liu K.S: Application of big data methods in student work: an example of data min-ing of students' campus network behavior. Studies In Ideological Education. 2021(2): 152–156
9. Jiang Q.H, Qian X.P: Data-driven precision of financial aid education in colleges and universities: motives, obstacles and practical progress--Based on the construction and research of student financial aid application platform in Jiangsu Province. Vocational and Technical Education.2021(18):37–41
10. Tao H.L; Zhang J; Yang Z.M: Design and implementation of a visualization system based on big data for student behavior analysis in colleges and universities. The Theory and Pracice of Innovation and Entreptrneurship.2021.2:163–166