RESEARCH-ARTICLE

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Research on Personalized Education for Business Talents Based on Big Data Driven Student Portrait

Yan Cheng
School of Economics
Wuhan Business University
Wuhan, Hubei Province, China
toisabelle@126.com

Yingfang Zhao*
School of Economics and Management
North China University of Water Resources and Electric Power
Zhengzhou, Henan Province, China
Z20252071417@stu.ncwu.edu.cn

Abstract

With the impact of technological changes such as artificial intelligence, big data, cloud computing and blockchain, the business environment has undergone disruptive restructuring and innovation. The digital economy has brought about changes in talent demand and supply, leading to changes in the knowledge system and quality capabilities of business talents in the new era. This trend of change places high demands on the personalized cultivation of new business talents. Based on the analysis of the Spark platform, this article proposes to establish a student "portrait" feature library that can fully depict students' personal characteristics through preprocessing, statistics, and analysis of raw data on campus student behavior, in order to analyze and predict students' learning needs, recommend personalized learning plans for students, and ultimately achieve the goal of providing personalized business talents for the development of the new economy.

CCS Concepts

• **Applied computing**; • **Education**; • **Computer-assisted instruction**;

Keywords

Spark, personalized learning, personnel training, cultivation mode

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1 Introduction

The traditional business school formed in the era of industrial economy pays attention to the function oriented training of professionals who understand management and economy, such as marketing, financial management, logistics management, human resource management. Its talent training mode mainly has the problems of emphasizing theory, ignoring practice, many professional and disciplinary barriers, insufficient integration of industry and education, and the disconnection between talent ability and market demand. With the advance of information technology, the global economy has entered a digital and intelligent era. Under the impact of technological changes such as artificial intelligence, big data, cloud computing and blockchain, the business environment has undergone disruptive reconstruction and innovation. The digital economy has brought about changes in talent demand and supply, which has changed the knowledge system and quality and ability of business talents in the new era.

This article analyzes the requirements of new business for the cultivation of new subject talents, and proposes that new business requires higher personalized training of talents. This is also the problem of cultivating business talents at present.

2 Design of personalized talent cultivation based on Spark student portrait

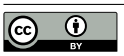
The talent cultivation based on the new business concept should be optimized in combination with the regional industrial development plan and the national development strategy to meet the development needs of modern society and personal growth needs.[1] In the digital economy era, students' personalized learning needs are more complex. In order to change this situation, the new business theory teaching should make full use of advanced information technology, guide students to participate in all aspects of teaching, change passive learning into active learning, understand the theoretical teaching content from multiple angles and at multiple levels, and meet the needs of students' personalized development through the implementation of personalized teaching methods to achieve common progress of individuals and society.[2]

The accumulation of campus student behavior data provides a data foundation for obtaining personalized training plans for students.[3] This article is based on the raw data of campus student behavior on the Spark platform. After preprocessing, statistics, and analysis of the raw data, a student "portrait" feature library is established that can fully depict students' personal characteristics and various aspects of campus behavior. It predicts students' learning needs, recommends personalized learning plans, and achieves the goal of providing personalized business talents for the development of the new economy.

2.1 Technology Architecture of Spark

Spark is a distributed big data computing engine based on memory (Figure 1). Spark's built-in modules include Spark Core, Spark SQL, Spark Streaming, Spark MLlib, and more. Spark Core implements

*Corresponding author.



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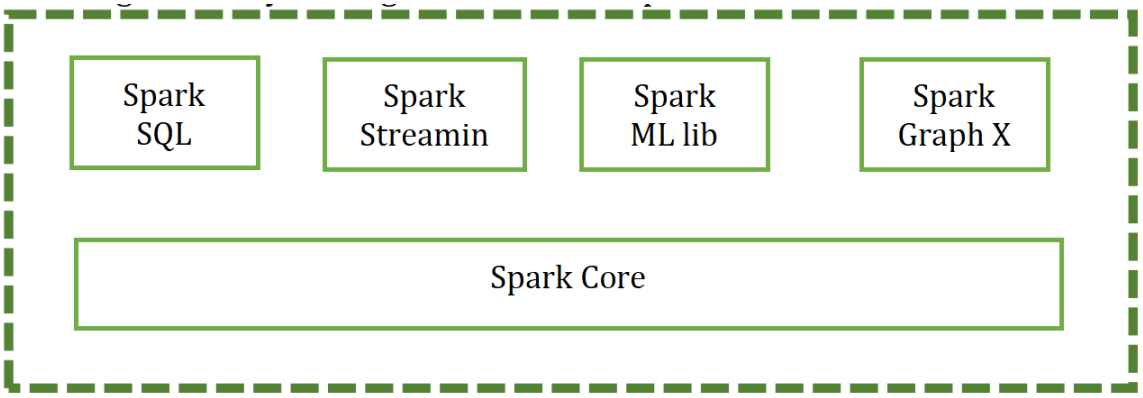

Figure 1: Technology Architecture of Spark

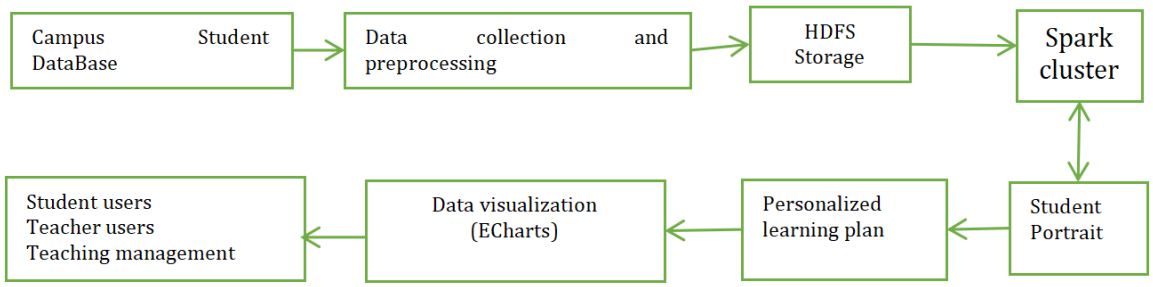

Figure 2: Personalized talent cultivation system architecture Based on Spark

the basic functions of Spark, including task scheduling, memory management, error repair, and interaction with the storage system. It supports data sources such as Hive tables; Spark Streming is a module for real-time data computing, which includes many operational APIs; Spark MLlib includes clustering algorithm, regression algorithm, classification algorithm and collaborative filtering algorithm. In addition, Spark also has the advantage of being able to integrate well with different cluster managers and run independently, not only in HadoopYarn, but also in Apache's Mesos and Spark's built-in independent scheduler, which are perfectly compatible.[4]

2.2 Personalized talent cultivation system architecture Based on Spark

The system (Figure 2) is based on multi-source data such as student consumption, grades, academic attendance, access control, and book borrowing to analyze student behavior, predict student learning needs, and recommend personalized learning plans. First, preprocess the data, integrate multi-source data, and store the data in the distributed system HDFS to ensure the consistency between the data and the data in the relational database, so that the data can be easily converted between the distributed storage and the relational database. At the same time, machine learning algorithms such as clustering analysis, association rule mining, collaborative filtering, etc. are parallelized on Spark through K-means, and this technology is applied to the distributed processing of historical data to complete clustering segmentation of student behavior, prediction and early warning of student learning behavior, personalized recommendation of student learning courses, etc. Finally, the analysis results are presented in a visual form using a web framework and ECharts technology, and friendly user query interaction functions are provided.[5]

Data collection and preprocessing: Complete the collection and storage of data, and integrate and preprocess various heterogeneous data to ensure data integrity and uniformity. Provide personal information, campus consumption data, classroom attendance data, library access and book borrowing records, and other data for the system, which is the underlying data support of the entire platform.[6]

Spark data processing: based on Spark big data analysis platform, it analyzes and processes various data provided by the data perception layer, and uses clustering, collaborative filtering and other algorithms to mine the association relationship and potential value between data to provide storage and distributed computing services.

Data interaction service: Realize data interaction through the API provided by Spark SQL component, associate the background offline analysis and calculation results with the foreground data visualization component, and realize data conversion between distributed data storage and relational database.

Data visualization: The Spring MVC framework of JavaWeb and Echarts component are used to realize the visualization of data

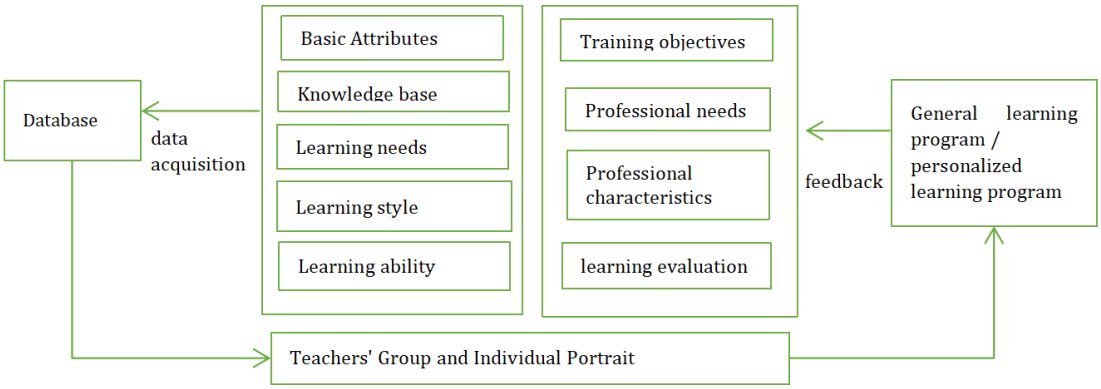

Figure 3: Intelligent Learning System Based on Spark

processing results, and charts are used to provide users with results display to achieve a friendly user interface.[7]

2.3 ”Intelligent” Curriculum Learning System Based on Spark

Education is a subject that studies people's learning behavior. Big data analysis technology can ”digitize” people based on factual data, and mine valuable implicit information and interpret it. Therefore, the user portrait technology based on big data will be applied to the education and teaching process, mining the business teaching, learning and evaluation and other conditions that are in line with the actual situation of students and teaching, so as to formulate and implement education and teaching policies and strategies with a targeted view, and reform the traditional business education philosophy and education thinking from a deeper level; Use big data technology to present the micro performance of each individual student in the teaching process, so as to teach students in accordance with their aptitude and carry out personalized education; Use big data technology to support and optimize various decision-making and control activities in teaching management, such as training program formulation, teaching plan revision, teaching process control, teaching effect evaluation to further improve the quality of education and teaching.[8]

The Intelligent Learning System (Figure 3) adopts online and offline mixed mode, including general programs and personalized programs. The general learning program is for the knowledge that the students must master according to the training objectives and characteristics of the specialty. Personalized learning program is provided by teachers according to their own actual needs to learn independently.

The theoretical teaching method is embedded with information technology development, data analysis and intelligent data processing means, so that students can become the main body of teaching, improve students' participation in teaching, shorten the distance between students and theoretical teaching, resolve students' difficulties in learning theoretical knowledge, and promote students' understanding and mastery of theoretical knowledge.[9]

For example, before learning theoretical knowledge, students are required to preview and collect relevant content of knowledge points through teaching space, micro classes, teaching websites, teaching animations, teaching games, teaching APPs, etc.[10] They can also shoot their understanding into small videos and share them in real time on communication platforms such as class QQ groups and WeChat groups. Students and teachers can discuss the collected data and small videos taken by students at any time, Find and understand problems from it; In class, teachers can discuss the correct and wrong information collected by students and the small videos taken by students respectively, and at the same time, they can further deepen students' understanding of theoretical knowledge with the demonstration of cases. After class, let the students find out the content related to or similar to the theoretical knowledge they have learned in life, and integrate the theory into life practice.

2.4 Establishing personalized curriculum resource recommendation system based on collaborative filtering algorithm

The core of the construction of intelligent curriculum system is to solve the problem of ”information overload”, that is, there are many learning resources on the network. In the face of massive curriculum resources, students are often difficult to choose, lost in confusion and impatience, and lose interest in learning. This project proposes to build a collaborative filtering recommendation model to realize personalized and customized recommendation of course resources for students, and optimize and improve the collaborative filtering model with K-means algorithm (Figure 4).

2.5 Implementing a precise teaching mode based on student portraits

The primary task of the personalized learning system is to accurately identify students and their needs, and on this basis, carry out accurate delivery of hierarchical and differentiated learning resources. Using big data analysis technologies such as data mining and artificial intelligence to intelligently analyze the data generated

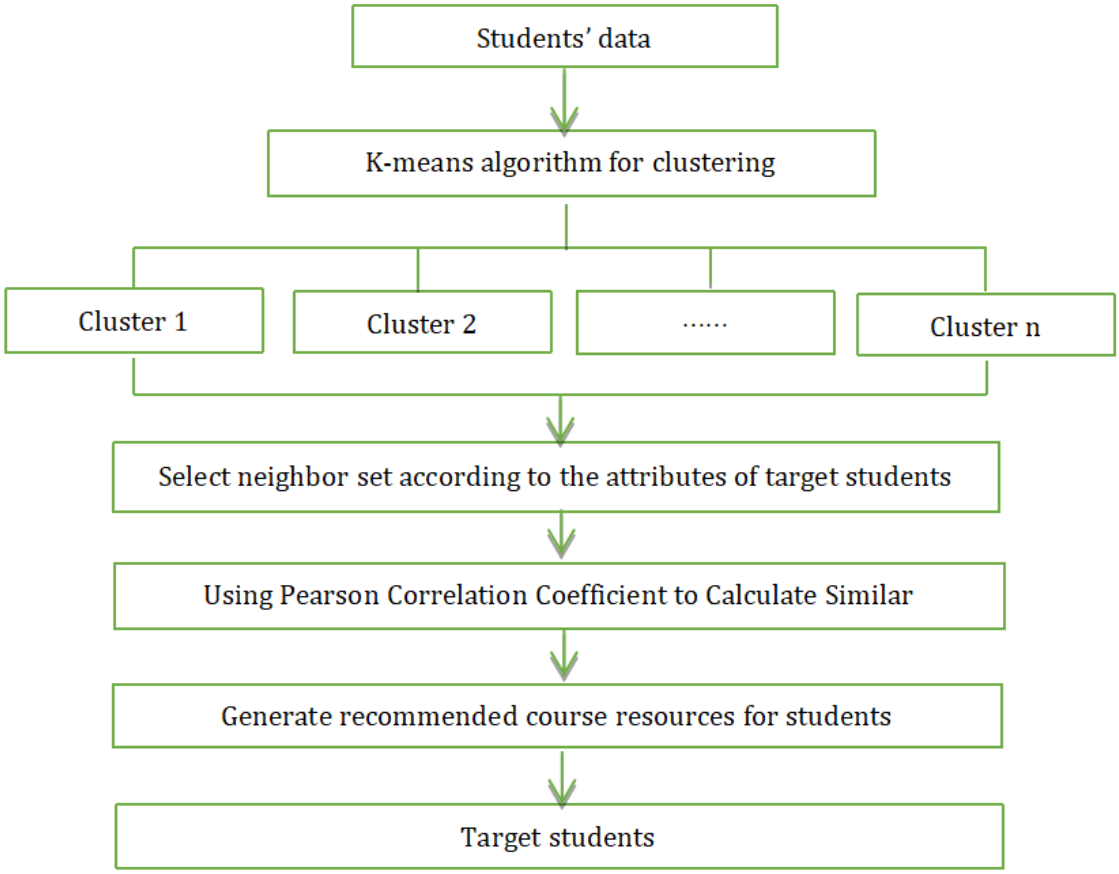

Figure 4: Collaborative filtering recommendation system based on K-means algorithm

in the teaching process, and deeply depict the students, can objectively, comprehensively and truly reveal the students' learning situation. The real data will not tell lies. It is more real than the teacher's experience and judgment. It can avoid the teacher subjectively believing that he/she knows the students and that his/her ideas are consistent with the students' needs. Under the background of big data technology support, multiple and credible evaluation dimensions are conducive to teachers' achieving accurate teaching, optimizing teaching decisions, providing accurate and effective learning guidance for students, and helping students fully stimulate their internal potential to achieve personalized learning and growth.

The construction process of student portraits plays a guiding role in the theoretical analysis, application and practice of portraits. The specific construction process includes four stages: automatic data collection, intelligent data processing, portrait model construction and optimization, and portrait application (Figure 5).

2.6 Building an intelligent quality monitoring and evaluation system

Build a teaching quality monitoring platform (Figure 6), through big data technology adopt a multi-layer architecture, effectively integrate big data processing, data exchange and sharing, relational and statistical big data storage, authority management, and big data analysis and mining, achieve in-depth analysis and accurate control of all data, automatically provide information feedback and adjust teaching and teaching management strategies according to the evaluation system, supporting services, highlight self-management and improvement (Figure 6). Realize timely, accurate, scientific and effective quality monitoring, and create the effect of closed-loop teaching quality monitoring and iterative improvement that can automatically find problems and automatically feedback and adjust under the data drive.

The system is mainly designed with three major functional modules, namely student portrait analysis, data collection and processing, and system management module. It uses relational database MySQL and non relational database Redis, and uses the mybatis persistence

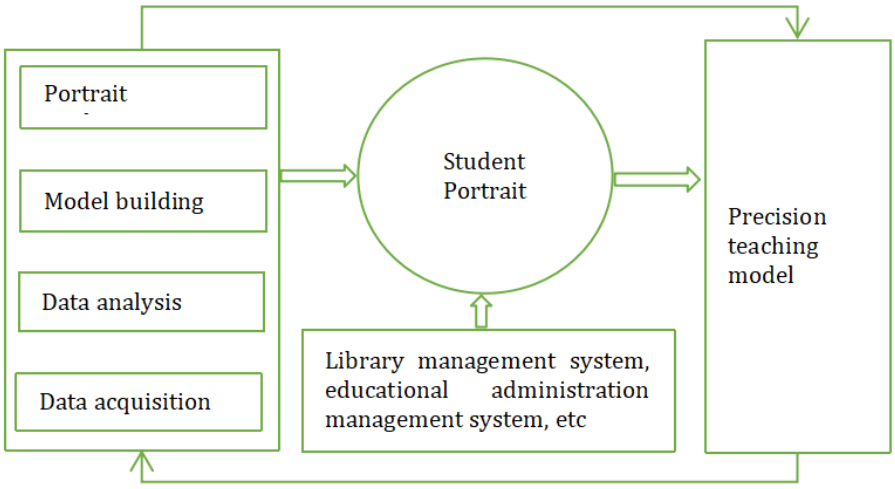

Figure 5: Precise teaching mode based on student portrait

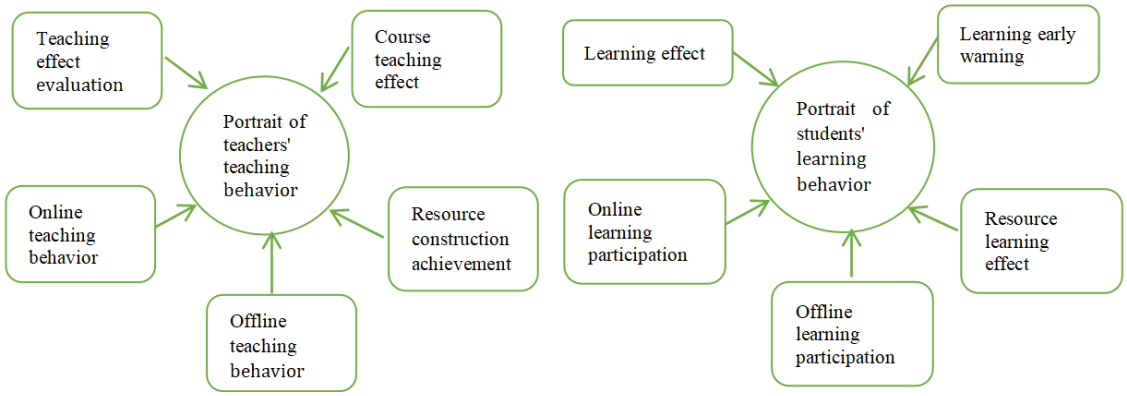

Figure 6: Teachers' and Students' Behavior Portrait Based on Big Data

layer framework for paging and other operations; The backend is developed using the SpringBoot framework. After the system development is completed, deploy it to run on the Linux operating system.

3 The Learning Effect of Intelligent personalized Education

In the institutions where the project members are located, the intelligent personalized training of business talents is being implemented. In order to analyze the implementation effect of intelligent personalized education (Figure 7) , project team members conducted a questionnaire survey on 148 international business students, and obtained the following conclusions.

In the Internet era, online learning is an important learning strategy. A large amount of data on learning behavior has been generated on various online education platforms. According to these data, it is difficult to master the learning situation of learners on the network platform. Through the collection and analysis of data, we can improve the learning mode, provide early warning for online teachers, and enable them to improve the learning process by adjusting teaching strategies. The diversity of learning information makes it difficult for students to adapt to traditional classroom teaching, so students' personalized and accurate service needs become particularly important. Through the construction of learner portraits, we can accurately match users' personalized knowledge needs from a large amount of information, and constantly improve the intelligent, situational and accurate level of personalized learning push services.

The project team measured the impact of intelligent personalized teaching mode on students' learning interest from two aspects: "Investment of professional learning time" and "Effectiveness of learning plan formulation" (Figure 8). It can be seen from the following table that after the implementation of the personalized teaching mode, the time invested by students in professional learning has

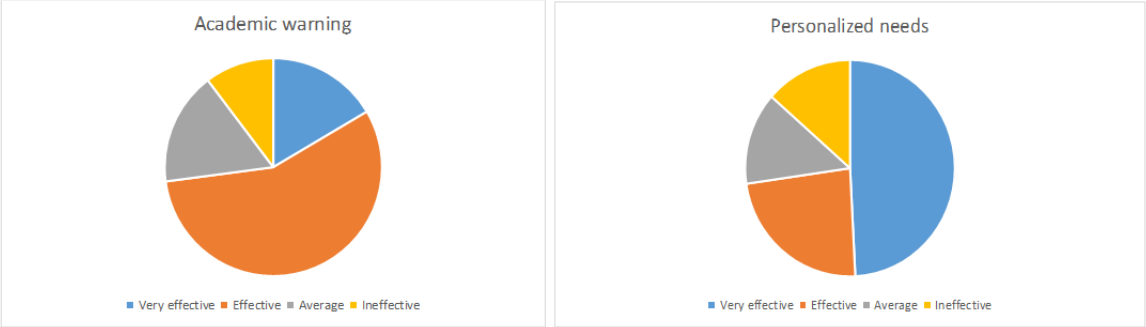

Figure 7: Evaluation of Intelligent Personalized Education effect

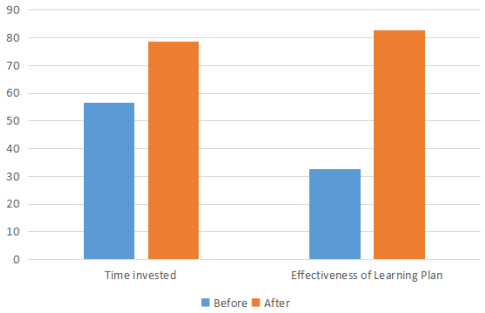

Figure 8: Evaluation of Intelligent Personalized Teaching Mode

increased significantly; More detailed and willing to implement the learning plan. Objectively speaking, the intelligent personalized teaching mode plays an obvious role in improving the effect of professional education.

4 Conclusions

The essence of accurate teaching in the era of education big data is to use big data analysis technology to accurately identify students, find out the learning situation, respect differences, and layered teaching, break the ambiguity and inefficiency of traditional empiricism teaching, and develop towards student-centered personalized teaching. Precision teaching should be truly student-centered. The key to its implementation is to accurately identify students and their personalized needs. When implementing teaching, it should be based on the actual situation of each student, which is consistent with promoting students' personalized development.

With the construction of personalized intelligent teaching system as the core, we will realize the design of precise teaching scheme based on student portraits. By using the Internet, cloud computing, big data, artificial intelligence and other technical means, we will make efforts from the innovation of education and teaching concepts, the reform of talent training mode, the construction of disciplines and specialties and other ways to keep up with the trend of regional industrial development and the needs of the employment market, and actively adapt to new technologies, new industries, new models The new era of new business types and new economy provides high talent guarantee for the development of regional economy.

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