

## Research status of education big data at home and abroad, existing problems and countermeasures

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### ABSTRACT

The age of big data has arrived, the combination of education and big data has become an inevitable result of social evolution—big data drives the education revolution. Education big data in China has a relatively short development time, relatively backward technology, and no good application. By comparing the differences in the key points of education big data at home and abroad, this paper summarizes the research status of education big data at home and abroad, and finds out the existing problems and countermeasures of education big data in China.

### KEYWORDS

education big data ; research status ; the existing problems ; countermeasures

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### BACKGROUND

The Internet has penetrated into every aspect of people's life, resulting in exponential growth of Internet data, and the era of big data has come. Technologies such as cloud computing can no longer cope with the scale of data available, and big data, the product of evolution, is changing society. Big data has promoted the reform of medicine, economy, politics, entertainment and other fields. It also has a great influence in the field of education -- big data drives the reform of education.

In the Big Data white paper "Big Data for Development: Challenges & Opportunities" released by the United Nations in 2012, it is pointed out that the era of Big Data has arrived and the emergence of Big Data will have a profound impact on all areas of society [1].

### THE IMPLICATIONS OF BIG DATA IN EDUCATION

#### • Concept of big data

McKinsey, an internationally renowned consulting firm, defined big data in 2011 and believed that big data is the data that cannot be acquired, stored, managed and analyzed by conventional data software because of the large amount of data, the diversity of data and the rapid generation of data [2].

#### • Big data in education

First of all, the education here is the concept of "big education", has a full (from a full-time student to universal, open to all people), the whole process (from preschool education to lifelong education, service) at all levels of education and comprehensive (family, school and social "trinity" education, education of ubiquitous, false or true integration of education) [3].

Educational big data is a branch of big data, including the collection, processing, analysis and storage of educational data. Currently, big data in education has not been given a clear definition. In a broad sense, educational big data generally refers to all human behavior data from daily educational activities, which has hierarchical, sequential and situational characteristics. In the narrow sense, educational big data refers to learner behavior data, which mainly comes from student management system, online learning platform and course management platform.

### DEVELOPMENT STATUS OF BIG DATA IN EDUCATION AT HOME AND ABROAD

#### • Foreign development status

Inco Pat patent database includes 102 countries/organization/area more than 100 million pieces of patent information, integrated the patent retrieval, analysis, data download, multiple functions such as file management and user management module, patent data and information in more than 20 major countries of the special collection and processing, data field

better, data quality is higher. Therefore, we analyzed the Internet of Things patent data provided by incoPat patent database as the data source, combined keywords and logical relation words to form the retrieval formula, and obtained patent information data in incoPat patent database. The data was collected from 1990 to 2015 (although the patent data is updated every day, the lag in the disclosure of patent applications will lead to the delay of patent data in the last two years and inaccurate data will occur, so in order to facilitate the unification and integrity of data analysis, we set the deadline as 2015). The number of patent applications related to the Internet of Things was 118,586. The development of big data in foreign education is mainly reflected in technological environment research, data mining and application research, education application research, user research and open resources and personalized teaching. The research direction is more inclined to data mining, data analysis and model building [4]. The application fields of educational data mining and learning analysis mainly include: modeling of learners' knowledge, behavior and experience; Learner documentation; Domain knowledge modeling; Trend analysis [5]. Learning analysis generally includes five links: data acquisition, data storage, data analysis, data representation and application service [6]. Through data mining and data analysis, researchers can evaluate learners' psychological status and their own knowledge reserve status.

Michal Kosinski, a professor at Stanford University Business School in the United States, has published a study: through 227 likes of learners on Facebook, the personality characteristics of learners can be inferred. If this technology is applied to education, learners' personality, learning characteristics and potential can be inferred, and then learners can be personalized education. In addition to collecting information on the Internet, foreign researchers have also realized the application of gamification assessment. The researchers tried to recreate life situations in the games. The game records and analyzes the time, methods and operating habits of players, and then summarizes the intelligence level of players. In the field of education, foreign researchers not only stay in teaching, but also develop a set of adaptive learning system. Give each learner the appropriate test, and then give the learner the appropriate learning materials. The system records learners' learning time, learning path, knowledge category, etc., comprehensively uses theories and methods of information science, sociology, computer science, psychology and learning science to analyze and model, and then feeds back the results to learners and teachers. The teacher corrects the learner's learning behavior according to the analysis results.

#### • Domestic development status

The research time of big data in education in China is short, and the research results and technology are relatively backward. Compared with the current situation of international research, big data in education in China has not yet taken shape. In 2016, China released the first big data development report in the field of education, Blue Book of Big Data Development in Basic Education of China (2015) [7]. The Blue Book summarizes the development direction of big data in Education in China, indicating that the research on big data in education in China has officially set sail.

The subject distribution of domestic education big data research includes education and teaching reform, teaching mode and application, education data analysis and personalized learning research, talent cultivation, and teacher professional development [8]. The research direction is inclined to the reform of teaching system. Domestic scholars have made many researches on the reform and innovation of education and teaching from the aspects of education management, education mode, education thinking, education evaluation and learning analysis. Moocs and flipped classrooms have eliminated the limitation of time and place. Use data analysis technology to analyze and model the collected data and establish the correlation between variables. Develop personalized learning, classify learners into different types according to the results of data analysis, and recommend appropriate courses and methods. The establishment of professional education big data talent training system, training and transportation of talents for education big data research.

First, changes in teaching methods. Instead of just relying on teachers' explanations to acquire knowledge in school, students can learn independently without time and place restrictions by using the Internet. Due to the lack of teaching resources and limited teacher resources in China, schools are often divided into different grades. In order to be admitted to good schools and learn from more qualified teachers, students have to get better grades in exams, which increases the learning burden of students. Through MOOCs and flipped classrooms, students can not only choose their favorite teachers, but also choose courses.

In addition, the teaching model has changed, big data has overturned the previous way of correcting homework. In the era of big data, teachers transfer homework to an intelligent platform. The platform even summarizes the whole class's homework based on homework correction, so that teachers can intuitively understand students' grasp of knowledge, which not only improves efficiency, but also reduces the error rate. English correction technology is the most advanced and widely used. The English correcting platform is based on the language features of different levels of manual correction, and then compares the language features of the composition with the language features stored in the

platform database, and gives the composition scores from the aspects of vocabulary, grammar, discourse and content. It can also spot spelling and grammatical errors and help correct idioms in The English language. The website most commonly used by college students is correcting website. In addition to the above functions, zhugay.com's corpus has mastered the real-time updating technology and can respond to the changes of English in a timely manner.

## **PROBLEMS EXISTING IN CHINA'S EDUCATION BIG DATA RESEARCH**

### **• Technical Problems**

In the era of big data, computer hardware is the most basic requirement for more accurate and comprehensive data acquisition, analysis and useful information. Whether the computer can store massive data information, whether the rapid completion of massive data statistics and calculation, are urgently needed to solve the problem. In addition, the current research on information collection and analysis algorithms is a thorny problem. China's data mining technology and data modeling and analysis technology are relatively backward, and there are few professional and technical personnel in big data education. It is estimated that 99 out of every 100 people in the education big data research industry are needed to develop algorithms for data acquisition and analysis. At present, it is a huge challenge to solve data compatibility. There is no unified data structure model among research institutions, which leads to serious obstruction of information exchange.

### **• Organizational Issues**

First, the current education big data in China is still in the research stage and is not widely applied. There is a lack of professional comprehensive knowledge talents and no professional education big data talent training system. The establishment of professional education big data talent training system, training and transportation of talents for education big data research.

Second, the research points of education big data are scattered. There is no specific definition of big data in education, so only a small number of people can actively participate in the research and development of big data in education. Different educational big data information systems have different structural patterns, and information sharing between various technologies and intelligent platforms cannot be realized, resulting in slow progress of research on big data in education. Therefore, it is very important to unify the data storage structure of educational information system.

### **• Application Problems**

The research direction of education big data in China is the reform of teaching mode, but differentiation and individuation are not really realized. A class of students must have their own characteristics, fixed teaching mode cannot be targeted for each student reasonable in-depth guidance. In order to solve this problem, Chinese scholars should increase the research on data mining technology, use data mining to analyze the learning needs, learning characteristics, learning attitude of each student, summarize the analysis results, and develop personalized teaching programs for different students.

At present, the application of big data in education is still scattered and in the initial exploration stage. China has a large population, and education reform is a heavy task and a difficult process. It is a huge project to apply big data in education to every learner. How to fully "land" big data in the field of education, and there is no mature application model that cannot be promoted, is still a big problem perplexing the education circle.

### **• Privacy and ethical restrictions**

Cyber security is a hot topic. Platform not only need to collect the learner's learning progress, scope of knowledge, but also statistics the learner's personal information, basic information such as personal, family, health, school, teacher and other data, that is to say, the big data for the development of the more advanced education, learners' the higher the transparency of information, privacy protection is more difficult. This requires researchers to study how to protect the privacy of learners.

## **COUNTERMEASURE RESEARCH**

### **• Increase investment in technical research**

China should support the research and application of education big data at the national level, and elevate education big data to the level of national strategy

Researchers from pedagogy, management, computer science, statistics and other disciplines will be organized to set up special educational big data research institutions to focus on data collection and analysis algorithms and application promotion. The collaboration of talents in multi-regional and multi-disciplinary research fields can realize the mining of big data of education quality monitoring. Provincial and municipal education quality monitoring institutions have been established, resulting in a huge talent gap, especially in the field of big data mining.

The Ministry of Education should establish and improve the education system for training and educating big data researchers, and provide more big data management and technical talents for the education of big data. Increase the research on educational data mining and educational data analysis technology, so that the submerged valuable data can be mined.

• **Strengthen online privacy protection**

Education big data is not only a valuable educational asset, but also involves the privacy of educators and students. In order to establish perfect education big data privacy protection system, on the one hand, should be formulated as soon as possible to the education of big data security management laws and regulations, set up management department, strengthen the management of education big data information system, intensify protection of information, information security for the user to provide comprehensive security protection, on the other hand, to speed up the big data privacy protection technology research, data encryption, The user information is encrypted in the form of ciphertext. At present, the existing encryption technologies (such as symmetric encryption and asymmetric encryption) have defects. They cannot have the advantages of fast encryption speed, simple secret key management, and can be applied to open networks. Control access technology, database to store the user's all new, and simple database encryption is not attack prevention function, time faced the threat of being invaded, therefore, must be combined with controlled access technology, the corresponding access rights to legitimate users, and can track the user's access behavior and generate the access log, recover the permissions for a user with illegal prose but, Restrict access behavior, etc.

• **Accelerate the application and promotion of big data in education**

How can we call education big data more quickly the comprehensive popularization, accelerate the education of big data, improve education value of big data, improve the efficiency of education, the enterprise and media are welcome to join us, to education research achievements of large data into enterprise operation, and combines the traditional media and new media effectively, play their respective advantages. Enterprises can legally purchase and acquire education big data information by means of development and proper channels, and operate intelligent learning platforms with their own characteristics. However, in the process of state and enterprise interaction, information leakage is an unavoidable problem. In order to facilitate the management of the market, the country should formulate the admittance standards for educational data operators, issue operation licenses, and regulate the commercial behavior and information commodities of operators. Operators must set up special educational data acquisition, processing, storage and other departments, to conduct comprehensive technical training and network security moral education for employees, employees use their own independent identity to enter the official education database. When using educational data for research, non-official institutions need to meet relevant regulations and obtain relevant licenses to obtain the right to use educational data.

Through the comparison of the current situation of education big data research at home and abroad, it is found that the data mining technology and data modeling analysis technology are backward, and more education big data professionals with comprehensive knowledge should be trained to speed up the research of education big data technology. In China, the environmental construction of big data in education is relatively weak. In order to better apply big data in education, it is essential to create a good environment for learners. Accurate knowledge points and fast learning methods can improve the efficiency of education. Therefore, it is necessary to strengthen the governance of education big data environment, establish relevant departments, formulate relevant laws and regulations, and provide a standard environmental system for education big data. Only with a healthy and sound development environment can big data in education be applied in an all-round way more quickly.

**SUMMARIZES**

Big data drives education revolution. Education is the foundation of a country, and the era of big data has promoted the transformation of education and its paradigm. Due to the short research time of big data in education in China, more attention and attention should be paid to it. In the face of massive and diversified data, it is necessary to acquire useful information with maximum efforts and tap its potential.

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