Study on Student Growth Tracking System based on Educational Big Data

Chongli Zhong [a], Zhenyu Cao [b]
Financial School, Eurasia University, Xi' An 710065, China.
[a]76449508@qq.com, [b]caozhenyu@eurasia.edu

Abstract. With continuous advances of the society, information technology has been developing rapidly. The digitalized era has arrived. Massive amount of data is being produced thanks to the rapid growth of computer science and technology and internet technology. In recent years, educational big data has been receiving more and more attention from university administrators. They seek to offer more scientific and humanized training schemes by analyzing students' overall performance in school with the help of data, thus provide better employment recommendation to them.

Keywords: Educational Big Data; Student Management; Growth Tracking; Database.

1. Introduction

The term "big data" origins from the internet industry. On the part of its literal meaning, "big data" refers to massive amount of data. The so-called "educational big data" means to introduce big data in the educational world and use it to serve the educational cause. The emerging teaching forms like e-learning and interactive teaching have laid foundation for data mining and analysis of the educational industry in the era of big data using the unstructured data generated by intelligence tutoring system and individualized learning system. The features of big data determine that it has practical value in the construction of digital campus.

2. Database Development

We hope to create a database system that help the students and teachers to explore the useful information. Through the data information, Teachers can provide a scientific help to the students for the next academic year. Students can use the guidance to create the study plan. To reach the goal, the technological team uses the rational database software to develop the "Student Growth Tracking System". The first step is to integrate the student information. The team uses the "Student ID" as the primary key that help the system to analyze the relationship between different tables. The following graph shows the dataset information and their relationships.

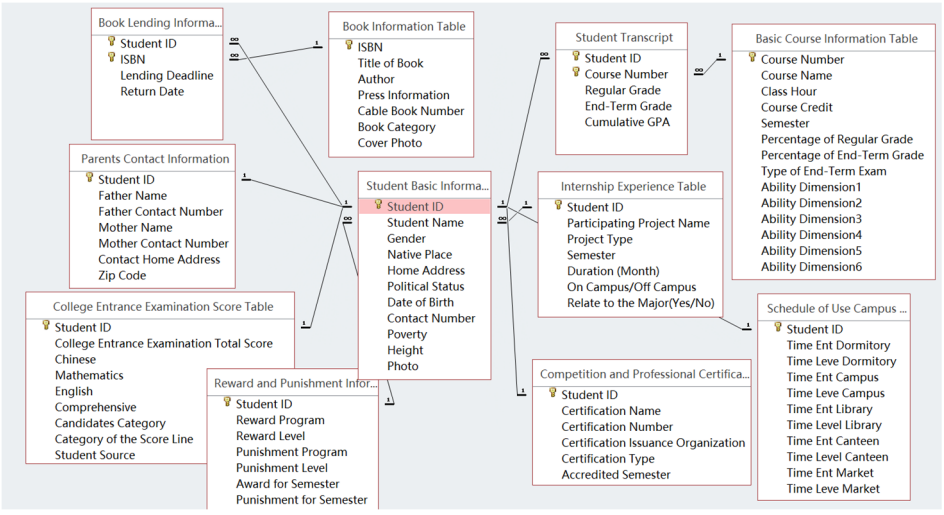

Fig. 1 Database Development and Parameters Relationship

As shown in the figure above, the system considered the students' basic information, cumulative GPA, rewards and punishment information, college entrance examination grades, and schedule of use campus public facility, etc. In the database, the team uses the "Student ID", which is in the Student Basic Information Table, as the primary key. Student information table creates the "one to one" or "one to many" relationship with other tables.

3. Functional Model Development

The functions of the "Students Growth Tracking System" include: dataset search and output report.

3.1 Dataset Search Function

The system provides the data information search function for the students and teachers.

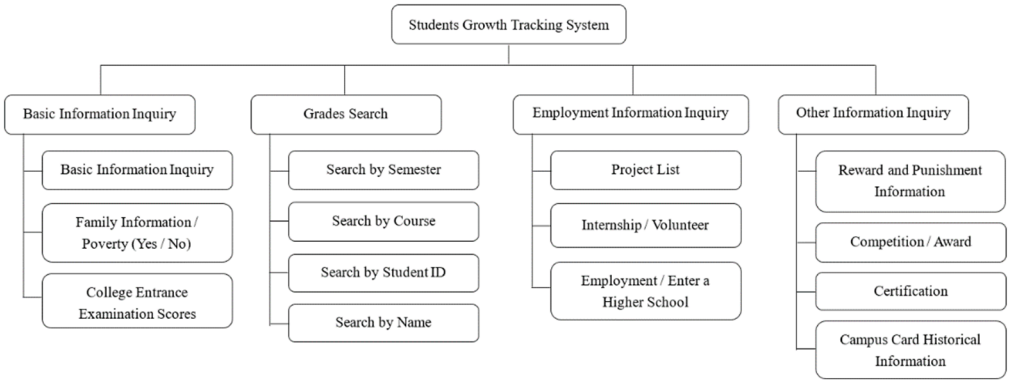

Fig. 2 Model of the Dataset Search Function

In order to gain a rational understanding of the own ability and make the reasonable plans for the next term, students need to rapidly find out the data that include the course grades, class average scores and performance ranking.

The dataset search system is based on the students as the subjects. People can search the student GPA, which include regular grade, final exams score, overall appraisals and rankings among the major, according to the student ID, student name, curriculum name and current semester. In addition, the course syllabus indicates the requirements of the key abilities. On the basis of these data information, the system uses the student GPA and performance data to create a radar map to present the advantages and disadvantages of the student. The graph told the students "what you have learned in this semester?", "which courses are proper for you to improve the abilities in the next semester?".

In summary, the "student-oriented information searching system" helps the students to understand the current ability and the performance ranking in the major. The radar map points out the future direction for them to strive for.

For the teachers, they can search for detailed information about the students, which include the student information, family background, internship and employment status, rewards and penalties information, award information, book lending and borrowing information. Teachers are able to understand the students' ability and requirements. They can use the data to make the future work plan. The following examples display the function of the "Student Growth Tracking" system for the teachers:

The system provides the student background information, parents contact number, and poverty condition, etc. The data information supports the teachers to manage the students.

The system provides the scores of college entrance examination. Teachers can use the data to analyze the factors to influence the grades. For example, if a student has the difficulties to learn English, the teacher can provide the specific support. In the college, the language test CET-4 have a direct impact on graduation. Another example, the system helps the teacher to analyze the phenomenon of the partial branch in learning. The teachers can use the data to provide the proper

guidance for the students and inspire their talents in terms of course studying, academic training, and club activities.

Teachers can use the data to understand the distribution of students' ability and scores. The system provides the early warming for students with low scores. The function can help the students to prevent the failing on a course or grade retention.

The system records the information of the student internship and social practice experiences. The students will receive the remind from the system to manage the knowledge and share the experiences. Teachers can also use the system to monitor the students' security status.

The tracking board displays the Student Honor Roll and the detailed information of the awards. Teachers can use the system to deliver the scholarship and prizes. The system the excellent students to become to the leaders. They will share the successful experiences and help other students.

3.2 Output Report Function

Expect for the dataset search function, "Students Growth tracking" system provides the templates that help the people to create the report, so as to explicitly display the results of database information.

(1) According to the student capability indexes, the system provides the tips for the career development.

In the "course information sheet", the teachers usually set up the anticipation level for the personal ability and professional skills. There are 5 anticipation levels. Level 1 stands for the students have weakest skills. Level 5 stands for the students have the abilities to use and innovate what they have learned. When the students finished the degree, the system will provide them a skills report that help them find a job.

The team collects the recruitment information from the recent years. They extract the key words and the levels of the corporate requirements. Teachers can use the references to compare the students' ability report with the industry requirements score. Higher levels of matching demonstrate that students conform to corporate demands. Students, who are matched by the system, will receive the company information. "Students Growth Tracking System" improves the accuracy and efficiency of job application.

(2) Comparison between college entrance examination scores and comprehensive abilities of graduation.

College Entrance Examinations include Chinese, Mathematics, English, and Science Comprehensive, and Liberal Arts Comprehensive They evaluate the students' ability that include literary quality, logical thinking, foreign language ability and comprehensive application of liberal art and science. Hence, college entrance examination scores can also reveal students' comprehensive quality and ability before going into college. By the same token, after four years of university study, course training objectives and evaluation scores can also demonstrate the levels of students' capabilities. Therefore, teachers can use the College Entrance Examinations scores as the primary ability parameters. They can compare them with ability parameter indexes upon graduation. The report can help teachers and students to understand the growth trajectory and core competence.

(3) Resume Development

Students Growth Tracking System stores the information on student's basic background, GPA, rewards, punishments, and credentials. The "Report Development" function can help students deign the cover letter and professional resume. The system provides many templates for different industries. In summary, the method will greatly reduce the time and money for students before college graduation. They can completely focus attention on job interviews.

4. Explore the Relationship between the Parameters

Students Growth Tracking System supports the teachers to download the dataset and make further research on the student performance analysis. Student management department can use the system to track the student behavior. According to the current research, the team found that the excellent students usually have a balanced life. They usually make a diet plan and study schedule for the daily

life. The student management office from Eurasia University devise some incentives to promote the work-life balance. For example, the students need to submit a short video to introduce the diet plan and achievement. If the students finished the "30 Days Healthy Challenges", they will win a free meal. In a similar way, teachers can use the system to explore the factors, which will influence the student behavior. Here are some educational big data research topics:

Is there a relationship between the family poverty and the student academic performance? For example, poor students usually have a better academic performance than the rich students.

Is there a relationship between social practice experiences with the career development? For example, if a student has abundant working experience, he or she can easily find job.

Is there a relationship between the certification and the career development? For example, awards and certificates bring directly influences on the career development.

Is there a relationship between the length of stay in the library and the academic performance? For example, the students, who stay in the library more than 3 hours per day, have better academic skills than other students.

Is there a relationship between the book lending and academic performance? For example, the number of the book borrowing, and the diversity of the reading behavior will directly influence the academic performance.

Is there a relationship between the sleeping behavior and GPA? For example, the sooner the students leave the dormitory, the better their academic performance will be.

Is there a relationship between the diet and GPA? For example, if a student has a regular meal plan, he or she usually has a excellent GPA.

Is there a relationship between the frequency to access the public area and love affair? For example, if two students with different gender usually use public facility, such as the study room, are they identified as in a love relationship?

5. Conclusion and Outlook

A tracking system on student development would be an ideal instrument, but it has not been put into service so far. Ordinary database software can only achieve functions like query and input. Database software has failed to achieve the exploration of correlation mentioned in Part Four so that we could only export the data from the database first and use specialized tools of data analysis such as R or Python to produce results. Future research would be needed in order to embed correlations in database and produce valuable output.

In conclusion, educational big data has lots of potential significances which are of great importance to university administrators and students, for it is the precious resource to elevate working and learning efficiency. Our hope is that we can integrate results of correlation analysis to the tracking system of student development and provide more guidance and help for teachers and students.

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