

College Entrance Examination Voluntary Filing System Based on Big Data

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Abstract

The university entrance exam to college relates to whether the candidates can be accepted and if you can admit to the satisfaction of the colleges and universities and professional, it is a complex process, the examinee scores, colleges and universities should be considered, family situation and other factors. Examinees and parents attach great importance to the college entrance examination volunteer to grasp its pulse. The university entrance exam to college guidance system based on business intelligence, using SSH framework, using the enrollment data mining system, analysis of the existence of college entrance examination to college objective law and the potential factors, tailored for candidates relevant filled guidance, the greatest degree to reduce the examinee variables that exist in the college.

Keywords: Volunteer reporting system, Business intelligence, University entrance exam, Data mining

1. Introduction

College entrance examination voluntary report, is the examinee according to own achievement, the ambition, the hobby and so on factor, selects oneself hope to study the university and the specialty, is the examinee's self-will expression. In the ordinary university enrollment process, Candidates' willingness is not only related to whether candidates can be admitted to ideal colleges and professions, but even to the question of whether candidates can be admitted. From the overall situation, this is also related to the rational selection of talents in ordinary colleges and universities. The problem of cultivating talents for the modernization of the country.

It is a complex and necessary problem for examinees and parents to fill in a voluntary application for the college entrance examination. It is said that it is complicated because there are quite a number of factors involved in the application, such as the test takers' grades, the situation of the colleges and universities. It is precisely because of these factors and links that the candidates' individual and family conditions have led to considerable variables in the application form for the college entrance examination. As a result, it is very difficult for candidates and their parents to grasp the proper measure, and every year they lose the list with high marks. Therefore, candidates and parents are in urgent need of comprehensive guidance on college entrance examination voluntary application.

At present, some institutions or Internet portals have launched a "reference system for voluntary application of college entrance examination" to meet the needs of candidates and

Article history:

Received (February 8, 2018), Review Result (March 26, 2018), Accepted (April 29, 2018)

parents, in order to help candidates select suitable and satisfied institutions and specialties. It can be divided into two categories: one is based on psychological assessment, the other is based on the results of college entrance examination.

The college entrance examination voluntary reference system based on psychological evaluation is a way to apply psychology to the guidance of higher education. Its typical application is the Beijing University Fangzheng professional selection evaluation system (advanced edition) [1] this kind of system fully considers the student's own interest and the specialty, but generally does not consider the examinee's achievement, the family condition and so on factor. The national college entrance examination voluntary reference system, which is based on the result or rank of the college entrance examination, is generally based on the candidate's own assessment score or ranking. To recommend some schools or majors to candidates in combination with the admission scores of each university or university in a certain year or several years and other information directly related to the score. At present, there are more such systems in China. Representative of the Ministry of Education National College students Information consultation and Employment guidance Center developed by the Ministry of Education "Sunshine College entrance examination" information platform - National College entrance examination voluntary comprehensive reference system [2], Sina Gao launched by Sina.com. Test Simulation Voluntary filling system [3], China Education online introduction of the National College entrance examination voluntary reference the examination system and so on. Some of these systems also provide historical information such as admission scores, enrollment numbers, employment status, etc. In previous years, but they are usually limited to simple data query and statistics, and do not have in-depth data analysis functions. The knowledge and law hidden behind the data can not be found, and the blindness of candidates' voluntary filling can not be solved fundamentally.

By synthesizing the above analysis, we can see that although the present domestic reference system for the voluntary application of the college entrance examination can provide a certain degree of decision-making assistance to the candidates and parents, But there are still a lot of things that need to be improved, such as a single research methodology, a single system dependent data, and so on. Therefore, develop a comprehensive consideration of a variety of factors (such as examinee scores, interests, strengths, physical conditions, etc.). The family situation, the college enrollment plan, the admission score, the batch score line, the examination heat and so on), can provide the decision making help for the examinee to fill in the voluntary fill in the guidance system to have the very big realistic significance and the application value.

The "guidance system for College entrance examination based on Business Intelligence", which is introduced in this paper, is based on a thorough analysis of the above situation and takes into account a variety of factors and links, such as candidates, colleges, and so on. And using the data information mined out by a provincial enrollment data mining system as the data source, this paper puts forward its own research method and model. The college entrance examination voluntary report guidance system based on business intelligence (hereinafter referred to as the system) can be used from many angles. Multi-level analysis is carried out to provide candidates and parents with relatively more accurate guidance in filling out the information. Its main features are as follows:

The backstage data mining system is supported: the college entrance examination voluntary report guidance system collects the relevant information of the examinee, through the designed association rule mining interface, it is handed over to the enrollment data mining system for intelligent analysis. Then the system returns the relevant data to the college

entrance examination voluntary report guidance system, instructs the system to carry on the related operation and makes the response for the examinee.

Adopt the Java EE platform Java EE framework and Struts Spring Spring hibernate technology: this kind of technical framework is usually used as an enterprise application platform, which can satisfy the high concurrent access of the system, and is beneficial to the maintenance and extension of the system in the future.

Web service interface: data mining interface adopts WEB service mode, realizes cross-platform and low coupling degree, also facilitates the system between the flexible call.

Cache technology: the system designed page cache, memory cache and database cache, so that the system can make full use of server's hard disk, memory, CPU and other resources.

To facilitate reading, the following Java EE platform for the SSH framework to do a brief introduction.

2. Related works

At present, the Java EE platform has become telecommunications, finance, electronic commerce and insurance after many years of precipitation. One of the preferred development platforms for large-scale application systems in various industries, such as securities, is the lightweight Java EE with SSH as the core. This combination is based on the retention of the application architecture of classic Java EE, high scalability, and high maintainability. It reduces the cost of Java EE application development and deployment. In addition, this combination is a B / S architecture [4], where users can use it across platforms, and all operations are implemented through the WEB interface. Do not need special client tools, easy to update and maintain the system.

The SSH framework also conforms to the MVC model, this model of the application of the input, processing, output process is divided into 3 layers: model layer, view layer, control layer. Through this, MVC mode to achieve the program of the loose coupling structure, the program reusability, scalability and maintainability are quite important. In addition, the SSH framework has its unique style and characteristics, intends to SSH framework for analysis, and integration of the system are described.

2.1. Struts

Struts is an open source framework for establishing Java EE programs. It provides MVC components and a series of JSP custom tags to help users simplify the development of Struts. Its MVC component realizes the separation of page display and business logic. The business process can no longer be hard-coded into the source program, which enhances the flexibility of the program. However, because of its weak support for the model part, it is easy to have the problem of high coupling degree because of using Struts alone for WEB development. Business logic appears in the Action class.

2.2. Spring

Spring is a business service layer development framework created to solve the complexity of Java EE enterprise development. Its core is inversion of control IOC [5], which uses configuration files to complete dependency injection between business objects, which encourages interface programming rather than class programming [5]. Spring itself is a hierarchical structure. AOP is a technique that can dynamically add functions to programs without modifying the source code. It can isolate all parts of business logic by using AOP.

Therefore, the coupling degree between various parts of business logic is reduced, the reusability of program is improved, and the efficiency of development. AOP and IoC can be improved. Complement each other, by using both of them reasonably, an efficient middleware solution can be formed.

2.3. Hibernate

The framework of Hibernate adopts object / relational mapping ORM pattern, which can realize data persistence operation. The main purpose of this framework is to establish a mapping relationship between objects and database tables to encapsulate and shield JDBC operations. So that all we have to do is manipulate the Fifth phase Shaw, etc.: design and implementation of the college entrance examination guidance system based on business intelligence 91Like some of the basic classes provided by Hibernate, the operation of the database can be achieved.

2.4. SSH framework integration

Through the above analysis, Struts Spring hibernate has its own features and functions, but in the framework of SSH, they also have a clear division of labor. Struts is the basis of the system in SSH, mainly responsible for the separation of MVC. In the model part of Struts framework, Hibernate is used. The framework provides support for persistence layer, and uses Spring to support business logic [6]. The method of integration is as follows: firstly, the object model is proposed according to the requirements, and the object model is realized as the basic Java class, and then the basic DAO interface is written. Then the DAO interface of Hibernate is written for the conversion and operation between Java class and database. Finally, the business logic is completed by Spring.

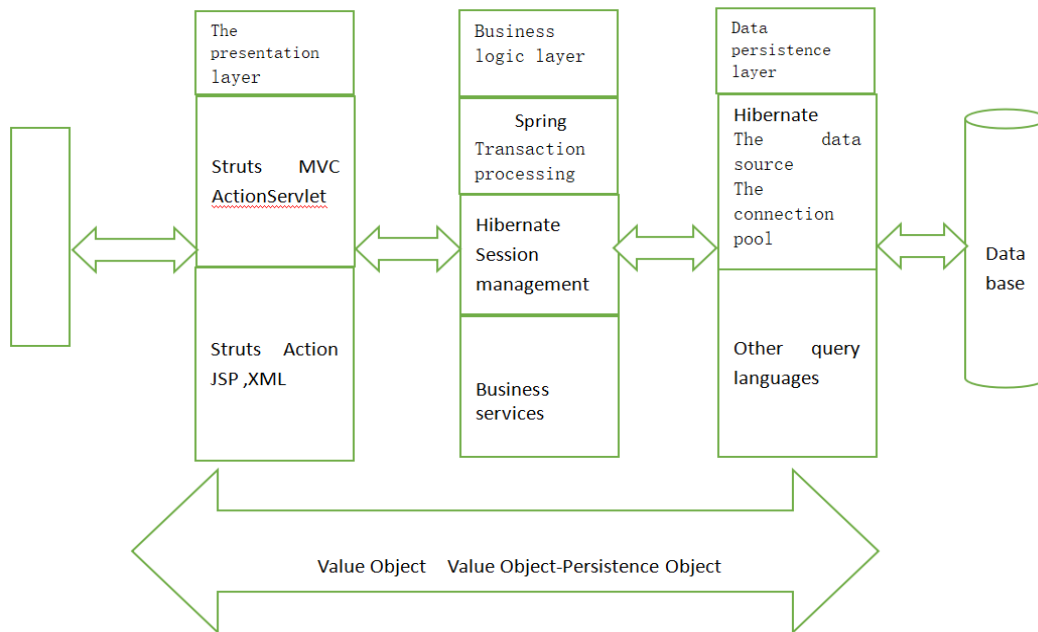


Figure 1. SSH integration architecture diagram

The design of presentation layer, business layer and persistence layer based on SSH not only greatly reduces the coupling degree of three layers, but also achieves the function of centralized configuration, which makes the functions of each layer of the system clear, and the maintainability and expansibility of the system greatly improved. The integration architecture diagram is shown in [Figure 1].

3. Design of proposed system

With the rapid development of the Internet, its application will not remain unchanged. Considering that the needs of candidates and parents for voluntary application guidance will also change, and the system will be relatively concentrated and large in traffic, the system needs to be robust. Maintainability and expansibility.

3.1. Main framework

As shown in [Figure 2], we use the SSH framework of the Java EE platform in the program platform, and the SqlServer2008 platform, which has been tested by the enrollment data mining system, in data storage. From the bottom up: the basic data platform layer, the system SSH framework layer, the functional module layer.

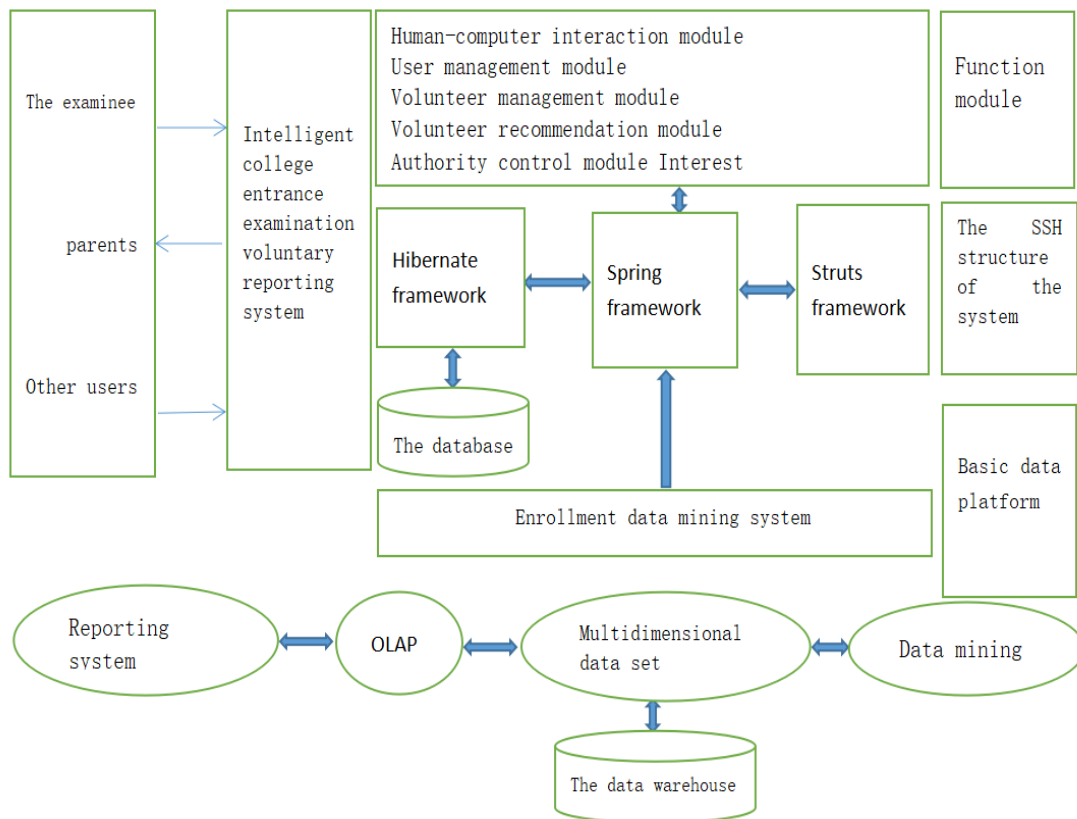


Figure 2. Overall design of college entrance examination voluntary application guidance system

Basic data platform: it is mainly divided into two categories, one is to meet the system's own data storage and management needs, the other is to use the database established by the

SqlServer2008 platform; In addition, the database of the system will cache the mining information to improve the efficiency of the system.

The SSH framework of the system: SSH is a lightweight framework for integrating Struts, Spring and hibernate, and is the more popular WEB framework at present. The framework of program MVC is divided into three layers: presentation layer, business logic layer and data persistence layer.

Functional modules: the various functional services realized by the system can be divided into two categories according to the operation mode: those used directly by users and those running in the background, mainly including voluntary recommendation module, user management module, authority control module and so on.

3.2. Major function

The design goal of the system is to provide more accurate voluntary guidance for candidates and parents, in addition, the system also needs to have security, stability and expansibility. Therefore, the system applies the SSH framework. Six functional modules are implemented: man-machine interaction module, user management module, authority control module, voluntary management module, interest preference management module, voluntary recommendation module.

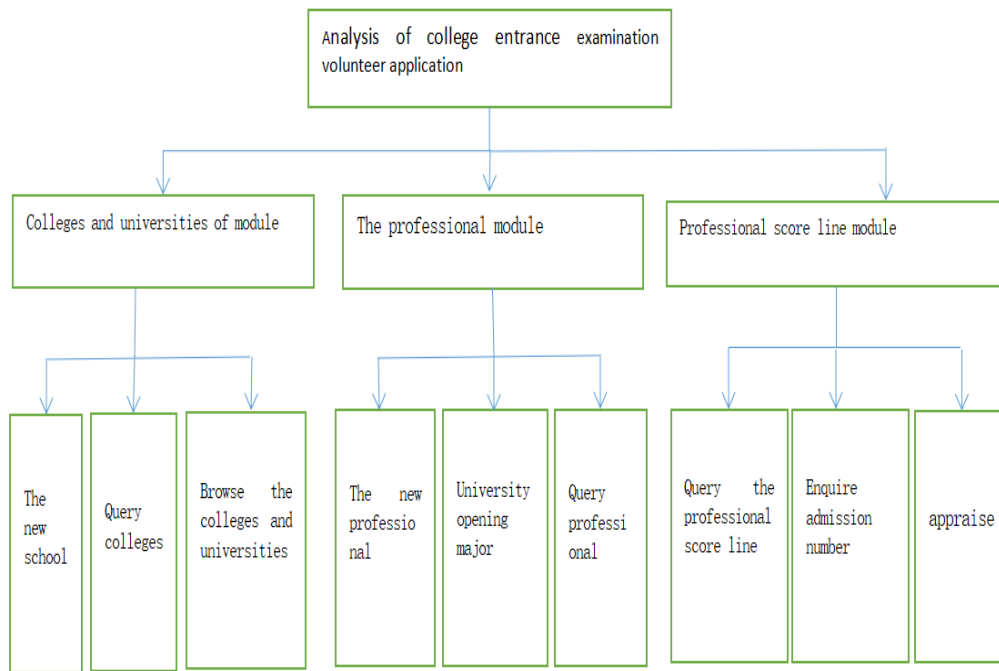


Figure 3. Functional Module structure Chart of College entrance examination Voluntary report guidance system based on Business Intelligence

The human-computer interaction module mainly provides convenient, beautiful user interface, and uses JavaScript dynamic script to realize the page without refresh operation, improve the user experience; user management module mainly includes user registration, add, Modifying personal basic information and detailed information, password management, etc., in which the Email verification function is adopted in the background to prevent false

registration, and the authority control module is used for the security control of the system. To enable legitimate users to browse the appropriate content, user rights can be allocated in the background; voluntary management module, mainly background operations, including colleges, specialized The role of industry in voluntary recommendation module, interest preference management module is the application of psychological testing, including the professional bias of candidates, regional orientation, cost burden, and so on. The function of “detailed information” in the user management module is also the reference factor; the voluntary recommendation module is the core function module and is also based on other modules, mainly including the data mining system interface and data collection and analysis. Generate reports and so on. System function module structure diagram as shown in [figure 3] below.

4. Implementation

In the section “introduction of Java SSH Framework”, we analyze the different levels of SSH framework, and introduce the integrated development of SSH.

4.1. System construction scheme

The system SSH framework version is Struts 2, Spring3, hibernate 3, and the development platform is MyEclipse.

Implementing data persistence layer: data persistence layer consists of Java object persistence class and data access object Dao. Each database table corresponds to a persistent object, object attributes and table fields. The transaction management of Java persistence class and corresponding mapping file. Hibernate adopts the full annotation mode. By default, the interface agent is used to manage the transaction, and the specific Hibernate data source session factory, transaction management. Buffering connection pooling and other functions by the business Layer Spring container provides.

Implementing the business logic layer: the business logic layer is supported by the Spring framework and provides a service component to handle business logic. The business model is abstracted and encapsulated in the Model component. The model component is saved to the corresponding Action class by calling the DAO component of the data persistence layer, and the service component of the business logic layer is called by the Action. Then the jump response is made according to the processing result. The deployment of the business process is completed by the Struts configuration file.

This system scheme helps us to establish clear structure, good reusability and maintenance extension. In the development process, we also face a number of problems, the following brief description of some of the relevant key issues.

4.2. The key to the question

1) The correct configuration of the framework: in SSH, we use the full delegation mode in the framework of Struts and hibernate framework use the built-in support mode, both of which are Spring to complete the work of transaction management by means of annotations, therefore, we must write the configuration files of the three correctly. To associate effectively.

2) Datasheet association: data table association is realized by class and class relation of data persistence layer. We need to deal with one-one, one-many many-many relation correctly, which needs to be fully considered in database design.

3) Security filtering: this system adopts two types of: javascript foreground data verification and strutsvalidate background data verification to ensure the legitimacy and security of input and the input experience of foreground users.

4) Correct use of cache: any cache is sacrificed for high efficiency at the expense of real time. In the process of system development, the cache mechanism is groping for use, which mainly implements memory cache, page cache, page cache and so on. Database cache is mainly used to solve the timeliness of mining association rules.

5. The support of backstage data mining to voluntary reporting

Based on business intelligence, the college entrance examination voluntary filing guidance system can provide more accurate guidance according to the candidates' various information. Essentially, it is based on the enrollment data mining system (such as the application of association rules derived from the college or professional relationship), so that the guidance system can conduct in-depth multidimensional data analysis.

Data mining is the process of finding interesting knowledge information from databases, data warehouses or other information repositories. The enrollment data mining system is based on the massive enrollment electronic data accumulated by a province for many years. In this section, the structure of enrollment data mining system and the support of enrollment data mining system to the guidance system of college entrance examination are described.

5.1. The structure of enrollment data Mining system

Enrollment data mining system mainly includes the following aspects: data warehouse ETL toolkit, cube OLAP analysis, report system, data mining, etc.

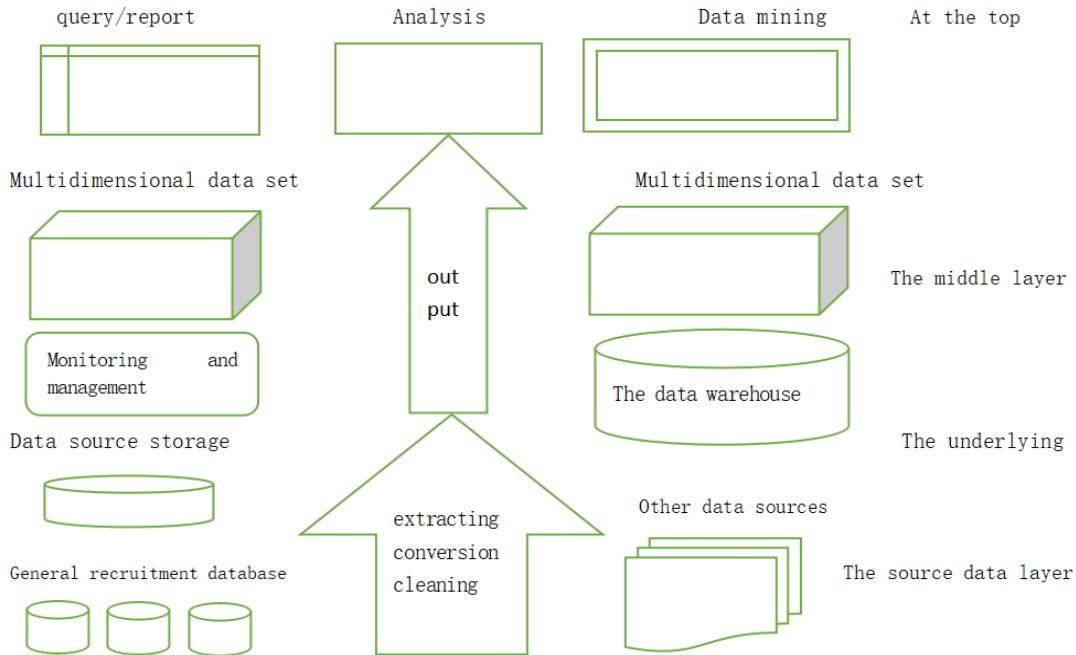


Figure 4. Structure of enrollment data mining system

As shown in [Figure 4], the enrollment data mining system adopts a hierarchical structure, specifically: the bottom is a data warehouse server, mainly data storage and metadata management, its data source is universal electronic data through the ETL process; The middle layer is a OLAP server, which is built with SSAS [7][8] and stored in MLOAP [9] mode, between the presentation layer and the warehouse, providing the cube of data for the front end display [10]; Layer is the front-end presentation layer to web pages, reports, applications and other ways to provide friendly operation interface.

5.2. Information mining for specialty support in colleges and universities

Enrollment data mining system supports two usage modes: B / S and C / S, in which the C / S mode is deployed through Microsoft's CLICKONCE, which does not require the user to install the client in advance on the machine, but is updated from the server in the form of link in real time. moreover, the C / S pattern supports nine mining algorithms, such as decision tree, association rules, clustering, neural network, etc.

Association rules, an important data mining algorithm, is used to extract the correlation between valuable data items from a large amount of data. The questions that need to be solved are: "if a candidate fills in a college, how much chance does he have to fill in school B?" "and" if he filled in C and D, what other schools would he fill in? "the purpose of using association rules is to reduce potentially large amounts of messy data and make it a small amount of observable and understandable information.

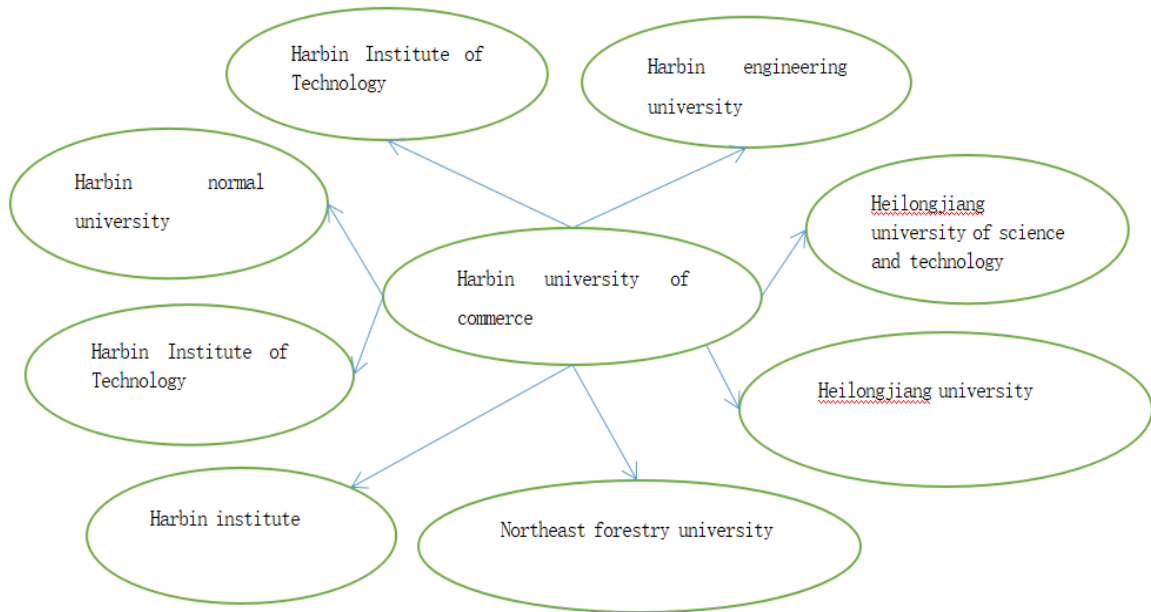


Figure 5. Schematic diagram of college support information mining

The enrollment data mining system uses association rules to discover the relationship between potential admission colleges and majors, and then send this relationship to the college entrance examination voluntary report guidance system through the WEB service

mode, supplemented by the results and the basic situation of the candidates. Through the analysis and processing, give the examinee the closest fact to fill in the guidance.

Next, the mining of association rules is given briefly by legend, and the “Southwest University” is chosen as a sign to find the institutions with the strongest relevance to Southwest University in the aspect of voluntary application.

For convenience, we only select some college samples as input data, and select 70% of them as training set. After training and processing as test set, we get the mining dependency network structure diagram as shown in [figure 5].

It can be seen from [Figure 7], representing a college each node in the graph, there are relationships between different between various colleges and universities. Colleges select a node displays the node associated colleges set. In the college sample, completing the candidates of Southwestern University, the associated colleges include Chongqing University of Posts and Telecommunications, Southwest University of Political Science and Law and so on.

In the voluntary application, the system will mine the information according to this, the examinee score segment, the fraction segment admission information and so on, carries on the comprehensive analysis for the examinee to fill in the guidance.

6. Voluntary reporting guidance

In order to better explain, the system will be simulated by candidates or parents, and the voluntary guidance will be described according to the actual operation process.

6.1. System login

First, enter the URL into the first page of the system, click “register new user” to register, after entering relevant information, the system will automatically send authentication Email and verify activation. Then use the approved account, password to log in. And input the correct dynamic verification code, you can enter the guidance system.

6.2. Perfect data

Access to the system, but also need to improve the relevant information, such as personal details, preferences and so on.

First click on the “personal Center” and go to the “modify details” page, you need to follow the instructions to improve all the information, The most important is the urban and rural categories of examinees (rural or urban areas, should be past categories (current or past, whether ethnic minorities). This information will be recommended as a reference information.

Then, click “fill in” to enter preference setting mode. The first step is to select the major categories of interest, you can choose more; the second step, according to your own regional tendency, you can choose your preference region, you can choose more; step 3, Choose the cost range that you can afford; 4th steps, choose your reporting psychology, mainly divided into insurance or sprint type and strong no emphasis on professional conformity, the default is to list all possible. Enter the grade setting and selection of science or liberal arts page.

The relevant information set by users is the basis for voluntary recommendation of the system. If the user information is modified, the voluntary recommendation analysis under different states can be carried out.

6.3. System voluntary recommendation

At present, the system has realized the voluntary recommendation of one batch of undergraduate course, two batches of undergraduate course, three batches of undergraduate course and three batches of undergraduate, each batch is divided into 6 volunteers. The function of voluntary recommendation has shortcut mode and advanced mode. The difference is that the advanced model can be modified on a voluntary basis.

In any batch, any volunteer clicks on “add College Major”, in the pop-up page box, you can select “College first” and “Major first.” Major priority is to list the majors most likely to be admitted, and then recommend colleges and universities with relevant majors, which may range from high to low. College priority is to first recommend the most likely colleges and universities. Then select a major. Whether colleges or majors are preferred, in the interface of the selected school, will indicate the last three years of the institution’s admission to similar conditions. [Figure 6] is a diagram of the voluntary recommendation process.

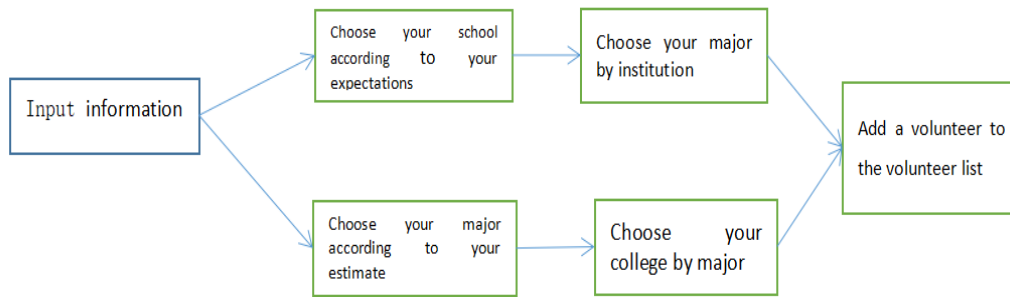


Figure 6. Voluntary recommendation process schematic

6.4. System simulation

In order to better explain, we input the relevant data, its key points are as follows: personal details: urban and rural categories choose rural, should choose the previous category of the session, ethnic minorities choose no. Interested tendency: professional preference to choose computers, Network, technology, region tend to choose southwestern region, expense interval choose 400110000, mental state system choose sprint. Related condition: apply for examination category is science department, the original score is 580. After inputting the data, Recommend the first volunteer according to the input conditions, the institutions recommended by the system are shown in figure 7 below.

Then, you can choose a school as your first choice, and so on, you can choose a second volunteer or other batch of volunteers.

Finally, you can print voluntary form to fill in guidance form, convenient candidates for reference.

大学搜索							
院校	所在地	院校性质	院校类别	985大学	211大学	教育部直属	高校对比
中国地质大学(北京)	北京	本科	理工		✓	✓	+
中国地质大学(武汉)	湖北	本科	理工		✓	✓	+
中国地质大学长城学院	河北	专科	综合				+
中国石油大学(北京)	北京	本科	理工		✓	✓	+
中国石油大学(华东)	山东	本科	理工		✓	✓	+
中国石油大学胜利学院	山东	专科	理工				+
中国农业大学	北京	本科	农林	✓	✓	✓	+

Figure 7. Simulated volunteer recommendation form

7. Conclusion

At present, there are some voluntary reporting and reference systems for college entrance examination in China, all of which are based on the ranking of college entrance examination results or psychological assessment. In this article the college entrance examination to college guidance system based on business intelligence based on data mining province enrollment, considering the examinee and the colleges and universities, to draw a relatively more accurate guidance is allowed. This paper introduces the whole scheme of the guidance system of college entrance examination voluntary filing and its relation with the data mining system of enrollment. The preliminary test shows that it is feasible and valuable to set up the guidance system of college entrance examination voluntary filing based on the data mining of enrollment. In the next step, we will continue to improve the relevant functions and interfaces of the guidance system for college entrance examination voluntary reporting, and strive to provide a complete and rich guidance system for the society.

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