Received: May 29, 2017
Revision received: March 21, 2018
Accepted: March 25, 2018

www.estp.com.tr
DOI 10.12738/estp.2018.6.202 ♦ December 2018 ♦ 18(6) ♦ 3028-3035

Research Article

Design and Implementation of College Graduation Employment Recommendation Service Platform under the Background of Big Data

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Abstract

At present, the number of college graduates continues to increase every year in China. The government, enterprises and other organizations should guarantee the smooth employment of college students from various aspects such as employment recommendation service. But due to the rapid development of Internet technology, which results in the explosive growth of information, the network is full of massive employment-related data. Therefore, in view of this issue, it is very urgent and important to effectively and timely extract the valuable employment data and publish it to the recruitment enterprises and the graduates. Based on this, this paper designs the employment recommendation service platform for college graduates, which creatively applies the data mining technology of big data, analyzes and processes the employment related information, establishes the search link, and helps the college graduates to find the required employment information more effectively and timely. The results show that the function and performance, reliability, availability and compatibility of the employment recommendation service platform for college graduates have been tested and accepted by the third-party software, and can be widely popularized and used to better serve the enterprises and graduates.

Keywords

Mother-child Relationship • Teacher-child Relationship • School Adjustment • Early Childhood

***Fund Project: National Education and Scientific Research "Twelfth Five-Year Plan" 2010 Project: Research on Curriculum Path Based on College Graduates' Grassroots Employment Competency, Project Number: EIA100411, Project Leader: Feng Dong
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Citation: Feng, D. (2018). Design and Implementation of College Graduation Employment Recommendation Service Platform under the Background of Big Data. *Educational Sciences: Theory & Practice, 18(6),* 3028-3035. http://dx.doi.org/10.12738/estp.2018.6.202

At present, the college graduates in China continue to grow every year, and the employment of graduates has always been the intense concern of the government, universities, enterprises and institutions, and the families (Chen, Cheng & Chuang, 2016); Governments at all levels have established sound employment information databases and provide the necessary monitoring and analysis services, as well as employment guidance services (Kim, Kim, Oh & Ryu, 2010). The Internet plays a more and more important role in the employment information service of college students. At present, the employment service network has been widely established, but the number as well as information sharing are limited (Montefinese, Zannino & Ambrosini, 2015). In addition, the employment services website only provides information services, but not personalized and efficient employment information recommendations (Li, Li, Yao, Jiang & Jin, 2015).

Facing the massive information databases of current employment service, graduates and enterprises will encounter great difficulties in selecting and making decisions. It's urgent for both graduates and enterprises to have employment recommendation services (Audretsch, Lehmann & Paleari, 2015; Constantin, Dahimene, Mouza, & Grossetti, 2016). In order to solve this problem, some researchers have carried out research work in recent years. The CASPER system proposed by Raft in 2000 is the pioneer of the employment market recommendation system (Mizunoya, Yamasaki & Mitra, 2016). The CASPER system uses access data and time data in the server log, and provides personalized information for specific users through case search and collaborative filtering (Conforti, De Leoni, La Rosa & Ter Hofstede, 2015). Yaolu proposes a hierarchical recommendation system that uses multiple interactive functions to better display the job preferences of applicants, and uses the 3A algorithm to sort them (Matejka, Grossman, Konstan & Fitzmaurice, 2011). Weili fully analyzes a company's historical recruitment data in order to predict the company's new recruitment trends (Diaby, Viennet & Launay, 2014). All of the above studies are based on the analysis and processing of recruitment information based on the commonly used Internet technology, and the results of employment recommendation services obtained are relatively limited. In view of this issue, this paper studies the employment recommendation service system based on big data mining technology, designs each function module, database and data mining algorithm in the system, and completes the testing of the prototype system. The employment recommendation service platform system not only can show graduates the appropriate job information, but also can show employers the potentially suitable employees, so as to realize the win-win situation between talents and enterprises.

Firstly, this paper describes the design of each function module and database of the employment recommendation service platform system in detail. Then, by using big data mining technology and taking into account the mutual restriction of recommendation precision and timeliness of recommendation service platform system, this paper designs two separate parts of online recommendation and offline processing. Finally, the unit test and integration test of the recommendation system are carried out to obtain the test reports of function and performance, reliability, operating efficiency and compatibility of the system. The results show that the recommendation system can promote better interaction between graduates and enterprises, and provide personalized service for both parties.

Design of Employment Recommendation Platform System for College Graduates

The choice between enterprises and graduates can improve the efficiency of matching employees with positions, and avoid the matching failure due to the limited coverage of the information. In the personalized employment recommendation service platform system for college graduates, the system will recommend articles based on the collected content, such as enterprises, number of answering posts, and demand. At the same time, the qualifications, major and specialties of applicants are listed on the Internet as the key reference in the database for enterprises to choose. All the key data retrieved from the database, in combination with the specific characteristics of each applicant, will help to distribute the contents of structured text and free text to the various parts as required, resulting in multidimensional vectors. The similarity among related items can also be found.

The employment recommendation platform system successfully manages the entire database of individual or enterprise registration accesses. Both graduates and enterprises, if they use the system, will be directed to the same login interface. In addition, the system also introduces hot-spot industry, active and enterprising talent, career enrichment and other new functions.

Design of user login

After the graduates register and log in, they can search for information according to their own needs. Personal information uploaded by the user, such as passwords or other basic data, can be updated or modified at any time if it is valid. The applicants of this function module includes website administrator, graduates and enterprises.

The website administrator shall undertake the maintenance, text upload and update, maintenance notice, advertisement display and so on. They also have the right to review and delete posts that violate relevant laws and regulations. The system will also automatically mask some sensitive words by comparing them with the entries collected in the database. The website administrator will also post other notices about a rich career and modify and delete out-of-date contents. Students and enterprises can query information on notifications and search posts.

Design of search matching

The most important part of the employment recommendation platform system is how to effectively select valuable recruitment information and qualified candidates, so keywords will become a key tool for users to locate quickly. Job search and talent search have two different sets of databases, as shown in the following two tables.

Table 1
Table for Searching Jobs

Case number one	Job searching
name	Search job information in the search box
users	Graduate applicants
input	Desired post
output	Some valuable job information
significance	High significance
procedures	Log in,input key words and get the outcome
data used	The relevant key words of jobs

Table 2
Table for Searching Qualified Talents

Case number one	Job searching
name	Search qualified applicants in the search box
users	Companies HR
input	Majors and qualification of applicants
output	Some desirable applicants
significance	High significance
procedures	Log in,input key words and get the outcome
data used	The relevant key words of majors

Design of new functions

The first page of the website of the employment recommendation platform system has designed three new function modules to provide more information about job search, which are hot-spot sectors, active and enterprising talents and career enrichment.

In the hot-spot sector, different jobs are divided into several categories, each category including similar, and will be divided into four hot-spot field projects, and graduates have a shortcut to look through potential jobs. 12 of the most promising candidates are listed on the homepage of the active and enterprising talents. Classification projects include specialties, qualifications, schools, and professional orientation. It's easy for employers to find and identify the right people. The career enrichment sector aims to provide practical advice to people in the workplace, some skills that can guide them in dealing with relationships, and even career planning and etiquette, so as to make them better adapted to the workplace.

Database design

The employment recommendation platform system creates a database table containing field names, field types, field lengths, major keywords, and some annotations, and processes data named bysi jobs in the SDL database. The final database table will be saved and renamed.

After registering, students need to fill in user name, password, school, academic degree, major and other information, and store them in the database. The original information also includes student identity card numbers, gender, nationality, politics, school, major, student type, academic degree, place of birth, revision

date, educational information, birthday and graduation date. The information that a company needs to provide includes ID, password, position, address, academic degree, requirement, etc.

All initial entries of the employment recommendation platform system are ID, job ID, job name, area, job type, description, date, academic degree, class, class name, number of views, skills, certificates, major, experience, etc.

Recommendation of Effective Employment Information Based on Data Mining Technology

Data mining is also called Knowledge Discovery in Database (KDD). Data mining is extracted from a large, incomplete, noisy, fuzzy, and random data, including pre-embedded, unknown but potentially useful information and knowledge (Lee & Lee, 2014). The data mining process can be roughly divided into the following processes: data selection, data integration, data pre-processing, data conversion, pattern evaluation and knowledge expression. The data mining process is a process of continuous feedback.

Personalized information service is a common application form of data mining technology. The personalized information recommendation may recommend information that users are interested in or required according to the interests and characteristics of users. Personalized service can be divided into three forms: personalized guidance, personalized filtering and personalized recommendation. Personalized guidance refers to the way in which the user finds the information that he or she is interested in when searching online, and prompts the user to browse in the next step. Personalized filtering refers to the pre-processing of the information that the user accesses to the Internet, and only presents the information that the user is interested in to the user. Personalized recommendation refers to recommend the information that the user is interested in to the user, and prompts the user to browse when the user accesses the Internet.

In the graduate employment information recommendation service platform system of this paper, the data mining technology mainly involves three key technology points, the main data processing of the customer, the establishment and expression of the pattern database and the data mining algorithm. The recommendation accuracy and timeliness of the recommendation service platform system are a pair of contradictory problems. Most recommendation technologies, while ensuring the real-time demand, are at the cost of the quality of the recommendation system. In order to solve this problem, the whole design architecture is divided into two parts: off-line and on-line. The off-line part is composed of data pre-processing, and is also called model acquisition stage. The online part consists of a real-time recommendation engine, also known as the model application phase.

Testing of the Employment Recommendation Platform System

Unit test

Unit test includes test scope, time, test task and priority. Unit test is to test each function design module of the employment recommendation platform system. Only each function module is designed correctly, is the normal operation of the whole system ensured. The planning of unit test is shown in the following table.

Table 3
Unit Test Plan

Test scope	Whole website service
Test methods	Black box testing
Test enviroment	Windows 7, mysql eclipse, tomcat 7.0 plugin, backend adopts mysql
Test aided tools	no
How much completed	All completed
Test procedures	unit test case and test report
Test task and priority	Time
User login module	2 hours
Student register module	1 day
Company register module	1 day
Search box module	1 day
New modules	1 day

Integration test

The integration test is to check that all relevant functions are working properly. When the internal structure and characteristics are not taken into consideration, the test is performed only in the program interface to check whether the program functions operate according to the specifications, and whether the functions can normally receive input data and collect data. From a user's point of view, they may enter the data into the system and get the output, but the test may have inherent limitations, that's, if internal features or instructions are defective, the test itself becomes meaningless. The plan for integration test is shown in the following table.

Table 4
Integration Test Plan

Test scope	Whole website service	
Test methods	Black box testing	
Test environment	Windows 7, mysql eclipse, tomcat 7.0 plugin, backend adopts mysql	
Test aided tools	no	
How much completed	All completed	
Test procedures	Integration test case and test report	
Task and priority	time	comments
recommendation website	3 days	Normally operated

Test report

The test report includes function test report, reliability test report, operation efficiency test report and compatibility test report.

Table 5
Safety test

Identity authentication	
Identity label	System identifies through user name and password
Failed login	Limited entry attempts
	Exit automatically if connection timeout
Login timeout	Exit automatically if over 5 mins
Access control	
Available access	Users who have the right will be identified and allowed to enter
abnormal access	System will block abnormal access out

The functional test report includes reports on the recommendation system test and the safety test, wherein the recommendation system test includes the test of the functions such as the login page and home page of the enterprises and students; and the security test includes the test of identity authentication and access control, with the specific test items shown in the following table.

The reliability test report includes error tolerance and stability. The system operation efficiency test report is measured via the average response time and resource utilization rate with the confidence coefficient of the related items calculated by a single user. The compatibility test report includes server software compatibility and computer software compatibility. The testing system of employment recommendation platform adopts B/S structure, the database adopts MySQL 5.5 and MongoDB 2.6, the application server and client test machine run on Windows 7, the middleware uses Apache Tomcat 7.0 and the browser uses Google Chrome 39.0.2172.95. The compatibility test report items are shown in the following table.

Table 6
Compatibility Test

Sever software compatibility	
Operating system compatibility	Windows 7
Database compatibility	Mysql 5.5
	Mongo DB 2.6
Middleware compatibility	Tomcat 7.0
Browser compatibility	Google chrome 39.0.2171.95

Concluding Remarks

This paper studies in detail the main technology of the employment recommendation service platform system, and expounds the main function modules and their concrete realization. Meanwhile, creatively based on the data mining technology, this paper solves the mutual restriction of recommendation precision and timeliness. In addition, unit tests are carried out on each functional module. The integration test of the whole system is carried out with the corresponding test report obtained. The employment recommendation service system provides a win-win platform for both enterprises and students, and can be widely applied to better provide personalized service for the vast number of college graduates and recruitment enterprises.

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