



Intelligent Push Method of Human Resources Big Data Based on Wireless Social Network

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Abstract. Human resources big data has a wide distribution range, a large amount of data and a variety of data types. Aiming at the problem of low integration of human resources raw data, an intelligent push method of human resources big data based on wireless social network is proposed. Combined with wireless social network, the human resources data is integrated and mined, and the human resources data is preprocessed to build an OAP data warehouse; then a human resources recommendation algorithm combined with the wireless social network latent semantic model is proposed. Behavior, mining the potential job characteristics of job seekers, and then realize the intelligent push and matching of human resources big data. The test results show that the intelligent push method of human resources big data based on wireless social network proposed in this study has a significantly better recall rate than the traditional single latent semantic model and deep forest algorithm, and effectively improves the integration degree and push efficiency of human resources raw data.

Keywords: Wireless social network · Human resources · Data intelligent push

1 Introduction

With the continuous deepening of the application of electronic human resource management, online career recruitment platforms, social network applications, online labor market and other technologies in organizational human resource management, as well as the maturity of big data technology, organizational collection, storage and use are closely related to human resources. Mass data related to resource management will become more convenient and systematic. The quantification of these data in structured, semi-structured and unstructured forms will also be possible. In this context, human resource big data that can be used for macro and micro human resource management research came into being. Compared with the previous sample survey data, human resources big data has the

characteristics of large sample size, real-time, dynamic, and valuable, which can more truly and deeply reflect the activities and status of individuals and organizations, and maximize the control of quantitative research. The measurement bias and statistical bias, as well as the exploration of more detailed research questions, make human resource management research usher in new opportunities.

Job hunting and recruiting have always been hot topics that people care about. With the advancement of modern information technology, job hunting and job application through intelligent data push has become a mainstream [1]. At the same time, considering the cost, more and more employers publish recruitment information through the Internet. Due to the gradual increase in the number of positions and job seekers, the corresponding job information and personal information of job seekers have increased, so there is a problem of information overload in the field of Internet recruitment. A large number of positions and user information make the management of human resources more cumbersome, and job seekers are also very easy to fall into the trap of “information trek”. However, at present, most recruitment websites mostly push popular jobs indiscriminately and users complete job matching by searching keywords, and do not carry out personalized job matching according to changes in user interests. In response to this problem, many companies comprehensively use the Simrank algorithm and hierarchy. The intelligent recommendation model is built by the analysis method, and the matching of personnel and jobs is realized [2]. Some enterprises have used Naive Bayes classification, case reasoning and context retrieval to complete job matching and recommendation, and achieved certain results. On the basis of the above research, in order to improve the accuracy of job recommendation in human resources recruitment, an intelligent push method of human resources big data based on wireless social network is proposed.

2 Wireless Social Network Human Resources Big Data Intelligent Push

2.1 Human Resource Management Data Information Management System

Human resource management refers to the rational allocation, organization and deployment of human resources according to the requirements of enterprise development strategy, using modern scientific methods and certain material resources, through the recruitment, training, use and assessment of employees in the enterprise. Through a series of processes such as planning, organization, command and control and coordination of human resources, a series of activities such as planning, organization, command and control and coordination of human resources can mobilize the enthusiasm of employees and give full play to the potential of employees, so as to achieve the goals of the enterprise, create value for the enterprise, bring benefit [3]. The specific content system of human resource management is shown in Fig. 1.

As shown in Fig. 1, human resource management activities mainly include human resource planning, recruitment and deployment, training and development, performance appraisal, salary and benefits and labor relations, etc. The focus of human resource management is on selecting, educating, employing and retaining people, Make the best use of talents, so that employees and enterprises can grow together. Human resource management mainly includes six modules, including human resource planning, recruitment

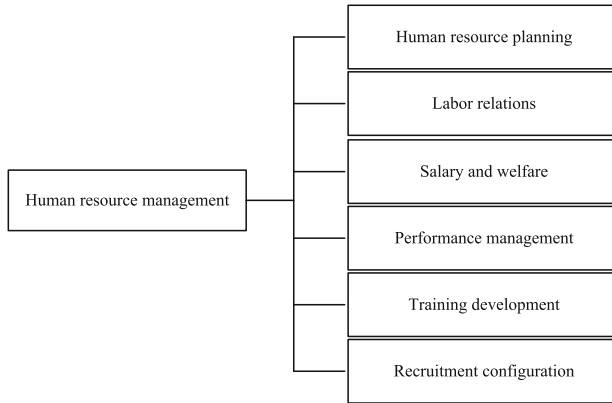


Fig. 1. Human resource management content system

and allocation, training and development, performance management, salary and benefits, and labor relationship management.

In order to ensure that enterprises can use faster and more effective management to respond to changes in the market environment. Human resource management is a very important part of enterprise management. Therefore, new practices of human resource management such as future organization, comprehensive talent supply chain, employee career development, and employer brand building are crucial for enterprises to respond to changes. To this end, a comparative analysis is made between the old human resource management model and the new human resource management demands, as shown in Table 1.

Organizational management is the foundation of enterprise human resource management, and also the foundation of human resource management software design. First, the model will design basic organizational element information such as companies, business units, and departments according to enterprise management demands [4]. These organizational element information can retrospectively modify the change history. Build associations on elements, and then form an organizational chart. Based on organizational element dimensions and organizational management, set the organization's preparation management and generate related management reports based on the organization. The design frame diagram of the organization management module and sub-module is shown in Fig. 2.

The human resources data integration recommendation model includes five parts: wireless social network application server, cache model, recommendation algorithm server, data warehouse and business database. The basic processing flow is shown in Fig. 3.

Based on the data warehouse data, the attribute features of users and positions are extracted to form a user-post feature vector; the speech is analyzed by the latent semantic model to obtain implicit features, and then spliced to form fusion features; the above features are used as input, input In the deep forest algorithm, the user post matching results are obtained [5]. Finally, under the condition of comprehensive consideration of job matching degree and user interest characteristics, and based on the results of

Table 1. Comparison of the old human resource management model and the new human resource management appeal

Old human resource management model	New human resource management demands
HR management business	
Hierarchical organizational structure and management mode	Networked and modular organizational structure and management mode
Focus on work arrangement and result evaluation based on management process	Based on project-based organization, pay attention to employees' learning and development, innovative achievements and influence
Pay attention to the performance results, and the evaluation process is evaluated according to a fixed cycle	Focus on the process of goal setting, decomposition, tracking and improvement
The assessment results will be directly applied to cadre selection and evaluation, employee family planning or salary results	Transparent assessment process. Employee performance can be assessed in multiple dimensions such as performance achievement
Only pay attention to the working experience in the enterprise	Pay attention to the current employment experience of employees and label their abilities
Focus only on the leader's evaluation and performance to achieve results	Pay attention to employee evaluation. In addition to the official assessment process, employees are encouraged to socialize and evaluate each other
Sanctify "leadership"	Everyone can be a leader and try the "maker" organization

deep forest prediction, the classification results are linearly fused to establish a job recommendation part.

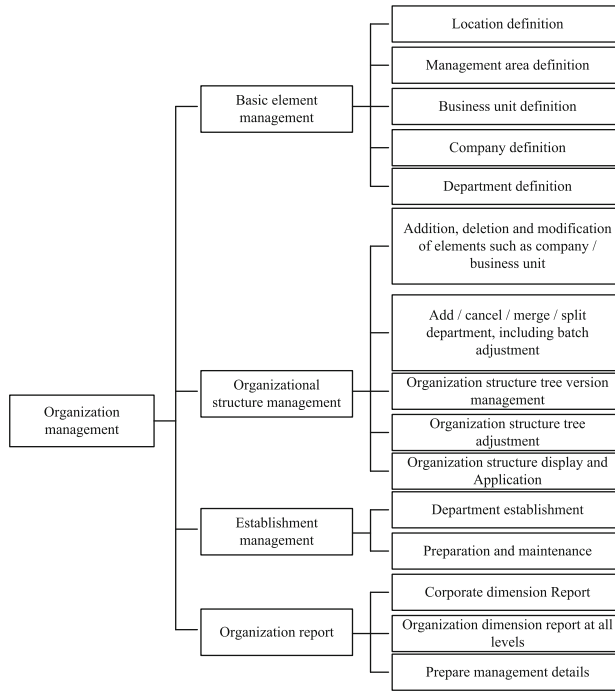


Fig. 2. Design framework of the organization management module and sub-modules

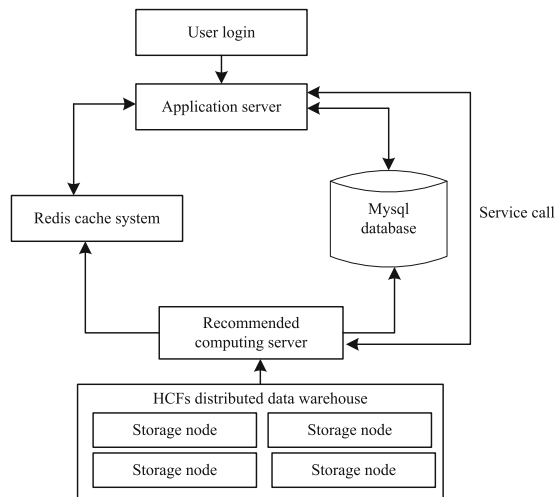


Fig. 3. Data collection model process based on wireless social network

2.2 Human Resource Management Information Evaluation Algorithm

Through the wireless social network, the establishment of personal and enterprise information characteristic profiles can more clearly understand the service objects and provide accurate recommendation services. For the above question, from the perspective of wireless social networks, which industries and companies have this person worked for in history, where have people with similar experiences gone to, and which companies have the need to absorb such people [6]. Through these features, targeted recommendations can be made.

A prediction model for the number of trainee positions in an enterprise is proposed. In this process, a penalty factor is added to avoid the problem of overfitting, and the accuracy of the prediction model is improved.

In order to achieve accurate matching of job seekers and positions, raw data need to be preprocessed. The specific processing steps include data extraction, data cleaning and transformation, and data loading. The specific process is shown in Fig. 4.

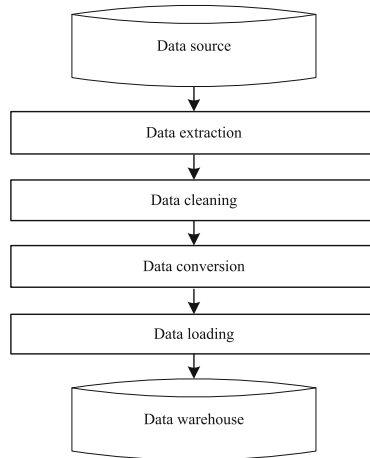


Fig. 4. Human resources data preprocessing process

Through the construction of human resources big data intelligent analysis wireless social network, improve the construction and improvement of human resources in data capabilities, realize unified management, statistical mining, unified analysis, unified application, and unified opening of human resources big data, and improve human resources. The transformation of big data from data-based to asset-based, while continuously improving the value of human resources big data, feeds back the business through the construction of data application capabilities, and from the perspective of wireless social networks, lays a good data foundation for the improvement of human resources business capabilities. HR big data value. The data used comes from a human resources platform [7]. It contains structured data in each sub-model of the platform and the model log of the platform, so as to obtain job information, job seeker information and user behavior data information. There are three matrices R , P , and Q in the latent semantic

model. Matrix R is the score of job seeker's interest in recruitment positions, matrix P_{uk} is the interest of job seekers in the hidden class, and matrix Q_{ki} is the job seeker's interest in the hidden class. Weights. It can be seen that the hidden class has the function of linking job seekers and recruiting positions in the implicit semantic model, and matrix R is decomposed into the product of matrix F and matrix K . According to the Latent Semantic Model (LFM), the number of hidden classes is 6, and the calculation formula of the prediction score of job-seeker 7 for the recruitment position i is as follows

$$r_{ui} = u/R \sum_{k=1}^F P_{uk} Q_{ki} - F_{KI} \quad (1)$$

Human resource data mining is not a one-shot solution, it needs repeated iterative experiments, and the optimization model is adjusted according to data changes, which are inseparable from the effective evaluation method of the model. Support offline evaluation and online evaluation of two model evaluation methods, simplify model evaluation work, support the visual display of evaluation results, make the evaluation results easier to understand, and make the trained model more suitable for business problems. According to the optimization loss function, the matrix p_u and Matrix p_i is solved, and a penalty factor r_{ui} is added to avoid the overfitting problem in this process, satisfying:

$$\lambda = r_{ui} \sum_u |p_u|^2 + r_{ui} \sum_i |p_i|^2 \quad (2)$$

The apprenticeship employment rate x can better reflect the contribution of an enterprise to the local employment situation, and is an important indicator to measure whether an enterprise can become a trainee base. Apprenticeship employment rate—the number of large human resources in the company's apprenticeship who stay in the local employment/the number of apprentices in the enterprise Through preliminary analysis, the estimation method of the apprenticeship employment rate of the enterprise is obtained, the relevant characteristics of the enterprise are extracted, and the characteristic factors that affect the apprenticeship employment rate are identified. And the linear regression method is used to predict the trainee employment rate. See the trainee employment rate and prediction model.

$$\begin{cases} A = \lambda u_N / v \\ B = \eta \lambda / a_1 x_1 + a_2 x_2 + a_3 x_3 \end{cases} \quad (3)$$

Among them, a_1, a_2, a_3 represents the weight value of the apprentice employment rate in the past three years, x_1, x_2, x_3 represents the apprentice employment rate of the company in the past three years, u_N represents the number of trainees employed locally in the apprenticeship human resources, v represents the number of trainees, and η represents the apprentice employment rate in the next year. Predicted value. According to the trainee data and employment data of some enterprises, the least squares method is used to fit a linear regression model. Then the loss function calculation formula is:

$$c = A \sum_{u,i} \left(r_{ui} - \sum_{k=1}^F p_{ub} q_{ki} \right)^2 + B \sum_u \eta |p_u p_i|^2 \quad (4)$$

According to the loss function, the stochastic gradient descent method is used to minimize the root mean square error between the job seeker's actual rating and the predicted rating, and realize the optimization of the objective function. To this end, we put forward a prediction model for the number of probationary positions in the enterprise. The model comprehensively considers the number of newly increased human resources, the number of newly increased human resources, and the number of existing employees in the enterprise in the past few years. The linear regression model is used to predict The optimal number of apprenticeship positions in an enterprise is the optimal number of apprenticeship positions. This model can be used for recommendation by companies that have not yet become apprenticeship bases, and can also be used to evaluate the scope of mid-term apprenticeship jobs for companies that have become apprenticeship bases.

2.3 Realization of Intelligent Push of Human Resources Data

Informatization can closely gather and analyze the scattered information about human resource management, automate and optimize the business process of human resource management, so that the information flow is accelerated and more comfortable. The functions are more tightly integrated. The human resource management information model can not only completely cover and clearly divide the work functions of the human resource management department, but also reflect the optimized business process in the model to standardize and improve the business process of human resource information management, which can make human resource managers Get away from it, and thus have more time to think about strategic human resource management. From the above general recommendation model analysis, it can be concluded that the data acquisition and processing of the input module, the user preference matching of the recommendation module and the model selection of the output module will affect the final recommendation result of a model, but the biggest factor that determines the accuracy of the model is the recommendation. Algorithm.

In order to complete the design requirements of the human resources data integration model, it is necessary to complete the design of the data integration and recommendation model based on the construction of the data warehouse. The construction frame diagram is shown in Fig. 5.

The recommendation model is divided into presentation layer, application layer, recommendation algorithm layer and storage layer from bottom to top. And the recommendation calculation method layer is divided into two types: online calculation method and offline calculation method. The presentation layer embodies the recommendation model and the user's interactive interface in the form of web pages, and provides users with functions such as registration, login and job personality recommendation. The application layer is mainly composed of user management section, job browsing section, query section and recommendation section. This layer is mainly responsible for receiving and processing user requests. The recommendation algorithm layer is the core part of the human resources recommendation model, which consists of two parts: online calculation method and offline calculation method. Among them, the online calculation method mainly uses the scoring or classification results to obtain the candidate's interest in the position and the matching degree of the position. Offline calculation method: mainly based on human data, construct user behavior, and establish recommendation

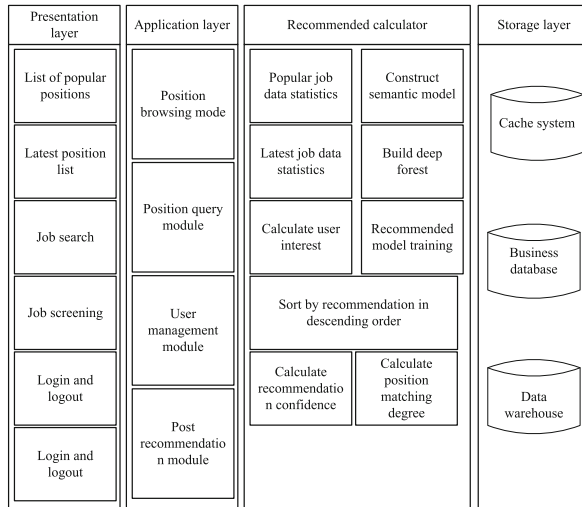


Fig. 5. Human resources data recommendation model structure

algorithm. The human resource intelligent recommendation model relies on the data mining algorithm based on clustering, so the effective data acquisition and processing is of great significance to the accuracy of the experimental results. Mainly describe the database establishment and data anonymization scheme and implementation process. Specifically, the source data acquisition and preprocessing process of the data are introduced, and then a data standardization and vectorization method based on the value weighting method is proposed. Secondly, a clustering effect is used to evaluate the DB index, and through the good convergence of the data in the graph The feasibility of this method is proved. At the same time, a joint anonymity hierarchical protection model suitable for data release is introduced, and an appropriate level of anonymity model can be selected according to the actual situation. Finally, the related models are compared and analyzed through experimental verification. Based on this, the process of database establishment and anonymization scheme is constructed, as shown in Fig. 6.

The real-time message push management module consists of two sub-modules, the task storage module and the task sending module. Among them, the task storage sub-module uses the API organization as the core to build the equipment. It can select the push instructions that the model needs to execute according to the emergency running rules in the background of the wireless social network environment, and temporarily store the information data in the IO chip in the form of a packet structure.. This sub-module performs connection judgment on the data structure to be stored in the form of WEB push to ensure that the API organization can obtain a push message queue with strong scalability. The task sending sub-module is the lower-level execution unit of the task storage sub-module. It cannot modify the existing information instructions in the API organization. It can only mark and forward the instructions to be pushed according to their storage sequence until the task storage sub-module. Existing information in

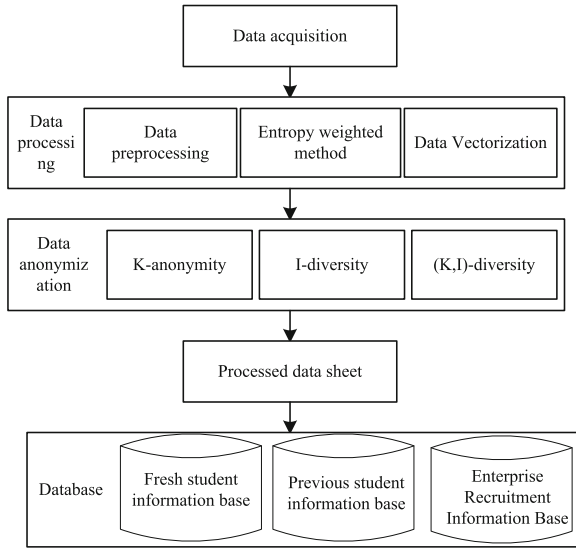


Fig. 6. Process flow of database establishment and anonymization scheme

is completely consumed. The detailed real-time message push management module structure is shown in Fig. 7.

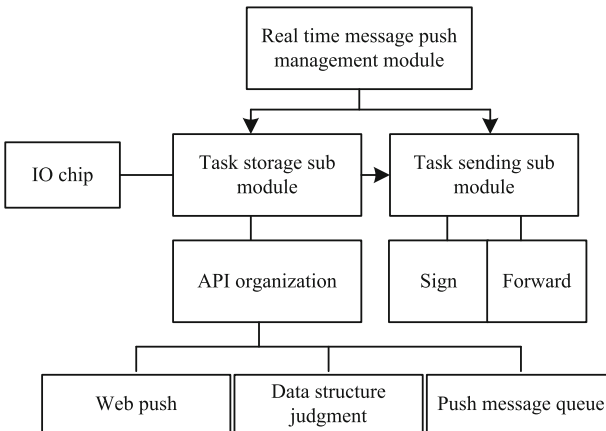


Fig. 7. Structure diagram of real-time message push management module

The business process of human resources information management should take into account the recruitment process, performance management process, employee training and development process, employee career plan, and resignation process. The corresponding templates can be designed according to the standard work process to complete

the HC Group can sort out the business processes involved in the human resources management system one by one, and analyze the feasibility of establishing business flow informatization, and gradually establish and improve human resources informatization. The business process, the designed human resources intelligent recommendation model for the field of college recruitment and employment can not only be used by colleges and universities to accurately recommend graduates to improve the employment rate during the recruitment and employment of fresh graduates. Emergency push human resource information distribution is based on the wireless social network bit sequence. Coded modulation operation performed on the information to be transmitted. Human resource information is a set of specific coded strings including head pointer, intermediate encryption algorithm and tail pointer, which can be freely communicated between the model center computer and various hardware execution devices. It realizes the organic integration of human resource information and communication nodes, and can accelerate the physical response speed of wireless social networks on the premise of ensuring accurate model push transmission. The intermediate encryption algorithm and the tail pointer are the main structure of the human resource information distribution operation of emergency push. On the one hand, it should comply with the communication operation requirements of hardware devices at all levels. Reasonably connect components to ensure that model push operations get good execution results. So far, the construction of the model software operating environment has been completed to realize the smooth operation of the emergency wireless social network large-capacity information real-time push model. The specific human resource information allocation principle is shown in Fig. 8.

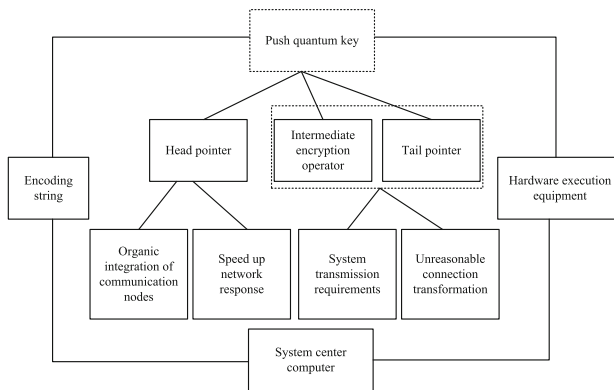


Fig. 8. Schematic diagram of emergency push data distribution

It can also be used by recruiting companies to effectively screen advantageous resources. Due to the relationship between the original data and the display effect, this chapter takes recruitment and employment as the starting point to conduct experiments, and this model is referred to as the intelligent recommendation model. The specific process is shown in Fig. 9.

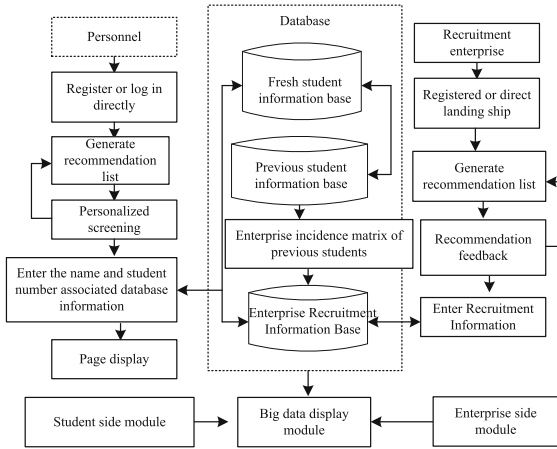


Fig. 9. Flow chart of intelligent recommendation model operation

The main user interface has three main ports, namely: human resources login terminal, enterprise login terminal and big data display terminal. The specific execution process of each port is as follows: Human resources login terminal: First, fresh graduates enter the account password (password) to log in to their own account. If there is no account, you can register an account (monitored by the background administrator, and illegal users cannot register); secondly, human resources Entering your own student number can automatically retrieve its school information; again, select the number of recommended lists, and then, according to the algorithm, the model recommends the top N enterprise lists with the highest matching degree of human resources to human resources users from high to bottom; finally, You can give feedback on the recommendation results or bookmark a company you are interested in; Enterprise login terminal: First, the recruiting company enters the account and password to log in to the enterprise account. According to the algorithm, the list of graduates who match the enterprise from high to low is recommended to enterprise users; finally, the recommendation results can be fed back or the information of a certain human resource can be collected; big data display terminal: school employment office or government management Organization, you can enter this port through the administrator password. Through the data visualization interface, real-time monitoring of multiple data such as the total number of contracts signed, enterprises with more contracts, and the flow of human resources employment to the national recruitment and employment trends can be carried out intuitively.

3 Analysis of Experimental Results

The software development environment of the entire experimental program is Windows, the test environment is macOS, the development language used is Python 3.7, and the packages called by the program include Sklearn, Django, Pandas, Pymysql, Spyder, etc. The initial data collection format is Microsoft Office Excel, and the later import database format is MYSQL. The specific development and test environment is shown in Table 2.

Table 2. Development and testing software environment table

Development environment	Operating system	Windows XP
	Development platform	Python 3.9.5
	Database	Oracle Enterprise 11G
	Data visualization	Navicat 12.2.22
	Necessary Kit	Django 2.1.7
Testing environment	Operating system	Windows 10
	Test platform	Python 5.8.9
	Database	SQL Server2008
	Interface browser	Google Chrome 80.0

Taking the Simrank algorithm and the naive Bayesian classification algorithm as the experimental comparison methods, the performance of the three algorithms for intelligent push of human resources big data is compared. The results are shown in Fig. 10.

From the above experimental results, it is not difficult to see that the recall rate and F1 value of the single Simrank algorithm and the naive Bayesian classification algorithm are significantly lower than those of the recommended algorithm in this paper. This improves the recommendation performance of the algorithm. The single model has the problem of overemphasizing user behavior data and pushing job positions only from the matching value of users and positions, ignoring the one-sidedness of users and positions' own content and user interests. A hybrid recommendation algorithm based on deep forest and latent semantic model, the algorithm fully considers the matching value of the job and the user's interest bias, that is, the user's interest bias and the job matching probability are linearly integrated to achieve the final recommendation.

On this basis, the time-consuming of the push method of human resources big data intelligent push method based on wireless social network is analyzed, and the comparison results are obtained as shown in Fig. 11.

Analysis of the results in Fig. 11 shows that the push time of the algorithm in this paper is less than 2 s, while the classification performance of the Simrank algorithm and the Naive Bayes classification algorithm are 6.2 s and 4.8 s respectively. It can be seen that the push method of human resources big data intelligent push method based on wireless social network proposed in this paper takes less time to push and has high push efficiency.

4 Conclusion

The research shows that the recall rate of human resources big data intelligent push method based on wireless social network is significantly higher than that of a single model or algorithm, and fully reflects the advantages of deep forest and latent semantic model. The experimental results also show that the recall rate of the recommendation

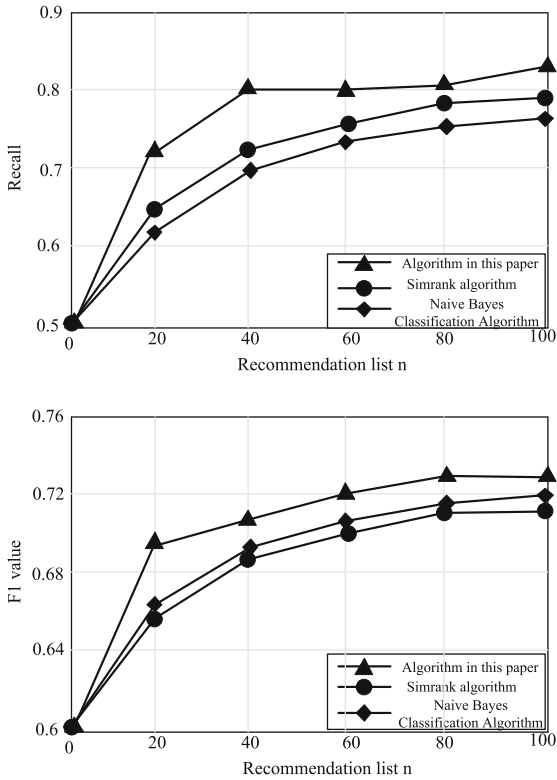


Fig. 10. Performance comparison test results of hybrid recommendation

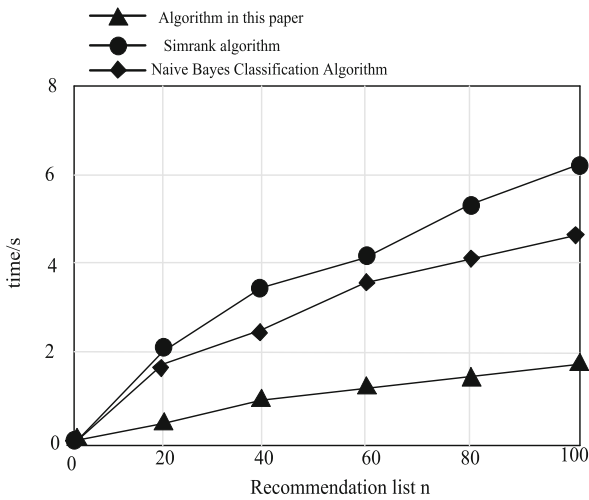


Fig. 11. Time-consuming comparison results of push

algorithm in the human resource big data intelligent push method based on wireless social network is significantly better than the recommendation performance of traditional collaborative filtering and content-based recommendation algorithms.

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