Design of Position Recommendation Model based on Knowledge Graph

Binyong Li[1,2,a], Jie Fang[3*], Mengqi Xu[4b]

[a]e-mail: lby@cuit.edu.cn, * Corresponding author: jolence@foxmail.com, [b]e-mail: xmq007@qq.com

[1]School of Cybersecurity (Xin Gu Industrial College), Chengdu University of Information Technology, Chengdu, China
[2]Advanced Cryptography and System Security Key Laboratory of Sichuan Province, Chengdu, China
[3]Sichuan Institute of Computer Sciences, Chengdu, China
[4]School of Cybersecurity, Chengdu University of Information Technology, Chengdu, China

Abstract. Under the background of the current epidemic, facing the severe employment pressure, the position recommendation system has become one of the important ways of employment. The traditional position recommendation model often has the problems of data sparsity and data cold start, so it can not recommend jobs well. In order to alleviate these disadvantages, a position recommendation model based on knowledge graph is studied and designed. Using the rich semantic relationship of knowledge graph, the recommendation efficiency of position recommendation system is improved, which can not only provide more efficient services for enterprise recruiters, but also alleviate the employment pressure of job seekers to a certain extent. Good model performance can help improve user stickiness, give better play to talent efficiency, and provide reasonable and feasible support for accelerating the rational and orderly flow of talents.

Keywords: knowledge graph; position recommendation; data sparse; data cold start

1 Introduction

With the rapid development of Internet and information technology, people have long been in an era of big data in which everything is interconnected. The network has also become an indispensable part of people's daily life and work. All kinds of data are growing exponentially on the Internet. The resulting incredible amount of data, structural and non structural data need to be stored, aggregated, searched and associated, so as to provide support for enterprises, governments and researchers providing tools and services. Recommender system [1-3] can help people find content that meets users' intentions or interests and preferences from massive data, so as to reduce the waste of time and energy caused by users browsing a large number of invalid data. At the same time, the recommendation system can help people more comprehensively and accurately screen out the content users need from the massive Internet data, so as to save users' time and avoid users having no choice among many choices. At present, the recommendation system is widely used, such as shopping recommendation, book recommendation, game recommendation, music recommendation [4] and film recommendation [5]. The position recommendation system constructed in this paper is also one of the application scenarios.

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At present, most position recommendation systems are based on collaborative filtering based recommendation (CF). As shown in Figure 1, an example of collaborative filtering recommendation is used to model user preferences based on the similarity of users or interactive data items. Although CF based position recommendation systems have been widely favored for many years, they generally have data sparsity and cold start problems [6], This paper attempts to design the model of position recommendation system by integrating knowledge graph. The integration of knowledge graph improves the interpretability of the position recommendation system. At the same time, it can alleviate the problems of data sparsity and data cold start to a certain extent, and bring better recommendation effect to the position recommendation system. This can not only shorten the enterprise recruitment process, but also help job seekers better understand whether the applied position meets their own needs and speed up the job search rate, which can improve the talent flow rate in the talent market and recruitment website to a certain extent, and play a great role in promoting the rapid employment of talents.

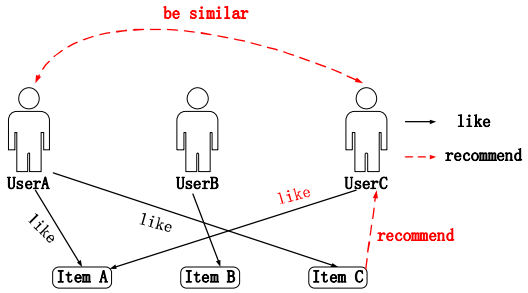

Figure 1. Collaborative filtering recommendation example.

This paper improves the traditional position recommendation model and designs the position recommendation model based on knowledge graph, so that the overall model has a good improvement in dealing with data sparsity and data cold start.

2 Related Work

The search engine can be optimized by representing the data as entities and attributes. The knowledge graph represents the data as entities with different attributes, and there are different relationships between entities. However, in the subsequent research and development process, it is found that the performance of the knowledge graph is also outstanding in other aspects, such as smart education, recommendation system, smart finance, smart medical treatment and other fields have good applications. In the recommendation system, knowledge graph can give play to its characteristics of integrating multi-source information, express various data on the network through information extraction and knowledge representation technology, and simplify knowledge representation through knowledge fusion and other technologies. Moreover, due to the multi-source nature of its knowledge, when carrying out the "user item" recommendation task, it can obtain more fine-grained characteristic information of users and projects, so as to more accurately calculate the correlation between users, users and projects, and projects and projects, and finally make more accurate recommendation in combination with

recommendation technology [7-9].

Information overload [10] is one of the important problems brought about by the rapid development of the Internet. Information overload is a word often mentioned by researchers in today's information age. It describes the phenomenon that the amount of information far exceeds the ability of individuals or systems to process information, resulting in the decline of information processing efficiency. Information overload is one of the negative effects of informatization. In the face of information overload, from the perspective of users, it takes a lot of effort to identify what they really need. For information producers, in the face of such a huge knowledge network, how their output content will not be annihilated and how to attract attention is also a problem to be considered. Early studies proposed to solve this problem through information retrieval and filtering. In the mid-1990s, many researchers began to pay attention to user rating data and solve the problem of information overload by predicting the scores of users and recommended items or pushed content. Since then, recommendation system has been widely studied and applied to life. The previous recommendation system is mainly based on machine learning method. The recommendation result is too single to model the changes of user behavior and the update of external environment, resulting in the same recommendation result. For example, if the user likes the aircraft model, the system will repeatedly recommend him the information related to the aircraft model. Under the classical framework of recommendation algorithm, most models based on supervised learning can not completely solve this problem. In reality, there is still a long way to go before the recommendation system can truly become an intelligent system, which is also the research direction of future scholars. In the resume recommendation system, this paper attempts to recommend jobs by integrating knowledge graph technology on the basis of machine learning. The position recommendation model based on knowledge graph has achieved good recommendation results.

3 Overall model design

The position recommendation system based on knowledge graph mainly collects the personal information and job demand information of job seekers, stores the processed information in the knowledge graph through resume recommendation algorithm, and completes the position recommendation. Finally, the generated recommendation list is displayed and pushed to job seekers and post publishers for reference, which can filter out the mismatched resume post information and reduce the burden of users, so as to speed up the completion efficiency of the whole job search. Overall, the detailed design model of the system is mainly shown in Figure 2. Before the core position recommendation algorithm, it is necessary to collect the information filled in or uploaded by the user and the position demand information released by the position publisher, and then sort the obtained information into a standardized format and store it in the resume graph database through information extraction and other technologies, and then call the relevant recommendation algorithm to obtain the information of the job seeker and the corresponding recommended position, which is finally displayed through the front-end page.

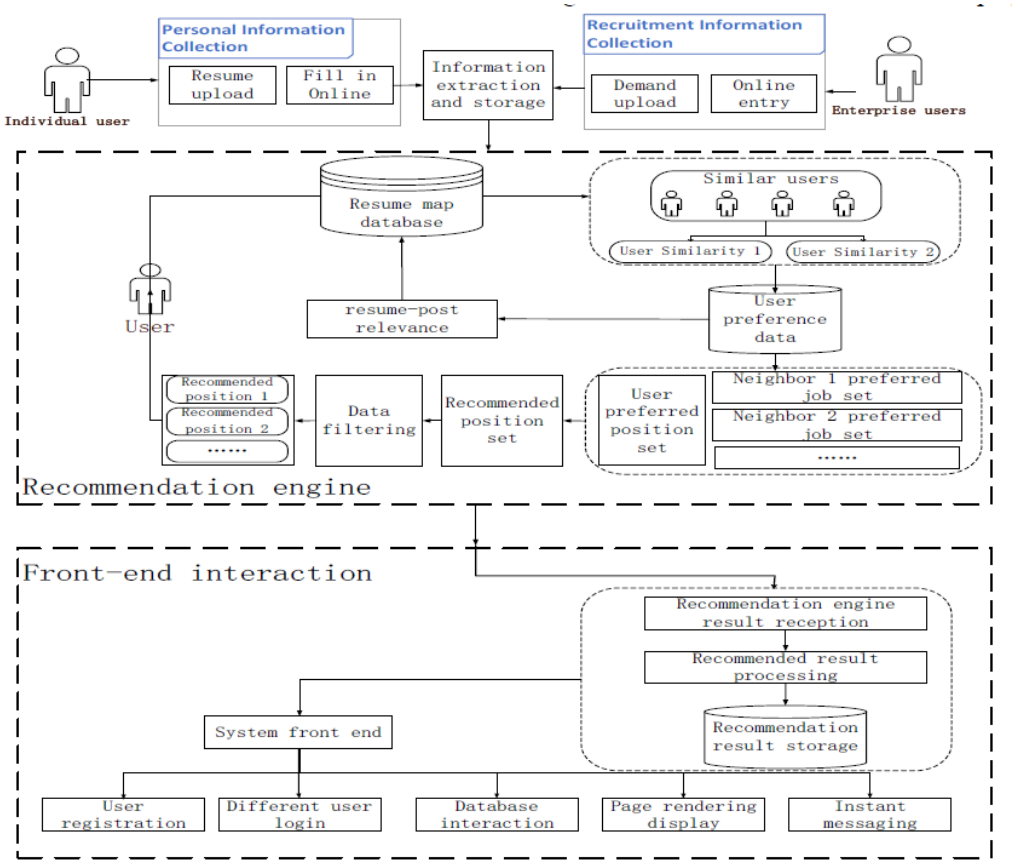

Figure 2. Overall model design of position recommendation system.

4 Position Recommendation Design

The position recommendation module is the core part of the recommendation system. After the user uploads or fills in personal information and personal job intention, the system uses the recommendation algorithm to find more suitable position information and push it to the user according to the user's conditions. The push is two-way. The enterprise post publisher can also receive the matched personnel information. Users can browse the recommended results in the recommendation column. If users are not satisfied, they can change a batch of recommended results. Users can also collect the posts they are interested in. The background records the user's behavior preferences for reference when recommending. The position recommendation process is shown in Figure 3.

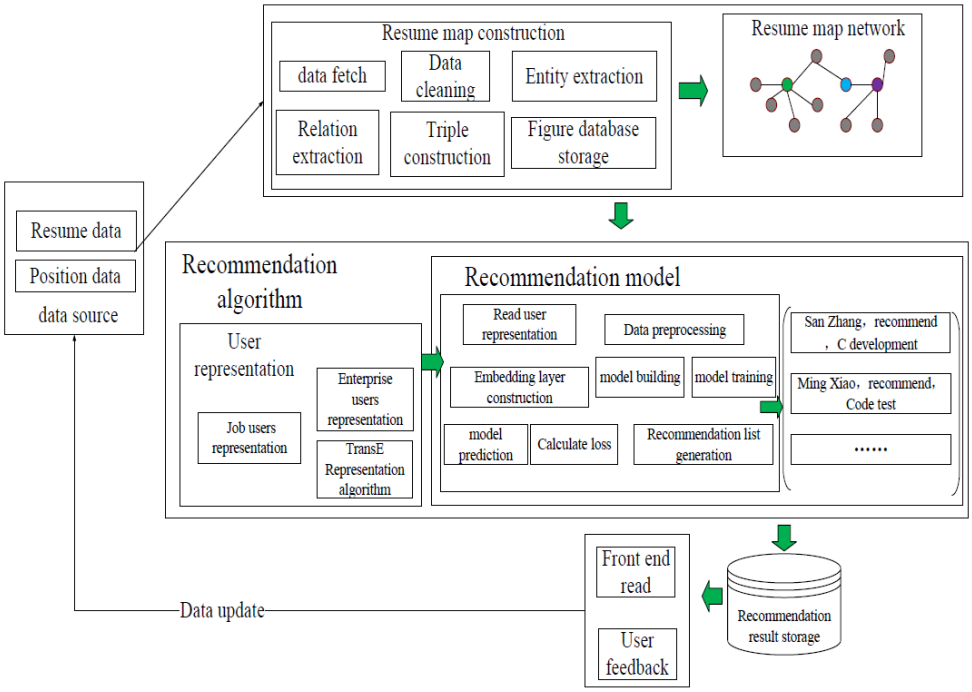

Figure 3. Position recommendation process.

In the process of data collection, job seekers and job publishers are required to fill in the corresponding information according to the corresponding information. The information can be collected and stored in the database in two ways. One way is to transfer the data filled in online by users to the server through web forms and store it in the database. Another way is to receive the electronic files uploaded by users. For example, electronic resume or requirement document, after identifying and analyzing the document, fill the corresponding content in the document into the formatted form. For incomplete data, the user will be prompted to fill in the missing data. After the user confirms that the data is correct, the data will be submitted to the server and stored.

However, the initial data obtained are generally messy. Therefore, data cleaning, data extraction and other operations are required to process the data into a standardized data format required by the recommended algorithm. In particular, it should be able to express the data into triples and store them in the knowledge map, so as to facilitate the use of knowledge map completion algorithms to complete and improve the data. After the data is processed in the data preparation stage, the recommendation algorithm can be used to recommend resumes.

After obtaining the resume and demand information data source, first carry out information extraction and data cleaning on the data, and then complete the triples with the trans algorithm. After obtaining the required format, complete the construction of resume graph. The background resume recommendation algorithm embeds the information in the graph, then uses the recommendation model for data loading, data preprocessing, model training, model

prediction, and finally stores the generated recommendation list in the database. The front end reads the contents of the database and displays the recommendation information in the front end page of the system. For the information feedback collected by the front end, the background data will be updated, and the updated data will be used for a new position recommendation process.

5 Implement

It shows the model design diagram of the system implementation in Figure 4. It mainly includes the design of data collection module, data processing module, recommendation algorithm and front-end page of the system. Through data collection, the unstructured and structured data contents are sorted out, and the standardized processing of data is carried out through the background data processing interface. The data processing module mainly carries out structured processing on the obtained data, and writes the final results into the resume knowledge graph database. The recommendation algorithm part calls relevant recommendation algorithms, combined with the network structure of knowledge graph, can obtain better recommendation effect in position recommendation, and finally generate the position recommendation list of job seekers. The front end of the system is mainly used for the function display and information interaction of the position recommendation system. The background calls the corresponding interface framework for the interaction between the front end and the back end.

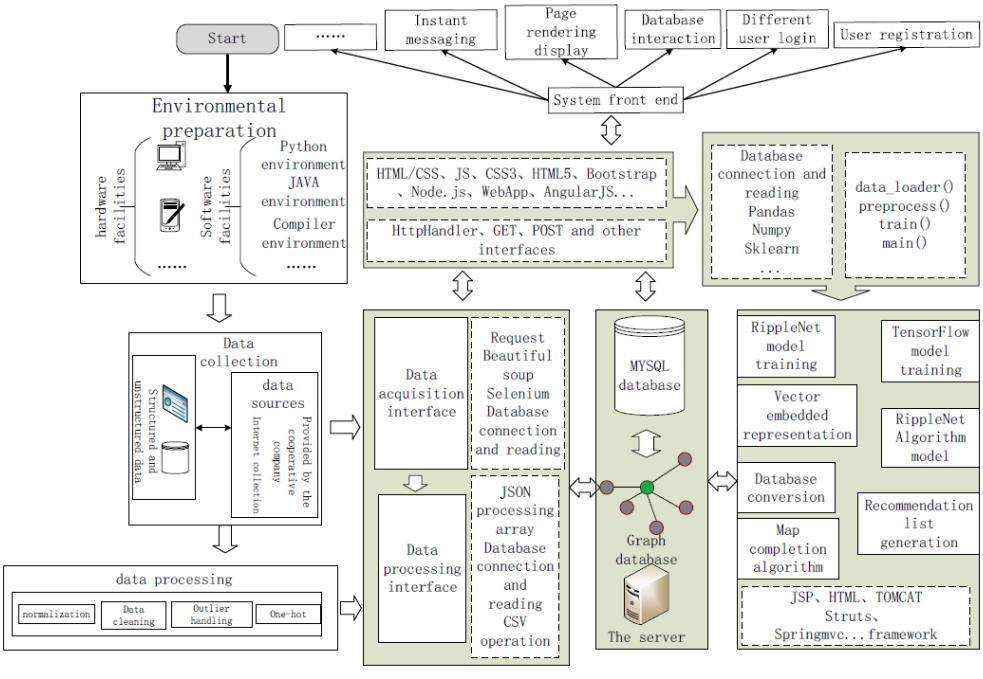

Figure 4. Design drawing of system implementation model.

6 Conclusions

This paper mainly introduces the design process of position recommendation model based on knowledge graph. The model is designed by integrating knowledge graph with recommendation system, which has achieved good results to a certain extent. It provides a feasible technical scheme and application reference support for job recommendation in enterprises. At present, there are still many problems with the traditional methods in the research of position recommendation system, such as the sparsity of position data and the cold start problem caused by the lack of historical data of resume personnel. At the same time, the missing resume data will not be used normally in the recommendation algorithm, which will greatly affect the accuracy of recommendation results. With the research of knowledge graph, it is found that integrating knowledge graph into position recommendation system can well solve the disadvantages of traditional position recommendation methods. Therefore, this paper attempts to design a position recommendation model based on knowledge graph, which proves that the model designed in this paper has a good effect in practical performance. In the future, we will further study the organic integration and integration of knowledge map and job recommendation, so as to provide more reliable data analysis services for job recommendation.

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