Application of Association Rules Mining in School Recruitment in the Background of Big Data Era

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***Abstract*—In recent years, big data technologies represented by internet of things and cloud computing are changing the development of various industries. In the field of education, big data technology has also played an important role in school personnel recruitment. In the context of the big data era, this paper uses the mining tools developed by Visual FoxPro to analyze the post plan and candidate information ,find out the law of objective existence, and provide services for the school personnel recruitment.**

Keywords—big data, association rule mining, school, recruitment

With the development of computer and information technology,big data is gradually applied in various fields,using big data technology to collect and analyze user activity data,master user behavior dynamics,and provide users with convenient services.Use big data technology to conduct detailed statistical analysis of school recruitment related data,find out the factors affecting recruitment,adjust the recruitment strategy in time,and create conditions for the school to recruit excellent faculty and staff.

I. RESEARCH BACKGROUND

In September 2008,NATUER released the "Big Data" column for the first time,which triggered the attention of academic circles on big data[1].At present,"Big Data" has become a hot spot in the network and has received great attention from all walks of life.As a new thing in the development of the information society,big data is gradually being recognized and applied.Big data is timely,efficient,diverse,large and widely used.All fields are unanimously recognized.The McKinsey Global Institute pointed out:"Big data is a data set that exceeds the capabilities of traditional database software acquisition,storage,etc.,and is not larger than a certain amount of data.Because with the development of science and technology,big data standards will also increase,and different industry standards Will change"[2].

With the liberalization of the national higher education enrollment policy,the number of enrollment in higher education institutions is increasing every year,which leads to an increase in the number of disciplines and majors and an increasing scale of schooling,which ultimately leads to the demand for disciplines,professions,management and other talents.The amount is getting bigger and bigger.However,when recruiting colleges and universities,because they do not have the dynamics of candidates,sometimes they can not recruit talents that are in urgent need,or they are not satisfied with the candidates.In order to solve the problems of "not recruiting people" or "not satisfied with the candidates",the school can use big data technology to analyze and research the relevant data of previous recruitment,find out the factors affecting recruitment,adjust the recruitment and promotion strategies in time,and attract excellent talents apply for the exam and achieve the goal of recruiting satisfied talents."

With the popularity of big data application technology,many big data tools are developed on the basis of data mining technology.The current discussion of data mining technology is not outdated,and research data mining technology is to lay the foundation for better use of big data.Association rule mining can just provide statistical analysis for past recruitment related data to serve the school recruitment work.

II. THE CONCEPT OF ASSOCIATION RULE MINING

Association rules are a very important mode in the knowledge model discovered by data mining.They are also one of the most active branches in data mining.They are rules that represent a certain relationship between objects in the database [3].Association rule mining is to find out the relevant rules of the relationship between the data items from the massive historical data[4].In the era of big data,the scale of data is getting larger and larger,the structure is becoming more and more complex,and the value of data is increasing.It is more and more important to obtain useful and relevant information from massive data.

Association rule mining is a data mining technique proposed by Agrawal et al. in 1993,and defined as:set I={i1，i2，…,in} is the item set,D is the transaction set,T is on I subset,T⊆I,TID is single transaction,then the association rule is represented as X⇒Y,where X⊆I,Y⊆I and X∩Y=∅,X is called the condition of the rule,and Y is called the result of the rule[5].In order to improve the accuracy of association rule mining,two parameters of support degree S and confidence C are introduced

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The support calculation expression:

$$\text{sup port}(X \Rightarrow Y)=P(X \cup Y)=\frac{\text{count}(X)}{N}\times 100\% \quad (1)$$

The confidence calculation expression:

$$\text{Confidence}(X \Rightarrow Y)=P(Y|X)=\frac{\text{sup } port(X \cup Y)}{\text{sup port}(X)}=\frac{\text{sup } port\_count(X \cup Y)}{\text{sup } port\_count(X)}\times 100\% \quad (2)$$

Where D represents the transaction database,N represents the sum of the number of transactions,and Count(X) represents the number of occurrences of transaction X,and Count(X ∪ Y) represents the number of simultaneous occurrences of transactions X and Y.The support degree S is the frequency at which the transaction X occurs,and the confidence C is the frequency at which the transaction Y occurs when the transaction X occurs.

III. Application of Association Rules Mining in School Recruitment

A. Data Preparation

The mining object mainly uses the school recruitment post plan and the applicant registration information,and mines the demand according to the association rules,and converts the school recruitment post plan and the applicant registration information into two two-dimensional data tables,and the legality of the data is constant and missing.Pretreatment such as processing,classification,etc. The pre-processed school recruitment post schedule and the applicant registration information form structure are shown in Table1 and Table2.

Table1 School Recruitment Post Schedule Structure

Post code	Post type	Post specialty	Post qualification

Table2 Applicant Registration Information Form Structure

Post code	Name	Student source	Education	Professional class	School area

B. Algorithm Implementation

The recruitment relationship mining tool uses FoxPro as back-end database management tool and Visual FoxPro6.0 as system development platform.

Database implementation

The school Post schedule includes four fields:Post code,Post type,Post major,and Post qualification.The data dictionary is shown in Table3.

Table3 School Recruitment Post Schedule Data Dictionary

Serial number	Field	Type of data	Length	Remarks
1	Post code	Character	10	
2	Post type	Character	30	Full-time teachers,General management posts,etc.
3	Post major	Character	30	Not limited to Professional,Educational,Computer,etc.
4	Post qualification	Character	30	Undergraduate,Master's degree,etc.

The applicant registration information form includes six fields:Post code,name,Student source,education,professional class,and school area.The data dictionary is shown in Table4.

Table4 Applicant Registration Information Data Dictionary

Serial number	Field	Type of data	Length	Remarks
1	Post code	Character	10	
2	Name	Character	8	
3	Student source	Character	30	Province,Outside province
4	Education	Character	30	Undergraduate,Master's degree,etc.
5	Professional class	Character	30	Education,Computer,Philosophy,etc.
6	School area	Character	30	Provincial colleges,colleges outside province,etc.

Implementation of Association Rule Mining

The operation object of the recruitment relationship mining tool is the school recruitment position planning data and the applicant registration data,and the association rules are generated in the form of text,the format: Attribute A→Attribute B Support degree:S% Confidence degree:C%.

The association rule mining algorithm is implemented by the programming tool Visual FoxPro,and its algorithm flow chart is shown in Figure1.

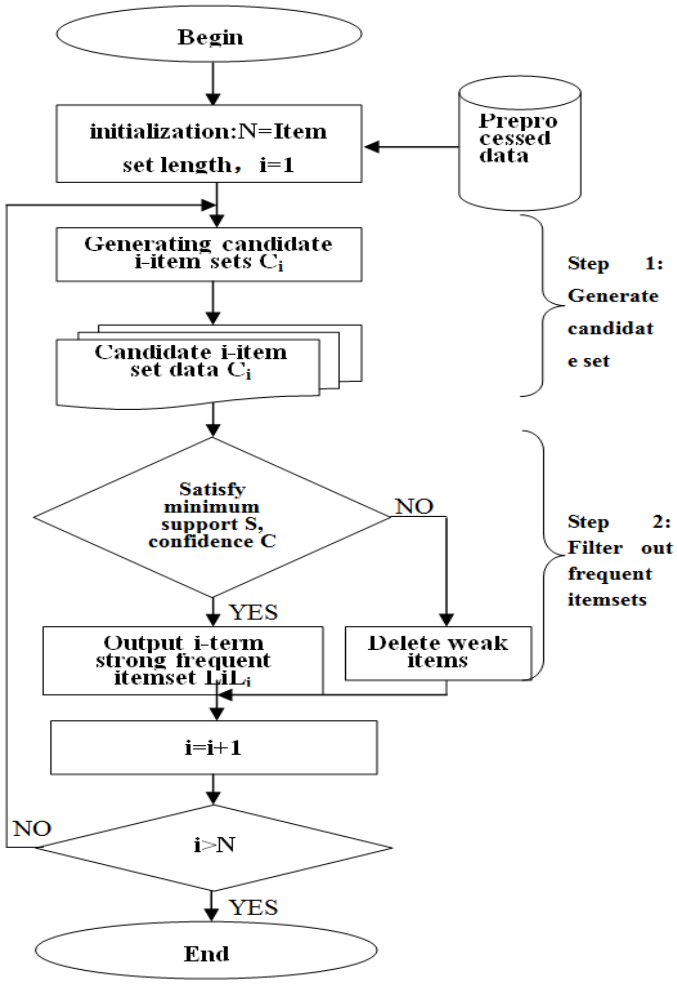

Fig.1 Flow chart of association rule mining algorithm

IV. ASSOCIATION RULE MINING

A. *Mining Results Display*

According to the preset minimum support threshold 5% and the minimum confidence threshold 20%,the rule that satisfies the condition is displayed in the form of "attribute A → attribute B support:S% confidence:C%".The mining interface and results are shown in Figure2.

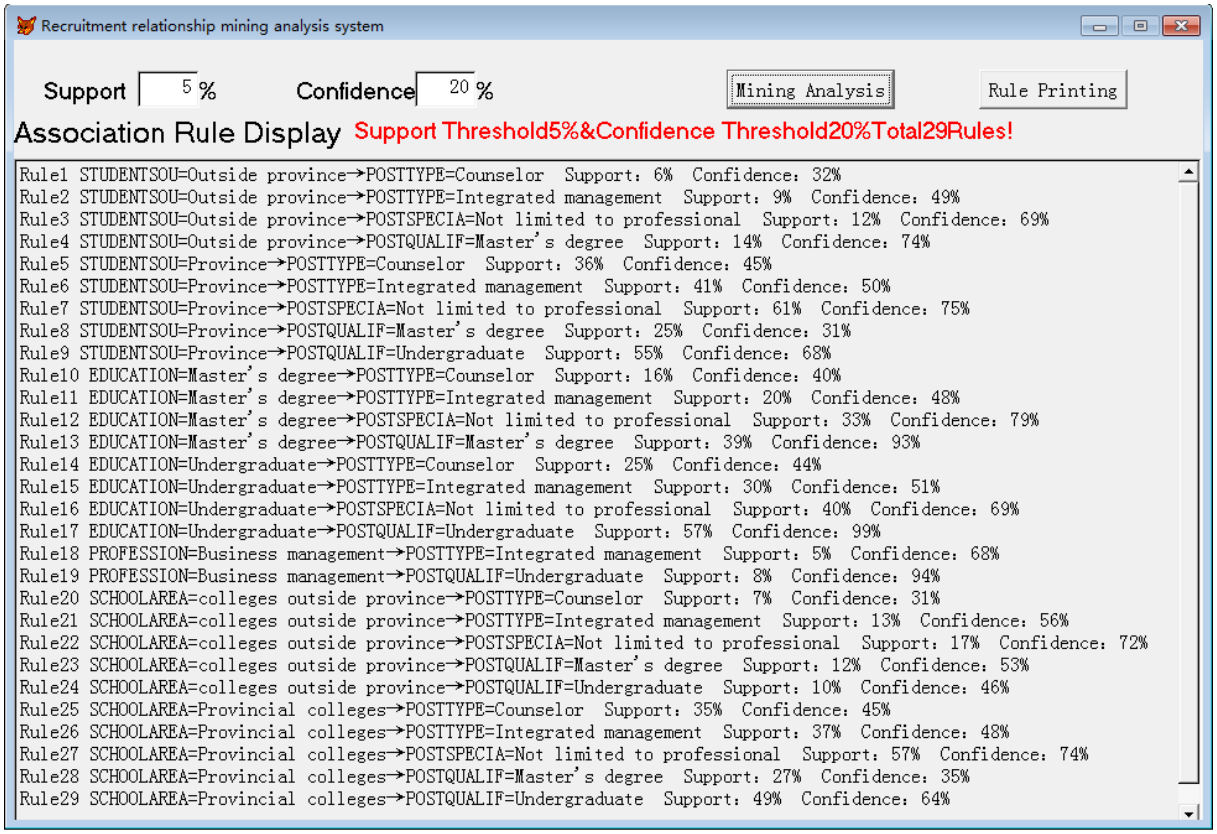

Fig.2 Recruiting relationship mining interface and results display

B. Analysis of Mining Results

The main task of association rule mining in school recruitment is to find out the relationship between the job requirements and the candidate information,and guide the school recruitment.Further analysis of the 29 mining results yielded the following conclusions.

First,it can be seen from rules 1-9 that the support from the "intra-province" of the student source is much higher than the "out-of-province" support,which indicates that the applicant is mainly from the province.Therefore,in the future recruitment,the school should expand the scope of publicity,increase the propaganda of "outside the province" students,or appropriately tilt the students outside the province when formulating recruitment policies.Inviting some teachers outside the province to make the faculty and staff students have a reasonable structure,and a reasonable structure of the faculty and staff is conducive to the cultivation of talents and the development of schools.

Second,as can be seen from Rule 10-19,the recruitment relationship mining system is not sensitive to the qualifications and professional categories of the candidates,because the qualifications and majors mainly depend on the requirements of the school job plan.

Third,as can be seen from Rule 20-29,the degree of support for the "graduate colleges" of the graduate schools is much higher than that of "offshore universities",which indicates that the candidates are mainly graduated from the provinces and universities.Therefore,in the future recruitment,the school should increase the propaganda of colleges and universities outside the province,attract more candidates from universities outside the province,and make the school's faculty and staff's source structure more reasonable.There are faculty and staff from different graduate school areas that are conducive to reform and innovation and are conducive to the development of schools.

V. CONCLUSION

In the context of big data era, this paper discusses the application of association rule mining technology in school recruitment, and uses the mining tools developed by Visual FoxPro to analyze the mining of job recruitment plan and applicant registration information, and find out the objective existence between each data item .relationship. Schools can adjust recruitment and promotion strategies and recruitment policies according to the results of association rules, attract more talents to apply for,and ultimately achieve the goal of recruiting excellent faculty and staff with reasonable structure .At the same time,it opened up new ideas for the school talent recruitment analysis and research, and also provided a new basis for the school personnel management workers to recruit talents.

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