

## Optimizing Path of Personnel Archives Management of College Staff

Zhiwei Tian<sup>1</sup> and Xiangkun Li<sup>2\*</sup>

<sup>1</sup> Foreign Language Department, Qiqihar Medical University

<sup>2</sup> Personnel Department, Qiqihar Medical University

\* Corresponding Author: vivian781021@sina.com

No.333, Bukui Street, Jianhua District, Qiqihar City, Heilongjiang Province, 161006 P.R. China

**Keywords:** University Personnel File Management; Data Mining; Path Optimization

**Abstract:** The management of staff personnel files in colleges and universities is one of the important parts of information management in colleges and universities. It is also the main platform for information induction and talent exchange in colleges and universities. In the current era of big data, it also brings new challenges to the management of personnel files in Colleges and universities. Therefore, this paper analyses all kinds of state types in current personnel management by means of questionnaires, and introduces the data mining theory of decision tree into the cadre personnel information database of colleges and universities to express and classify complex personnel data and find relevant association rules, so as to realize the path of personnel file management mode. To optimize and ultimately help university managers to carry out clear personnel management measures, and constantly improve the management level and quality of university personnel files.

### 1. Introduction

With the continuous development of economy and society and the continuous progress of science and technology, information technology has penetrated into all areas of social life. Therefore, the personnel management of cadres in Colleges and universities is facing severe challenges. It needs the continuous integration of information technology and personnel management in Colleges and universities to ensure work efficiency [1-2]. Many experts at home and abroad have discussed the electronic realization of university human resources management. The research results show that the importance of information technology in university information management is helpful to the process of transition to electronic management, especially electronic personnel resources management [3-4].

In the construction of archives management in modern colleges and universities, informationization is the core content of archives management. Colleges and universities must properly increase investment in the construction of archives management information, actively introduce and apply advanced computer information technology, strengthen the development, utilization and safe storage of archives information materials, and realize the digital development of school archives information [5]. The management of personnel files in colleges and universities is not only used to inquire information, but also to provide digital services for colleges and universities [6]. Implementing post incentive mechanism, strengthening career planning, establishing ability training system and enhancing psychological endurance in Colleges and universities can improve the professional identity of teachers and staff [7-8]. In the process of managing personnel files in most universities, the importance of personnel files in the development of universities has not been recognized. The management of personnel files is mostly based on the personal merits and demerits of teachers. Personnel archives work is one-sided in the development of colleges and universities, which leads to the phenomenon that the management mode of personnel archives in Colleges and universities is monotonous and the management consciousness is weak. The practicability of personnel archives work in data exchange and information sharing is poor, which affects the development of information construction in Colleges and universities [9].

Because all kinds of personnel information in Colleges and universities are dispersed and stored in various departments of colleges and universities, it is difficult to ensure the consistency of data collected and analyzed by all kinds of personnel information. At the same time, due to the lack of unified management and coordination on the collection and update of personnel information, the lack of coordination among departments, the uneven process of archives informatization, and the different forms of maintenance and storage of existing personnel information, all of these lead to the difficulty of ensuring the integrity of information and data accuracy. Different departments use different software and different data format definitions, and it is difficult to analyze data comprehensively [10-11].

This paper intends to optimize the path of personnel archives management of cadres in Colleges and universities on the basis of in-depth study of personnel archives management in Colleges and universities in China, and provide basic data for staff and faculty for the management information system of the whole university. Through optimizing the path of archives management, we can promote the standardized management of personnel departments, improve the efficiency and level of personnel management, organize and manage personnel information dispersed in various departments conveniently and quickly, provide reliable data in time, provide important basis for scientific decision-making of schools, and further promote the opening of human resources. Develop and give full play to the maximum effectiveness of university talents.

## **2. Optimizing Path of Personnel Archives Management in Colleges and Universities**

The essence of personnel archives management refers to a series of management activities of various archives, each of which is extremely important. In the process of personnel archives management in Colleges and universities, the archives management in Colleges and universities includes the information materials of personal learning and development experience, professional ability and work performance of faculty members. These archives information materials are the important scientific basis for the investigation and selection of talents in Colleges and universities. Therefore, it is necessary to reform and innovate the mode and path of personnel archives management in colleges and universities.

### **2.1 Strengthen the Overall Management of Personnel Files**

An important prerequisite for the informationization of personnel archives management in colleges and universities is to strengthen the overall management of personnel archives so as to carry out the archives management in strict accordance with the management system, make the management responsibilities clear and strict, file electronic documents and manage archives at all levels in a regular manner according to relevant technical standards. The management of human resources mainly meets the characteristics of application needs from the management and technical levels, and adopts advanced and applicable design patterns and design processes to meet the characteristics of human resources management in colleges and universities.

(1)To realize computer automatic processing and orderly management of a large number of repetitive and complicated work: in order to achieve paperless office to a certain extent, the staff will be released from a large number of complex affairs and reduce the consumption of human and material resources; In order to ensure the consistency, accuracy and timeliness of data, computer processing can be realized in the work of personnel file management, such as salary upgrade and adjustment, assessment information summary, standardized data maintenance, teacher statistical analysis, etc. It also provides real-time, dynamic, accurate and complete human resources information, improves the quality of management in teaching, scientific research, administration and logistics, provides a highly digital, standardized and scientific human resources management information and processing platform for colleges and universities, and provides an accurate basis for leadership decision-making.

(2)Achieving the collection and sharing of effective data and information: Due to the constant expansion of the amount of personnel data and information in colleges and universities, it is required that the management of personnel information must be accurate and fast; the management

of personnel archives for university cadres should take the management needs as the core and the relatively perfect and prominent management functions as the main objectives. Pre-set personal information of cadres is the main support and one of the important carriers to realize personnel management. On this basis, it includes data expansion of file management, allocation and change, professional technology, labor wages, teacher training, Department management, evaluation management and so on, in order to realize the comprehensive and scientific management of human resources in Colleges and universities. In addition, university staff can interact with each other in real time on the open network with different privileges to achieve the open management requirements, complete their respective tasks or common purposes, and try to achieve the sharing of human resources data, so as to avoid the waste of information resources.

## 2.2 Personnel Archives Management Method Based on Decision Tree

Classification and prediction of personnel data can be used to extract important data sets or predict future data trends. In the process of Archives Informationization Construction in Colleges and universities, we should not only satisfy various inquiry services, but also realize the reference and decision-making functions of personnel archives in the personnel work of colleges and universities. The method of personnel archives management in Colleges and universities needs to screen and analyze a large number of information data of teachers and staff personnel archives. Therefore, the method and theory of data mining based on classification is the focus of this paper. Based on decision tree, this paper proposes a data mining algorithm for personnel archives management in Colleges and universities.

Given a set of target databases  $D = \{d_1, d_2, \dots, d_n\}$ , a set of attribute set  $A = \{a_1, a_2, \dots, a_n\}$ , a set of data category set  $C = \{c_1, c_2, \dots, c_n\}$ , if it has the following properties:

- 1) The internal nodes of the tree correspond to the value of a set of attributes A.
- 2) The edges between two nodes of a tree can be judged by a predicate operation.
- 3) Each final leaf node represents the value of a taxonomic set C.

This tree is a decision tree based on data classification and screening. It shows the classification structure of a decision tree for the classification and screening of personnel upgrading in colleges and universities as figure 1. Rectangular boxes are used to represent internal nodes (non-leaf nodes), and circular boxes are used to represent leaf nodes.

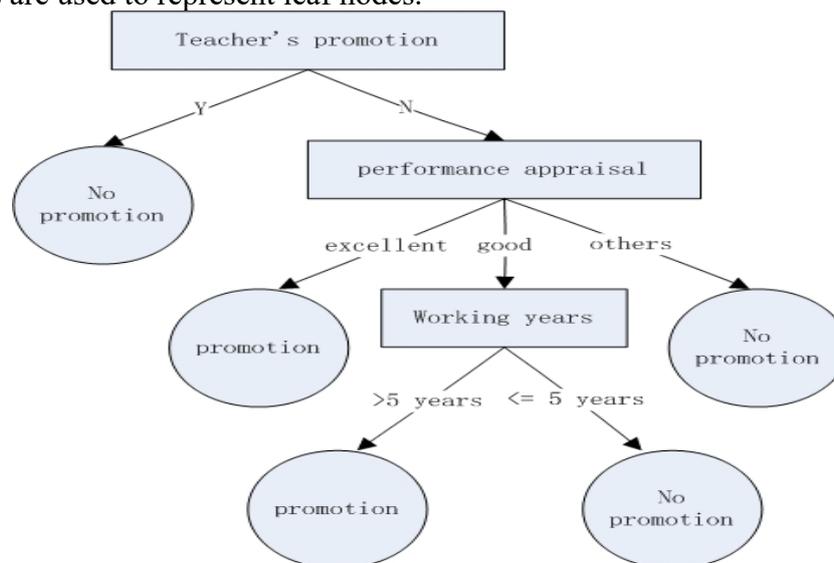


Figure1. Decision Tree Structure Diagram

## 2.3 The Computing Process of Personnel Archives Management Based on Decision Tree

The process of generating and calculating decision tree is realized by recursive method from root node to leaf node step by step. Each internal node is analyzed and compared strictly with its attribute values, and the branch direction of the next level is determined to ensure that the final leaf node is obtained on the basis of a certain rule. The execution of decision tree includes the following

main processes:

1) To analyze the attributes of the target database, select one attribute as the root node, and then analyze the attributes to get the next internal node, then analyze in turn, and finally get the whole decision tree.

2) On the basis of the decision tree generated, some disturbing and abnormal data nodes are deleted, and the internal nodes and leaf nodes of the whole decision tree are constructed to optimize the overall structure of the decision tree and ensure that the decision tree meets the following conditions: all attributes can not be segmented.

The process of classification calculation and selection of decision tree is mainly to study the attributes and classification of the target database, complete the construction of a hierarchical structure model, and adopt different algorithms of decision tree can get different decision results in the actual application process. This paper intends to use ID3 algorithm to construct decision numbers and classify the implementation process of evaluation. ID3 algorithm defines the attributes of each node in the decision tree, uses information gain to determine the criteria of attributes, builds the model of the final decision tree according to the information gain of attributes, and completes the execution process based on continuous recursive calls. In ID3 algorithm, entropy is used to determine the dynamic index of data. In general, the value of data is "0" to indicate that the data is determined, and "1" to indicate that the data is uncertain. Generally, the value of entropy is defined between 0 and 1. When the probability of occurrence of relevant data in all data subsets is the same, the value of entropy is the largest, indicating that the data is the most stable.

Given the probability of a set of data  $p_1, p_2, \dots, p_n$ ; the conditions are satisfied:  $\sum_{i=1}^n p_i = 1$ ; define the value of entropy  $H(p_1, p_2, \dots, p_n)$  as  $H(p_1, p_2, \dots, p_n) = \sum_{i=1}^n (p_i \log(1/p_i))$  (1)

For the state D of any data,  $H(D)$  is expressed as a measure of that state. According to the definition of entropy, the value is between  $[0, 1]$ . If the data state is split again, it can be divided into several new data states, then the entropy value of the data state needs to be recalculated. The implementation process of ID3 algorithm is to calculate the maximum attribute state value based on the entropy value to determine its split attribute. The definition of information gain appears. For a data state D and its split state set  $M = \{m_1, m_2, \dots, m_n\}$ ,  $\text{Gain}(D, M)$  represents the information gain value. Which satisfied:  $\text{Gain}(D, M) = H(D) - \sum_{i=1}^n (p(m_i)H(m_i))$  (2)

The implementation of ID3 algorithm is based on the definition of formula 1 and formula 2 to determine the principle of attribute splitting and decision number construction. It is related to the probability and state of data, and the overall design idea meets the dynamic design requirements.

## 2.4 The Process of Classification and Screening of Personnel Archives Data in Colleges and Universities

According to the core of the above algorithm, in the process of data classification and screening in personnel files of colleges and universities, each data attribute is split. According to the definition value of information gain and entropy, the target data set is analyzed separately. A decision tree is constructed and the final decision results are obtained. The core execution process is as follows:

1) Determine the target set of data according to the existing personnel archives database of colleges and universities, transform the objects of classification and screening of personnel archives data of colleges and universities, and form a candidate target queue set;

2) Clean and prepare the data in the target set, eliminate the abnormal data and invalid data, and achieve the first step of simple screening;

3) Entropy calculation of each attribute in the target set;

4) Analyze the entropy of attribute set, and determine the split result of attribute according to the result of information gain to form decision tree;

5) Pruning the decision tree to form the final decision results.

In this paper, data mining and data classification technology based on decision tree is applied to colleges and universities. All the data of personnel archives management are classified and analyzed, so as to reveal the dynamic relationship between the same and different types of cadres

and personnel data dynamically, and show clearly the reasons for its formation and the direction of its development, so as to realize the path optimization of personnel archives management in colleges and universities.

### 3. Questionnaire Design

This paper compiles a questionnaire around the basic personnel situation of teachers in a university and the application of specific personnel file management. The scope of the questionnaire includes not only all on-the-job faculty and staff of the sample university, but also the staff in charge of the higher education department. The questionnaire is compiled and distributed by using the "questionnaire" website. Finally, through statistical analysis, the obtained personnel file data are analyzed and summarized. Through the mining method of decision-making number, we can mine the correlation between data from a large number of data, which is helpful for university leaders to make further reasonable adjustment and improvement of the cadre personnel archives work in accordance with these rules. The questionnaire consists of three parts:

1) Questionnaire Statement: Mainly describe the respondents according to the actual situation of individuals and units, to ensure the authenticity of the answers.

2) Basic information: Mainly understand the personal information of the respondents, including gender, age, position, education level, post level, and so on. From this, extract the basic situation of the internal structure of human resources in sample colleges and universities, and pave the way for the follow-up study.

3) Targeted problems: Based on the key factors affecting the effectiveness of human resources management in sample units, combined with the content of basic information, design targeted problems to prepare for the extraction of data classification.

There are 14 colleges in the sample university. 179 questionnaires were sent out to the faculty and 179 questionnaires were collected. All of them are valid questionnaires. The basic contents of the questionnaire are shown in Table 1.

**Table1.** Design of Questionnaire for Personnel Archives Management of College Cadres

projects	category	Number of samples	Percentage
Gender	Male	103	57.5%
	female	76	42.5%
age	≤25	15	8%
	26-35	51	28.5%
	36-45	48	26.8%
	46-55	41	22.9%
	≥56	24	13.5%
professional titles	Professor	41	22.9%
	Associate professor	77	43%
	Lecturer	56	31.3%
	Assistant	7	3.9%
Education	Doctor	71	39.2%
	Master	61	34.1%
	Bachelor	47	26.3%

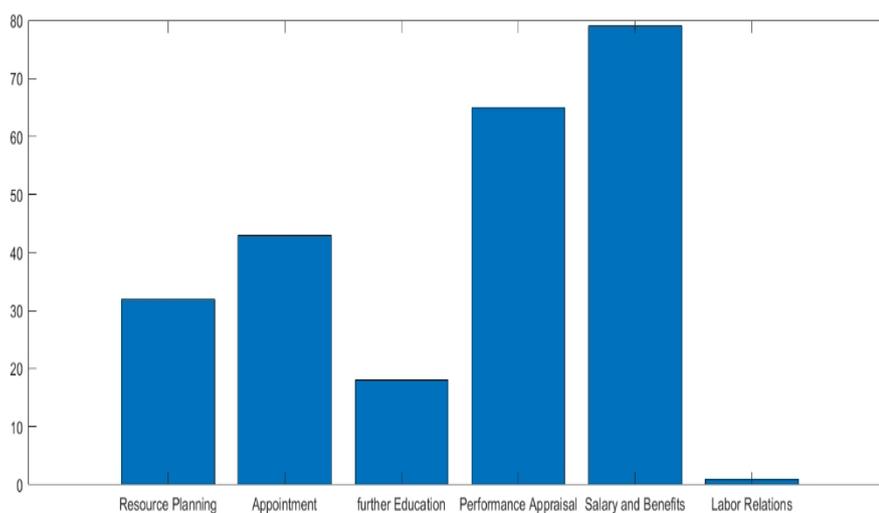
### 4. Results and Discussion

The personnel files of colleges and universities have accumulated a large amount of data, which are currently mainly used to provide various statistical reports and information inquiries to management departments at all levels. In order to realize the hidden value of these data, this paper takes the existing cadre and personnel archives management information database of colleges and

universities as the research object, quantifies the intelligence, position, physical structure, performance structure of teachers, processes and processes the personal information of the faculty and staff of the whole colleges and universities, and finds out the influence on the training of talents in schools. The factors of cultivating and developing talents and the correlative relations among them can optimize the path of personnel archives management in colleges and universities, and on this basis, establish a scientific personnel archives management and evaluation mechanism. Through the analysis of 179 questionnaires collected, it is found that the teachers and staff surveyed generally believe that there are many factors affecting the effectiveness of human resources management. This paper further analyses the structure of human resources management and the elements extracted from the previous interviews, and summarizes the cadres and personnel influencing the teaching staff. There are six main elements of source management: personnel resources planning, post appointment, training and further education, performance appraisal, salary and welfare, as shown in Table 2.

**Table 2.** The table of factors influencing the effectiveness of human resource management

N O.	Influencing factors	Classification and Integration of Relevant Descriptions
1	Human Resource Planning	Age, gender, position, educational background, professional title structure, personnel needs analysis, management budget
2	Recruitment and Appointment	Recruitment needs, job analysis, reducing staff turnover, employee appointment
3	Training and Development	Training Survey and Evaluation, Training Needs, Training Design
4	performance appraisal	Equity, objectivity, operability, the relationship between performance and salary, performance application
5	Salary and benefits	Salary level, salary system, salary equity, labor cost accounting, welfare, salary incentive
6	Labor Relations Management	Trade Union Management , Teachers' Feelings

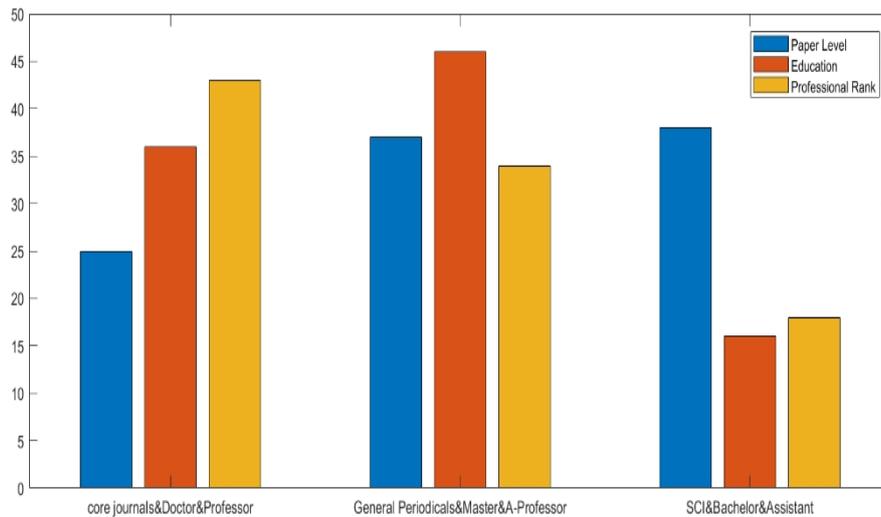


**Figure 2.** Analysis of the Main Influencing Factors on the Effectiveness of Personnel Archives Management of Cadres and Teachers in Colleges and Universities

(1)The results of the questionnaire show that the main factors affecting the effectiveness of personnel file management of university cadres and teachers are: salary and benefits accounting for

75%, performance appraisal accounting for 68%, post appointment accounting for 42%, human resources planning 32%, training and further education 18%, as shown in figure 2. Among them, the top three ranking of the degree of association with university personnel archives are "performance appraisal", "appointment post", "resource planning". These three items can be closely related to the current management of university personnel archives, and the data connection and application are relatively smooth.

(2) The title, educational background and publishing grade were counted from the questionnaire in this study, and the proportion was shown in figure 3, 43% are professors among them, 34% are associate professors and 8% are medium-grade professional title. 38% of the respondents had doctoral degrees, 46% of the respondents had master's degree and 16% of the respondents had bachelor degree, The proportion of core journals in published papers is 25%, the proportion of general journals in published papers is 38%, and the proportion of SCI is 38%



**Figure 3.** Statistics on the proportion of titles, academic qualifications and publishing grades

(3) In order to find the association between some undetectable data in university personnel management, this paper uses decision tree and data mining to find out the association rules of personnel file management. The results of the questionnaire show that when the title of a teacher is a professor and the highest degree is a doctor, the number of teachers whose publication level is SCI accounts for 24% of the total number. Professor titles accounted for 8% of the total number of papers published, as shown in table 3. From these data, we can find some intrinsic relationships among attributes: the level of teachers' publishing papers has a great deal to do with their academic qualifications and titles. The higher the professional title and the higher the academic qualifications, the higher the grade of papers; at the same time, the professional title is also affected by the academic qualifications and the level of papers.

**Table 3.** Association Rules of Personnel Management in Colleges and Universities

project	Support	project	Support
(Professor, Doctor)	25%	( Associate professor, General publications)	15%
(Professor, SCI)	24%	(Master, General publications)	27%
(Doctor, SCI)	22%	(Professor, General publications)	8%
( Associate professor, Master)	18%		

These

relationships can not only help school leaders make decisions to improve their scientific research level, such as introducing highly educated talents, or sending out their own staff for further training, but also encourage teachers to take the initiative to study and publish high-quality papers. It is helpful for leaders to make further reasonable adjustment and improvement of their work according to these rules.

## Conclusion

Under the impetus of big data, the level and quality of efficient personnel archives management can make the personnel archives of university cadres be managed systematically. Therefore, we should solve the problems in the process of personnel archives of University in time and effectively, formulate clear management system and measures, and optimize them continuously. With innovation, improve the development of information management level of personnel files in Colleges and universities. In this paper, decision tree theory is introduced to analyze the age, degree, working time and number of papers published by teachers in university personnel information database. The application of data mining theory in personnel information can increase the ability of managers to analyze data, optimize the path of personnel management in Colleges and universities, and ultimately achieve the level of personnel management in Colleges and universities.

## Acknowledgment

This work was supported by Social Science Foundation of Qiqihar Medical University, the project number QYSKL2019—13.

## References

- [1]. Liu, Y. (2015). Analysis on the effective integration of information technology and personnel management in colleges and universities. *Creative Education*, 6(08), 785.
- [2]. Wang, H., Wang, Z., & Ding, S. (2018). Optimization of teaching management in colleges and universities based on dynamic programming. *Cluster Computing*(3), 1-8.
- [3]. Naser, S. S. A., Al Shobaki, M. J., Amuna, Y. M. A., & El Talla, S. A. (2017). The Reality of Electronic Human Resources Management in Palestinian Universities from the Perspective of the Staff in IT Centers. *International Journal of Engineering and Information Systems (IJEAIS)*, 1(2), 74-96.
- [4]. Kováčová, L., & Vacková, M. (2015). Applying innovative trends in the process of higher education security personnel in order to increase efficiency ☆. *Procedia - Social and Behavioral Sciences*, 186, 120-125.
- [5]. Hall, H., & Raeside, R. (2016). Mapping the UK information workforce in the library, archives, records, information management, knowledge management and related professions. *Proceedings of the Association for Information Science & Technology*, 53(1), 117.
- [6]. Al Shobaki, M. J., Naser, S. S. A., Amuna, Y. M. A., & El Talla, S. A. (2017). Impact of Electronic Human Resources Management on the Development of Electronic Educational Services in the Universities. *International Journal of Engineering and Information Systems*, 1(1), 1-19.
- [7]. Johnson, W. C. (2013). Analysis on the strategy of enhancing occupation identity of archives management personnel in colleges and universities. *Journal of Fuqing Branch of Fujian Normal University*, 57(s 1-3), 255-266.
- [8]. Tsav, S. A. (2015). Governing Councils' Activities on Staff and Students Personnel Management in Federal and State Universities in the North Central States, Nigeria From 2003-2013. *JOURNAL OF EDUCATIONAL POLICY AND ENTREPRENEURIAL RESEARCH*, 2(4), 85-89.

- [9]. Wang, & Ling. (2017). Optimization process of compiling and researching archives in universities under the background of information sharing. *DEStech Transactions on Social Science, Education and Human Science* (6), 36-38.
- [10]. Morris, L. V. (2016). Management and leadership in colleges and universities. *Innovative Higher Education*, 41(1), 1-3.
- [11]. Katuu, S. (2015). The development of archives and records management education and training in Africa—challenges and opportunities. *Archives and Manuscripts*, 43(2), 96-119.