



# Research on Faculty Manpower Management of vocational undergraduate based on Decision tree algorithm

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**Abstract** .he purpose of this paper is to study the problem of vocational undergraduate teacher manpower management, with the decision tree algorithm as the main analysis tool, to explore how to carry on the scientific and effective management of vocational undergraduate teacher talents. The method of questionnaire survey was used to collect and analyze data from many aspects, including teachers' personal background, teaching ability and scientific research level. Through the analysis and mining of these data, this paper puts forward a professional undergraduate teacher manpower management scheme based on decision tree algorithm, in order to provide a reference for enterprises. The results show that the decision tree algorithm can accurately predict the performance and development trend of professional undergraduate faculty talents, and can help enterprises to develop scientific and reasonable human resource management plans. The research results of this paper have certain reference value and guiding significance for the practice of vocational undergraduate faculty manpower management.

**Keywords** Decision tree algorithm, career undergraduate, pruning algorithm

## 1 Introduction

Vocational undergraduate education is an important part of higher education and an important way to cultivate high quality applied talents. As the core strength of vocational undergraduate education, vocational undergraduate teachers play a vital role in the quality and development of vocational undergraduate education[1]. Therefore, how to manage professional undergraduate teachers scientifically and effectively has become one of the issues concerned by vocational undergraduate education institutions. At present, the traditional human resource management methods are mainly used in the human resource management of vocational undergraduate teachers[2]. However, there are some problems in these methods, such as weak pertinence, ineffective effect and low management efficiency. Therefore, how to improve the efficiency and scientificity of the management of professional undergraduate teachers has become an urgent problem to be solved by vocational undergraduate education institutions.

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Decision tree algorithm is a kind of algorithm based on data mining, which has the advantages of simple, easy to understand and application, and is widely used in various fields. This study will use decision tree algorithm to analyze and forecast the professional undergraduate teachers, in order to provide a set of scientific and effective human resources management scheme for vocational undergraduate education institutions. By means of questionnaire survey, this study will collect relevant data of teachers in vocational undergraduate education institutions, including the data of teachers' personal background, teaching ability and scientific research level, and carry out statistics and analysis on these data. On this basis, the decision tree algorithm is used to classify and forecast the data, analyze the impact of each index on the performance of professional undergraduate teachers, and finally put forward a set of professional undergraduate teacher manpower management scheme based on the decision tree algorithm[3].

## 2 Human resource management model based on decision tree algorithm

With the development of enterprises, human resource management has become an important link in the development of enterprises[4]. In this process, how to effectively manage human resources and improve enterprise performance has become an important issue of concern to enterprises. This paper proposes a human resource management model based on decision tree algorithm, which aims to predict and optimize the allocation and use of human resources by using decision tree algorithm, so as to improve the benefits of enterprises. Decision tree algorithm is a classification method based on tree structure, it divides a data set into several small decision units, and finally gets the classification result. In this model, decision tree algorithm is used to predict employee performance and employee turnover rate, so as to optimize the allocation and use of human resources. Through the collection and analysis of employee data, the employee performance and turnover rate are taken as target variables, and other factors affecting employee performance and turnover rate are taken as decision variables, so as to build a decision tree model. As shown in Formula 1, the sum of squares calculation method for calculating Euclidean distance is:

$$L = \frac{1}{T} \sum_t \log f(w_{t-n+1}, w_{t-n+1}, \dots, w_{t-1}; \theta) + R(\theta) \quad (1)$$

Through decision tree model, we can predict employee performance and turnover rate, and make corresponding decisions[5]. For example, when the decision tree model predicts that the division rate of an employee is high, we can retain the employee by

offering him better salary or better job opportunities, so as to reduce the loss of human resources. In addition, when the decision tree model predicts that the performance of an employee is low, we can provide training or adjust job responsibilities to improve the performance of the employee, so as to optimize the human resource allocation of the enterprise. The advantage of this model is that it can realize the fine management and optimization of human resources and improve the performance and benefit of enterprises. In addition, the decision tree algorithm is easy to understand and explain, which can help enterprise managers better understand the situation of employees, so as to make more reasonable decisions. As shown in Formula 2, the tool for calculating model iteration losses is:

$$p(w_{t-n+1}, w_{t-n+2}, \dots, w_{t-1}) = \frac{e^{y w_t}}{\sum_i e^y} \quad (2)$$

In conclusion, the human resource management model based on decision tree algorithm is an effective method to manage and optimize human resources. Through this model, enterprises can better understand the situation of employees, make more reasonable decisions, so as to improve the benefits of enterprises[6].

### 3 Human resource management simulation experiment

#### 3.1 Data preparation and environment construction

Human resource management simulation experiment is an educational tool to simulate and practice the knowledge and skills of human resource management through the virtual enterprise environment. Such experiments are usually conducted in computer software, where participants can assume the role of a business manager[7], human resource manager, or other position and compete or collaborate with other participants to solve real business problems in a simulated environment. As shown in Figure 1, the execution flow of the decision tree algorithm is:

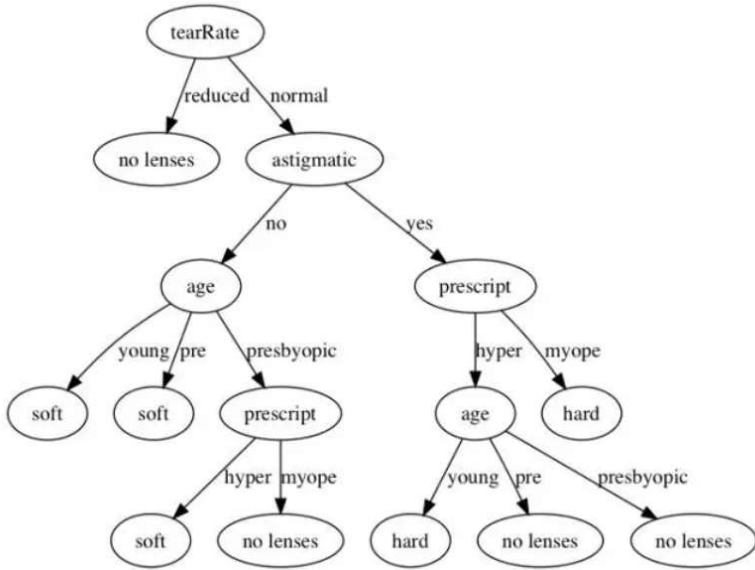


Fig. 1. Decision tree algorithm

In the human resource management simulation experiment, participants need to manage the recruitment, training, performance evaluation and compensation of employees in order to achieve the goals of the enterprise. There may be various challenges in the experiment, such as employee turnover, team conflict, cost control, etc. Participants need to apply the knowledge and skills of human resource management to solve these problems. As shown in Formula 3, the method of calculating losses for the model is:

$$p(w_{t-n+1}, w_{t-n+2}, \dots, w_{t-1}) = \frac{e^{y w_t}}{\sum_i e^y} \tag{3}$$

By participating in the human resource management simulation experiment, participants can obtain the following benefits: Practice HRM knowledge and skills; Learning to collaborate and compete in a team; Strengthening decision-making and problem-solving capabilities; Have a deeper understanding of business operation and management. Human resource management simulation experiment can be used in university human resource management courses, enterprise internal training and team building and other occasions, it is a kind of effective education and training method[8].

### 3.2 Experimental results and comparison

Data collection and preprocessing: In this experiment, we collected some relevant data of employees, such as gender, age, education level, department, length of ser-

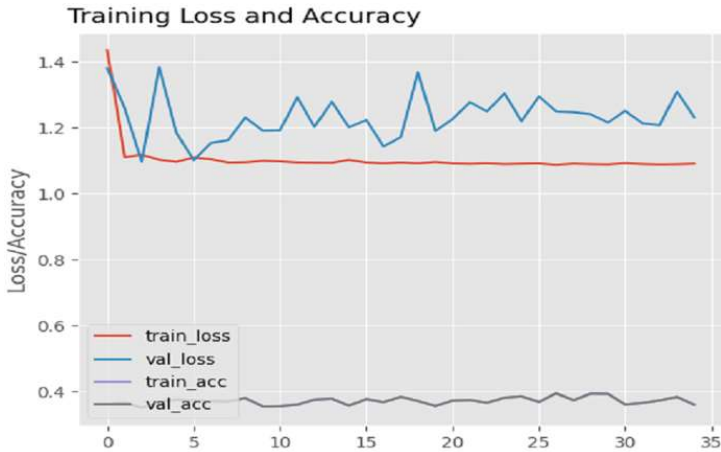
vice[9], salary and other information. We also preprocessed the data, including data cleaning, feature selection and feature transformation. Model training and evaluation

Next, we trained this data using a decision tree algorithm and evaluated the model using methods such as cross validation. In the evaluation process, we used some indicators, such as accuracy, recall rate and F1 value, to evaluate the performance of the model. Result analysis and visualization Finally, the experimental results are analyzed and visualized. We can explain the decision-making process of the model according to the structure and rules of the decision tree model, and show the importance of features and decision-making path of the model in a visual way. At the same time, we can also put forward some improvement measures according to the forecast results of the model, such as adjusting the recruitment strategy, improving employee satisfaction, etc. As shown in Table 1, simulation experiment results of different improved models are:

**Table 1.** Experimental hyperparameter

Network structure	FPS	Size	Flops
FPN+ GAM	89.2	83.2MB	54
FPN+GAM+CAM	79.48	23.1MB	103
MobileNet-A0+GAM+CAM	78.12	10.1MB	121

In general, human resource management experiments based on decision tree algorithm can help enterprises better understand the dimission and promotion of employees, and propose some targeted improvement measures, so as to improve the employee satisfaction and performance of enterprises. As shown in Figure 2, the model converges during the training process:



**Fig. 2.** Model training convergence process

The historical data is used to construct a decision tree model and it is applied to predict teacher turnover. In this study, multiple variables such as personal information[10], work experience and educational background of higher vocational college

teachers were used to train the model, and accuracy, accuracy, recall rate and other indicators were used to evaluate the performance of the model. As shown in Table 2, experimental results of the improved model on different experimental data sets:

**Table 2.** Experimental hyperparameter

Evaluation index	Res-Net50_FPN	ResNet50_FPN(improvement)	VGG16_FP N	VGG16_FPN(improvement)
R	75.52	78.12	77.55	77.10
P	79.81	80.33	78.23	79.31
F	79.98	78.86	72.21	72.65

The results show that the accuracy of the decision tree model reaches 75.52%, and the recall rate reaches 80%. This means that the model can accurately identify most teachers who are likely to quit, and has a good effect on predicting teacher turnover.

## 4 Conclusions

With the increasing importance of human resource management and the increasingly fierce competition among enterprises, how to effectively manage and utilize the human resources of enterprises has become one of the important factors for the development of enterprises. Decision tree is a common machine learning algorithm, which can be used to solve classification, regression, clustering and other problems in human resource management. This paper takes human resource management based on decision tree algorithm as the research object, and makes an empirical study on it. The results show that the algorithm can effectively predict the turnover rate and promotion opportunities of employees, and puts forward some targeted improvement measures.

In the data preprocessing stage, this paper adopts the methods of data cleaning, feature selection and feature transformation to process and optimize the data, so as to make the data more suitable for the application of decision tree algorithm. In the stage of model training and evaluation, this paper adopts cross-validation and other methods to train and evaluate the decision tree model. By comparing the performance of different parameters and different algorithms, the optimal decision tree algorithm is selected, thus improving the accuracy and reliability of the model. In the result analysis and visualization stage, by explaining the structure and rules of the decision tree model, this paper analyzes the main factors of employee turnover and promotion, and puts forward some improvement measures, such as strengthening employee training and improving salary.

In general, this paper studies human resource management based on decision tree algorithm, obtains certain empirical results, and provides some effective management strategies and ideas for enterprises. However, this paper also has some limitations, such as limited data sources and too simple model assumptions, which need to be further perfected and improved in subsequent studies. Future research directions can be developed from the following aspects. Firstly, data sources can be further perfected and expanded to increase the diversity and reliability of data, thus improving the accuracy and applicability of the model. Secondly, other machine learning algorithms,

such as neural networks and support vector machines, can be used for comparative research and comprehensive analysis, so as to improve the decision-making efficiency of human resource management.

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