Research on the Construction of Students' Comprehensive Ability Evaluation System

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Abstract

Facing the huge competition pressure of modern generation, it is of practical significance to evaluate the comprehensive abilitiy of college students. Objective evaluation can make both college students and teachers realize the shortcomings of students' development and make progress . However, in reality, many colleges lack an objective evaluation system and rely more on subjective judgments of personal emotions. Therefore, this paper wants to establish an objective and fair evaluation system for the comprehensive development level of college students, and proposes the use of machine learning models for adaptation to provide support for scientific evaluation of college students' comprehensive ability.

Keywords

Evaluation System; Machine Learning; System Construction.

1. Introduction

Nowadays, lthough the demand for high-end talents is increasing, the employment situation in China is becoming increasingly severe. Difficulty in recruitment and employment have become the main problems of the society at the same time. The main reason for this phenomenon is the school's Talent training is derailed from enterprise requirements, and it is imperative to establish a model of a comprehensive ability evaluation system for students based on employment standards. The student comprehensive ability evaluation system is an important way to inspect the ability of college students, and it is also the way of comprehensive quality evaluation method adopted by most schools in China. However, at present, the construction of student development potential evaluation system is mostly a simple general analysis. This research wants to use machine learning technology to help evaluate and predict the students' development potential while establishing the students' existing comprehensive ability evaluation system.

2. Literature Review

Domestic researches on the construction of a comprehensive talent evaluation system based on machine learning model is getting more these years. Articles on the construction of an evaluation system using artificial intelligence and machine learning as tools include Wang Guifang (2009) who designed a new comprehensive evaluation mathematical model, and proposed a combined algorithm using the respective advantages of fuzzy analysis and neural network in evaluation. Fuzzy neural network algorithm, established the fuzzy neural network model of college students' comprehensive quality. Cai Huijuan (2014) designed the structure of the comprehensive quality evaluation model of college graduate students based on BP neural network from the aspects of the number of network layers, the number of neurons in each layer, the neuron conversion function and the determination of the learning rate, and finally simulated it through the Matlab platform. , divide the evaluation results obtained by AHP into

training samples and test samples, respectively train and test the constructed network model, and finally obtain more accurate evaluation results. Li Dan (2018) A student ability evaluation model based on hopfield discrete neural network, using discrete neural network to evaluate students' comprehensive ability in all aspects efficiently and fairly. Chang Qing (2017) uses the BP neural network model to construct an evaluation system for students' mathematical ability. Wang Yongsheng (2021) studied the factors of students' experimental ability, established the evaluation index standard of students' experimental ability, and proposed an evaluation model of students' experimental ability based on BP neural network. The evaluation simulation system is constructed by Matlab, and the network training is carried out on the sample data. To sum up, it can be seen that there have been some researches on machine learning used in education evaluation system, and BP neural network is the main one. However, in terms of the total number, the absolute amount of related research is not much, and there is still a lot of room for improvement in algorithm improvement. For English researches, Kotsiantis (2012) used machine learning to predict student performance, and based on the prediction results, it provided data support for various decisions in schools. Mahboob (2016) used the random forest algorithm to construct a student learning performance evaluation system. Sethi (2018) built a teaching evaluation system using machine learning and artificial intelligence methods.

In general, the research so far has focused on the construction of evaluation indicators, and less involved in predicting the potential of students' future development. And in the index construction and potential evaluation, less advanced tools are used, and the model in machine learning is used for supervised learning prediction. Therefore, this study has high academic research value.

3. The Construction of Students' Comprehensive Ability Evaluation System

3.1. Evaluation Feature Extraction

By referring a large number of literatures on the construction of college students' ability evaluation system and the use of machine learning model in data analysis, the author has a basic understanding of the research status in China and abroad in this field. At the same time, the author obtained the student information of Hubei Commerce College, collected information of different dimensions such as students' ability and learning situation, and used it as a data source to construct a student ability evaluation system. At the same time, the author also refers to the data of the app "Dream Space" developed by the National School Communist Youth League Research Center, combined with the data from school's academic affairs office and student life, to collect the school's full-time undergraduate students's activiteis in the four years of college. The following table shows tipical activities of one student.

Table 1. Tipical Activities of one student

Type of activities	Contents of activities
Leadership	Moniter;group secretary;assistant counselor;class committee;head of domitory;Class representative;student union;club leader etc
Conpetitions	The national college English Competition;The computer design competition;Calligraphy competition;Software copyright etc
Comprehensive Ability	Lectures;Volunteer;opening ceremonies;volunteer teaching
Living	Top dormitory;getting on with classmates
Knowledge	Acdamic grades; GPA; Report writing

3.2. Evaluation Model Construction

By referring literature and consulting with expert and other researchers, combined with the research foundation of predecessors, and based on the evaluation principles of rationality, fairness and scientificity, two primary elements, six secondary elements and 16 tertiary elements are finally established.

The configuration of indicators is relatively simple and clear, and the empirical determination method is adopted in the configuration of indicators. Consulting scholars and experts with rich practical experience, and determine the weights of the primary elements, secondary elements and tertiary elements according to their experience and subjective understanding. Taking an ordinary student as an example, the establishment of the evaluation model construction is as follows:

Table 2. Evaluation Model Construction

primary elements	secondary elements	tertiary elements
dominant element	knowledge learning ability	English Certification;Accounting Certification; Computer Certification
	Professional technical ability	Academic grades
	Research ability	Competitions, patent writing; paper publication; entrepreneurial projects
hidden element	Management and leading ability	Participation in clubs; hold positions in various student departments; participation in work-study programs
		Participation in volunteer service; Participation in teaching support; Participation in research projects
	Comprehensive development ability	Outstanding student,;outstanding provincial school student cadre;awarded scholarship
	Working ability	Internship and working salary

3.3. Machine Learning Model Usage in Evaluation System

Machine learning is to have computers to simulate human learning behavior, acquire knowledge and skills through learning, and continuously improve performance. This is an emerging discipline involving probability theory, statistics, convex analysis and other disciplines. Use induction, synthesis and other methods to achieve self-improvement. Machine learning is the study of how to enable machines to acquire new knowledge and skills by identifying and utilizing existing knowledge. As an important research field of artificial intelligence, the research work of machine learning mainly focuses on the three basic aspects of learning mechanism, learning method and task-oriented. Current machine learning is divided into supervised learning and semi-supervised learning.

Evaluating the model and constructing a support vector machine model is a new technology in data analysis. It solves the related problems of machine learning through statistical learning theory and optimization theory, and has been successfully used in various pattern recognition fields. The core idea is to accurately distinguish the data samples of the existing labels by constructing a discriminant function with the optimal classification surface, and at the same time, it must meet the constraints of the largest sample interval. The advantage of this model is that it only needs a small number of known label samples to construct a nonlinear model that meets the requirements of college students' comprehensive quality evaluation.

In the follow-up research, the author will continue to select more suitable machine learning algorithms to build models. Machine learning is divided into supervised learning, unsupervised learning, transfer learning and reinforcement learning, etc. Supervised learning includes

algorithms such as support vector machines, artificial neural networks, logistic regression, decision trees, K-nearest neighbors, random forests, naive Bayes, and linear regression. ; Unsupervised learning includes K-Means clustering etc. In real life, there are many factors that make up the student evaluation system. When studying the influence of different factors on behavior, you can choose multiple algorithms to train the model, compare their performance, and select the best performing algorithm, or you can use a combination of multiple algorithms.

4. Conclusion

This paper conducts an in-depth study on the status quo of college students' comprehensive ability evaluation, collects actual college students' data, extracts the elements of college students' ability evaluation, and builds an ability evaluation system according to the elements. The next research plan is to carry out an empirical analysis on the proposed comprehensive capability evaluation model, continuously revise the evaluation model, and then conduct into generalization.

Acknowledgments

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