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Retraction

Retracted: The Practice and Reform of Classroom Teaching Based on the Coordination of Online Environment and Deep Learning

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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[1] S. Zhou and B. Long, "The Practice and Reform of Classroom Teaching Based on the Coordination of Online Environment and Deep Learning," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 8576037, 7 pages, 2022.

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Research Article

The Practice and Reform of Classroom Teaching Based on the Coordination of Online Environment and Deep Learning

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By analyzing and reflecting on the characteristics of the network in teaching applications and some problems that arise in the traditional classroom teaching mode and classroom teaching in the network environment, some ideas and measures are proposed on how to strengthen and improve the organization and management of teaching in the network environment, and for the effective integration of teaching elements and resources. This paper proposes a teaching evaluation model based on a weighted plain Bayesian algorithm. According to the degree of influence of different attributes on the evaluation results, a method is proposed to determine the weights of each evaluation attribute using the correlation probabilities of class attributes and set the corresponding weights for each evaluation index. The experiment demonstrates that the accuracy of using the weighted plain Bayesian algorithm to construct the model for classification can reach 75%, and the average accuracy can be improved by about 3% compared with the traditional Bayesian classification algorithm.

1. Introduction

The widespread use of Internet technology in classroom teaching has provided a broad platform for students' independent learning, collaborative inquiry, and creative development, while at the same time bringing enormous challenges to the organisation and management of traditional classroom teaching, giving rise to a series of new teaching problems [1]. How to improve classroom teaching methods takes into account the different needs of students at different levels.

The rapid application of computer networks to teaching and learning has a unique advantage: globalisation of resources. The richness of resources, multimedia, and the openness of resources create rich situations for learning and teaching, helping students to broaden their horizons and engage in independent and personalised learning; diversification of interaction. From the traditional teacher-led one-way interaction in teaching to the teacher-student interaction mode, there is a variety of teaching interaction forms; smooth communication and convenient feedback. The variety of interaction not only promotes mutual help and multidirectional communication between students, facilitating the development of collaborative learning, but also promotes the construction of two-way, two-object interaction between teachers and students, facilitating multiple channels to connect teachers and students, helping teachers to understand students' learning situation in a timely manner, adjusting classroom teaching, giving personalised guidance, and even harmonising teacher-student emotions; teacher-student relationship tends to be equalised. The deeper influence of sharing ideas and resources in the online community will certainly lead teachers to change from being the leader of teaching to being the guide of learning [2].

The main body of traditional classroom teaching evaluation usually consists of expert evaluation, teacher mutual evaluation, teacher self-evaluation, and student evaluation. However, most of the existing evaluation indicators are general and mostly focus on teachers' teaching attitudes and quality [3]. At the same time, the existing teaching evaluation

results are mostly in the form of statistical reports to analyse the teaching effect, which is not only a heavy workload but also difficult to discover the hidden information in a large amount of data, so new data mining techniques need to be introduced to solve this problem [4].

This paper, in extending the application of data mining technology in the field of education, can in practice provide new ideas and technical references for teaching evaluation in universities and solve the problem of excessive subjectivity in traditional teaching evaluation [5].

2. Related Work

2.1. Educational Data Mining. With the rapid development of information technology, databases often accumulate a variety of massive data information, so how to use data mining technology to process large amounts of data and obtain useful knowledge information has become a research hot spot for scholars to focus on.

A clustering and density-based outlier detection method was proposed in [6], which substantially reduces the complexity of the algorithm by K-mean clustering pruning followed by a local anomaly factor detection algorithm. In [7], multiple classification methods are used to analyse and predict student behaviour by processing student login information in online learning systems. In addition, many universities have already added big data technologies to traditional classroom teaching [8]. [9] used the Hadoop platform to analyse and process students' grades and improved the traditional association rule Apriori algorithm by combining the features of the MapReduce programming model to explore the degree of influence between students' grades in each course, the relationship between course settings and grades, etc., to obtain valuable information to guide teaching reform and improve teaching quality. [10] The decision tree algorithm was used to mine the teaching evaluation data to obtain a more ideal prediction model, and the association rule algorithm was used to verify the comparison and analyse the reliability of the decision tree model [11].

2.2. Classroom Assessment. In the learning and training process of the evaluation of their performance, based on these evaluation data to make continuous improvements to the program and curriculum [12]. [13] et al. derived a learning performance assessment system by integrating four computational intelligence theories: K-means clustering algorithm, grey correlation theory, fuzzy inference, and fuzzy correlation rules. In addition, research in teaching evaluation has included emotional mining of students [14] and extraction and analysis of teaching evaluation index scores [15]. [16] used correlation coefficient analysis to determine the correlations between teaching evaluation indicators. [17] used partial correlation analysis and factor analysis to analyse the indicators that affect teachers' teaching quality and used multiple linear regression techniques to identify valuable indicator patterns in response to the results of the analysis.

To sum up, scholars have made certain achievements in teaching evaluation in recent years. However, more research has been conducted on the theory of teaching evaluation, less on the techniques of evaluation methods, and the techniques used are relatively homogeneous. Further research is needed on how to effectively use new technologies in data mining and machine learning to address the shortcomings of qualitative and quantitative evaluation in traditional teaching evaluation [18, 19].

2.3. Subsection. When including a subsection you must use, for its heading, small letters, 10 pt, left justified, bold, Times New Roman as here.

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3. Building a Classroom System in a Networked Environment

3.1. Changing the Concept of Education. Only with an updated educational concept can the online platform be used to serve classroom teaching. Under the guidance of the theory of dual teaching, teachers should consider the online platform, classroom teaching, and practical classes as a whole to achieve the teaching objectives, clarify the mechanism of division of labour and collaboration between them, and specify the teaching tasks to be completed by each of them.

3.2. Defining the Organisational Model of Classroom Teaching. In the classroom, the focus is on the relevance and effectiveness of teaching and learning, organising the teaching from the perspective of "learning."

Independent learning based on the web environment provides the conditions for personalised learning, allowing students to choose the pace and content of their learning according to their own personal circumstances, but this type of learning is bound to magnify its shortcomings if it is not controlled. For example, the arbitrary nature of learning and the reduced attention to teaching elements such as the capacity of "teaching" in the classroom will not ensure the integrity of students' "learning" and the full achievement of skills training objectives. In practice, the following measures can be taken: the structure of the online platform and the content of the resources are organised with due regard to the division of labour and collaboration with classroom teaching; the overall objectives of independent online learning are defined and a phased learning check plan is drawn up; communication with students is strengthened on the online platform, student problems are identified, and students are urged to have a clear plan for completing their independent learning, i.e., their specific learning is subject to the teacher's intervention and guidance by the teacher [20].

3.3. Integrating and Organising Teaching Resources. One of the characteristics of the Internet is the abundance of resources, but the relevance of these resources to the learning of the course is difficult to ensure. Therefore, in the teaching practice of the course, it is necessary to organise and integrate the relevant resources and to discover and create online resources that are highly relevant to the learning of the course. The first thing to do is to reorganise the original teaching courseware

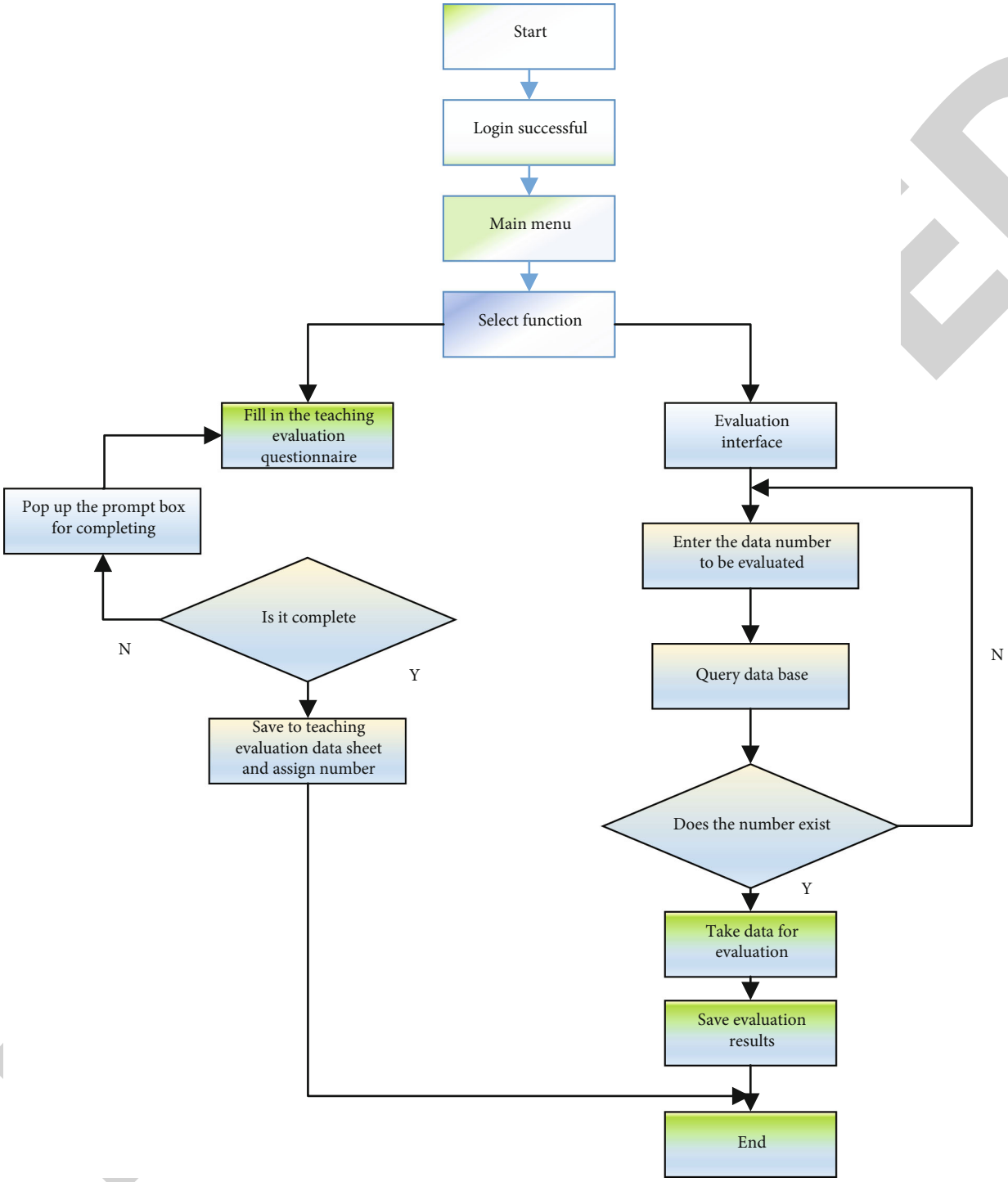

Figure 1: Specific evaluation process.

Table 1: Classification accuracy of the NB algorithm and the WNB algorithm.

Frequency	1	2	3	4	5	6	7	8	9	10	Mean value
NB	0.729	0.071	0.714	0.672	0.699	0.724	0.728	0.757	0.752	0.742	0.711
WNB	0.669	0.757	0.771	0.729	0.725	0.843	0.742	0.699	0.721	0.742	0.745

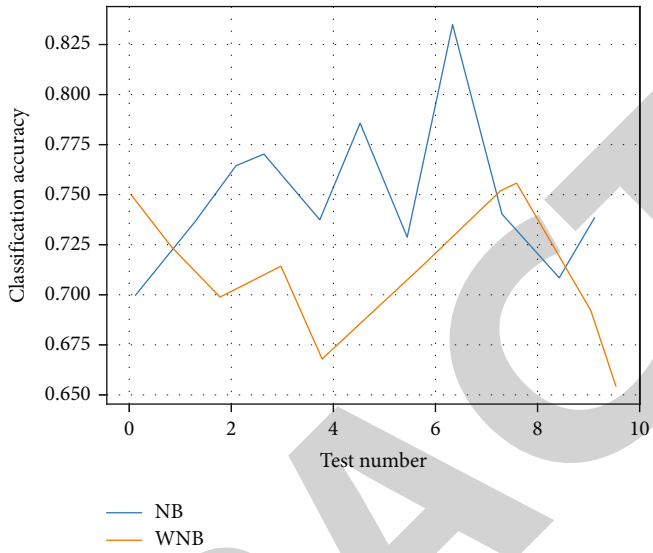

Figure 2: Comparison of classification accuracy between NB and WNB algorithm.

Table 2: Partial experimental results of the 2BP algorithm.

Real evaluation value	Grade value	Predicted calculated value	Error range	Prediction level
0.98645	Excellent	0.926	0.061	Excellent
0.94324	Excellent	0.908	0.034	Excellent
1	Excellent	0.908	0.071	Excellent
0.97724	Excellent	0.945	0.031	Excellent
0.98863	Excellent	0.952	0.035	Excellent
0.96354	Excellent	0.923	0.021	Excellent
0	Unqualified	0.291	-0.209	Unqualified

Table 3: Classification accuracy of BP algorithm and WNB algorithm.

Frequency	1	2	3	4	5	6	7	8	9	10	Mean value
BP	0.743	0.657	0.671	0.628	0.657	0.7	0.729	0.643	0.628	0.628	0.684
WAN	0.729	0.783	0.814	0.729	0.757	0.771	0.729	0.843	0.729	0.786	0.766

according to the needs of independent learning on the Internet: break it down into precourse courseware, postcourse summary courseware, and teaching courseware for use in the classroom, in the hope that this will not only meet the needs of independent learning on the Internet but also reflect the teachers' teaching ideas and realise the flexibility and relevance of classroom teaching.

The open nature of the Internet, in practice, of course, also through the course teaching platform, actively promotes students to provide professional application-oriented materials,

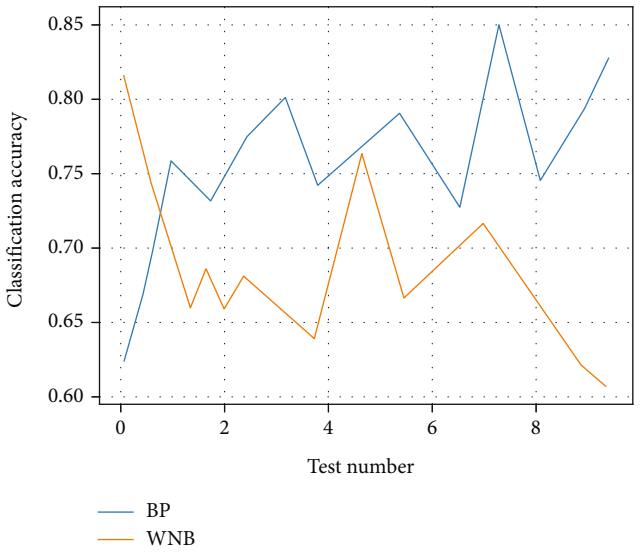

Figure 3: Comparison of classification accuracy between BP and WNB algorithm.

resources, student participation is both a requirement for teaching activities, but also to enrich the teaching resources, to achieve the teaching of professional application-oriented clues. The organisation, integration, and refinement of resources are therefore also part of this work.

4. Design of a Weighted Plain Bayesian-Based Evaluation Classifier

4.1. Weighted Plain Bayesian-Based Evaluation Algorithm. The plain Bayesian algorithm assumes that the conditional attributes are independent of each other in order to reduce computational overhead, and implicitly assumes that each conditional attribute is equally important to the decision classification, i.e., the weights are all set to 1. In practice, each conditional attribute is not equally important to the classification, so when all weights are set to 1 by default, the correct rate of classification is reduced.

In this paper, the weighted Naive Bayes (WNB) classification algorithm is used to assign a reasonable weight to the attributes according to their contribution to the classification, in order to maintain the high speed of the WNB algorithm and to reduce the impact of the assumption of conditional independence of the attributes on the performance of the classifier. The formula is shown below.

$$p(C_j|\mathbf{X}) = \arg \max_{c_j} p(C_j) \prod_{i=1}^{n} p(A_i|C_j)^{w_i},$$
$$p(A_i|\text{re1}) = \frac{\text{count}(A_i = a_k \wedge C_j)}{\text{count}(A_i = a_k)}, \quad (1)$$
$$p(A_i|\text{norel}) = 1 - p(A_i|\text{rel}),$$

where w is the statistic, when attribute A_i has a value of a_k and belongs to class C_j, its attribute weight is calculated as follows:

$$w(Ai, a_k, j) = \frac{p(A_i|\text{rel})}{p(A_i|\text{norel})}. \quad (2)$$

Therefore, the specific formula for the weighted plain Bayesian classification algorithm is as follows:

$$p(C_j|\mathbf{X}) = \arg \max_{c_j} p(C_j) \prod_{i=1}^{n} p(A_i|C_j)^{w(A_i,a_kj)}. \quad (3)$$

5. System Implementation

This subsection introduces the detailed design content of each part of the student evaluation module, including the login and registration of users, the collection of evaluation data, and the application of evaluation algorithms. The implementation flow of the overall evaluation module is shown in Figure 1.

The detailed design of each function is described as follows.

This includes administrator login, teacher login, and student login. The administrator mainly sets up the information of teachers and students, sets up the evaluation items, and views the evaluation results of all subjects being evaluated. Teachers can view their own teaching evaluation results, and students mainly evaluate the teaching process of their own subjects.

Mainly to realise students filling out teaching evaluation questionnaires online and submitting evaluation data to the server's database. Before submitting the data, it is necessary to check whether it is filled in completely, and if there is a case of filling in omissions, a prompt box should be given, and the data should be saved after the user has checked that it is filled in completely.

After the data has been successfully saved to the evaluation data table in the database, the system will automatically assign a number to the evaluation data for subsequent determination of the evaluation results.

The main implementation is based on the evaluation model of the weighted plain Bayesian algorithm. Upon entering the interface of the teaching evaluation algorithm, the number of the data record to be evaluated should be entered first, and the corresponding number in the database should be queried; if it does not exist, the user is prompted to reenter it, and if the number is found, its complete data record is extracted. The evaluation algorithm is selected for data analysis, and the evaluation results are calculated. The evaluation results are transmitted to the visualisation interface in real time so that they can be viewed by the user, who can save the evaluation results for enquiry as required [20].

6. Experimental Results and Analysis

The experimental environment in this section is the windowslO operating system, and the specific algorithm is implemented in the Eclipse + Pydev experimental platform using python 3.5 as the algorithm development language.

Experiment 1. NB and WNB algorithm classification accuracy comparison analysis experiment.

The experimental data was obtained from the evaluation database. 220 data records were randomly selected as the training set and 70 data as the test set for cross-validation experiments. Through 10 cross-validation experiments, the classification accuracy of the NB algorithm and the WNB algorithm was measured, and the specific experimental results are shown in Table 1 below.

From Table 1, a comparison of the classification accuracy of the NB algorithm and the WNB algorithm is shown in Figure 2.

In the field of teaching evaluation, most of the methods used in the current research are BP neural network methods, while this paper uses a weighted plain Bayesian classifier to construct an evaluation model and compare the efficiency with the traditional methods.

The BP neural network algorithm processes the training data set by normalising the original rating values (percentages:) to a decimal in the interval [0, 1], and by setting an error threshold, a model is formed which is used to predict the evaluation grades for new sample data. The test results obtained from the neural network algorithm training are shown in Table 2.

From the analysis of all the experimental results data, because the percentage-based rating values given by students were generally high during the actual assessment process, they were easily overfitted during the training of the model, resulting in generally high predicted grades. Therefore, after preprocessing, the percentage rating values were considered to be discretized into five-grade rating values, and data of different grades were randomly selected and mixed as the training data set, of which 220 data were in the training set and 70 data in the test set, to conduct cross-experimental comparison of BP network and WNB algorithm, and the experimental results are shown in Table 3.

From Table 3, a comparison of the classification accuracy of the NB algorithm and the WNB algorithm is shown in Figure 3 below.

7. Conclusions

This paper proposes a teaching evaluation model based on a weighted plain Bayesian algorithm. All teachers and students of local universities should adhere to the style of linking theory with practice, actively participate in urban construction, discover true knowledge in practice, draw nutrients of cultural innovation from rich social life, enhance students' innovative quality and practical ability, and "make real" the core value system through a broad vision and innovative spirit.

Data Availability

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

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