ISSN : 0974 - 7435 Volume 10 Issue 13

2014

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(13), 2014 [7492-7499]

Experience and influence of data mining in the analysis of english teaching quality in colleges

Lihua Huang

School of foreign languages of AnQing Normal University, AnQing 246000, (CHINA)

ABSTRACT

The data mining process, analyzing and solving the influencing factors in promoting the efficiency in students' learning progress, has a positive role in promoting the analysis of English teaching quality in colleges. This article combines the analysis of college English teaching quality and designs relevant experiences, in order to stimulate students' enthusiasm in learning. Through data mining, extended models are further researched, the exploration of the influencing factors in English teaching in universities is provided with appropriate theoretical and experimental support and the scientificity is positively guaranteed in the process of this study.

KEYWORDS

College English; Data mining; Teaching quality; Experimental analysis.

INTRODUCTION

From the perspective of college students in English learning, learning initiative is an important factor affecting the efficiency. It includes a lot of implicit and explicit factors, such as teaching methods, teaching models.
And teaching environment is a hidden factor. The influence of implicit factors in the students' learning progress and efficiency cannot easily achieved, so the model and matrix need to be constructed in order to effectively determine the efficiency in students' study, to make this analysis process about college English teaching quality a scientific exploration and an active role in data mining.

AHP EXTENDED RESEARCH MODEL BASED ON DATA MINING

Based on the process of establishing AHP traditional data models, the AHP extended model theory is introduced, further researched and discussed. In the process, the association rules in this technology and data mining process is used and combined, making the most of teaching quality analysis process to get it layered. Thus the development goals for the quality of teaching can be multi-angle analyzed[1]. The specific build process of AHP extended model is shown in Figure 1.

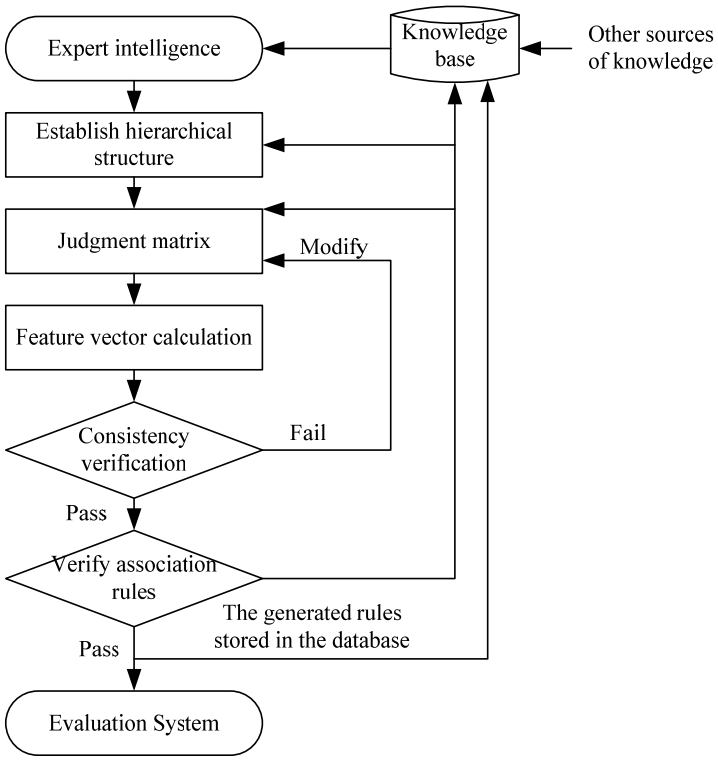

Figure 1 : AHP extended model based on data mining

Through the construction of the data mining process, the "consistency" is examined during the detection process, followed by appropriate management to carry out the inspection process of management rules. In this process, once discrepancy appears between the relevant rules in the event of data mining and college English teaching evaluation system, it will be effectively ruled out by the teaching evaluation system. However, the relevant rules of data mining and college English teaching evaluation system is able to maintain the appropriate match, then the logical knowledge will be deposited into the knowledge base. If not, a further cycle of the process and the establishment of its associated evaluation knowledge structure will be constructed to modify the existing index and by this analogy to gradually achieve the standards. Usually the process is defined as the establishment of low-level hierarchy. The following is the discussion of evaluation system of the extended model, so as to make the process of college English teaching quality analysis more comprehensive.
The establishment of a scientific construction of the hierarchical structure is through the effective use of expert intelligent and the establishment of the model of an effective education evaluation system. This idea was proposed by Professor Satie back in the seventies. He believes the system establishment process takes two dimensions --time and space, as a starting point, making the hierarchical model of the system can be further reflected.

The establishment of the system should be separated from the environment, thus making the whole process level embodied in a descending order and getting scientific and effective decomposition. Through the above discussion process, professor Satie's hierarchical structure will be divided into three layers:

The first is at the highest level which is referred to as the target layer. This level contains only one element, which is the expected target in the analysis process or the desired results[2].

The second is the middle layer which is often referred to as the criterion level. This level covers the intermediate links in the process of achieving the desired goal. It is not of the " unity " but can be composed in a multi-level which are defined as sub-criteria.

The lowermost layer is often referred to as the program layer, which means the required preparations to achieve the goal, including the implementation of the program. Here is the model -building process of the hierarchical structure. Specific construction steps are shown in Figure 2.

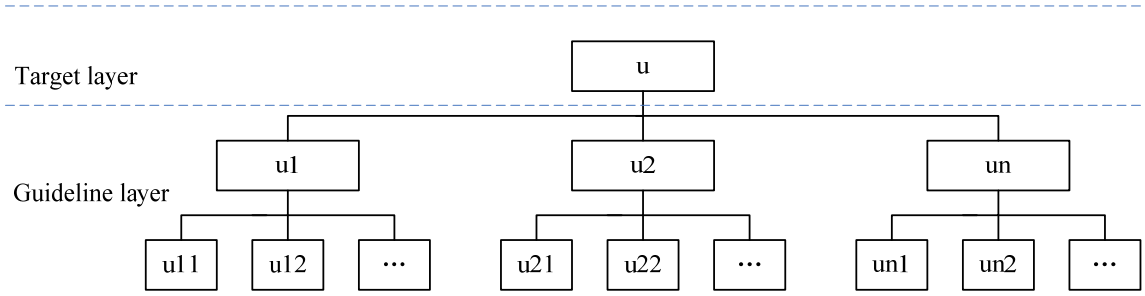

Figure 2 : General hierarchical structure model

The process of establishing a hierarchical structure usually involves analysis of the complexity of the problem and the level of detailed analysis of the problem. The greater complexity of the problem is, the more detailed the information required for analysis. Thus the establishment of hierarchical structure is more complex. There is no clear requirement for their number of the general level,thus with no “restriction”. In the process of building a standard layer, sub- criteria for each target dominated generally not more than nine, and in this context, the more sub- criteria are, the more difficult in comparing two goals. The structure of science is a core part of to solve the problem scientifically and effectively. Seen through this regard, an effective response to the latest knowledge needs to be understood, and use of various indicators between each level needs to be effectively made. In such case, the process of establishing a hierarchy is able to tend to be improved and have a positive impact on solving the problem. The definition of knowledge is an increasing knowledge database, whose fundamental source is basic theory, experience, and part of the rules of the internal model based on AHP Extended Data Mining generated in the corresponding fields.

Construct pairwise comparison judgment matrix

During the construction of hierarchical structure model,the relationship between the rule layer and the target can be determined. Assuming the u in a target layer as a criterion, then the sub-criteria and other criteria can be defined as U1.U2.U3 until Un. However, when raking the importance of the existence of sub- criteria for scientific sort, their weights will be ranked from high to low. When the importance weights of Un can be directly quantified, the important weight can be intuitively reflected. However, there are some important weights cannot be directly quantified and is difficult to acquire (such as economic, cultural factors, etc). And during the course of requiring an important weight, corresponding calculation process is needed to get the scientificalness reflected. With expert evaluation, the pairwise sub-factors is compared. With views effectively integrated, the corresponding judgment matrix can be formed[3]. When analyzing the impact generated by the target, only two criteria should be selected each time. The results are expressed in pairwise comparison scale indicating the pairwise comparison scale of the relative importance for u_1 and u_j, specifically shown as TABLE 1.

TABLE 1 : The pairwise comparison scale

importance degree	**definition**	**description**
1	equally important	two elements functioning equally
3	slightly strong	one element functioning slightly stronger than the other one
5	strong	one element functioning obviously stronger than the other one
7	very strong	one element functioning greatly stronger than the other one
9	absolutely strong	one element being stronger than the maximum intensity of another one
2,4,6,8	medium degree of the above	
Reciprocal value	when *i* and *j* are compared and assigned a scale value,the weights should be the reciprocal of the scale	

During the comparison process, the results obtained are shown as U_{ij}, the process of comparing the results of all pairwise comparisons forms a judgment matrix as follows:

$$U = (u_{ij})_{n\times n} = \begin{pmatrix} u_{11} & u_{12} & \dots & u_{1n} \\ u_{21} & u_{22} & \dots & u_{2n} \\ \dots & \dots & \dots & \dots \\ u_{n1} & u_{n2} & \dots & u_{nn} \end{pmatrix}$$

Pairwise comparison judgment matrix has a corresponding feature as follows:

$$U = (u_{ij})_{n\times n}, (u_{ij} > 0)$$

$$u_{ji} = \frac{1}{u_{ij}}, or\ u_{ij} \bullet u_{ji} = 1$$

From the above model features, it can be obviously seen that pairwise comparison judgment matrix U is naturally the same with reciprocal matrix. The description is as follows:

(1)Transposed matrix *UT* is also consistent with *U*

(2)Each row of U is the positive multiples of one line arbitrarily designated so that $R(U) = 1$

(3)The largest eigenvalue of *U* is $\lambda_{\max} = n$, the rest characteristic roots are 0

(4)If the corresponding $\lambda_{\max}$ eigenvectors of *U* is $W = (W_1, W_2, \dots, W_n)^T$, $u_{ij} = W_i / W_j$

It can be concluded from the above discussion that when U is as the "consistency" matrix form, max=n. When the eigenvectors are normalized, $W = (W_1, W_2, \dots, W_n)^T$. The *W* of $\sum_{i=1}^{n} W_i$ is called the Weight vector, indicating u_1 ; u_2 ; … ; u_n is the weight of *u*. On the basis of comparative judgment matrix, the feature vector W can be further calculated. If it does not pass the consistency test in the fourth step, it needs to be adjusted back in the matrix[4].

Calculate the weights

Calculating the weights needs to judge the feature vector corresponding to the matrix W. The common calculation method of feature vector is exponentiation, may root method, the sum product method. The sum product method is a common way to calculate weights, judging the largest eigenvalues of the judgment matrix and calculating the consistency.

EXPANDED MODEL IN COLLEGE ENGLISH TEACHING QUALITY ANALYSIS

Establishment of Evaluation Index hierarchical structure model

With the expert intelligence and combination with knowledge of the domain knowledge, the hierarchical structure will be constructed,based on the characteristics of teaching quality evaluation. Hierarchical structure model of the system is shown in Figure 3.

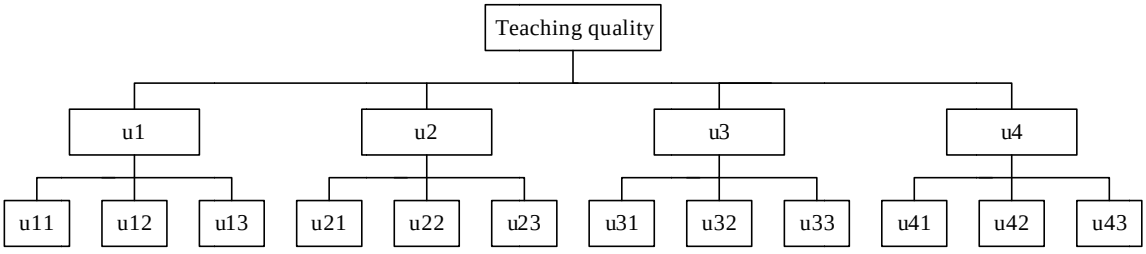

Figure 3 : Hierarchical tree structure model of Teaching Quality Evaluation System

In Figure 3 target layer is the "teaching quality" criterion level which is the evaluation indicator u_1 - u_4 from the student evaluation, peer evaluation form, expert evaluation and self- evaluation form, the following are the corresponding sub-indicators u_{11} - u_{13}, u_{21} - u_{23}, u_{31} - u_{33}, u_{41} - u_{43}, shown as TABLE 2:

TABLE 2 : Teaching Quality Evaluation in colleges

first class indicator	Second class indicator
U1 teaching contents	U_{11} Teaching objectives, consistent with teaching content requirements
	U_{12} Teachers' thorough understanding of basic theories, concepts, key and difficult points
	U_{13} Substantial and reasonable arrangements, focusing on the introduction of new achievements
U2 teaching skills	U_{21} Rational layout on the blackboard with clear layers
	U_{22} Fluency and accuracy in expression, thinking clearly
	U_{23} Teachers can use a variety of teaching methods, focusing on students' analysis and problem-solving abilities
U3 teaching attitude	U_{31} Teaching with enthusiasm, full of energy and serious investment
	U_{32} Abiding by teaching discipline the class schedule
	U_{33} Teachers teaches scientifically and strictly,dressed right
U4 Business and research capabilities of teachers	U_{41} Knowledgeable, able to absorb multi-disciplinary teaching theory and knowledge
	U_{42} With higher teaching and research capabilities
	U_{43} Some research capacity

First compare the indicators of the first guideline in pairs to make judgment matrix. Then compare the indicators of the second class in pairs to make judgment matrix further[5].

Making judgment matrix structure of pairwise comparison

According to TABLE 3 pairwise comparison scale, the use of expert judgment matrix using intelligent pairwise comparison method helps to get scores of the relevant elements pairwise comparison, shown as TABLE 3:

TABLE 3 : Judgment matrix

First class indicator U	U_1	U_2	U_3	U_4
U_1	1	½	½	1
U_2	2	1	1	2
U_3	2	1	1	2
U_4	1	½	½	1

Teaching contents U_1	U_{11}	U_{12}	U_{13}
U_{11}	1	1/3	½
U_{12}	3	1	2
U_{13}	2	1/2	1

Teaching skills U_2	U_{21}	U_{22}	U_{23}
U_{21}	1	1/2	½
U_{22}	2	1	1
U_{23}	2	1	1

Teaching attitude U_3	U_{31}	U_{32}	U_{33}
U_{31}	1	2	2
U_{32}	1/2	1	1
U_{33}	1/2	1	1

Teachers' knowledge level and ability U_4	U_{41}	U_{42}	U_{43}
U_{41}	1	2	2
U_{42}	1/2	1	2
U_{43}	1/3	1/2	1

THE EXPERIMENTAL DESIGNING OF DATA MINING PROCESS FOR COLLEGE ENGLISH TEACHING QUALITY ANALYSIS

Subjects, methods and sample characteristics analysis

The object and purpose of the experiment

1132 non-English major freshmen were chosen as survey objects during April to June in 2004 with students' making notable progress (MNP) as the objective evaluation indicator. Though CHAID (CHi-squared Automatic Interaction Detector) algorithm factors affecting the MNP was analyzed. (Note: In this experiment, under the same difficulty degree of a test students whose scores increase by more than 5% are regarded as the obvious progress standard of individual student.

Experimental Methods

This article uses CHAID algorithm to analyze the factors affecting the MNP. CHAID is a method, analyzing to target the optimal target by target selection, variable selection and clustering and used for classification of ordinal rank data. Based on optimal partition of given response variables and the filtered explanatory variables, and the significance of chi-square test of multivariate contingency table, the grouping is automatically determined, which usually sets good results with automatic classification of discrete data.

TABLE 4 : Sample Characteristics

Property name	Property values	Number of samples (a)	Proportion of the total sample (%)
Student gender	male	649	27.3
	female	483	42.7
Teaching methods	Rich multimedia teaching methods	746	65.9
	Little or inadequate multimedia teaching	386	34.1
Learning Objectives	Passing the exam	376	33.2
	Interest	594	52.4
	Looking for a job or going abroad	162	14.3
Teaching mode	Happy English	422	37.3
	University English (IVY A)	258	22.8
	University English (IVY B)	129	11.4
	New Horizon English	110	9.8
	High starting point of English	99	8.7
	Others	104	10.0
Students' overall evaluation of teachers	Excellent	640	56.5
	Good	422	37.3
	Average or poor	70	6.2
Students' extracurricular communication with teachers	much	221	19.5
	average	222	19.6
	little	689	60.9
teachers' qualifications	Doctor	109	9.6
	Master	909	80.3
	Undergraduate	114	10.1
Student evaluation of teaching materials	good	450	39.8
	average	512	45.2
	poor	170	15.0
teaching language	teaching in English	413	36.5
	teaching in Chinese and English	719	63.5
Teachers' scientific research level	High	271	23.9
	average	690	61.0
	low	171	15.1
Student evaluation of exams	relatively difficult	282	24.9
	Moderate	654	57.8
	easy	196	17.3
Grade in the entrance exam	The top 30%	332	29.3
	The top 30% - 60%	352	31.1
	other	448	39.6
The teacher type	Foreign teachers	165	14.6
	native teachers	967	85.4
total		1132	100

Sample Characteristics

Factors that affect the quality of student learning and teaching quality are given effective observation when conducting research and exploration. In the research, the tendency elements are surveyed which include students' learning targets, teachers' teaching methods,the main mode of teaching process,teachers' teaching types and so on (a total of 13 factors

that affect the quality of student learning). Among these factors, some are subjective factors, such as student learning objectives, and so on, while some are part of the objective factors, such as the learning environment [6]. There are some factors that are generated by two factors reflect the appropriate action, such as teaching methods. Specific data and sample are shown in TABLE 4.

The test results and the analysis process

The importance of the various factors effecting the quality of learning

In the process of research, the experimental results is reflected in the form of a tree diagram, with 52 nodes at the 95% confidence level in the decision tree. Here are the 15 important node. In the discussion, the efficiency of the students' individual performance does not represent the learning quality and efficiency. through the picture 4 it can be found that there are many affecting factors. But CHAID algorithm mainly determines grouping of multiple contingency table by chi-square automatically. It can be seen that the root factor has the most serious influence on students. Among 1132 samples, only 208 people were satisfied with their grades in two exams in the experiment, accounted for a total of 18.4 percent share of the survey samples. such a conclusion can be found in picture 4 that one of the important elements affecting the efficiency of students' learning progress is the purpose of the student 's learning, for example, comparison between students who treat study with interest and the ones who pass examinations helps to find that students who treat study with interest have as two times efficiency as the latter ones, while other factors have no such influence.

The impact of the effect of each factor analysis

In the construction of the learning efficiency decision tree, each node uses CHAID operation process, with scientific classification, in which data is able to fully reflect the related impact of student progress efficiency caused by each factor. we can express this law through the "if... then..." form. For example, in node 14, the rule is if, and, and, then. However learning efficiency is 14.6%. Calculation by this node can fully reflect the progress of the various factors that affect the efficiency of students learning. And this effect is mainly reflected in two aspects. The experimental analysis staff have a better intuitive understanding of the influence of different environments and different factors and the effect on students' study quality in college English teaching, so teachers are able to accurately grasp the teaching quality.

Each index node statistics (shown in TABLE 5) can be further quantitatively reflect the actual impact of the effect of each factor. For example, 44 samples of 8 nodes contains in TABLE 2 in which 13 to reach MNP and PMNP is 29.5%, PMNP ratio is 1.61. This indicates that the average PMNP node represents 8 of the taxonomic groups (ie, motivation is " to find a job or go abroad " and the teaching methods as " rich multimedia ") of PMNP and is 61% higher than sample collection.

TABLE 5 : Statistic indicators of some nodes

Node number N	8	6	5	1	4	3	21	18	9	14	13
A: Node that contains the number of samples	44	17	290	594	304	162	88	12	118	151	216
B: percentage of A in the total (%)	3.9	1.5	25.6	52.5	26.9	14.3	7.8	1.1	10.4	13.3	19.1
C: significant academic performance progress in the number of samples	13	5	71	132	61	31	16	2	18	22	23
D: percentage of C in the total (%)	6.3	2.4	34.1	63.5	29.3	14.9	7.7	1.0	8.7	10.6	11.1
PMNP (%)	29.5	29.4	24.5	22.2	20.1	19.1	18.2	16.4	15.3	14.6	10.6
E:PMNP Magnification E	1.61	1.60	1.33	1.21	1.09	1.04	0.99	0.91	0.83	0.79	0.58

Measures to improve the quality of targeted teaching

during the course of the student progress efficiency decision tree, it can help teachers to teach with targeted changes. For example, the underlying motivation for the students ' study changes into interest in learning,However, in conventional teaching, teaching methods or teaching mode can not meet this, Then teachers should get the appropriate changes in teaching methods, such as node 13 which makes a contrast with node 18(shown in TABLE 5)[7]. However, in contrast to the process node 13 and node 18, it can clearly be seen that students intrinsic motivation plays a positive role, but in the conventional teaching this aspect has a more obvious impact on students. And for this phenomenon is usually interpreted that happy English mode brings higher efficiency than conventional English teaching. Students 'overall ability grows, but also produce corresponding psychological dependence on these teaching methods. Thus the effective use and development of teaching tools should also be further strengthened in order to continuously improve the efficiency of students' learning.

CONCLUSION

There are many factors affecting the quality of university English teaching,including students' learning objectives, learning motivation. As for teachers, teaching methods, teaching models are the important factors affecting the quality of teaching in universities. But all the factors are of explicit and implicit function, and can not guarantee the quality of conventional teaching. In this paper, data mining to build an expansion model and establishing a matrix for teachers are

discussed, which gives further exploration on teachers, students and the dominant factors. All the these are verified by teaching experiments and ensure that this paper is of strong rationality.

ACKNOWLEDGEMENT

Fund Project: the research part of English national specialty project of Ministry of Education, reform and practice of comprehensive research of normal English major (Item Number TS12154)

REFERENCES

[1] Cheng mian, Zhang Yuan, Lu Guohua; Classroom Teaching Quality in Agricultural Universities--based on the Survey of Hebei Agricultural University[J], Heilongjiang Animal Husbandry and Veterinary, **6**, 204-206 **(2014)**.

[2] Zhang Weijin; Based on analysis of standard of quality teaching about principal component[J], China Institute of Industrial Relations, **28(2)**, 115-118 **(2014)**.

[3] Liu Yaofei; Research of Evaluation System of Teaching Quality in Independent Institutes[J], Education Review, **6**, 12-14 **(2014)**.

[4] Jiang Hongxin; Reflections on national standards on undergraduate teaching quality of English major Foreign Language Teaching and Research[J], Foreign language bimonthly, **46(3)**, 456-462 **(2014)**.

[5] Cai Hongmei; Construction of Evaluation Index System of College Teaching Quality[J], Higher Engineering Education Research, **5**, 119-121 **(2014)**.

[6] Qian Jingzhu; constraints and countermeasures to university classroom teaching quality in the information age[J], China Adult Education, **5**, 119-121 **(2014)**.

[7] Wang Lei, Li Cuixia, Zhang Yongqiang; Research and Exploration of Teaching Quality of Experimental courses in Management college[J], Laboratory Research and Exploration, **33(3)**, 249-254 **(2014)**.