Research on the Teaching Reform of Environmental Specialty Courses based on Big Data Platform

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Abstract
Data mining is a kind of computer science decision-making process, through parallel computing and visualization analysis of large data, make a reasonable judgment and logical reasoning. In this paper, the authors analyze the teaching reform of environmental specialty courses based on big data platform. With the evolution of the original environmental problems and the emergence of new environmental problems, the development of environmental science should also be adjusted accordingly. Through the analysis of the change of the employment market, this paper puts forward the design scheme of the curriculum system, and makes the reform from the direction of professional development, the structure of the curriculum system and the experimental training, and strengthens the connection between teaching and practice.

Keywords: Data mining, Artificial neural network, Teaching reform, Environmental specialty

1. INTRODUCTION

Widely used in the rapid development of database technology and database management system makes the data stored in the database increases rapidly, so behind the huge data that contains a lot of useful information, people look forward to more in-depth analysis, in order to fully use these data(Krstev, 2014). Although the existing database management system through the query, sorting and statistical functions can be part of the surface information of the data, however, cannot be hidden behind these data is more important, deeper level of information and knowledge mined and utilized, cannot be predicted from existing data trends, and to provide advice the purpose of service for decision-making, thus leading to the huge data but lack of knowledge phenomenon(Murakami, 2011; Dai, 2012). How to effectively use and deal with a large number of data has become a topic of common concern of today's world. With the rapid development of database technology, statistics technology, artificial intelligence and parallel computing technology and integration, data mining technology should be from time to time, the technology of data mining is to find the hidden behind the data the valuable information and knowledge from large amounts of data, it has been widely used in many fields, and have achieved good results give the correct decision, people also brought a lot of help.

China's higher education from elite to mass change of the national higher school enrollment has expanded each year, in order to facilitate the teaching and employment of the daily management work, all colleges and universities are using computer and database technology to establish the corresponding information system. In addition, all kinds of colleges and universities in order to facilitate the digital management, the daily management of the use of student management system, teaching and educational system and employment system also store a lot of data(Gangopadhyay, 2011). Therefore, many scholars at home and abroad, the application of data mining technology in the field of education and teaching, in order to dig out the knowledge from these data and a lot of valuable information to guide the development of education and teaching, so as to promote the scientific decision-making(Valkenburg, 2006). The objective background of China's environmental problems based on the practical needs and social development, the cause of the rapid development of China's environmental protection, environmental professional heat gradually, gradually expand the scale of enrollment, ushered in the golden period of development. Environmental professional shoulders the important task of cultivating the future environmental technology and management talents for the country. As a new interdisciplinary comprehensive discipline, it is not only an unprecedented opportunity, but also a new challenge. The urgent need to build a scientific and reasonable professional environment, the whole process of the undergraduate knowledge system, based on the characteristics of setting training objectives and supporting the teaching plan, to meet the social demand for talents, to better solve the environmental problems of China's service.

2. DATA MINING THEORY

2.1. Data mining
Data mining is also called knowledge discovery based on database, data is from a large database to extract effective, hidden, potentially useful and ultimately understandable information and knowledge of the non trivial
process. Data mining is a kind of computer science and is closely related to the process of decision-making, it is mainly through machine learning, expert system, pattern recognition, statistics, database technology, parallel computing and visualization techniques to fully automatically analyze the organization or enterprise data, make reasonable judgment and logical reasoning, and then dig out the potential value of the information and knowledge in helping decision-makers to adjust the market competition strategy, to reduce the risk, to make good decisions.

![Data mining process](image)

Figure 1. Data mining

According to the difference between statistical and non statistical, data mining can be divided into two different types: hypothesis driven and discovery driven data mining. The biggest difference between the two lies in the process of getting information. Hypothesis driven is often referred to as validation driven, and it is mainly devoted to the hypothesis that a model or relationship is implicit in the data[8-9]. Validation of driving data mining mainly depends on the decision maker or business analyst to find in the data. In the first place, we often need to make some assumptions before data query and data mining, then we can use the results of mining to explain the results. This method has two potential problems, one is the lack of information and knowledge of decision maker or business analyst must first to show the data to make a guess, which is limited to their organization, data, technology and industry level of understanding. Another problem is that the quality of the information and the quality of knowledge depends on the interpretation of the results of the decision makers or business analysts to dig out[10]. Query languages, statistical tables, graphs, and multidimensional analysis are the main techniques used to validate the drive. Discovery driven data mining is also called knowledge discovery, which is mainly to find the hidden relationship and patterns in the data. It is through the data mining software to automatically find and mining of new knowledge in the business data. However, a successful data mining should be an organic combination of hypothesis driven and discovery driven by these two types of data mining. Hypothesis driven data mining allows decision makers or business analysts express and validate individual and organizational knowledge, and found that the driven data mining is to refine the knowledge and information that is not assumed before recognition.

![Data mining software](image)

Figure 2. Data mining software

2.2. Data mining process
Data mining is a complete man-machine interaction, iterative process, usually more than each other there are related steps, such as definition, data selection, data preprocessing, data transformation, data mining, model interpretation, knowledge evaluation etc. The process of data mining is illustrated in Figure 3. The corresponding steps in the process are described as follows:

1) **Definition of problem**: Accurately identify the definition of the problem to be excavated, to clarify the subject and target of mining is the cornerstone of the success of data mining. Before the preparation of useful data, data mining related personnel must clearly understand the end user requirement, clarify the background knowledge, understand the relevant application situation and the process of data mining in the data mining algorithm.

2) **Data selection**: The key point of data selection is to determine the target data, according to the needs of end users, experts in related fields under the guidance from the original database to extract the relevant data or samples into meaningful new target data set. In this process, the main use of some of the database operations on the original data set to deal with.

3) **Data preprocessing**: Will determine the good data for further processing, extracted data consistency and integrity check data, and remove the useless data mining target deviation, cleaning noise data, data type conversion, according to the data characteristics and changes of the selected data sets, the calculation data using statistical method to derive the vacancy.

4) **The data transformation**: Then according to the pre processed data has been the target task of data mining, in order to eliminate the redundant features in the data, it is usually used for other operations by using the methods of projection or database to reduce the number of data set variable or attribute.

5) **Data mining**: To determine the type of knowledge mining, and then select the corresponding data mining algorithm, because the different types of knowledge by using data mining algorithms are not the same, such as association rules, classification, clustering, summarization, the form of expression of their results completely different. After the algorithm is determined, the appropriate data mining algorithm is selected to select the appropriate model and parameters. There are two ways to choose the algorithm: one is based on the data of different features, select the corresponding algorithm, the other one is according to the needs of users, some users need to describe the results, some users hope to get the prediction accuracy as high as possible results.

6) **The mode of interpretation**: To explore the knowledge and information to explain, to remove those redundant by machine or user evaluation found or irrelevant information and knowledge, in addition, if the knowledge and information can not meet the needs of users, you need to find out the reasons and repeated in some extraction processing steps to get back in the. Such as re selection of data, a data mining algorithm or change the data mining algorithm in some of the parameter values, so as to dig out more effective, more accurate knowledge.

7) **The evaluation of knowledge**: This step is to reveal the knowledge and information to the user can understand the more intuitive form to show to the user. Because the knowledge and information which are found through the above steps are ultimately to be oriented to the user, therefore, it should be the most intuitive way to understand the final expression of knowledge and information. Therefore, the work of data mining also includes the visualization of knowledge and information processing and rule conversion

![Figure 3. The data mining process](image)

2.3. Neural network
Artificial neural network is a kind of information processing method, which is inspired by the biological neural system. It simulates the structure of biological neural system. The success of the artificial neural network model has many kinds, but the most perfect, the most widely used theory is the main error back-propagation model. The network model has good function approximation ability, through the study of sample, and can well reflect the complex nonlinear relationship between the input/output object selection. The general BP model of three layers of non circulation network. With M input nodes and output nodes of the BP network n. Because the network contains a large number of nonlinear nodes, so it can be highly nonlinear. For a group of learning samples, it can be considered that there is a mapping G, which makes the:

\[ y_i = G(x_i) \]  

This network is actually learning sample set, automatically find an internal expression, mapping F, which in some indicators, F enough approximation of the G. BP network, as long as there is plenty of hidden nodes, the mapping network can be arbitrary input to output. A represents the sum of the inputs of neurons, corresponding to the biological membrane potential nerve cells, called the activation function; y neuron output; these neurons and the threshold:

\[ y = f(A), A = \sum_{i=1}^{m} w_{ij} x_i - \theta \]  

The study of the neural network is to produce a desired output for a given input, which requires the adjustment of the network constantly connected arc weights. If arbitrarily set the initial weights of W_{ij} network, the threshold and the learning factor Z, then for each input mode P (O_{pj}) network, the actual output and the expected output (y_{pj}). Error:

\[ E_p = \frac{1}{2} \sum_j (y_{pj} - Q_{pj})^2 \]

The total error is:

\[ E = \frac{1}{2\rho} \sum_p E_p \]

If the total error:

\[ |E| \leq \Omega \]

\( \Omega > 0 \), then the learning success, the algorithm ends; otherwise, the next step. Set up learning sample set including M sample mode, the output is recorded as Q_{pj}, then:

\[ Q_{pj} = f(a_{pj}) = \frac{1}{1-e^{a_{pj}}} \]

\[ a_{pj} = \sum_{j=0}^{N} w_{ij} Q_{pj} - \theta_j \]

The connection weights of W_{jt} are modified according to the formula below:

\[ W_{jt}(t+1) = W_{jt}(t) + ZW_{pj}Q_{pj} \]

\[ \theta_j(t+1) = \theta_j(t) + UW_{pj} \]

Great influence learning parameter value on the learning speed of the BP algorithm. In general, the greater the parameter value, the error correction made by the greater value, learning faster. But too large, will cause system oscillation, but reduce the learning performance, caused no convergence. Optimal parameter value is difficult, but after several debugging will be able to find the appropriate parameter values.
3. ANALYSIS ON THE INFLUENCING FACTORS OF ENVIRONMENTAL PROFESSIONAL EMPLOYMENT

3.1. Problems in the employment of college graduates

The structural contradictions of employment: from a macro perspective, the contradiction between supply and demand contradiction in employment reflects the structural mismatch between supply and demand, extreme hand "working people do not, job skills and technical positions to recruit talents; on the other hand there was no job, the job management positions and job seekers oversupply.

From the requirements analysis shows that the industry demand for talent is great for marketing, machinery manufacturing, construction and real estate, the relatively competitive position is the administrative management, accounting, lack of social demand for agricultural, financial and professional literature and science professional, therefore, the structural contradictions of the employment of College graduates. Some of the popular professional graduates and excess, but there has been a large part of the popular professional employment needs.

- The gap between the individual ability of college students: the supply and demand in employment, not only in the number of graduates and job supply, but also reflected in the ability of college students and the needs of employers to match the. Through the use of the unit of the interview and the questionnaire survey of college students, found that there is a gap between the two. Nearly 3/4 of the employer's most important is the sense of responsibility, followed by the team spirit, moral integrity, communication skills. For this problem we found that the employing units of students' personal qualities more attention, and the students' academic performance and foreign language performance requirements are not high. A questionnaire survey of college students: "you think you have the following abilities?" The top three are: obtaining a variety of skills certificates, ethics and team spirit. Through the investigation on the two aspects of the discovery, although the ranking is the same, has great difference with the actual needs of students and employers ability but, attention the employer is responsible, but the students think the employer will focus on various skills certificate, did not think of the importance of responsibility to this point.
3.2. Analysis of factors affecting employment

The government's policy intervention has a lot of help to alleviate the pressure of College Students' employment, but the implementation of the employment policy of university students has not achieved the initial goal of government intervention. In the past, entrepreneurship is a very difficult thing, the government in laws and regulations, the number of funds, management and entrepreneurship training on helping provide defect data show that China's small and medium enterprises in the quantity and quality are far behind the developed countries. College Students' entrepreneurship policy system has been established, policy support, various departments actively cooperate with the support of entrepreneurship from both tax policy, financial policy, training policy and organization system have made great breakthrough. Overall, college students' entrepreneurial policy belongs to the government leading. However, the 61.4% have entrepreneurial aspirations of the students, 35.2% students do not understand the relevant policies of the enterprise, the rest of the students think that the existing procedures cumbersome, professional limited, policy implementation is not in place and the lack of guidance problems. College students should be rich and colorful forms of entrepreneurship, whether it is science, art, or art class students can work through the employment channels. All parts of the establishment of venture capital funds, most venture fund aims to encourage technological entrepreneurship and innovation of science and technology enterprises, for the liberal arts students, the equivalent is grounded in the door, the fund's access threshold standard is in accordance with the development of science and technology talents, explore the support technology and high technology enterprises.
The problems of higher education structure and market demand are reflected in the following aspects:

1. **The lack of scientific professional settings**
   University discipline distribution is the most literature, management science, law, economics and professional settings; the high repetition rate is: professional English, accounting, computer application technology, logistics management, electronic information technology, economic management etc.. Whether it is college or college; whether the characteristics of colleges or universities will set up the above professional. These liberal arts majors, the cost of running a school is relatively low, and the higher income is higher. These professional with obvious characteristics of the times, it is not mainly driven by the demand of the labor market, more is the result of government policy oriented. Such a background, the outstanding problem is caused by the supply of talent is too concentrated, the single type of talent, more than the market demand. The professional structure of college students and the market demand dislocation, resulting in structural contradictions in employment. The new professional settings are influenced by social development, although some colleges adjust professional settings made some achievements, but most of them is quick, a new set of professional can be divided into four kinds, one is the source for type. The purpose is to recruit more students, the number of students, the education fund provided by the City Board of education increased accordingly. Two is history dependent. The use of the original teachers to set up a new professional. Three is the market oriented type. Too much emphasis on market demand, but did not see the trend of market development, do not consider the strength of teachers, which door professional popular on what kind of professional, blind income students. Four is to disperse the employment pressure type. In order to alleviate the employment pressure, the dispersion is too concentrated in a professional, and the creation of the original professional similar to the new professional.

2. **Professional structure and industrial structure dislocation**
   The government's support to the industry policy will affect the development of different industries, the adjustment of industrial structure and the change of economic growth mode, the employment of college graduates will also bring the corresponding impact. Actively adjust the industrial structure change a lot of talent demand, which requires the training mode of higher education and economic industrial structure adjustment to adapt to, otherwise, will appear the employment difficulties of college graduates. The overall structure of the professional is not tight with the pace of industrial structure, the shortage of the second industry in urgent need of professionals, while the third industry talent excess cannot provide adequate employment opportunities, employment competitiveness enhancement. Government can help universities out of the predicament, this dilemma is not only with the ability of college students can be improved. University professional structure adjustment failed to meet the needs of the industrial structure adjustment, and the dislocation between the two is a factor in the employment of university graduates.

4. **TEACHING REFORM OF ENVIRONMENTAL SPECIALTY**

4.1. **Environmental professional training objectives**
   The basic research object of environmental science is "man and environment", which can be regarded as a science to study the interaction between man and environment. Compared with the traditional disciplines of environmental science is developed in the study of environmental problems in the process of social economic...
development, such as air pollution, water pollution, global warming and the reduction of biodiversity, with distinct characteristics of the problem oriented. With the evolution of the original environmental problems and the emergence of new environmental problems, the development of environmental science should also be adjusted accordingly. Environmental science is a natural science and social science research in the traditional comprehensive process of environmental problems, the system research will involve chemistry, physics and sociology, economics and law and other traditional disciplines. To study and solve environmental problems, it is necessary to give full consideration to the comprehensive application of the knowledge of various disciplines. Environmental science is a social application subject, to provide decision support for the development strategy and environmental problems in countries and regions, providing solutions for pollution treatment enterprises, to provide the necessary knowledge and information consulting services to the public.

Specifically, talent training objectives can be divided into two categories: one is the profound science and engineering based personnel (and with the knowledge of social science, two) has a profound social science based talent (and with the knowledge of natural science). In the field of learning to be thick, micro level proficient in the relevant knowledge and skills, while at the same time in the entire field of environmental learning to be broad, macro understanding of the overall development of the field and research frontier. The environmental professional students must have the knowledge reserve or the quality of the multi-disciplinary knowledge. Only by reflecting the knowledge structure of "comprehensive cross type", can we cultivate qualified talents who meet the needs of the society. First of all, students understand and grasp the reality of environmental problems, causing their own thinking and learning interest, and then a comprehensive study of natural science and Humanities and social sciences. To some extent, the basic principles and methods of environmental science are systematically mastered. Finally, according to the specific field of their choice, in-depth study of environmental expertise in a certain aspect, including environmental science and environmental knowledge of Humanities and Social Sciences, in turn according to need to supplement the corresponding humanities and social science and natural science knowledge.

4.2. Design of compulsory core curriculum system for Environmental Specialty

Specifically, the basic required courses in Colleges and universities should pay attention to reflect the characteristics of environmental disciplines, only the completion of these courses can truly become students in the field of learning. The course selected according to the greatest common divisor of the knowledge system of the professional direction, each professional must be learning. The basic required courses of the college are dominated by the college, which is in accordance with the academic norms. There is a clear logical and temporal relations from the view of the whole learning process between each course, the organic combination of various courses, the compulsory curriculum system of the undergraduate constitute a "large class", from "environmental problems” to the introduction, basic knowledge, professional knowledge, the final integration, apply the knowledge to solve practical the problem. The design of the whole course system is based on the idea of combining the first (professional basic course) with the characteristic curriculum, which is also consistent with the goal of mastering the macro and micro leading talents. In the course of setting time, a major environmental problem through the course of environmental problems and cognition, through a large number of cases and the introduction of knowledge, the greatest degree to mobilize the enthusiasm of the students learning environment professional; second is through environmental science, environmental engineering, environmental monitoring and testing of professional courses reinforce discipline basis; the third based on Environment Microbiology, environmental chemistry and environment research methods courses to enhance the professional level, the curriculum research methods combined with professional environment strengthen the systematic thinking and specific tool model; fourth case environmental decision analysis, comprehensive study integrated three years of knowledge to solve problems. At the same time, in the whole learning process, through the practice of curriculum (cognitive practice + subject + professional practice), the students continue to deepen the understanding and application of theoretical knowledge. Based on the curriculum system, with the increase of the grade, according to the student's professional interest in the school will provide a variety of professional curriculum modules and research learning project for students’ elective, promote the development of personalized. At the same time, on the basis of improving the knowledge system, we need to establish the corresponding supporting system. Such as the establishment of the backbone of the course team composed of teachers, design and improve the curriculum outline research system, the establishment of the system of lectures and teacher-student communication system, as well as the preparation of relevant teaching materials.

From the perspective of the current employment of environmental professionals, we believe that we can gradually develop the direction of professional development. With the development of China's economy, the real estate industry has been rapid development, for building decoration industry service quality disputes arising from the increasingly fierce, especially the problems of indoor environmental pollution is closely related to the people health has become the focus of the debate, thus a large number of indoor environmental monitoring and control of the company came into being, and have indoor environmental monitoring and control technology professionals are relatively scarce. This provides us with an excellent historical opportunity for the development
of indoor environmental testing. At present, the pollution control industry, accounted for a large proportion of water pollutants, many Environmental Engineering Company are in water pollution control engineering industry, from a technical point of view, the key lies in the pollution control process equipment design, and related disciplines such as chemical industry, construction, water supply and drainage, environmental professional advantage to understand the degree of pollution control process is more thorough.

5. CONCLUSIONS

The professional environment of market demand began to play back significantly after a few years ago, after a contraction, the employment unit with various Environmental Engineering Company as the main body, but also put forward higher requirements for professional skills of graduates and technical management; for these new circumstances, we believe that the reform from three aspects of professional development of course system, structure and experimental training, strengthen teaching and practice. Only in the continuous reform and exploration, environmental monitoring and management to achieve greater development. The trend of the future development of the talent market is that there are new knowledge, high skills, good quality of talents have employment opportunities, rather than the identity of College students. So college students should have a sense of crisis, should pay attention to improve their comprehensive quality. Such as often go to the library to study integrated knowledge, actively participate in class activities, community activities, in the extra time or during the winter and summer vacation time to find a part-time job, etc.. College students should also cultivate good psychological quality, enhance self-confidence, improve psychological endurance and anti frustration ability. Universities should be based on market demand, the establishment of learning base, strengthen the cultivation of students' comprehensive ability, or the establishment of a joint training system with the employing units. Establish a smooth flow of information transfer mechanism, improve the employment guidance service system, to guide the employment of College students. The employing units should establish a people-oriented concept of the people, the college students into their loyal employees, and certainly their value, to stimulate their passion, their training into a suitable organization development of the excellent talent.

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