AI Curriculum Reform Based on Scientific Analysis Algorithm

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Abstract-The artificial intelligence technology specialty registered in vocational colleges should do a good job in teaching for training application-oriented, skilled and practical talents. Taking the teaching work of the specialized course of artificial intelligence as an example, this paper introduces how to use IBM SPSS as a data statistical analysis tool, take students' grades as data samples, and obtain reliable data results after data collection and preprocessing, modeling, analysis, and calculation. Subsequently, the results were analyzed in detail, and as an important basis for curriculum reform. In the article, the relevant algorithm and operation process are also introduced in detail, and other teaching arrangements of the course are also mentioned. This may serve as a way for higher vocational colleges to exchange experience in the course reform. This is also conducive to the better development and implementation of precision teaching in higher vocational college.

Keywords-analysis algorithm based on IBM SPSS; course reform of artificial intelligence; precision teaching

1 INTRODUCTION

On July 8, 2017, the State Council issued the "Notice on the Development Plan of the New Generation of Artificial Intelligence", which is the first national level artificial intelligence development plan in China [1]. According to the plan, the development of AI has entered a new stage: especially driven by new theories and technologies such as mobile Internet, big data, super-computing, sensor networks, brain science, and the strong demand of economic and social development, AI has accelerated its development, showing new features such as deep learning, cross-border integration, human-computer collaboration, open group intelligence, and independent control. We will seize the global commanding heights of AI by 2030, accelerate the training and gathering of high-end AI talents, and improve the discipline layout in the field of AI. On April 3, 2018, the Ministry of Education issued the "Action Plan for Artificial Intelligence Innovation in Colleges and Universities", which requires "to deploy AI related majors according to the national and regional industrial needs, and increase the talent training in the field of AI" [2].

According to the information on the Internet: In 2022, 95 undergraduate universities across the country had been approved to major in artificial intelligence，438 colleges have opened AI majors. According to the Innovation Alliance information, there are 1016 vocational colleges in China that have successfully filed AI technology service (application) expertise, laying a foundation for the training of AI application-oriented, skilled and practical talents. The original

intention of school education is to cultivate talents for the society, so it is necessary to adjust the majors of universities according to the needs of society [3].

2   LATEST PROGRESS IN ARTIFICIAL INTELLIGENCE APPLICATION

In recent years, with the development of computer technology/network technology/big data technology, the application of artificial intelligence has made great progress. On July 28, 2022, the 2022 Global Digital Economy Conference "Artificial Intelligence Drives the Future Industry Forum" was held in Beijing, and the China Academy of Information and Communication Research, together with the National Engineering Research Center for Deep Learning Technology and Applications, released the Development Report of Deep Learning Platform (2022) [4]. According to the report, with the maturity of technology, industry, policy and other environments, AI has stepped into the golden decade of industrial empowerment with the goal of large-scale application and value release, having passed the power generation and reserve period of technology theory accumulation and tool platform construction. With the large-scale implementation of artificial intelligence, building an intelligent ecological platform based on the deep learning framework has become the common choice of domestic and foreign technology giants.

The report pointed out that the autonomous and controllable full stack platform and ecosystem developed by Baidu accelerated China's technological inclusion and industrial empowerment, which is an important part of building a domestic ecosystem. Based on the demand of industrial practice and application innovation in China, this system is making continuous efforts in the construction of community ecology, and its advantages are gradually showing. Among the numerous platform services, it has a leading edge in terms of   scale and technology application capabilities.

The teaching in our colleges and universities should adapt to the progress of the times. At present, the teaching reform is imperative.

3   TEACHING REFORM OF ARTIFICIAL INTELLIGENCE APPLIED TECHNOLOGY

In 2020, our school set up the major of artificial intelligence technology application and begun to recruit students. The second batch of enrollment had been in September 2021. In March 2022, we conducted a pilot course reform for the second batch of students. With the first year of teaching experience, we have done a lot of work on the talent training program, curriculum, teaching content, synchronization and collaboration of teaching and teaching research, scientific evaluation of teaching effects and many other aspects of the AI technology application specialty. These works are the concrete embodiment of our school's reform direction of "precision teaching", and will certainly become the normal teaching reform task in the future.

3.1 Teaching Content

After analyzing the previous courses and their teaching contents, we started from the actual situation to mediate the course contents. After the section "Course overview", five main contents are arranged, which are "Data Science Mathematics Foundation", "Machine Learning Technology Foundation", "Data Mining Technology Foundation", "Introduction to Artificial Intelligence Development Platform" and "Utilities and Applications (Optional)".

3.2 Practical Operation and Experimenst

In the teaching content, all chapters have detailed practical examples, and the operation process and calculation results are given.

3.3 Examination Contents and Methods

We have abandoned the questionnaire based examination method and adopted a new examination method in which students use computers to solve problems.

3.4 Scientific and Standardized Curriculum Summary and Examination Paper Analysis

Our approach is as follows.

As the sample data involves personal information, the student name is omitted in the statistical table and represented by symbols. In the following table, the cell content in column A represents the student's name, and the cell content in column B corresponds to the student's score. The datasets in the following table have been cleaned and eliminated the non-standard data.

Let's see Table 1, these are student's transcript.

Table 1 Student's Transcript

A	B	A	B	A	B	A	B
107	87	213	97	201	66	115	76
116	89	220	72	104	80	112	90
121	95	208	71	108	82	204	60
214	94	121	77	113	80	216	73
120	94	101	75	218	71	104	78
110	95	122	86	202	79	102	60
121	87	215	95	207	80	210	86
219	93	106	77	212	77	221	77
203	81	205	70	222	78	104	80
118	74	119	60	103	84	217	60
209	82	211	67	111	87	117	78
109	87						

IBM SPSS is a series of software products for statistical analysis, data mining, prediction analysis and decision support tasks, which can be trustworthy, so we use it as a tool. The collected data are analyzed effectively. The operation process is as follows [5].

Because we have completed the data collection of student scores and conducted necessary preprocessing, we can use this dataset directly.

The following is the process of data statistics and analysis used IBM SPSS. The specific operation process of data input is shown in the Figure 1 below. The sample data are from Table 1.
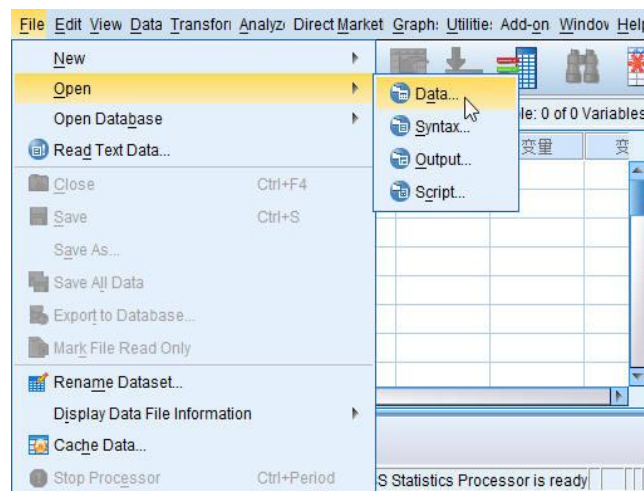
Figure 1 The Process of Importing a Dataset by IBM SPSS

In descriptive statistical analysis, the operation of frequency analysis is shown in the following Figure 2.
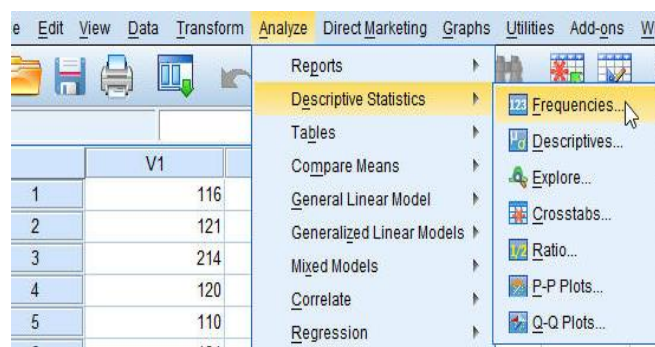
Figure 2 Operation Process Frequencies Analysis

In the descriptive statistical analysis, using frequency analysis, we can find some statistical laws. Although these laws are only superficial features, we will do more detailed analysis in the subsequent operations.

The parameter selection operation for displaying the normal distribution of data with histogram is shown in the following Figure 3.
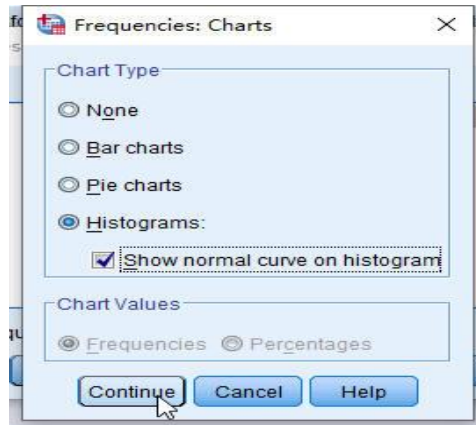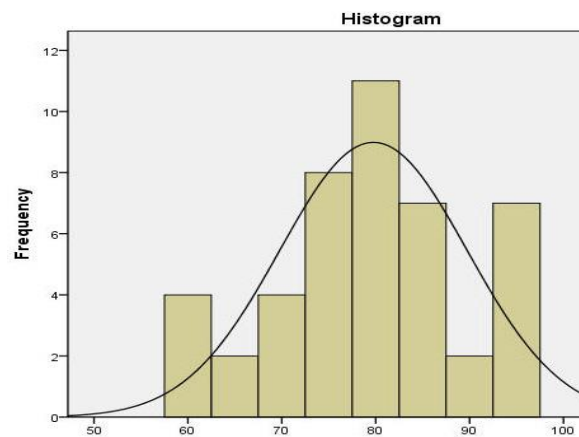

Figure 3 Operation Process Frequencies Analysis

The graph obtained by the Normal Analysis is shown below.

GRAPH 1 Normal distribution graph

The calculation results are shown in follows. We focus on the following data:

Mean = 79.76;

Std.Dev = 9.984;

   N = 45

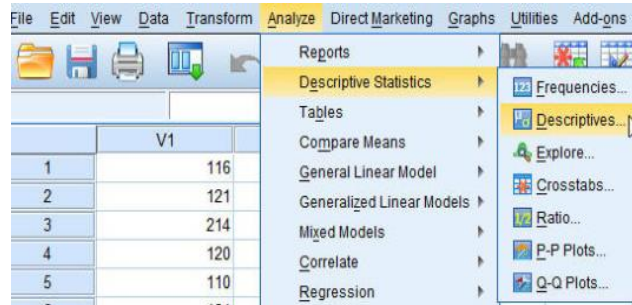Next operations are shown in the Figure 4 and Figure 5.

Figure 4 Statistical Analysis Operations

Figure 5 Parameter selection operation

The "kurtosis" and "skewness" shown in the table are important parameters for checking whether samples conform to the characteristics of normal distribution. "Kurtosis" is a measure of the degree of the peak value of the sample distribution curve; "skewness" measures the direction and degree of the "skewness" of the sample distribution. Therefore, this operation step is very important when we judge and analyze the characteristics of the normal distribution.

The results of the operation are shown in the following Table 2.

Table 2 List of Description Statistics

Std.Deviation	Skewness		Kurtosis	
Statistic	Statistic	Std.Error	Statistic	Std.Error
9.984	-217	0.354	-481	0.695

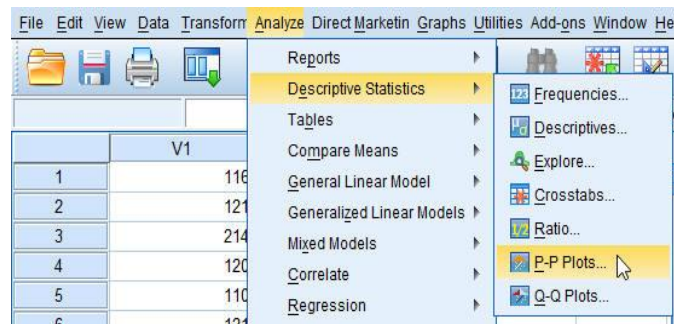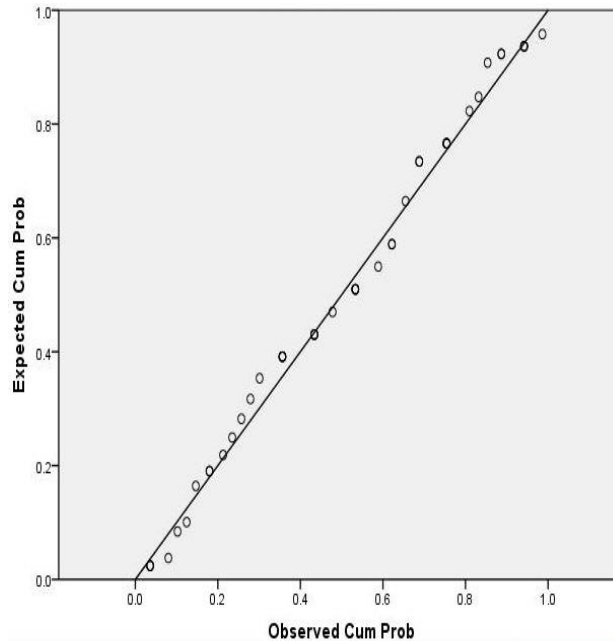Next operations are shown in the Figure 6.

Figure 6 Preparation of P-P Diagram Operations

In Graph 2 as shown below, we can further analyze and judge the deviation degree of all data in Table 1.

Graph 2 Normal P-P Diagram of Data Samples

It can be seen from the above figure that the data at the right end of the observation map is more deviated than the data at the left end. The Graph 2 confirms the normal distribution of the curve shown in Graph 1 [6].

3.5 Analysis of results

According to the data table listed after calculation, the total average score of students is close to 80 points. We generally believe that 80-90 points of the hundred mark system are good results. This is not easy to achieve the teaching effect. Because students come from different

regions, towns, villages and schools in China before they enter the school; their learning foundations are different, or even quite different. There are also differences in the quality and accomplishment of students. Entering the learning environment of higher education for the first time, the students' adaptability meets great challenges. The teaching task in the first semester is not very heavy, but some students still fail to meet the requirements of the school, and the failure rate of the courses is often 10% or more. Then, the examination results of today's AI Fundamentals course can be improved so much, which is the result of students' hard work and the embodiment of the effect of curriculum reform.

4 CONCLUSIONS

It can be seen from the above analysis that although the score basically conforms to the normal distribution, the deviation is in the range of about 60 points and in the period of about 90 points. Although there are a few students with low scores, we should pay more attention to them in the future teaching. This is something that needs to be improved in the future teaching. For students with excellent performance, we should pay attention to their personalized training in the future, stimulate their potential, so that they can have greater gains during the period of receiving higher education.

Scientific and standardized teaching effect analysis is very important. Without a scientific analysis method, the teaching reform and curriculum reform aimed at precise teaching cannot be achieved [7].

IBM SPSS is one of the mature data analysis tools, which is widely used and widely recognized by the industry. Of course, in the age of big data, the theoretical research and technology application of artificial intelligence are also constantly developing and progressing. Computing tools based on intelligent algorithms and platforms that can be re developed are constantly being introduced. We should pay enough attention to teaching.

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