



Teaching Reform Based on Correlation Analysis Algorithm

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Abstract

Taking the teaching data of the course "Artificial Intelligence Basic" as a sample, and IBM SPSS as a data analysis tool, through data collection, data extraction, data modelling, this paper uses the comparative analysis method to obtain valuable data analysis results, which can be applied to the teaching reform of the course, and finally achieve the purpose of fine teaching. "Accurate teaching" is an important measure to improve teaching quality and learning effect in Colleges and universities. Using advanced mathematical analysis tools and scientific data analysis methods is the prerequisite and necessary process to achieve accurate teaching.

Keywords: *Correlation analysis, application of IBM SPSS, teaching reform, precision teaching*

1 INTRODUCTION

In recent years, many higher vocational schools have set up the application specialty of artificial intelligence technology. Artificial Intelligence Basis is the first specialized basic course for freshmen in their first school year. It is very important to arrange the teaching content of this course so truly realize it as a basic course with "professional" characteristics. The goal of this course was initially set to lay the foundation for a series of specialized courses such as Machine Learning and Algorithms, Deep Learning and Application. Then, how to check and accept the effect of the course and carry out the teaching reform on the basis of careful analysis and objective summary is the teaching research work that teachers must do.

In September 2021, 44 freshmen were enrolled in the artificial intelligence technology application major of our university. After learning the two courses of Computer Application Basis and C Language Programming, they began to learn the two courses of Artificial Intelligence Basis and Python Language Programming in March 2022. We started to track and conduct teaching research on the learning situation of these students since they entered the school. Teaching in higher vocational colleges has its particularity. Doing well in "precision teaching" is an important measure to improve teaching quality and learning effect. So, what is the basis for implementing precision teaching?

Although teachers' views are consistent in college teaching, the methods used are different. In view of the characteristics of our students and the nature of the artificial intelligence application major, which belongs to the new engineering category of colleges and universities, we decided to use IBM SPSS as a tool for data analysis. First, we made a descriptive statistical analysis of the sample data to have a certain understanding of the overall situation and characteristics of the data set, and then we made a correlation analysis of different factors. After obtaining the true and reliable data results, we can clearly know the teaching effect of this course. Of course, through the analysis of inference and prediction algorithms, we also find the characteristics, and take this as the basis to improve the teaching work.

The following is the student transcript of the class. In order to simplify the table, we have used English characters A, B and C to represent three courses, namely, Artificial Intelligence Basis, C Language Programming and Computer Application Basis. The student names have been coded separately. Of course, the data in the table has been cleaned and normalized.

Table 1: Data by Class 1.

No.	A	B	C	No.	A	B	C
101	75	66	57	201	81	71	65
102	64	65	77	202	64	64	69
103	80	91	73	203	70	95	76
104	77	92	68	204	64	86	78
105	87	64	64	205	80	66	85
106	82	66	70	206	71	92	81
107	87	70	59	207	82	66	71
108	95	67	66	208	86	67	70
109	87	70	66	209	67	64	86
110	90	66	62	210	77	96	86
111	64	72	57	211	94	80	66
112	76	74	66	212	94	74	72
113	89	75	62	213	95	60	59
114	78	67	64	214	73	70	61
115	74	66	71	215	64	92	82
116	64	92	74	216	71	66	65
117	94	69	63	218	93	66	61
118	95	68	63	218	72	70	73
119	86	68	65	219	77	92	65
120	84	93	83	220	78	69	75
121	66	93	67	221	80	74	82
122	79	64	81				

Our work is analysis of the transcript of this semester's Artificial Intelligence Basis course. By analysis the data in the data sample, describe or calculate its centralized trend (e.g. average), discrete trend (e.g. standard deviation, variance, full range, maximum value, minimum value, standard error of average) and distribution (Kurtosis and Skewness). We have a global understanding of the sample data and a detailed grasp of its eigenvalues.

Subsequently, we will research whether there is a certain relationship between the two leading courses and the Artificial Intelligence Basis, and how these two leading courses affect the course Artificial Intelligence Basis. The two leading courses are C Language Programming and Computer Technology Application Basis. These real data are very helpful for us to improve teaching and teaching methods.

2 ALGORITHM

The mathematical analysis tool we use is IBM SPSS, which has powerful functions, high operation efficiency and detailed and reliable data analysis results [1] [2].

Table 2: Enter the data from Table 1.



Table 3: The operating are for data analysis.

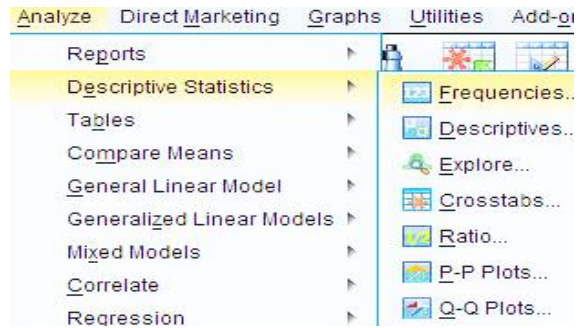
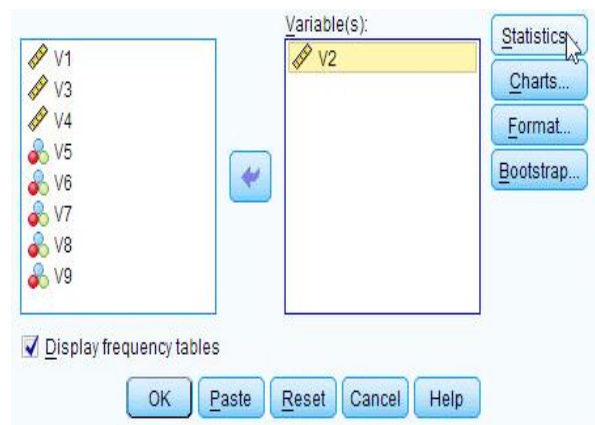


Table 4: This is Frequencies' Statistics.



Operation completed. Let's analyse the results.

Table 5: This is a preliminary statistics result.

N	Valid	43
	Missing	1
Mean		79.37
Std. Error of Mean		1.541
Median		80.00
Mode		80
Std. Deviation		10.107
Variance		102.144
Skewness		-.138
Std. Error of Skewness		.361
Kurtosis		-.796
Std. Error of Kurtosis		.709
Minimum		60
Maximum		95

Next:

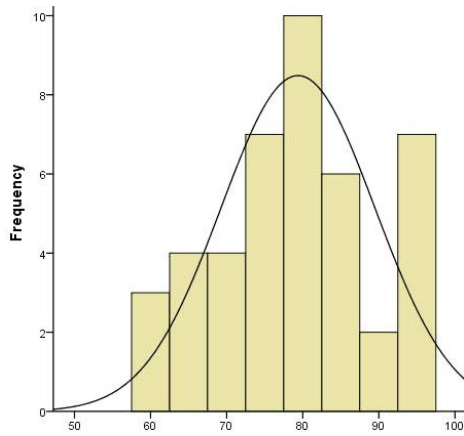


Figure 1: This is the Histogram Plot.

Table 6: This is the Model Description.

Model Name	MOD_1
Series or Sequence	V2
Transformation	None
Non-Seasonal Differencing	
Seasonal Differencing	
Length of Seasonal Period	No periodicity
Standardization	Not applied
Distribution	Normal
Type	estimated
Location	estimated
Scale	Blom's
Fractional Rank Estimation Method	

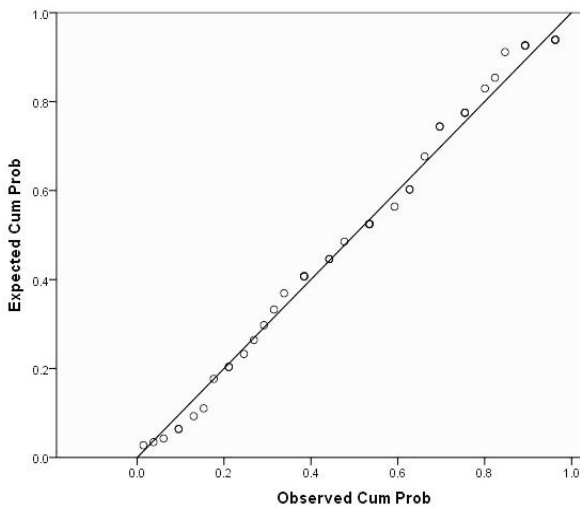


Figure 2: This is the Normal P-P of V2.

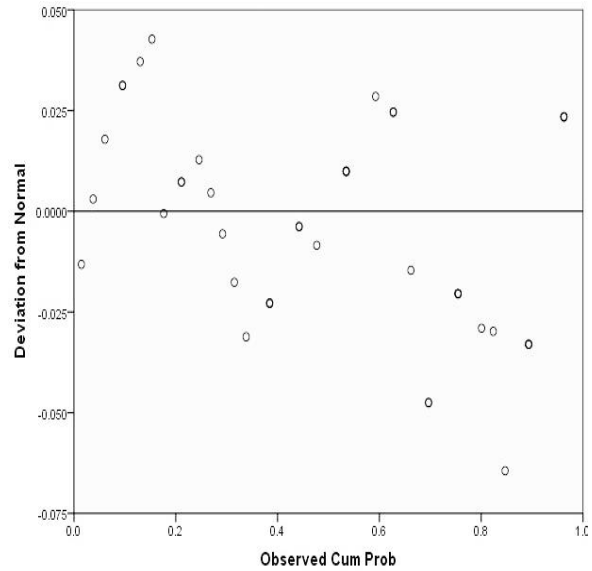


Figure 3: This is the Detruded Normal P-P of V2.

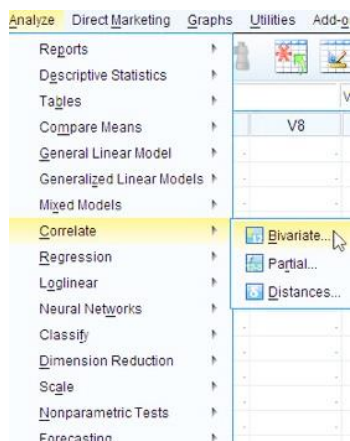
Obviously, the data in this data sample basically conforms to the normal distribution characteristics. So, is the score of this course related to its leading courses "C Language Programming" and "Computer Application Basis"? How relevant?

3 CORRELATION ANALYSIS ALGORITHM

There are many quantitative relations among social and economic phenomena, which are interrelated, interdependent and mutually restrictive. This relationship can be divided into two types. One is functional relation, which reflects the strict dependency between phenomena, also known as deterministic dependency. In this relationship, for each value of a variable, there is one or several definite values corresponding to it and this dependency can be reflected by a mathematical expression. The other is correlation, in which there are uncertain and lax dependencies between variables. Its characteristic is that the quantitative change of one phenomenon will affect the quantitative change of another phenomenon, and this change has certain randomness and always fluctuates regularly around the average of these values.

We will research whether there is a certain relationship between the two leading courses and the Artificial Intelligence Basis, and how these two leading courses affect the course Artificial Intelligence Basis. The two leading courses are C Language Programming and Computer Technology Application Basis. These real data are very helpful for us to improve teaching and teaching methods. We still use IBM SPSS as the analysis tool [5].

Table 7: This is the Parameter selection of correlation analysis.



Next:

Table 8: This is the Descriptive Statistics.

	Mean	Std. Deviation	N
V2	79.37	10.107	43
V3	74.37	11.197	43
V4	69.91	8.263	43

Next:

Table 9: This is the Correlations of V1, V2 or V3.

		V2	V3	V4
V2	Pearson Correlation	1	-.394**	-.369*
	Sig. (2-tailed)		.009	.015
	N	43	43	43
V3	Pearson Correlation	-.394**	1	.375*
	Sig. (2-tailed)	.009		.013
	N	43	43	43
V4	Pearson Correlation	-.369*	.375*	1
	Sig. (2-tailed)	.015	.013	
	N	43	43	43

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Therefore, we clearly know that "C Language Programming" has greater impact on the course of "Artificial Intelligence Basis", followed by "Computer Application Basis" has an impact on the course of "Artificial Intelligence Basis", In fact, there are many inevitable connections between professional basic courses and between professional basic courses and professional courses. If we learn the leading course well, we will certainly promote the learning of the follow-up courses.

In order to get further enlightenment, we show the basic situation of "C Language Programming" and "Computer Application Basic" as follows.

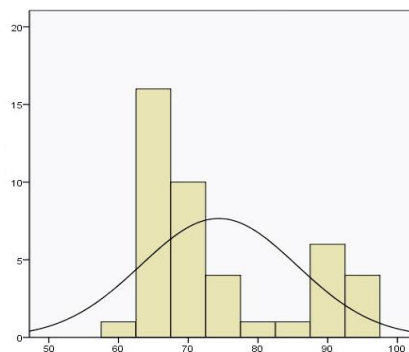


Figure 4: This is the Histogram Plot for "C Language Programming".

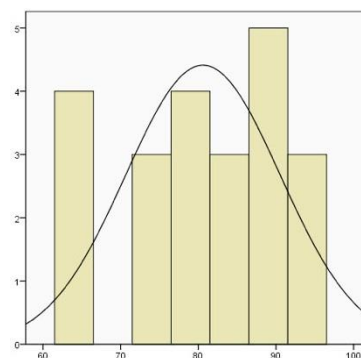


Figure 5: This is the Histogram Plot for "Computer Application Basis".

Compared with Figure 4, Figure 5 and Figure 1, we can clearly see that the courses teaching of Artificial Intelligence Basic is better.

However, there are still some unsatisfactory aspects. At least 10% of the students have poor grades. It is unsolved why their academic performances improve so slowly with the same teaching method. Only by finding out the reasons can we solve the problem of their slow improvement in academic performance [3] [4].

4 ANALYSIS OF STUDENTS' SITUATION

Whether in Colleges and universities or secondary vocational colleges, there are differences in the learning basis of students. Before entering the school, students come from different regions, different towns or rural areas and different schools in China; their learning foundation, especially the foundation of computer knowledge, is quite different. This may be due to the poor implementation of the teaching regulations of the Ministry of education in their school before entering school, or their teaching environment cannot meet the most basic requirements of teaching. Here, let's not talk about whether this situation is related to the current entrance examination system, we should admit is that at present, there are differences in the degree of economic development in various regions and between urban and rural areas. Of course, its impact will also be reflected in the imbalance between education and education conditions.

5 ANALYSIS OF TEACHING ENVIRONMENT

It should be said that at present, all schools have the hardware and software conditions for setting up this course, such as computer equipment, network environment, Internet access conditions, operating system and teaching software etc. The possible problems are in management, for example, whether the maintenance rate of daily equipment in the school can be maintained and reached 95% to 98% or more, whether the equipment can use on this service standard in 24 hours all day. Teaching environment and teaching conditions are undoubtedly the necessary conditions to ensure daily teaching and improve teaching quality.

On the other hand, there must be something wrong with the allocation of class hours between theoretical courses and practical courses. At present, our school offers courses such as "C Language Programming", "Artificial Intelligence Basis" and "Python Language Programming". These courses are highly practical courses. According to the school regulations, theoretical courses and practical courses account for 50% of the class hours, respectively. Since the theory class can only be arranged in the classroom, most students in our school rarely have portable computers (commonly known as notebook computers). Therefore, the teaching effect of theoretical courses in the classroom is very poor. If the teaching benefit is measured by the students' learning gains, it will not be greater than 15%, and "the rest of the theoretical class hours" will be helplessly wasted.

6 SELECTION TEACHING CONTENT

This is really a difficult thing to deal with. Take the course Basics of Computer Application as an example: This course is not only a compulsory basic course in the whole school, but also a professional basic course for information majors. However, the teaching contents of the two courses are different, and the learning requirements for students are also different. At present, there are many versions of textbooks for this course on the market, with different contents. This requires teachers to analyse and choose the content of teaching, keep the extraction of important knowledge, abandon and update old content, and impart the latest knowledge and technology to students.

For another example, the textbook of "artificial intelligence foundation" for the artificial intelligence application major in vocational colleges has very little choice in the market, and a few versions are not suitable for our school's teaching plan. According to the actual situation of our school, we have made a new reform in the teaching content of the course.

7 CONCLUSIONS

Classified teaching and personalized teaching are one of the important teaching reform methods.

The so-called classified teaching is to do the following work at two levels. First, find out whether the students have studied the course before and how they have studied it. Then the school guides the course. Classified training is necessary. This method seems troublesome, but it is actually a good method to make better use of teaching resources and improve students' quality. Another aspect of our work is that the arrangement of course contents should be different, and different guidance and help should be given to students of different foundations.

ACKNOWLEDGEMENTS

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