

Research on the Effect Forecast of Three Industries on Higher Vocational Education Development

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Abstract

The change of enrollment situation of higher vocational college is the main embodiment of development trend in higher vocational education, and it is also used as the main index for forecasting research. There is a reliable forecasting research on how the three major industries affect the enrollment of higher vocational colleges, which is the important theoretical support for comprehensively developing higher vocational education. The effect between the three major industries and higher vocational education development should be accurately and reasonably predicted, the selection of proper method must be based on their own characteristics. After this paper analyzed the implicitness and uncertainty of enrollment situation in higher vocational education and so on, the gray correlational analysis is used for data separation, on this basis, BP neural network is used to predict the data.

Keywords

Three major industries; enrollment trend of higher vocational colleges; grey relational analysis; BP neural network algorithm.

1. Introduction

Because there are no direct connections among objective factors that affect the enrollment change of higher vocational education[1], so the data which can be used to analyze the enrollment trend of higher vocational education is relatively few, it is said that uncertain system which lack small samples and information. The relevant analysis of traditional mathematical statistics that need to be analyzed based on a large number of data is not applicable to the analysis of this object [2]. The correlation analysis of traditional mathematical statistics that requires based on mass data, which is not applicable to the analysis of this object; a new approach must be adopted. The correlation analysis in grey system theory can quantify the hidden relationship among factors that are not directly related, which is important means for this forecast. After the main relevant factors are found through the grey relation, forecast methods take BP neural network forecast as the main, time series analysis as supplement, and reasonably predict trend change of future development of higher vocational education.

2. Grey Relational Analysis of the Influencing Factors

If the change of two factors in the development of the whole system is consistent, it shows that they have a larger correlation [4], otherwise there is a smaller correlation [5]. The correlation is marked as r [6]. X_1 to X_{11} as subsequences and is conducted grey relational analysis with Y as mother sequence. The resolution ratio is set to 0.65 in the DPS system module, and the result is shown in Table 1.

This paper mainly analyzes the direct influencing factors of the three major industries of Tianjin on higher vocational education enrollment change. According to the relevant records of "Tianjin statistical yearbook", the three major industries are divided into primary industry, secondary industry and tertiary industry.

$R > 0.6$ is selected as the most satisfactory correlation degree, the output value of primary industry, secondary industry and tertiary industry are marked as X_I , X_{II} , X_{III} , after the correlation analysis with the enrollment number Y in higher vocational colleges, it is found that the primary industry X_I and the

secondary industry XII are highly related to higher vocational enrollment Y, and it is the most direct factor that affects higher vocational enrollment, the results are shown in Table.1.

Table.1 The rank of correlation degree of factors in the subsequence and mother sequence

No.	factor	correlation coefficient
X _I	output value of primary industry	0.69919
X _{II}	output value of secondary industry	0.64429
X _{III}	output value of tertiary industry	0.51347

3. Establishment of BP Neural Network Model

3.1 Sample data pretreatment

X_I, X_{II} and X_{III} are used as data of input layer, and Y is used as the data of output layer, and then the data standardized processing are conducted for them.

3.2 BP neural network algorithm

BP neural network algorithm contains input layer, hidden layer and output layer three layer network structure, It is possible to estimate the error of the previous layer of the output layer by using error after the output, the overall weight and threshold are constantly revised to lower overall error [7].

3.3 Realization of BP neural network

The realization of BP neural network adopts BP neural network function module in DPS data processing software[8]. The forecast of BP neural network algorithm is based on the main correlation factors separated from the overall data after the grey relational analysis [9]. The self-learning and adaptive ability of BP algorithm can be used to obtain more accurate forecast results [10]. Therefore, BP neural network algorithm is suitable for the future trend forecast of higher vocational enrollment in Tianjin.

4. Trend Forecast of Enrollment Change of Tianjin Higher Vocational Education

4.1 Time series trend forecast and BP forecast

Table.2 trend forecast of higher vocational education change in Tianjin City

year	2014	2015	2016	2017	2018	2019	2025	2027	trend
output value of primary industry	188	199	208	219	229	239	300	320	rise
output value of secondary industry	7308	7731	7704	7977	8175	8373	9760	9958	rise
output value of tertiary industry	6945	7795	8625	9468	10308	11148	17027	17866	rise
predictive value of higher vocational enrollment	57448	58915	56647	56558	56469	56380	55864	55668	decline
high vocational enrollment number	56705	58084	56527						
relative error	1.3%	1.4%	0.2%						

The forecast of BP neural network algorithm is based on the grey relational analysis, and grey relational analysis screen out the main influencing actors produced by the change trend of higher vocational enrollment. Firstly, the time series trend forecast method is applied to predict the change of X_I, X_{II} and X_{III} in the next ten years. Time series analysis establishes mathematical model to analyze

the trend change of each factor in a future certain period of time by curve fitting and parameter estimation [10]. The trend forecast adopts the regression analysis method in time series, and then the predicted X_I , X_{II} and X_{III} as input vectors, and Y as the output vector for BP forecast, as shown in Table.2.

4.2 Analysis of the advantages of the main related factors

In order to compare the importance of X_I , X_{II} , X_{III} these three factors in the change trend of higher vocational enrollment, through analysis and comparison, we decided to adopt the advantage analysis of multivariate regression analysis module of DPS data processing software for data analysis [12]. It is appropriate to use the advantage analysis that can show the relative importance of each factor as a percentage. When X_I , X_{II} and X_{III} are input as the independent variables, the dependent variable is the number of enrollment in the higher vocational education, the analysis of the advantageous factors is shown in Table.3.

Table 3 analysis of the advantages of main correlation factors in higher vocational recruitment

related coefficient	X_I	X_{II}	X_{III}		Y	p value
X_I	1.0770	1.0453	1.0504		0.9141	0.0014
X_{II}	1.0433	1.0910	1.0649		0.8316	0.0018
X_{III}	1.0340	1.0768	1.0280		0.9613	0.0002
variable		r power contain x	after delete x	contribution of x	Percentage %	r power contain x
X_I	primary industry	0.8216	0.3840	0.4493	33.0854	0.8216
X_{II}	secondary industry	0.8493	0.3741	0.5103	34.6579	0.8493
X_{III}	tertiary industry	0.9052	0.3387	0.5873	39.7712	0.9052

5. Conclusion

After the analysis and comparison of grey relational analysis, the relevant factors of main influence of higher vocational education enrollment change trend were selected. On this basis, BP neural network model is used to predict change trend of high vocational enrollment in Tianjin higher vocational education from 2017 to 2027. The trend change is the scale level of the enrollment trend of higher vocational education will decrease year by year in Tianjin. After advantage analysis of the main factors that affect the change of the enrollment trend in higher vocational education are carried out, It is found that the output value of the tertiary industry in the three major industries will have a major impact on the enrollment of higher vocational colleges, when setting up a major, the school should match the tertiary industry with the relevant profession of service, and achieve the strategy to formulate and produce qualified personnel to meet market expectations.

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