The Construction of University Professional Enrollment Plan Allocation Model Based on Big Data Analysis Model and Multi Factor Analysis Method

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Abstract. The distribution of specialty enrollment plan is an important part of the college enrollment plan preparation, which is related to the development of college enrollment work. At present, colleges and universities have been short of scientific and reasonable allocation methods and models in determining professional enrollment plans. In this paper, five representative factors are selected as variables for the distribution of college professional enrollment plans. Based on the big data analysis model, a multi factor analysis method is used to build the distribution model of college professional enrollment plans, which is scientific and operable.

Keywords: College Enrollment, Multifactor Analysis, Distribution Model, Big Data Analysis Model

1 Introduction

The distribution of specialty enrollment plan is an important part of the college enrollment plan preparation, which is related to the development of college enrollment work. At present, colleges and universities have been short of scientific and reasonable allocation methods and models in determining professional enrollment plans. In this paper, five representative factors are selected as variables for the distribution of college professional enrollment plans. Based on the big data analysis model, a multi factor analysis method is used to build the distribution model of college professional enrollment plans, which is scientific and operable

2 Influencing Factors of Professional Enrollment Plan

The major enrollment plan of colleges and universities has an important impact on optimizing the structure of student sources. Scientific and reasonable distribution of major

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enrollment plans is a key link in the preparation and management of college enrollment plans. At present, the professional enrollment plan of colleges and universities mainly depends on the experience of decision-makers and team members. Due to the limitations of the post holding level of operators and subjective preferences, the distribution of professional enrollment plan lacks scientificity and fairness.

In view of the problems in the distribution of professional enrollment plans, due to certain differences among majors, the degree of examination attention, talent training effectiveness, funding and discipline construction are different. In order to formulate professional enrollment plans scientifically, reasonably and effectively, many factors need to be considered.

The principle of "equality" is one of the important criteria for the distribution of professional enrollment plans [1]. Theoretically, for the professional enrollment plan, the probability of a candidate applying for each major is equal, and for all college candidates, each major can participate in the distribution of candidates, so the number of professional candidates concerned is a very important factor [2].

At the same time, among all the examinees who pay attention to colleges and universities, the training effect and the degree of discipline construction are important influencing factors in the choice of majors. The examinees with good training effect and high degree of discipline construction naturally pay more attention to them, and for the majors with large investment in talent training, the examinees tend to think that they can obtain more educational resources [3]. In addition, for majors with large enrollment plans, examinees also tend to think that they can have a greater probability of being admitted.

To sum up, in terms of the distribution of professional enrollment plans, this paper selects five factors, including the number of candidates concerned, professional training results, total enrollment plans in the past three years, undergraduate talent training funds, and degree of discipline construction, to analyze the relationship between them and professional enrollment plans.

3 Construction of the Distribution Model of Professional Enrollment Plan

Based on the analysis of influencing factors of professional enrollment plan, this paper establishes a model with the number of candidates, training effectiveness, enrollment plan in recent three years, training funds, student teacher ratio as independent variables, and professional enrollment plan as dependent variables [4]. If the enrollment plan of specialty i is Ai, then:

$$A_i = \lambda(w_1 \frac{P_i}{P_g} + w_2 \frac{G_i}{G_g} + w_3 \frac{E_i}{E_g})(u_1 \frac{C_i}{C_g} + u_2 \frac{I_i}{I_g})A_g \quad (1)$$

In the formula, λ is the adjustment coefficient, which is used to ensure that the sum of the enrollment plans of all majors is equal to the total enrollment plan of the university; Pi is the number of examinees of major i in that year (valuation); Pg is the number of concerned candidates of the whole school in that year (valuation); Gi is the training

effect of major i in that year (including employment rate, further education rate, salary level, etc.); Gg is the overall training effect of the whole school in that year (including employment rate, further education rate, salary level, etc.); Ei is the total enrollment plan of major i in recent three years; Eg is the total enrollment plan of the whole school in recent three years; Ci refers to the total investment of professional undergraduate talent training funds; Cg is the average investment of undergraduate talent training funds of the whole university; Ii is the degree of discipline construction of specialty i; Ig is the average degree of discipline construction of the whole school; W1, w2, w3, u1, u2 are weight coefficients. In the model, w1=w2=w3=1/3, u1=u2=1/2 [5]; Ag is the general enrollment plan of the university.

When collecting college enrollment plan data for analysis, we need to borrow the Hadoop distributed storage and computing platform, which is mainly composed of HDFS distributed file system and MapReduce parallel computing. In view of the complex, diversified and exponentially increasing big data environment of college enrollment plan, Hadoop can efficiently realize distributed access and parallel computing of big data, with high fault tolerance and system scalability, and can realize high-speed data reading and writing, as shown in Figure 1.

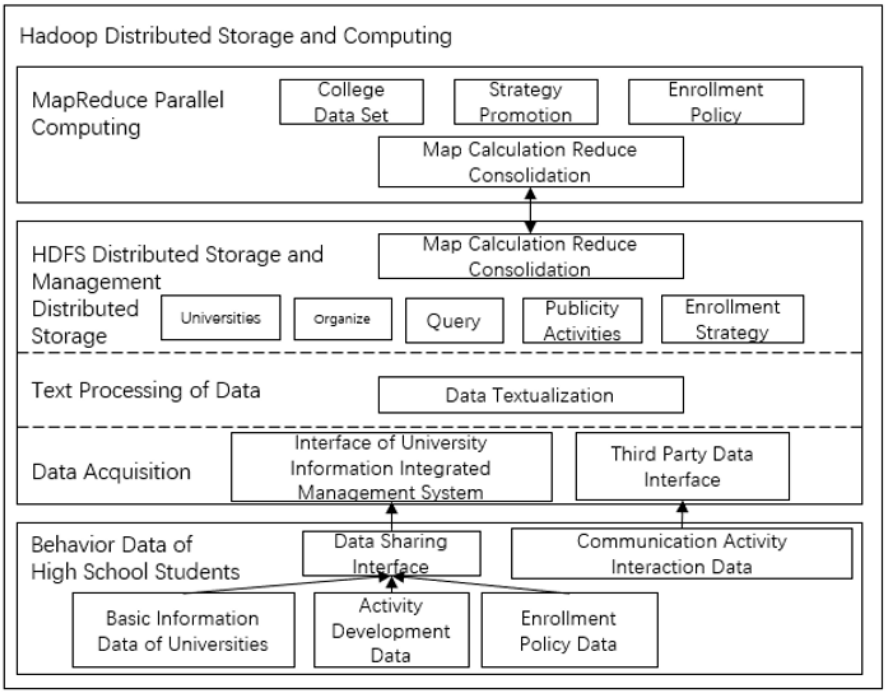

Fig. 1. Big Data Analysis Model of College Enrollment Plan

4 Calculation of Professional Enrollment Plan

Suppose that the admissions office of U University needs to determine the enrollment plan for 30 majors in the whole university in year g. The total enrollment plan of the whole university in recent three years is Ag-1=4900, Ag-2=4800, and Ag-3=4700 respectively.

4.1 Determination of the Overall Plan of the School

Assuming that the university wide enrollment plan in year g of U University is determined according to the floating rate of the university wide enrollment plan in the previous three years [6], the university wide enrollment plan in year g

$$A_g = A_{g-1}(1+\alpha) = A_{g-1}\left(1+\frac{\frac{A_{g-2}-A_{g-3}}{A_{g-3}}+\frac{A_{g-1}-A_{g-2}}{A_{g-2}}}{2}\right) \quad (2)$$

Where: Ag is the general enrollment plan of the whole school in year g; Ag-1 is the general enrollment plan of the whole school last year; Ag-2 is the general enrollment plan of the whole school in the previous year; Ag-3 is the general enrollment plan of the whole school in the year before the university; α It is the average floating proportion of the enrollment plan of the whole school.

According to formula (2), the total enrollment plan of U University in year g Ag=5000.

4.2 Calculation of Enrollment Plan of Each Specialty

Assuming that a university has 30 enrollment majors i

$$\delta_{i1} = w_1\frac{P_i}{P_g} + w_2\frac{G_i}{G_g} + w_3\frac{E_i}{E_g} \quad (3)$$

$$\delta_{i2} = u_1\frac{C_i}{C_g} + u_2\frac{I_i}{I_g} \quad (4)$$

$$\delta_{i3} = \delta_{i1} \times \delta_{i1} \quad (5)$$

Where: δ_{i1} is the first coefficient of specialty i; δ_{i2} is the second coefficient of specialty i; δ_{i3} is the product of the first coefficient and the second coefficient of specialty i [7]; Pi is the number of people concerned by specialty i in that year (valuation); Pg is the total number of people concerned by the school in that year (valuation); Gi is the training effect of major i in that year (including employment rate, further education rate, salary level, etc.); Gg is the overall training effect of the whole school in that year (including employment rate, further education rate, salary level, etc.); Ei is the total enrollment plan of major i in recent three years; Eg is the total enrollment plan of the

whole school in recent three years; Ci refers to the total investment of professional undergraduate talent training funds; Cg is the average investment of undergraduate talent training funds of the whole university; The degree of discipline construction of the specialty; Ii is the average degree of discipline construction of the whole school; w1, w2, w3, u1, u2 are weight coefficients. In the model, w1=w2=w3=1/3, u1=u2=1/2.

The product δ_{i3} of the coefficient of the first term and the coefficient of the second term can be obtained through calculation. See Table 1 for the results.

Table 1. The product of the first coefficient and the second coefficient of each specialty

Major	δ_{i3}	Major	δ_{i3}	Major	δ_{i3}
Major1	0.026016	Major11	0.056987	Major21	0.002124
Major2	0.017158	Major12	0.030431	Major22	0.014184
Major3	0.055651	Major13	0.027978	Major23	0.040579
Major4	0.05717	Major14	0.0194	Major24	0.015764
Major5	0.038875	Major15	0.0805	Major25	0.017111
Major6	0.039579	Major16	0.045664	Major26	0.031998
Major7	0.016627	Major17	0.029195	Major27	0.014265
Major8	0.023671	Major18	0.030354	Major28	0.002518
Major9	0.027568	Major19	0.114806	Major29	0.016096
Major10	0.087078	Major20	0.019478	Major30	0.02713

According to the calculation results in Table 1, calculate the adjustment coefficient λ, that is,

$$\lambda = 1/\sum_i^n \delta_{i3} \tag{6}$$

Where: λ is the adjustment coefficient, which is used to ensure that the sum of all professional plans in the current year is equal to the total enrollment plan of the university.

Then Formula (1) can be simplified as:

$$\begin{aligned} A_i &= \lambda(w_1\frac{P_i}{P_g} + w_2\frac{G_i}{G_g} + w_3\frac{E_i}{E_g})(u_1\frac{C_i}{C_g} + u_2\frac{I_i}{I_g})A_g \\ &= \lambda \times \delta_{i3} \times A_g \end{aligned} \tag{7}$$

Where: δ_{i3} is the product of the first coefficient and the second coefficient of specialty i; Ai is the enrollment plan of specialty i; Ag is the general enrollment plan of the university.

According to Formula (7), we can get the enrollment plan of each enrollment major in the current year. See Table 2 for the results

Table 2. Enrollment Plan of Each Major in Year g

Major	Enrollment Plan	Major	Enrollment Plan	Major	Enrollment Plan
Major1	127	Major11	278	Major21	10
Major2	84	Major12	148	Major22	69
Major3	271	Major13	136	Major23	198
Major4	279	Major14	95	Major24	77
Major5	189	Major15	392	Major25	83
Major6	193	Major16	223	Major26	156
Major7	81	Major17	142	Major27	70
Major8	115	Major18	148	Major28	12
Major9	134	Major19	560	Major29	78
Major10	424	Major20	95	Major30	132

5 Conclusion

The distribution of specialty enrollment plan is the core content of the college enrollment plan preparation, which is related to the optimization of college student source structure and the effectiveness of talent training. Whether each major can continuously output high-quality talents will affect the overall talent training quality of colleges and universities. This paper takes full account of the differences between different majors in colleges and universities in terms of candidates' willingness to apply for the examination, funding, teachers' strength and training quality. Based on the three principles of "fairness, responsibility and ability" [7], the relevant theories of big data analysis model are used for the analysis of relevant data. At the same time, the multi factor analysis method is used to complete the construction of college enrollment plan distribution model.

This paper builds a scientific and reasonable model for the distribution of college enrollment plans, gives a scientific and reasonable operation method for the distribution of college enrollment plans, and provides an important reference value for the further optimization of the structure of college students.

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