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Prediction Model of College Entrance Examination Score Line

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Abstract

From college admission rate and the examinee the voluntary choice of two sides of the space for the development of students, put forward a comprehensive universities in recent years according to the weight at the location of the examinee admission seating arrangement and admission score, ranking of universities, colleges and universities in cities and popular major in universities ranking method of four factors. First of all, the average value of the admission position and the average value of the admission score of each university in the recent three years were calculated to calculate the deviation, and the risk coefficient was introduced, and the risk coefficient of each university was calculated according to the two deviations. This scheme takes into account the influence of different factors on the application form and makes a reasonable assessment of the success rate of the application form, gives consideration to the future career development of students, and facilitates the search and application of candidates with different scores. It has stability, reliability and good adaptability.

Keywords

Weighted; Risk factor; Comprehensive evaluation value.

1. INTRODUCTION

In the application of college entrance examination, the possibility of the candidate being admitted by the college is the key to evaluate the rationality of his/her choice. Fill scheme mainly depends on the accuracy of each college admissions calendar year examinee the power range and score range, but due to the changes to the difficulty of the college entrance examination questions, examination form of innovation and the influence of many factors such as the change of the college admissions requirements, admission to the university student's minor range with different score range exists different degree of volatility, which largely affected our judgment, so only rely on the two conditions for college is not enough. At the same time, the criterion for the success of the application is not only limited to the success rate of admission, but also depends on whether the selected university provides good development opportunities for students, the development level of advantageous subjects in the university and other factors.

For every college entrance examination student, the application for college entrance examination is very important. The most important part of applying for a job is to accurately evaluate the possibility of being admitted to a voluntary college. We will establish a mathematical model of college entrance examination application strategy based on the admission situation of colleges and universities in recent years. Taking examinees' college entrance examination scores and their ideal majors as examples, this paper designed the application scheme for college students.

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2. MODEL HYPOTHESIS

2.1. Risk Assessment

Must be taken into account in application, by applying to colleges and universities in recent years, the fractional line of volatility, when a college admissions situation changes during the recent volatility is larger, it thinks that the colleges and universities, relative to other admissions fluctuations is a greater risk of small colleges, namely for might not be able to better predict the acceptance situation trend in the future and reduce the possibility of be admitted to universities in the volunteer. On the contrary, if the admission situation of a college is relatively stable in recent years, it can be said that it can better predict the change trend of the admission situation of the college, that is, to some extent, it can improve the possibility of being admitted by the college of choice, because we can fill in the college entrance examination application more reasonably.

In undertaking risk assessment [1] (namely the possibility that evaluates to be admitted by volunteer college, the same below), admit a circumstance to come according to the school in last few years namely assess risk. We believe that the admission situation can be analyzed from two aspects:

1. The fluctuation of the lowest admission score in recent years (hereinafter referred to as "score");

2. The fluctuation of the ranking (hereinafter referred to as "ranking") corresponding to the lowest admission score of colleges and universities in recent years;

In other words, the risk is evaluated by integrating score and position, and the risk is quantified by certain mathematical model, and then the possibility of being admitted to voluntary colleges is directly visualized by the quantified value of the risk.

2.2. Comprehensive Evaluation Value

In the hypothesis of this model, considering that all kinds of factors have different degrees of influence on the application form, and colleges and universities have different advantages in different influencing factors, it is necessary to establish an evaluation system to classify the comprehensive factors of colleges and universities according to scientific proportion. In order to make each evaluation factor quantifiable, we have set up a standard of "comprehensive evaluation value" for the unified evaluation of comprehensive factors in various institutions after consideration and analysis. The reference factors are divided into the following four aspects:

Lambda risk factor;

Assessment value K1 of professional ranking;

The evaluation value K2 of the alumni association ranking of the institutions;

Assessment value K3 of the city where the institution is located;

According to the evaluation results, the colleges and universities are ranked, and the ranking is taken as the reference standard to develop three more scientific and accurate application schemes for candidates.

2.3. Ranking Section

According to reference data [2], 2015-2017 the college entrance examination scores of volatile, at the same time, considering each year due to the difficulty of the test the variation, which has a great influence on to the appropriate year college entrance examination scores, and all sorts of colleges and universities admit students province ranked relatively more stable and less volatile, therefore, relative to according to the score partition, selects the seating arrangement as divided on the basis of more appropriate. In addition, considering that the

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concentration degree of examinee's college entrance examination score varies in different sections and there is concentration of students in some sections, it is not possible to simply divide three sections with a span of 33 points in an average range of 550-650 points. Based on the above factors, the grades should be divided into three sections with different lengths according to the average score of each year's ranking, and three more scientific and accurate application schemes should be formulated for the candidates.

2.4. Design Ideas of Voluntary Programs

According to the annual average number of points, the use of Excel to map the different points for the number of candidates roughly distribution curve and the corresponding calculation, and then on the basis of calculation results the problem described in the "550-650" performance range interval length is divided into three (because we cannot simply by 550-650 points evenly divided into three interval span for 33 points, so choose places as separate basis, so as to make the three schemes of interval fraction span is not equal to) and work out three sets of volunteer fill scheme. Then, according to the quantified ranking results of the comprehensive evaluation values of the colleges and universities in each set of programs, students will choose from the corresponding colleges and universities in the corresponding intervals and take this as the overall plan to be filled out by candidates.

2.5. Determine the Range of Valid Data

In this model, combining with the reform of the national policy of higher education to the college entrance examination, and previous data in 2014 is now larger changes have taken place, at the same time, along with the development of the colleges, colleges fractional line change over time, (in addition to the individual places very far or college level almost stable situation) before the change of the fractional line along with the accumulation of time become larger and unpredictable, so we think in 2014 and the previous data for the modeling of limited help, so in the establishment of mathematical model using data from 2015~2017.

In addition, in order to reduce as much as possible in the process of the volunteer to fill for colleges and universities this year admit fractional line or corresponding minor fluctuations and risks, we will based on the analysis of the institutions of quantitative risk value, delete part of larger fluctuation in colleges and universities, the colleges and universities will no longer be included in the application when the optional range of colleges and universities, this consideration in the process of actual college also need to consider, so we think based on part of the risk is removed from the alternative school volunteer less is feasible.

And for the first time in 2017 for some universities recruit students, or not in the above identified during 2015~2017 consecutive admissions, cannot pass the school three years of the relationship between the data of the established risk value or related, so for this kind of colleges and universities that quantifies the risk buy for average, and during the period of 2015~2017 discrete risk quantification value of recruit students of colleges and universities.

3. ESTABLISHMENT OF THE MODEL

3.1. Deviation of Position

In order to better reflect and quantify the changes in the ranking of institutions within the scope of the plan from 2015 to 2017, the deviation of ranking is cited.

The overall standard deviation is used for the calculation of the degree of deviation, since it USES all three data listed from 2015 to 2017.The overall standard deviation of the position is reflected as STDEVP function in Excel calculation and operation.

Where, the STDEVP function [3, 4] is a computer function that calculates the standard deviation based on the entire sample given as a parameter. That is, the standard deviation

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reflects the degree of dispersion relative to the mean value, which is used to express the degree of dispersion of the ranking in the past three years, and then to express the risk that the applicant may take in the ranking fluctuation.

3.2. Scores of Deviations

The definition method is analogous to the "rank deviation", that is, the deviation of the score is calculated using the overall standard deviation.

3.3. Risk Factor

In order to better evaluate the risk, even if the risk is quantifiable, the coefficient of risk is introduced.

According to the existing literature [5] of fund risk coefficient, the reference standard deviation is to measure the fluctuation degree of fund return rate. The smaller the standard deviation is, the smaller the fluctuation degree of its net value is and the smaller the risk degree is.

Lambda: lambda is a measure of the degree to which an institution's score fluctuates over time. The smaller the coefficient of risk, the smaller the school's score fluctuates over time.

The expectation of the risk coefficient is given to express meaning, to expect to express meaning, combined with minor deviation and the deviation of the scores and trying to define the risk coefficient on the interval [0,1], the scores in a solution within the scope of the various colleges and universities, in the range of the largest colleges risk coefficient as 1 or from the left side is close to 1, similarly, in the range of the smallest risk coefficient as 0 or from the right side close to zero.

According to the calculated position deviation and score deviation, the value of the position deviation of each institution fluctuates more than the value of the score deviation. Therefore, when weighing the change of the value response of the two deviations, the position deviation should be considered more.

Remember places the overall standard deviation for mu, scores of the overall standard deviation for eta, risk coefficient for lambda, all colleges and universities within the effective range of the average deviation of the seating arrangement for mu a, scores of the average standard deviation for eta a.

Considering that the risk coefficient is defined on the interval [0,1], the base e of the natural logarithm is taken as the base, and the index function ex represents the risk coefficient, that is, when $x \in (-\infty, 0]$ is exactly satisfied so that it is defined at (0,1].

In order to represent the relative value of the average college risk to that school within that range, muon/muon a is used. Again at the same time considering the score fluctuation in a certain extent, also reflects the department of the hospital admission fluctuations may, so the eta is also considering the risk factor, but to make risk coefficient of main parts, so would μ/μ_a combined with η is represented as $(\mu+\eta)/(\mu_a+\eta_a)$.

Apparently $(\mu+\eta)/(\mu_a+\eta_a) > 0$, namely does not meet the given when $x \in (-\infty, 0]$ make its definition in (0,1], so dubbed the minus sign, if $x = -(\mu+\eta)/(\mu_a+\eta_a)$, and when the bigger the lambda should express the greater the risk, and in the $\lambda \in (0,1]$ cases you can define the λ:

$$\lambda = 1 - e^{-\frac{\mu+\eta}{\mu_a+\eta_a}}$$

3.4. Evaluation Value K1 of Professional Ranking

Considering the role of the major chosen by students in the future social talent demand direction and candidates' personal development, applying for the hot major with development

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advantages and good prospects is also a factor that should be considered in the establishment of the volunteer model. Therefore, this paper introduces the evaluation value K1 of major ranking.

By searching the hot majors with good development prospects in the current period and in the future, we found that computer and related majors accounted for the majority of the top 10 majors. Therefore, the university ranking of computer and related majors was taken as the measuring factor in the model.

In the process of evaluation value calculation of K1, we first obtain the university computer and its related professional ranking, and then the data corresponding to meet the requirements of the candidates on a scale university, computer and related professional ranking from the university, finally according to the calculating the corresponding scores ranking from high to low, makes fraction gradient decreases, as a professional ranking the evaluation values of K1.

Considering the priority order of various factors selected by a large number of candidates when filling out the application form and the influence of these factors on students' final personal development, the assessment value K1 was weighted by 6% in this paper.

3.5. The Assessment Value K2 of the Alumni Rank of the Institution

The influence of institutions on students cannot be ignored. Therefore, the ranking of institutions is also a factor to be considered in the application. In this paper, the assessment value K2 of the alumni association ranking of institutions is introduced.

Through comparative analysis, this paper adopts the 2017-2018 university ranking list released by the university research team of China alumni association. The list is based on the three functions of Chinese universities: talent cultivation, scientific research and social service. It examines and considers Chinese universities from the perspectives of international influence, national development and social contribution, and ranks them with high reliability and accuracy.

After obtaining the ranking of national university alumni association, the data are corresponding to the universities that meet the requirements of the examinee score section, and the alumni association ranking of these universities is divided into five grades: A, A-, B+, B, C. The five grades are graded in A gradient descending way, and the evaluation value K2 of the alumni association ranking of the universities is obtained.

Considering the priority order of various factors selected by a large number of candidates when filling out the application form and the influence of these factors on the final personal development of students, the assessment value K2 was weighted by 14% in this paper.

3.6. Assessment Value K3 of the City Where the University Is Located

Considering that the level of urban development has an impact on the number of universities in the city, the exchange between universities and the development opportunities of the university, this paper introduces the evaluation value K3 of the city where the university is located.

We obtained the latest ranking of the first, second and third-tier cities, and further ranked the cities at the same level according to their economic development level, university settlement and communication environment and other factors, and finally obtained the ranking of the cities that meet the requirements of the test scores. The assessment value K3 of the city where the university is located is obtained by assigning each university according to the gradient descending mode.

Based on the priority order of various factors selected by a large number of candidates in the application form and the influence of these factors on the final personal development of students, the assessment value K3 was weighted by 10% in this paper.

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3.7. The Calculation Method of Comprehensive Evaluation Value

The comprehensive evaluation value is simply denoted as W (the total score is set as 100 points), which consists of:

Lambda risk factor is lambda;

Assessment value K1 of major ranking;

The evaluation value K2 of the alumni association ranking of the institutions;

The evaluation value of the city where the school is located is marked as K3;

According to the different weights corresponding to the above factors, the calculation method of comprehensive evaluation value W is as follows:

$$W = (1 - \lambda) \times 70 + K1 + K2 + K3$$

W is the comprehensive evaluation value, and the total score of W is 100.

3.8. Model Modification

Lambda's coefficient of risk is calculated under the default formula to find that some colleges or universities are not enrolled in the territory or in a certain form of enrollment in 2015 or 2016, and therefore the school's coefficient of risk is calculated at $\lambda = 0$. $\lambda = 0$ has a direct impact on the final value of the evaluation when robustness is first, or when 70% of the power is assigned to robustness. Therefore, the risk factor should be improved for the situation that some colleges did not enroll students in the region or in a certain form in 2015 or 2016.

1. When no enrollment is conducted in 2015 and 2016 at the same time, the risk coefficient of the school is revised as follows:

$$\lambda' = average(\lambda)$$

That is, it is the average of the risk factors of all the colleges with enrollment from 2015 to 2017 in the effective range of scores under the scheme.

2. If and only if the university enroll students in one of the two years of 2015 and 2016, that is, if one of the three data items is missing, we believe that the risk factor shown by only two results calculated by data deviation is not enough to reflect the real risk:

(1) if the fluctuation is obvious, the obtained risk coefficient will be too large, but in fact, the admission situation should be stable, so that the actual risk is lower than the further obtained risk coefficient with this standard deviation.

(2) if the fluctuation is not obvious, the obtained risk coefficient will be very small, but in fact, the college only has nearly two years of enrollment data, it should be considered that it has a greater risk;

Taking these two considerations into consideration, it is required to revise the risk factors of institutions with the mentioned conditions:

$$\lambda' = \left|\left(1 - e^{-\frac{\mu+\eta}{\mu_a+\eta_a}}\right) - \frac{1}{3} average(\lambda)\right|$$

Where 1/3 means the school is missing one year of the three-year data it needs, so it is compensated with the average risk factor for the school's scope, taking into account lambda's lambda value of (0,1], so it is marked with an absolute value.

4. SUMMARY

Through the above calculation method, we got the expected voluntary program. The algorithm given in this model is a calculation scheme based on the comprehensive data of various colleges and universities. Therefore, the scheme listed in this model is effective for arts and sciences in various regions. Only by applying the method given in this model to the data of

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colleges and universities in the areas to be evaluated, the expected volunteers in the desired areas can be obtained through the final calculated comprehensive evaluation value W.

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