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Analysis of the Investment Recommendation Degree and Influencing Factors of Scenic Spots in Qingdao West Coast New Area District Based on the Fuzzy Comprehensive Evaluation Model

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Abstract

At the end of 2019, the COVID-19 epidemic was rampant. Under the correct leadership of the CPC, the epidemic was brought under control. Under the correct leadership of the CPC, the national industry and tourism began to recover. With the promotion of all-round well-off society in recent years, more and more people pay more attention to spiritual affluence and choose to travel to broaden their horizon during the May Day holiday, among which visiting Qingdao west Coast New Area is a perfect choice. this paper in order to "Qingdao high quality development" and "Qingdao city circle" as the breakthrough point, to Qingdao west Coast New Area district government investment in Qingdao west Coast New Area district a-class tourist attractions as an example, through the establishment of fuzzy comprehensive evaluation model and principal component analysis model respectively to analyze problem one, two, Through the reasonable calculation of the results, the best scheme is obtained. For Qingdao's social and economic development to put forward the corresponding policy construction of this center, this paper carries out research on three issues. Question 1: Select 5 scenic spots most worthy of investment from the fourteen A-level scenic spots (this paper is measured by the recommendation score); Question 2: After inserting the new influencing factor fixed asset investment, the principal components are selected by dimensionality reduction and the relationship between principal components and other factors is expressed. Question 3: Check other people's papers on the development of coastal cities or Qingdao on academic websites such as CNKI for integration and suggestions. For question 1, the government investment in Qingdao west Coast New Area district tourism development as an example to discuss, Based on the number of tourists during May Day, the average score of scenic spots, ticket prices and the average expenditure of tourists for food and entertainment, the four indexes are obtained through normalization processing, respectively affecting the weight of the government's investment amount in different scenic spots. Under the influence of major factors such as the number of tourists during the May Day holiday, the average score of scenic spots, the ticket price of scenic spots, and the average expenditure of tourists on food and accommodation, the recommendation degree of different scenic spots is often different. Establish the comprehensive matrix according to the table, refer to the fuzzy comprehensive evaluation model, use the coefficient of variation method, through Matlab programming software to process the data, get the recommendation degree and recommendation degree ranking. The top five spots are what you want. For question 2, SPSS was used for principal component analysis of multiple factor variables, and factor analysis was used for dimensionality reduction of data. The relationship between the linear function coefficient calculated by factor analysis and the linear function coefficient of principal

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component analysis was $w_{ij} = d_{ij} / \sqrt{\lambda_i}$, thus the linear function relationship between principal components and other factors was calculated. Two principal components were obtained to replace the original influencing factors. The calculation of the model is simplified, and the data obtained are real and valid. For question 3, which is more about pooling wisdom and being relatively open, we can get inspiration by referring to many works on the development of Qingdao west Coast New Area District published by various scholars, and put forward appropriate suggestions based on the current situation of various economic, political status and geographical location of Qingdao west Coast New Area District. In this paper, the comprehensive fuzzy comprehensive evaluation, the establishment of comprehensive evaluation table and principal component analysis finally get reasonable quantitative results. After analysis and verification, the model we applied is reasonable and of certain practical significance, and can also be used in practical life as a simple reference for relevant research.

Keywords

Fuzzy comprehensive evaluation model; West Coast New Area tourism investment; Principal component analysis; Factor analysis; Dimension reduction.

1. RESTATEMENT OF PROBLEMS

This paper is based on the "new era of statistical modeling and social development", referring to the development of Qingdao "ecological environment protection", "building high quality city" and other key topics, questions, discussion, data collection, calculation process, solving, including questions, assumptions, the model, model analysis results, discuss the statistical knowledge analysis, data technology, statistical analysis software, etc.To solve the problem, we will put forward improvement plans and policy suggestions for the social progress and economic development of Qingdao.

Based on the following three questions.

Question 1: Select the 5 most worthwhile scenic spots among the 14 A scenic spots in Qingdao west Coast New Area District;

Question 2: Several main factors are expressed in the multiple factors affecting the score of scenic spots, so that they retain as much information about the original data as possible, and the main factors are not related to each other.

Question 3: Based on the current situation of Qingdao west Coast New Area District, we put forward views and suggestions on the tourism prospects of Qingdao west Coast New Area District.

2. PROBLEM ANALYSIS

2.1. Analysis of Problem 1

Question 1, find the recommendation degree of 14 A-level tourist attractions in the West Coast New Area and the recommendation degree ranking of these 40 A-level scenic spots, and select 5 best scenic spots (the highest recommendation degree).Because the evaluation needs the government to consider multiple factors, this paper needs to establish a reasonable evaluation model for this problem, and this time considers the fuzzy comprehensive evaluation model.

The evaluation index of scenic spots mainly includes four aspects:

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Referring to the user satisfaction can be targeted to evaluate attractions, judge whether scenic area service need to improve, our satisfaction data from Meituan software scenic spot score, full marks is five points, accuracy to ten;

Ticket price.Scenic spot ticket price is an important factor affecting the government evaluation, ticket price through as part of the government income to affect the government evaluation scores;

Daily daily accommodation consumption for tourists. Therefore, the prosperity of the surrounding commercial street, whether the commercial street environment is clean, the amount of customers ' accommodation and consumption, and the tax payment around the scenic spot all affect the government's assessment of the scenic spot;

Flow of people. As an important evaluation factor, the flow of people directly determines the actual value and existence significance of scenic spots.

To sum up, it shows the feasibility and necessity of considering tourist satisfaction (tourist score), tourist daily accommodation consumption, ticket price of scenic spot and flow of people.

The data sources of the paper are based on app materials such as Meituan, Ctrip, Tencent Map and Dianping, etc., as well as West Coast Weekly and offline actual data. Government assessment factor chart:

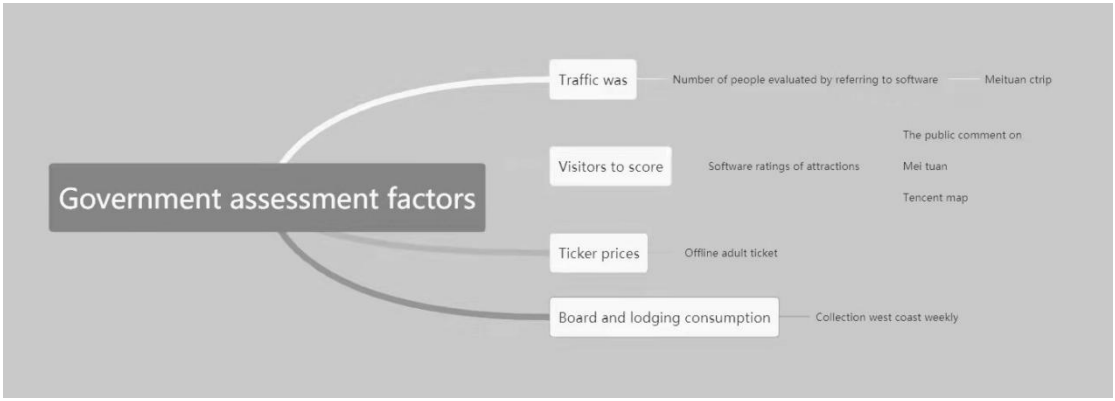

Figure 1. The Government Assessment of the Impact Factors

The data of the four factors evaluated by the government, the data are normalized according to the coefficient of variation method, obtain the weight, find the coefficient, and then the coefficient is multiplied by the original matrix to obtain the index of the investment recommendation degree of the 14 scenic spots. The larger the value of the final index, the more recommended the investment of the corresponding scenic spots. Combined with the questions, the five top scenic spots are arranged in descending order of the recommendation degree. The following is the flow chart:

Figure 2. Title solving flow chart

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The evaluation of scenic spots model using the score as one of the factors affecting the results, and evaluation results as a dependent variable to design a simplified model using multi-directional evaluation system as the basis, evaluation results as far as possible to the real situation, namely by calculating different factors using different evaluation results by matrix transformation, finally can get different scenic spots, according to the comprehensive score value, and select the top five scenic spots.This simplifies the workload without changing the ranking.

Finally, the code is written combined with lingo and Matlab, and the simulation experiment provides a reference for question 2.

2.2. Analysis of Problem 2

This model replaces many components with principal components.

The specific operation is to record the linear combination of the first factor selected (i. e., the first comprehensive variable) as F1. At this time, we naturally hope that F1 can reflect the information of the original variable as much as possible, and generally expressed according to the variance. Generally, the greater the value of var (F1), the greater the volatility, and the more information F1 contains.Therefore, F1 should be the largest variance, and F1 is taken as the first principal component. If F1 is insufficient to represent all the original influencing factors, var (F2) (i. e., the variance value is second only to var (F1)) is selected as the second principal component, and so on.

In order to effectively represent the original information, the previous principal component has represented the factors no longer appear in the latter principal component, when each principal component is unrelated, namely cov (F1, F2) =0, when the different principal components are different from each other, but the principal component represents all the influencing factors, and the variance is decreasing.

For the data processing analysis, in the SPSS, the default variance is greater than 1, so only the first two serve as principal components, which is expressed as> 80% of the variance contribution of the respective principal component.

2.3. Analysis of Problem 3

In view of problem three, problem three is an open problem in a more sense, based on the prospect of Qingdao west Coast New Area District for the corresponding analysis and put forward pertinent views and suggestions.In 2014, The State Council issued a notice to establish the West Coast New Area, which, as the ninth economic new area in China, has advantages in economic and political aspects in a certain sense.

3. THE ASSUMPTIONS OF THE MODEL

(1) Question 1: It is assumed that the only factors affecting the recommendation are tourist evaluation, passenger flow, daily accommodation consumption and ticket price, while other factors do not affect government investment, and the impact of the four factors on the recommendation is equivalent.

(2) Suppose that the impact of the epidemic on the flow of people in each scenic spot is the same.

(3) Suppose that meituan tourist evaluation and rating are true and reliable.

(4) The ticket price of scenic spots is the adult ticket price of 2021.05.01.

(5) Food and beverage consumption only considers the data of the two days before the May Day holiday.

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(6) Suppose the traffic data according to the average number of tourists from Meituan, ctrip scenic spot evaluation number (because during the May Day some scenic spot without the number of tourists, so on Meituan according to a scenic spot average year the proportion of the proportion of the number of allocation, tourist data have certain deviation).

4. DEFINITION SYMBOL DESCRIPTION

Symbol	Meaning
①②..	Number 14 scenic spots randomly
$\overline{x_i}$	Average of different factors in 14 scenic spots
s_i^2	Find the variance of different factors for 14 scenic spots.
v_i	Weight of each evaluation factor indicator
ω_i	The coefficient of the matrix
w_{ij}	The actual linear coefficient of the principal component
d_{ij}	Linear coefficients of data after standardized processing
λ_i	Eigenvalues of Principal Components
f_i	Common factor
F_i	Principal component I
ξ_i	Special factor

5. MODEL ESTABLISHMENT AND SOLUTION

5.1. Model for Question 1

Problem using the fuzzy comprehensive evaluation model, considering the final recommendation we require must be objective, so we choose fuzzy comprehensive evaluation model, we arrange the initial data (four indicators, fourteen scenic spots) into four rows, fourteen columns of matrix, and variance, the initial weight, then normalize the weight, the original weight, the final weight matrix and the original matrix, the final result of the recommendation.

5.1.1 Select the scenic spots to be evaluated

In this paper, 14 A-level tourist attractions in Qingdao west Coast New Area District of Qingdao are selected for evaluation, and 14 scenic spots to be evaluated are randomly numbered:

① Qingdao Jinshatan Scenic Area② Qingdao Dazhu Mountain Scenic Area③ Qingdao Langyatai Scenic Area④ Qingdao Zhushan National Forest Park⑤ Qingdao Forest Wildlife World⑥ Qingdao Lingshan Bay Urban Leisure Tourism Zone⑦ World Museum of Animal Nature Ecology⑧ Qingdao west Coast New Area District Ecological Sightview Park⑨ Qingdao Zangma Mountain Scenic Area⑩ Tangdao Bay Scenic Area⑪Qingdao Xiangbo Garden Scenic Area⑫The Mingyue Seaweed Museum⑬Qi Great Wall Hundred Orchard⑭Qingdao Shell Museum

5.1.2 Statistics of the data

(1) Solving for the flow of people

The data of the number of tourists all comes from the annual evaluation number of scenic spots in Meituan, Ctrip and other software.

(2) Statistical solution of tourist satisfaction

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Statistics on tourist satisfaction (scenic spot score): The original data is obtained according to the APP with user scores, such as Dianping, Ctrip, Meituan and Tencent Map.

(3) Valuation of accommodation consumption

Accommodation consumption considers the average daily consumption of tourists around the scenic area (the average daily consumption only considers accommodation and catering consumption), and the data is from Qingdao west Coast New Area District Weekly.

(4) Statistics of ticket prices

The ticket price is calculated according to the adult ticket price of the scenic spot, and the final result makes the recommendation change in proportion does not affect the ranking.

Table 1. Data on the four factors affected by the 14 A-level scenic spots

Scenic spot number	Name of scenic spot	Total number of participants in the evaluation (persons)	Average annual number of appraisers (persons)	Average score of scenic spots	Number of tourists during May Day (people)	Ticket Price (RMB)	The average daily meal and entertainment expenditure of tourists (yuan)	Total expenditure of tourists for two days (yuan)
(1)	Qingdao Jinshatan Scenic Area	4015	397.5	3.9	15860	0	224	7105280
②	Qingdao Dazhu Mountain Scenic Area	5211	560.3	4.6	22355	40	238	12429380
(3)	Qingdao Langyatai Scenic Area	1113	156.8	4.4	6256	50	184	2927808
④	Qingdao Zhushan National Forest Park	9342	1279.7	4.6	51060	45	243	29410560
⑤	Qingdao Forest Wildlife World	34512	4657.5	4.2	185834	100	184	105553712
⑥	Qingdao Lingshan Bay Urban Leisure Tourism Zone	1229	153.6	4.1	6128	0	193	2365408
⑦	World Museum of Animal Nature Ecology	849	141.5	4.1	5645	80	195	3104750
⑧	Qingdao west Coast New Area District Ecological Sightview Park	6809	907.9	3.9	36225	40	243	20503350
⑨	Qingdao Zangma Mountain Scenic Area	11451	2156.9	4.1	86060	70	270	58520800
⑩	Tangdao Bay Scenic Area	1742	285.6	3.5	11395	0	264	6016560
⑪	Qingdao Xiangbo Garden Scenic Area	305	42.7	4.0	1703	42	279	1093326
⑫	Mingyue Seaweed Museum	22	731	3.5	29166	120	232	20532864
⑬	Qi Changcheng Baiguoyuan	119	23.8	4.0	949	50	228	527644
⑭	Qingdao Shell Museum	3441	555	4.8	22144	70	224	13020672

5.1.3 List the matrix, and process the data

(1) List the rating matrix of 14 scenic spots on human flow, ticket price, accommodation consumption valuation, and tourist evaluation (1) (rows represent the data of corresponding factors of 14 scenic spots, and list 4 evaluation factors).

$$\begin{bmatrix} 15860 & 22355 & 6256 & 51060 & 185834 & 6128 & 5645 & 36225 & 86060 & 11395 & 17036 & 29166 & 949 & 22144 \\ 3.9 & 4.6 & 4.4 & 4.6 & 4.2 & 4.1 & 4.1 & 3.9 & 4.1 & 3.5 & 4.0 & 3.5 & 4.0 & 4.8 \\ 0 & 40 & 50 & 45 & 100 & 0 & 80 & 40 & 70 & 0 & 42 & 120 & 50 & 70 \\ 224 & 238 & 184 & 243 & 184 & 193 & 195 & 243 & 270 & 264 & 279 & 232 & 228 & 224 \end{bmatrix}$$

Matrix (1)

(2) According to the coefficient of variation method:

① takes the average of 14 scenic spots for each evaluation factor and lists (1 * 4) matrix (2):

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$$\begin{bmatrix} 20222293.86 \\ 4.121428571 \\ 50.5 \\ 228.6428571 \end{bmatrix}$$

Matrix (2)

② finds the variance of the 4 factors for the 14 scenic spots respectively, and lists the (1 * 4) matrix: (3)

$$\begin{bmatrix} 844927117875956.00 \\ 0.146428571 \\ 1298.884615 \\ 956.8626374 \end{bmatrix}$$

Matrix (3)

③ Let $v_i = s_i / |\overline{x_i}|$, the normalized v_i is the weight of each indicator:

$$[1.4376 \quad 0.0928 \quad 0.7137 \quad 0.1353]$$

Matrix (4)

④The resulting normalization matrix (4) is the sought coefficient, i. e $\omega_i = v_i / \sum v_i$, Get the value:

$$[0.6042 \quad 0.0390 \quad 0.2999 \quad 0.0569]$$

Matrix (5)

5.1.4 List the final matrix to obtain the recommendation degree

(1) Matrix appearing in 5.2 (4) * matrix (1)

$$[0.6042 \quad 0.0390 \quad 0.2999 \quad 0.0569] \begin{bmatrix} 15860 & 22355 & 6256 & 51060 & 185834 & 6128 & 5645 & 36225 & 86060 & 11395 & 17036 & 29166 & 949 & 22144 \\ 3.9 & 4.6 & 4.4 & 4.6 & 4.2 & 4.1 & 4.1 & 3.9 & 4.1 & 3.5 & 4.0 & 3.5 & 4.0 & 4.8 \\ 0 & 40 & 50 & 45 & 100 & 0 & 80 & 40 & 70 & 0 & 42 & 120 & 50 & 70 \\ 224 & 238 & 184 & 243 & 184 & 193 & 195 & 243 & 270 & 264 & 279 & 232 & 228 & 224 \end{bmatrix}$$

(2)The data is processed through Matlab to obtain the ranking recommended value.

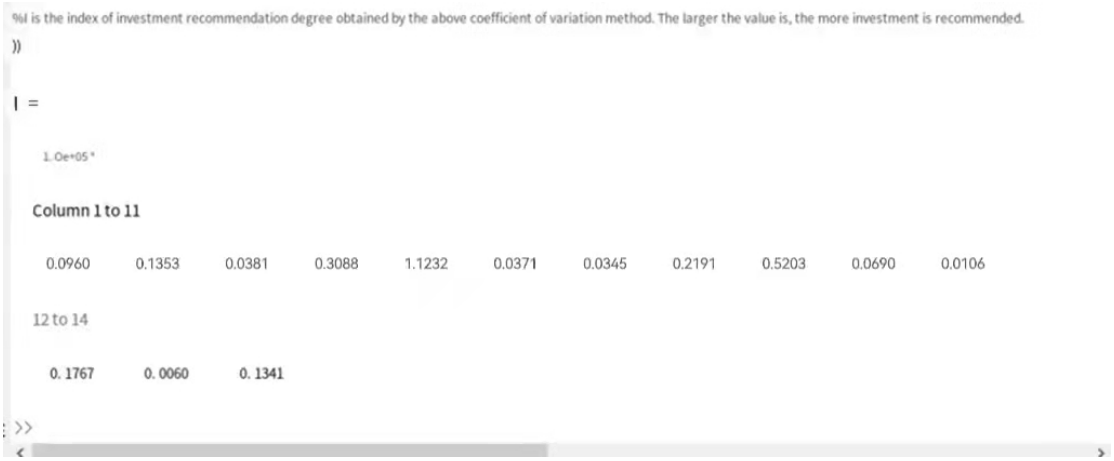

Figure 4. Matlab solves the ranking recommended values

(3) Re-rank the scenic spots, and rank the bar chart from high to low according to the recommendation degree.

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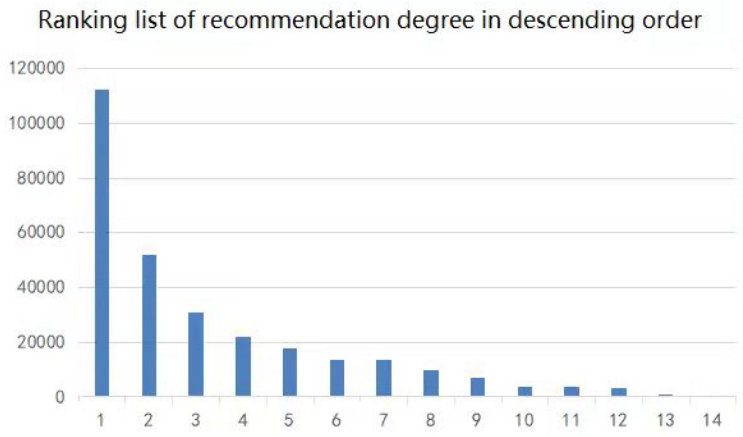

Figure 5. Bar graph of the recommended degree of 14 A-level scenic spots

(4) Get the recommendation ranking of the scenic spots, as shown in the table below.

Table 2. The ranking of 14 A-level scenic spots

Recommendation ranking	Name of scenic spot	Recommendation
1	Qingdao Forest Wildlife World	112320
2	Qingdao Zangma Mountain Scenic Area	52032
3	Qingdao Zhushan National Forest Park	30877
4	Qingdao west Coast New Area District Ecological Sightview Park	21912
5	Mingyue Seaweed Museum	17671
6	Qingdao Dazhu Mountain Scenic Area	13532
7	Qingdao Shell Museum	13413
8	Qingdao Jinshatan Scenic Area	9595.2
9	Tangdao Bay Scenic Area	6899.8
10	Qingdao Langyatai Scenic Area	3805.4
11	Lingshan Bay Urban Leisure Tourism Area	3713.6
12	World Museum of Animal Nature Ecology	3445.8
13	Qingdao Xiangbo Garden Scenic Area	1057.5
14	Qi Changcheng Baiguoyuan	601.4843

The top five scenic spots evaluated by the government by the picture above.

Table 3. Gets the top five recommended scenic spots according to the ranking

Recommendation ranking	Name of scenic spot	Recommendation
1	Qingdao Forest Wildlife World	112320
2	Qingdao Zangma Mountain Scenic Area	52032
3	Qingdao Zhushan National Forest Park	30877
4	Qingdao West Coast New AreaDistrict Ecological Sightview Park	21912
5	Mingyue Seaweed Museum	17671

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Conclusion: The top five recommended scenic spots ranked by the recommended scores are Qingdao Forest Wildlife World, Qingdao Zangashan Scenic Spot, Qingdao Zhushan National Forest Park, Qingdao west Coast New Area District Ecological Sightseeing Park and Mingyue Seaweed Hall.Their descending scores were 112320,52032,30877,21912,17671.

5.2. The Model for Problem 2

5.2.1 Standardized data for all influencing factors

Using SPSS will all influencing factors data (participate in the total number, average annual evaluation, scenic average score, during May Day tourists, ticket prices, tourists average daily entertainment spending, tourists play two days total spending, fixed assets investment) import processing, the results are as shown in the figure (figure 1 is the original data, figure 2 for standardized processing data)

Table 4. Raw Data

Total number/person involved in the evaluation	Average annual number of appraisers/ person	Average score of scenic spots	Number of tourists/ person during May Day	Ticket price/yuan	The average daily meal and entertainment expenditure of tourists/yuan	Total expenditure of tourists for two days/yuan	Investment in fixed assets/billio n yuan
4015	397.5	3.9	15860	0	224	7105280	3.64
5211	560.3	4.6	22355	40	238	12429380	6.37
1113	156.8	4.4	6256	50	184	2927808	1.5
9342	1279.7	4.6	51060	45	243	29410560	15.08
34512	4657.5	4.2	185834	100	184	105553712	54.11
1229	153.6	4.1	6128	0	193	2365408	1.21
849	141.5	4.1	5645	80	195	3104750	1.59
6809	907.9	3.9	36225	40	243	20503350	10.51
11451	2156.9	4.1	86060	70	270	58520800	30
1742	285.6	3.5	11395	0	264	6016560	3.08
305	42.7	4	1703	42	279	1093326	0.56
22	731	3.5	29166	120	232	20532864	10.53
119	23.8	4	949	50	228	527644	0.27
3441	555	4.8	22144	70	224	13020672	6.67

Table 5. Normalized data

Z Average annual number of appraisers/ person	Z scenic spot average score	Number of tourists/ person during may 1	Z ticket price/yu an	Z average daily meal entertainment expenditure/yu an for tourists	Z total expenditure of tourists for two days/yuan	Z Investment in fixed assets/billion yuan
-0.37437	-0.57866	-0.37436	-1.40122	-0.15009	-0.45126	-0.45126
-0.24279	1.25064	-0.2428	-0.29134	0.3025	-0.2681	-0.2681
-0.5689	0.72799	-0.5689	-0.01387	-1.4432	-0.59497	-0.59497
0.33864	1.25064	0.33865	-0.15261	0.46413	0.3161	0.3161
3.06863	0.20533	3.06863	1.37347	-1.4432	2.93562	2.93562
-0.57149	-0.056	-0.57149	-1.40122	-1.15225	-0.61432	-0.61432
-0.58127	-0.056	-0.58127	0.81853	-1.0876	-0.58889	-0.58889
0.03815	-0.57866	0.03815	-0.29134	0.46413	0.00967	0.00967
1.04761	-0.056	1.04761	0.54106	1.33698	1.31757	1.31757
-0.4648	-1.62397	-0.4648	-1.40122	1.14302	-0.48871	-0.48871
-0.66112	-0.31733	-0.66112	-0.23585	1.62793	-0.65808	-0.65808
-0.10483	-1.62397	-0.10483	1.92841	0.10853	0.01068	0.01068
-0.6764	-0.31733	-0.6764	-0.01387	-0.02078	-0.67755	-0.67755
-0.24707	1.7733	-0.24707	0.54106	-0.15009	-0.24775	-0.24775

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5.2.2 The correlation coefficient matrix is obtained according to the standardized data matrix

The factor analysis of the standardized data is solved by the factor analysis in SPSS. After a series of operations, the total variance interpretation, gravel map, component matrix, component map and other tables and images can be obtained, as shown in the following figures:

Table 6. Interpretation of the total variance

Total variance explanation

Components	Starting eigenvalue			Capture sum of squares and load		
	Total	% of variation	Accumulated%	Total	% of variation	Accumulated%
1	5.257	65.713	65.713	5.257	65.713	65.713
2	1.215	15.184	80.897	1.215	15.184	80.897
3	. 815	10.188	91.085			
4	. 689	8.611	99.696			
5	. 024	. 297	99.992			
6	. 001	. 008	100.000			
7	9.686E-12	1.211E-10	100.000			
8	-1.444E-15	-1.805E-14	100.000			

Capture method: host component analysis.

When the main component is selected, the cumulative contribution rate is required to 80%. At this time, the factors that can be considered to meet the requirements can already contain the information of all the factors.As shown in the figure above, the first two factors accumulate to 80.897%, and the two principal components are selected by default.

5.2.3 Solution of the data coefficients after standardized processing

The following figures 1 and 2 represent the first and second principal components, respectively, and the first principal component represents the linear coefficient of the data, and the second principal component represents,,.Therefore, the correlation coefficient between the first principal component and the total number of participants in the evaluation is 0.968, and so on, The first main component is strongly related with the total number of participants, average annual evaluation number, tourists during the May Day period, total expenditure of tourists for two days, and fixed asset investment, The second main component is a strong correlation with the ticket price, the average annual evaluation number, the number of tourists during the May Day period, the average score of scenic spots, and the average daily meal and entertainment expenditure of tourists, However, since the first principal component already represents the average annual evaluation number and the number of tourists during the May Day holiday, Therefore, the second main component represents the ticket price, the average score of the scenic spot, and the average daily meal and entertainment expenses of tourists.The correlation of the first and second principal components and other factors.

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Table 7. The component matrix

Component matrix a

	Principal component	
	1	2
Zscore: Total number of people participating in the evaluation/person	. 968	-. 014
Zscore: average annual number of evaluations/person	. 994	. 073
Zscore: ticket price/yuan	. 547	-. 092
Zscore: Number of tourists/person during may day	. 994	. 073
Zscore (average score of scenic spots)	. 162	-. 771
Zscore: average daily meal and entertainment expenses of tourists/yuan	-. 233	. 759
Zscore: total expenditure of tourists for two days/yuan	. 991	. 111
Zscore: Investment in fixed assets/billion yuan	. 991	. 111

Capture method: host component analysis.

In the element diagram, the horizontal axis vertical axis represents the first principal component and the second principal component respectively. In the horizontal axis, the farther away from the coordinate (that is, the zero coordinate), the stronger the correlation between the first principal component and the factors represented; Similarly, in the vertical axis, the farther the coordinate from the middle, the stronger the correlation between the second principal component and its represented factors.

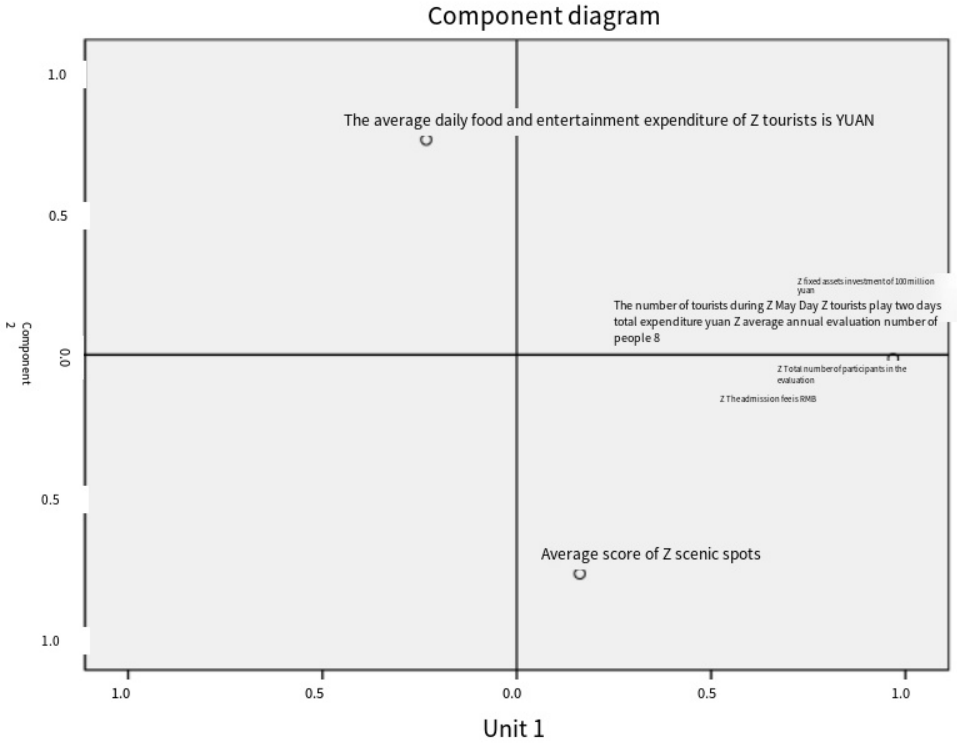

Figure 7. Element diagram

5.2.4 Calculate the correlation coefficient of the original data

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PCA expression:

$F_1 = w_{11}ZX_1 + w_{12}ZX_2 + ...w_{18}ZX_8$

$F_2 = w_{21}ZX_1 + w_{22}ZX_2 + ...w_{28}ZX_8$

Factor analysis represents all the metrics with a common set of formulas,

That is, f_1、f_2、……、f_8 the public factor

$ZX_1 = d_{11}f_1 + d_{12}f_2 + ...d_{18}f_8 + \xi$

$ZX_2 = d_{21}f_1 + d_{22}f_2 + ...d_{28}f_8 + \xi$

……

$ZX_8 = d_{881}f_1 + d_{82}f_2 + ...d_{88}f_8 + \xi$

Let $F_i / \sqrt{\lambda_i} = f_i$,After simplification, we can obtain the relationship between principal component analysis and factor analysis $w_{ij} = d_{ij} / \sqrt{\lambda_i}$

That is:

w_{1j}=d_{1j}/SQR(5.257)

w_{2j}=d_{2j}/SQR(1.215).

Inside, d_{11}=0.968, d_{12}=0.994, d_{13}=0.547, ……, d_{18}=0.991.

d_{21}=-0.014, d_{22}=0.073, d_{23}=-0.092, ……, d_{28}=0.111.

Finally get:

Table 8. The linear coefficients corresponding to the principal component analysis

w_{1j}	w_{2j}
0.42	-0.01
0.43	0.07
0.24	-0.08
0.43	0.07
0.07	-0.7
-0.1	0.69
0.43	0.1
0.43	0.1

5.2.5 Linear representation of the principal components and other factors

(1) Calculate by using SPSS F_1, F_2

$F_1 = w_{11}ZX_1 + w_{12}ZX_2 + ...w_{18}ZX_8$

$F_2 = w_{21}ZX_1 + w_{22}ZX_2 + ...w_{28}ZX_8$

That is:

F_1=0.42*ZThe total number of participants in the evaluation + 0.43 * Z average annual evaluation number + 0.24 * Z scenic spot average score + 0.43 * Z May Day tourists + 0.07 * Z ticket price yuan-0.10 * Z tourists average daily food entertainment expenditure yuan + 0.43 * Z tourists play two days total expenditure yuan + 0.43 * Z fixed assets investment 100 million yuan.

F_2=-0.1*ZTotal number of people participating in the evaluation + 0.7 * Z average annual evaluation number of people-0.08 * Z scenic spot average score + 0.07 * Z May Day tourists-0.7 * Z ticket price yuan-0.69 * Z tourists average daily food entertainment expenditure yuan + 0.1

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* Z tourists play two days total expenditure yuan + 0.1 * Z fixed assets investment 100 million yuan.

(2) The final result are as follows:

Table 9. Coefficients and principal component expression results

d_{1j}	d_{2j}	W1	W2	F1	F2
0.97	-0.01	0.42	-0.01	-1.01	0.77
0.99	0.07	0.43	0.07	-0.21	-0.34
0.55	-0.09	0.24	-0.08	-0.9	0.44
0.99	0.07	0.43	0.07	0.97	-0.03
0.16	-0.77	0.07	-0.7	6.79	2.65
-0.23	0.76	-0.1	0.69	-1.23	1.27
0.99	0.11	0.43	0.1	-1.08	-0.33
0.99	0.11	0.43	0.1	-0.11	-0.05
				2.19	-0.29
				-1.61	-0.09
				-1.64	-1.51
				-0.61	-1.31
				-1.5	-0.54
				-0.05	-0.63

5.3. The Solution of Problem 3

Qingdao west Coast New Area District began its construction and development in the 1990s, Today's West Coast New Area has a solid foundation to develop the economy. The public account of Qingdao west Coast New Area District released a good news report on December 10,2020, The West Coast New Area was awarded the most competitive and strong area in China, This proves that the development momentum of Qingdao west Coast New Area District is still relatively fierce.

The excellent geographical location of Qingdao west Coast New Area District makes the environmental quality of Qingdao west Coast New Area District relatively excellent, so it needs to increase a certain cost in environmental maintenance to attract tourists.In addition, the West Coast New Area has 20 A-level tourist attractions, so the government can appropriately publicize the less-known scenic spots and give some support.

In general, it is to introduce talents, maintain environmental quality, maintain their own advantages, and improve the visibility of scenic spots.

6. INTERPRETATION OF RESULT

6.1. Results Analysis of Problem 1

Four main influencing factors were considered in question 1, The remaining secondary factors were ignored, This is not just about simplifying the data size, Another reason is the causal relationship between the remaining several factors and the main factors. After the fuzzy comprehensive evaluation model and the normalization of the data will dominate, This greatly weakens the other factors. Because the data source is more accurate and true, the model can show the actual situation of traffic flow, customer evaluation, ticket price and tourist accommodation consumption of the scenic spot for a period of time, so the ranking data is more objective and true.

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The model transforms the complex policy problems in all aspects of Qingdao construction into a simple and readable tourism investment problem in the West Coast New Area, which simplifies the problems and solves the problems.Given the model to explore the evaluation factors is less, but the data results are more objective and effective, for a fuzzy comprehensive evaluation model, can continue its idea, using Python, Spss and other data processing software for multiple factors for more detailed processing, or directly ask the scenic spot head get more accurate data, then with the model.This data ranking is more real and accurate, and the government assessment results are more objective.

In summary, the question 1 model yielded considerable data.The hypothesis data is simulated and the model is simplified to get the ranking data in a short time and solve the problem.Greatly saves the working time.This model can obtain effective ranking results based on the exploration of these four influencing factors. Under the condition of the restriction principle, the government investment ranking results obtained from this model have strong research value and practical significance.

6.2. Results Analysis of Problem 2

The problem two minimalization simplifies the data, but due to the limitations of the software, the factor analysis can only be solved in SPSS software, so it is necessary to find the relationship between principal component analysis and factor analysis and then solve the real linear coefficient of principal component representation.But despite the cumbersome data processing, the use of SPSS greatly improves the computational efficiency.

7. EVALUATION, IMPROVEMENT AND PROMOTION OF THE MODEL

7.1. Advantages and Disadvantages of the Model

7.1.1 Advantages

(1) The model specifies the complex policy problems in the construction of Qingdao to the relatively single tourism investment problem in the West Coast New Area, which is conducive to the solution of the problem and is more targeted.

(2) Model combined with software solution, using Matlab programming language, data structure and other professional knowledge, writing programs, high program operation efficiency and low time complexity and spatial complexity.

(3) In solving the problem, using fuzzy comprehensive evaluation model, principal component analysis method, fuzzy comprehensive evaluation model more objective and real, this paper will tourist evaluation, traffic, ticket prices, tourists' daily accommodation consumption as an independent variable, the result of recommendation as a dependent variable to establish a simplified model can be carefully and objectively recommended degree and ranking.

(4) When solving problem 2, this paper analyzes the principal component of the factors affecting the evaluation of the scenic spots, simplifies the model, and simulates the assumed data, which greatly saves the working time.

(5) The Qingdao city can be evaluated with reference to this model.Under the condition of the restriction principle, this model can be used for other city governments to invest in different attractions.

(6) The model is more comprehensive, with different four factors as indicators, to make the results more convincing.

7.1.2 Disadvantages

(1) It is impossible to take all the factors into account. The results are the reference of objective facts and not completely objective facts.

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(2) Data are affected by the epidemic.Tourist data that cannot be found on the official website are allocated according to the annual proportion of people evaluated, which can only be close to real data but not real data.

(3) If other evaluation methods other than fuzzy comprehensive evaluation are used, the results may be different, that is, different evaluation methods may not be the same results.7.2. Improvement and promotion of the model

7.2. Improvement and Promotion of the Model

7.2.1 Improvement

(1) Model for Problem 1:

The model can refer to the investment evaluation of A-level tourist attractions in Qingdao west Coast New Area District according to the data of Qingdao Government Network, Qingdao Culture and Tourism Bureau, and Qingdao west Coast New Area District Journal in 2021, so that the ranking is more accurate and convincing.The influencing factors may not be representative, that is, the number of influencing factors is not enough. In fact, more factors are considered in reality, such as natural disasters, price changes, scenic spot opening time, scenic spot maintenance and so on. Therefore, this model has certain limitations.In addition, there are some decision-making problems in government investment, such as arbitrary decision-making, wide investment scope, disorderly investment direction, loose investment management and other problems, which should be considered as evaluation factors.Make the investment target, direction, amount more accurate, reduce the investment risk.

(2) Model for Problem 2:

Principal component analysis is applicable to the data that too many influencing factors are not conducive to calculation, but it requires a certain correlation between influencing factors. If they are independent of each other, principal component analysis is not applicable.

7.2.2 Promotion

Problem a type can be applied to a city or even a provincial government investment evaluation of all scenic spots, scenic spot ranking, and reasonable investment in the scenic spot, can refer to the second problem solution to find out the main components of local scenic spot investment assessment, according to the component weight, data processing, through Lingo, Spss software processing data get the final scenic spot.This model is also applicable to fund investment, enterprise investment, college students' course selection and so on.

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