J. COMBIN. MATH. COMBIN. COMPUT. 127b (2025) 4769--4783

Journal of Combinatorial Mathematics
and Combinatorial Computing
www.combinatorialpress.com/jcmcc

Combinatorial Press

Research on strategic research of red tourism culture platform construction and brand development based on big data

Feifei Ye[1,✉]

[1] *Department of Tourism and Public Management Tongcheng Teachers College Tongcheng city, Anhui Province, 231400, China*

ABSTRACT

The red spirit is an important part of the Chinese culture that needs to be inherited and developed, but it may also face the problem of insufficient attraction to the general masses. This study is based on big data model, visualization model and risk model, geographical location, historical culture, policy support, population and red culture platform for independence of variables, risk degree and popularity, the actual number of visitors for the red tourism culture platform construction and brand development, at the same time with the visual model of the dynamic red tourism experience application, dynamic real-time monitoring attractions red platform and brand construction, realize the red tourism culture platform construction and brand development strategy research dynamic visualization development and provide effective decisions. In the model design, the measures taken by the experimental group have a significant effect on improving the visibility of scenic spots, and the risk degree is significantly lower than that of the control group, which indicates that the experimental group is significantly better than the control group in reducing the risk degree, improving the visibility of scenic spots and increasing the actual number of tourists. This further shows that the joint use of big data analysis model and risk assessment model has effectively promoted the construction of red tourism culture platform and brand development. At the same time, compared with the people of different age groups, the satisfaction of red scenic spots soared, reaching more than 98%. Therefore, this model plays a key role in the strategic decision-making of red tourism culture platform construction and brand development, and also provides new ideas and methods for the inheritance and protection of red culture.

Keywords: big data model, red tourism, cultural platform construction, cultural brand, visual model

✉ Corresponding author.
E-mail address: YFF91241@163.com (F. Ye).
Received 12 January 2024; Revised 05 March 2024; Accepted 25 December 2024; Published Online 16 April 2025.
DOI: 10.61091/jcmcc127b-262

1. Introduction

China is many red tourist attractions and has important historical significance, red spirit is need to inherit and carry forward the important part of the Chinese culture, and the red tourism culture platform construction and brand construction can be more intuitive let people experience the red spirit and connotation, immersive feel the patriotic spirit and fighting spirit. Wu et al. believe that the red tourism cultural resources are abstract, contemporary and intangible, and the old revolutionary base areas with rich revolutionary cultural connotation may also face the problem of insufficient attraction to the general masses [1]. In today, the speed of information technology update iteration is far beyond imagination, through the help of network and artificial intelligence, big data analysis, visualization technology vivid image and convenient display and promotion of the red spirit is the focus of future development. The specific red tourist attractions should pay attention to the construction of red tourism culture platform and brand development [2].

The development of big data technology provides a new thinking scheme for the dissemination of red culture. Through the analysis of tourists' behaviors and needs, scenic spots and tourism enterprises can understand the preferences and expectations of tourists in advance, so as to provide personalized services and products, and realize personalized cultural teaching and thought dissemination. At the same time, the real-time monitoring system detects the flow and distribution of tourists in the scenic spot in real time, timely finds and solves the problems encountered by tourists in the tour process, improves the overall service quality of the scenic spot and the reputation of tourists, and establishes the brand effect [3]. At the same time, big data analysis can help scenic spots and tourism enterprises to accurately grasp the changing trend of market demand and tourist flow, reasonably arrange human, material and financial resources, and save the maintenance cost of scenic spots. In order to further improve the brand effect need to have their own special gen, which requires the analysis of market data and tourist feedback, can accurately judge tourism projects and products have market potential, to optimize the product structure, concentrated resources development and promote popular products, improve the enterprise's economic efficiency and operational efficiency. Therefore, big data analysis can help to explore the connotation and value of red tourism culture, and have a deep understanding of tourists' cognition and interest in red culture[4]. Through the development of innovative and educational red tourism products and experience projects, such as red culture themed exhibitions, interactive performances, research courses, etc., the red culture will be presented to tourists in a more vivid and vivid way.As shown in Figure 1, the adolescent group chose 34.13%, while the elderly group was as high as 42.11%. People aged 16-30 chose only 28.41%, while 30 and 36.43% aged 30-50. Young and middle-aged groups usually pursue diversified and personalized tourism experience, and non-red scenic spots can attract them more in terms of product innovation and integration of fashion elements.The propaganda penetration rate of non-red scenic spots is generally high in all age groups, above 85%, while the propaganda penetration rate of red scenic spots is relatively low in 65-80 years old except 74.68%, especially in 16-30 years old, only 46.86%. This shows that red scenic spots fail to effectively cover all age groups, especially those young in the publicity channels and methods of young people, which leads to a large gap in their market recognition and non-red scenic spots, and thus affects the choice of tourists. The overall satisfaction of non-red spots was higher than that of red spots.For example, the satisfaction of 16-30 was 84.64%, but 74.43%; 30-50 was 85.57% and 72.45%. Therefore, it is very important to strengthen the propaganda intensity and propaganda way of red culture to improve the influence and national confidence of red culture.

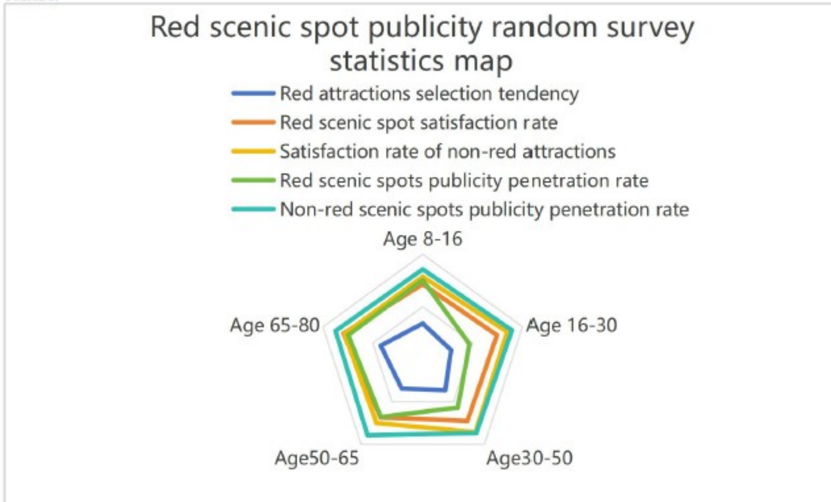

Fig. 1. Statistical map of the random survey of red scenic spots publicity

The construction of the red tourism culture platform is an important carrier to inherit the red gene. The construction and brand of red tourism culture platform are effective places to carry out patriotism education [5]. Vigorously developing the construction of red tourism culture platform and brand effect can effectively integrate red tourism resources, display the information of revolutionary sites, memorial halls, red theme parks and other tourist attractions, and improve the utilization efficiency of tourism resources. Such as li et al. through the establishment platform big data of Nanchang city red tourism network visualization model, analysis of tourist intention and emotional change, research red tourism destination brand image perception characteristics, for the red tourism destination brand construction, image space optimization, tour value reveal provide clear governance direction and decision-making ideas [6]. Among them, the image cognition factor can be summarized into 4 main categories and 12 sub-categories. In terms of image emotion, positive emotion is significantly higher than that of neutral and negative emotions, and the proportion of negative emotions is the least. At the same time, big data analysis can help tourists to customize their personalized tourism routes. Through digital technology, the platform can provide virtual tourism, intelligent guided Tours and other services. Virtual tourism allows tourists to feel the charm of scenic spots in advance before they travel, while the intelligent guide can provide real-time explanation and route recommendation according to the location of tourists[7]. Wang et al to zhunyi red cultural attractions as the research object, with the help of big data analysis and visualization model of Zunyi red cultural tourism existing situation, clarify the big data of Zunyi red tourism resources, put forward under the background of cultural development and prosperity, through big data expand with characteristics of Zunyi and era characteristics of red culture influence is the effective path to protect and use of red culture resources [8]. With the development of big data in Guizhou and the continuous and rapid development of tourism, Zunyi city needs to establish the concept of "big data analysis and big tourism", closely integrate big data with the diversified tourism development trend of Zunyi city; and be good at using big data to analyze and open a new communication mode of red text.As table 2 for the 2024 National Day reception during the top 30 attractions table, table 3 for 2024 National Day during the national reception of the top 30 red spots, can find the red spots during the National Day reception more, the red spots third reception number is 177300, and red attractions basic reception below 160000 people, considering some red spots for protection measures and space, geographical location, lead to reception, but such a big gap further illustrates the lack of red spots propaganda. This need to further strengthen the new media platform of red spots, using short video, live form show the unique charm of red attractions and innovative tourism products, can change their inherent cognition of red spots, stimulate their tourism interest, and red tourism consumption growth, promote the sustainable development of the red tourism industry, but also can promote the local economic development and employment growth. Table 1 shows the statistical table of the top 30 scenic spots received during the National Day period in 2024, and Table 2 shows the statistical table of the top 30 red scenic spots received during the National Day period in 2024

Table 1. Statistical table of the top 30 scenic spots received during the National Day period in 2024

Ranking	Scenic spot name	Location of scenic spots	Reception person-time (ten thousand people)
1	Hangzhou West Lake Scenic Area	Hangzhou, Zhejiang	422.6
2	HongYa hole	Chongqing	103.1
3	Magnet mouth ancient town	Chongqing	86.5
4	Wuhan East Lake Scenic Area	Wuhan, Hubei province	84.32
5	JinjiLake Scenic Spot	Suzhou, Jiangsu province	64.3
6	Kaifeng long live mountain	Kaifeng, Henan	59.67
7	Zhangjiajie scenic spot	Zhangjiajie, Hunan	56.65
8	Kaifeng Qingming Festival in Shanghe Garden	Kaifeng, Henan	55.33
9	Zhengzhou Yinji International Tourism Resort	Zhengzhou, Henan	50.05
10	Badaling Great Wall	Beijing	48.86
11	Mount Wutai Scenic Area	Xinzhou, Shanxi	46.26
12	Jiaozuo Yuntai Mountain	Henan Jiaozuo	45.06
13	Zhongshan Scenic Area	Nanjing, Jiangsu province	44.54
14	Wulong Karst tourist Area	Chongqing	43.12
15	Luoyang Longmen Grottoes	Luoyang, Henan	42.81
16	Chengdu Research Base of Giant Panda Breeding	Chengdu, Sichuan	39.5
17	The Beijing Olympic Park	Beijing	36.75
18	The Confucius Temple in the Qinhuai scenic belt	Nanjing, Jiangsu province	36.33
19	Phoenix ancient city	Xiangxi Tujia and Miao Autonomous Prefecture, Hunan Province	36.05
20	The National Palace Museum in Beijing	Beijing	32.76
21	Chongqing Zoo	Chongqing	30.2
22	Jiuhua Mountain Scenic Spot	Anhui Chizhou	27.4
23	Mount Emei scenic spot	Leshan, Sichuan	26.31
24	Qiyun Mountain ecological culture tourism resort	Anhui Huangshan	26.03
25	The Summer Palace	Beijing	24.65
26	Nanxi river	Wenzhou, Zhejiang	23.65
27	Xi an City Wall	Xi'an, Shaanxi	21.54
28	Youyang Peach Blossom Land	Chongqing	20.2
29	Huangshan scenic spot	Anhui Huangshan	19.18
30	Fuling Meixin Red Wine Town	Chongqing	17.73

Table 2. Statistical table of the top 30 red scenic spots received during the National Day period in 2024

Ranking	Scenic spot name	Location of scenic spots	Reception person-time (ten thousand people)
1	China National Museum	Beijing	16.42
2	Tian'anmen Square	Beijing	15.32
3	Gutian conference site	Fujian Longyan	13.25
4	site of the Zunyi Conference	Zunyi, Guizhou	12.21
5	Xibaipo Scenic Spot	Pingshan County, Hebei Province	11.17
6	Baiyangdian Scenic Spot	Xiongan New Area, Hebei Province	10.13
7	The Chinese People's War of Resistance against Japanese Aggression Memorial Hall	Wanping City Nei Street, Lugou Bridge, Fengtai District, Beijing	9.09
8	Terrace ofRaining Flowers	Nanjing, Jiangsu province	8.61
9	Naval Museum	Qingdao, Shandong	8.13
10	Yuelu Mountain	Changsha City of Hunan Province	7.65
11	Yalu River broken bridge	Dandong, Liaoning	7.17
12	Winter Palace	Beijing	6.69
13	The Changchun Film Studio	Changchun, Jilin	6.11
14	Pagoda Mountain	Yan'an, Shaanxi	5.53
15	Jinggangshan scenic spot	Jinggangshan, Jiangxi province	4.95
16	Nanchang Bayi Uprising Memorial Hall	Nanchang, Jiangxi	4.37
17	Yimeng Mountain Menglianggu battle site	Linyi, Shandong	3.79
18	The Yan'an Revolutionary Memorial Hall	Yan'an, Shaanxi	3.21
19	Deng Xiaoping's former residence and memorial hall	Guang'an, Sichuan	3.08
20	The Memorial Hall of the Victims of the Nanjing Massacre by Japanese Invaders	Nanjing, Jiangsu province	2.95
21	The Pingjin Battle Memorial Hall	Tianjin	2.82
22	Memorial of the Liao-shen Campaign	Jinzhou, Liaoning	2.69
23	The Huaihai Campaign Memorial Hall	Xuzhou, Jiangsu	2.56
24	Crossing the River Victory Memorial Hall	Nanjing, Jiangsu province	2.43
25	Zhou Enlai and Deng Yingchao Memorial Hall	Tianjin	2.3
26	The September 18th History Museum	Shenyang, Liaoning	2.19
27	Memorial Hall of Anti-American Aid and Aid Korea	Dandong, Liaoning	2.08
28	Wuhan 87 Conference site memorial Hall	Wuhan	1.97
29	Former residence and memorial hall of Mao Zedong in Shaoshan	Xiangtan, Hunan	1.86
30	Liu Shaoqi's former residence and memorial hall	Hunan Ningxiang	1.73

Therefore, based on the big data collection and analysis model, this study, the operation situation and human flow ofred tourist attractions in China in the recent 5-10 years, Comprehensive analysis ofthe brand building, At the same time, with the help of the visual model, launch the dynamic red tourism experience application, Dynamic and real-time monitoring of the red platform and brand construction of each scenic spot, On the construction of national red tourism culture platform and brand development with the help of computer-aided decision support system, According to the different market performance of red scenic spots in different age groups, According to the characteristics and needs of each age group, Adopt differentiated strategies in promotion, product optimization and service promotion, To improve the attraction, satisfaction and market share of the red scenic spots, Also learn from the successful experience of non-red scenic spots in the market promotion, Strengthen the development ofred cultural tourism.

2. The establishment of big data model in the red tourism culture platform and brand construction

2.1. The operation logic of the big data model in the red tourism culture platform and the brand construction

Big data analysis needs a comprehensive analysis of the operation data in the red tourism culture platform and brand building, which requires the help of professional dynamic collection and analysis software. In the process of big data platform analysis, it is necessary to carry out data collection, data cleaning and preprocessing data analysis and modeling, market segmentation and construction, tourism demand prediction (neural network model, ARIMA model, random model), personalized service, risk assessment and visual decision module [9]. As shown in Figure 2, the operation logic diagram shows a comprehensive analysis for the operation data of the red tourism culture platform and brand building. The analysis process of big data requires data collection, data cleaning and pretreatment, data analysis and modeling, market segmentation and construction, tourism demand prediction (neural network model, ARIMA model, random model), personalized service, risk assessment and visual decision module.Data collection, data cleaning and preprocessing data analysis and modeling determine the accuracy of the model and data analysis, and for tourism demand prediction, it requires neural network model, ARIMA model, random model god, which will also be the focus of modeling optimization [10]. The personalized service module is to provide customized tourism services for tourists through data analysis according to their personal preferences and historical behavior data, and also helps to establish a long-term relationship with tourists. The risk assessment module helps to identify potential operational risks in advance and provide reference for the rational allocation of tourism resources. At the same time, it can rationally allocate marketing resources, human and material resources according to the risk degree and revenue expectations of different tourist destinations [11]. For tourism projects with high risk and high yield, investment can be appropriately increased under the premise of controllable risk; for low risk and low return, resource utilization can be optimized. The visual decision module presents complex data in intuitive charts, graphics and other visual ways, to help decision makers quickly understand the current situation of the tourism market. For example, the visual map shows the distribution of tourist hot spots and the dynamic changes of tourist flow. For strategic planning, the visualization module can show the macro tourism market trends, competitor analysis and its own advantages and disadvantages [12].

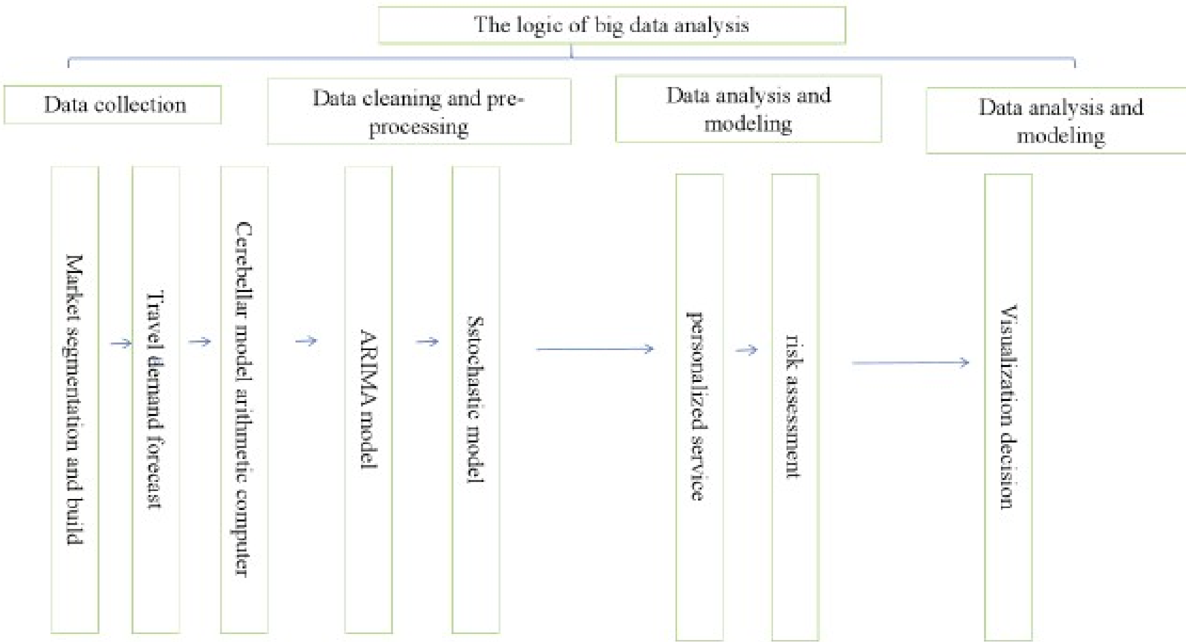

Fig. 2. A Schematic diagram of the logic operation of the big data analysis

2.2. Big data model and model optimization in the red tourism culture platform and brand construction

In the process of establishing the model, the comprehensive information is collected about the red scenic spots, which includes the geographical location, the historical and cultural deposits, the policy support and so on. In addition, it is necessary to further consider the population, transportation, red culture platform foundation, economic structure and economic development vitality and other multidimensional data for comprehensive analysis. When constructing the model, the relevant influencing factors need to be included as variables. In this study, the geographical location, historical and cultural heritage, policy support, population, transportation and red culture platform foundation serve as independent variables, striving to truly reflect the comprehensive characteristics of strategic research on the construction of red tourism culture platform and brand development. This requires not only data collection and sorting through big data analysis model, but also optimization and visualization model and neuron model, so as to verify the accuracy and reliability of the model.

First, the independence detection of independent variables is taking the specific variables as the reference, so that the degree of independence between different variables is calculated. The initial independence test model is as follows:

$$F(x) = P(X \leq x) \tag{1}$$

Then, the dividing site function of the variable x can be obtained for any parameter x of a random variable.Among them, (2) as a judgment condition, its independence is determined, but in the solving process, the real solution process is too complex, so the empirical distribution function (3) is generally used to represent:

$$q(a) = \inf\left\{x : F(x) \geq a\right\} \tag{2}$$

$$F_{n(x)} = n^{-1}\sum_{i=1}^{n} I\left(X_i \leq x\right) \tag{3}$$

Combining (1) with (2) and (3), the initial independence correlation equation can be obtained, where I is an indicative function, a function completely independent from the dependent variable, and generally a determined function.

$$q_{n(a)} = \inf\left\{x : F(x) \geq a\right\} \tag{4}$$

Due to the investigation of the red tourism culture platform construction and brand development data comprehensive analysis, geographical location, history and culture, policy support, population, traffic, red culture platform, and other variables, on the basis of the model of further build square statistical model to judge the independence between the variables.

$$Q(a) = \sum_{k=1}^{K} \sum_{b=0}^{1} \frac{[P(Y=k)[P(Z(a)=b)] - (C(a)=b)(Z(a)=b)]}{[P(Y=k)]P(Z(a)=b)} \tag{5}$$

$$Z(a) = I\left\{X - qX(a) > 0\right\} \tag{6}$$

where Q (a) is the correlation factor, stipulating that the two variables are relatively independent of each other only when the value is less than 5%, and the two variables are independent when the value is less than 1%. K is the initial parameter, which is generally a large amount of data used for training. P and C represent different variables, b represents the variable weight, and $Z(A)$ represents the independence detection equation for the above variables. However, in order to improve the detection accuracy of variable independence, this study used the following method for further optimization.

$$q_x(a) = \inf\left\{x : n^{-1}\sum_{i=1}^{n} I\left(x_i < x\right)\right\} \tag{7}$$

$$Z_i(a) = I\left\{x_i > q_x(a)\right\} \tag{8}$$

$$P(Z(a)=b) = n^{-1}\sum_{i=1}^{n} I(Z(a)=b) \tag{9}$$

$$P(Y=k) = n^{-1}\sum_{i=1}^{n} I(k) \tag{10}$$

$$C(Z(a)=b) = n^{-1}\sum_{i=1}^{n} I(Z(a)=b) \tag{11}$$

$$C(Y=k) = n^{-1}\sum_{i=1}^{n} I(k) \tag{12}$$

In this study, the variable parameters are geographical location, historical and cultural heritage, policy support, population, transportation, red culture platform foundation, etc. So their relative independence relationship was calculated by the models before and after the optimization described above.The independence test is as shown in Table 3, which calculates the independence of geographical location, historical and cultural heritage, and policy support, population and red culture platform. Can find both geographical location, historical culture, policy support, population and red culture platform, they for population and red culture platform construction has certain randomness, this is because with the change of k and weight b also present nonlinear change, it also accord with the actual, specific analysis, each region, attractions, difficult to use to determine the weight than.The overall data showed some discrete and diversity, and the proportion of samples on different items varies. Regardless of the geographical location, historical and cultural background, policy support, population, transportation and red culture platform, they show good independence of variable parameters among each other. All the independence judgment parameters are less than 5% and basically less than 1%, which provides a guarantee for accurate analysis in the future. For subsequent analysis, advanced statistical methods such as cluster analysis, principal component analysis, factor analysis or multiple regression analysis are considered to deeply explore the structure, patterns and relationships that may be hidden behind the data. These methods can help simplify data, extract key information, and build mathematical models between data to more accurately interpret data and perform predictive analysis.

Table 3. Detection ofindependence between the different variables

k	Q1	b1	Q2	b2	Q3	b3	Q4	b4	Q5	b5
1	1.07%	34.42%	0.83%	17.81%	0.38%	12.07%	0.03%	16.90%	0.02%	18.80%
2	1.14%	9.82%	0.45%	16.55%	0.33%	16.06%	0.13%	22.49%	0.11%	35.08%
3	0.23%	32.50%	0.03%	21.70%	0.04%	12.48%	0.78%	17.47%	0.65%	15.85%
4	0.08%	27.78%	0.36%	28.39%	0.45%	29.66%	0.38%	5.93%	0.31%	8.24%
5	1.28%	30.98%	1.05%	1.85%	0.66%	9.41%	0.76%	13.18%	0.63%	44.58%
6	0.76%	35.56%	0.06%	18.76%	0.03%	29.91%	0.65%	14.67%	0.54%	1.10%
7	0.41%	4.54%	1.03%	26.43%	0.48%	17.69%	0.56%	24.76%	0.47%	26.58%
8	0.09%	9.24%	0.53%	6.64%	1.12%	12.07%	0.20%	16.90%	0.17%	55.14%
9	0.74%	29.43%	0.26%	18.07%	0.93%	4.89%	1.01%	6.85%	0.84%	40.76%
10	0.34%	31.33%	0.97%	2.49%	1.10%	28.85%	0.95%	23.87%	0.79%	13.46%
11	0.79%	29.90%	0.40%	22.76%	0.73%	14.26%	0.41%	19.96%	0.34%	13.13%
12	0.07%	18.39%	0.33%	28.37%	0.14%	9.03%	1.14%	12.64%	0.95%	31.58%
13	0.28%	2.79%	0.80%	28.04%	1.06%	18.16%	0.96%	25.43%	0.80%	25.58%
14	0.25%	34.66%	0.74%	27.35%	0.53%	20.12%	0.89%	12.98%	0.74%	4.89%
15	0.18%	31.89%	0.10%	21.97%	0.99%	13.49%	0.91%	18.89%	0.76%	13.75%
16	1.04%	7.77%	0.77%	20.64%	0.40%	4.27%	0.51%	5.98%	0.42%	61.34%
17	1.17%	30.19%	0.94%	18.24%	0.27%	16.32%	0.40%	22.85%	0.34%	12.40%
18	1.27%	8.56%	0.73%	2.89%	0.37%	21.79%	0.79%	30.50%	0.66%	36.26%
19	1.38%	23.65%	0.34%	2.69%	0.90%	28.49%	1.03%	39.88%	0.85%	5.29%
20	0.53%	14.48%	1.13%	29.16%	0.60%	29.46%	0.43%	21.31%	0.36%	5.60%

3. The establishment of the visual model and the risk model in the red tourism culture platform and the brand construction

3.1. The establishment of the risk model in the red tourism culture platform and brand construction

In the modeling process, by taking the variability of uncertain parameters into consideration, using the random planning method can effectively deal with the uncertainty risks in the process of red tourism culture platform and brand building, which is the premise and basis of optimizing and solving the practical problems model in advance. The adoption of risk assessment model can provide targeted solutions for the establishment of red tourism culture platform and brand, and can conduct almost real simulation before the actual decision (see Fig. 3) [13]. Especially in the aspect of the establishment of the red tourism culture platform and brand under the economic market, the random planning model is adopted to conduct a targeted investigation on its market positioning, which then gives birth to the changes of independent variable parameters such as geographical location, historical and cultural heritage, policy support, population, transportation and foundation of the red culture platform. In the risk assessment model, the COVAR model has higher precision and universality. In the process of building the model, the COVAR model can use the data collected by big data for early simulation training, and make prediction and risk assessment through computer technology. However, considering the operation rate, it is necessary to optimize the integration and simplicity of the risk model. In order to improve the running rate, the finite element method and L-core method are used to optimize the algorithm [14-15].

The integrated analysis of the L-finite element and multi-core L-shaped methods can be regarded as the analysis of the risk weight of the risk system.

$$A = CoVaR_q^{C|X^i = VaR_q^t} - CoVaR_q^{C|X^i = VaR_{q<10}^t} \tag{13}$$

Considering the non-linear distribution of weights in the independence test, we need to establish a variable regression equation for Xi and Xc, as shown in formula (14) α, β, and ε indicate the regression intercept, coefficient, and random perturbations, respectively.

$$X^{c|x^i} = \alpha_q^t \pm \beta_q^t \pm \gamma_q^t \tag{14}$$

The parameter A in the above model is called a dynamic risk variable, which is relative to the traditional risk model According to the dynamic risk variable model Thomsett, it is believed that the traditional static risk model cannot simulate the risk value in the real situation, while the dynamic risk assessment can realize the simulation with high accuracy. The dynamic risk model function about the time change is calculated based on the above model. The calculation procedure can be summarized as follows

$$X_t^i = \alpha_q^t + w_q^t stateVarst + \varepsilon_{q,t}^t \tag{15}$$

For the above dynamic risk model, the regression equation is used to analyze the relationship between random variables and platform construction. α, ω and indicate the intercept, coefficient and random perturbations, respectively. The range of risk assessment values of different conditions is shown in Table 4. In the geographical factor variables, a starts from the initial value of 0.22 and shows a gradual upward trend, finally reaching 0.98. The rising process is not completely linear. β The overall trend showed a downward trend, gradually from 0.91 to 0.10. The early decline rate is relatively gentle, and the decline rate accelerates after $w = 0.8$. γ remained relatively stable throughout the process, always at around 0.19. In the historical and cultural deposits, α began to decline from 0.75, and the downward trend was more obvious, and finally decreased to below 0.15. β also showed a downward trend, from 0.95 to about 0.07, and the decline rate was relatively uniform. The γ coefficient of geographical factors kept relatively stable, stable at about 0.32. The α of policy factors gradually increased from 0.10, and the rising speed was relatively stable, finally reaching 0.99. β began to rise from 0.09, with an obvious upward trend finally reaching 0.98, and γ stabilized at around 0.37.

Table 4. Correspondence between fixed parameters and w in the risk assessment model under different variables

	geographical position			Historical and cultural deposits			Policy support		
w	α	β	γ	α	β	γ	α	β	γ
0	0.22	0.91	0.20	0.75	0.95	0.43	0.10	0.09	0.31
0.1	0.23	0.87	0.19	0.71	0.84	0.32	0.17	0.25	0.37
0.2	0.24	0.76	0.19	0.54	0.78	0.32	0.26	0.26	0.37
0.3	0.39	0.73	0.19	0.48	0.74	0.32	0.31	0.37	0.37
0.4	0.57	0.69	0.19	0.44	0.66	0.32	0.35	0.45	0.37
0.5	0.58	0.69	0.19	0.40	0.54	0.32	0.36	0.64	0.37
0.6	0.58	0.64	0.19	0.38	0.53	0.32	0.48	0.72	0.37
0.7	0.59	0.48	0.19	0.30	0.29	0.32	0.51	0.73	0.37
0.8	0.67	0.25	0.19	0.22	0.20	0.32	0.78	0.88	0.37
0.9	0.67	0.15	0.19	0.16	0.07	0.32	0.85	0.94	0.37
1	0.98	0.10	0.19	0.15	0.05	0.32	0.99	0.98	0.37

Secondly, we introduced the risk state variable into formula (14). Considering the interaction of multiple variables in the risk assessment process, we introduced formula (15) as the intermediate condition, and combined (13) (14) and (15) to derive the dynamic risk model formula under risk and normal state:

$$X_{it}^{e}=\alpha_{q}^{t}+BX_{it}^{t}+DstateVar_{st}+\varepsilon_{itq}^{e} \tag{16}$$

where B and D are constant, and this value is only related to time t.

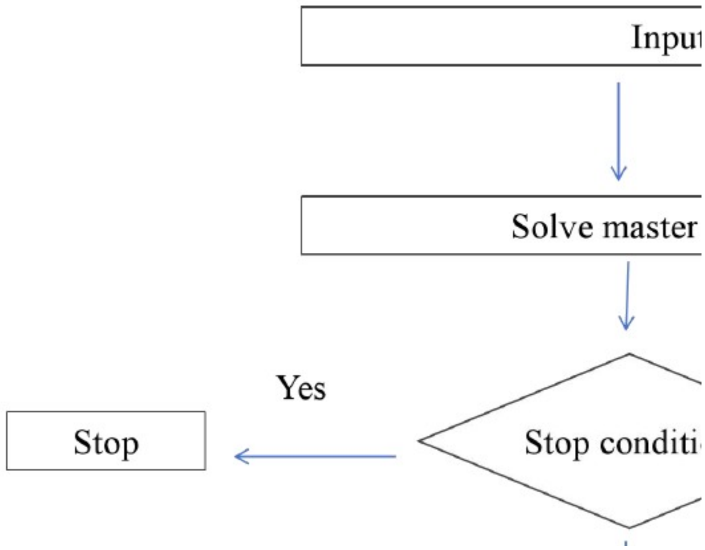

Fig. 3. Logical diagram of L-shaped operation in red tourism culture platform and brand building risk model

3.2. The establishment of the visual model in the red tourism culture platform and brand construction

The establishment of the visual model in the red tourism culture platform and brand building can present massive complex tourism data in the form of intuitive charts, graphics, maps and other forms, so that tourism enterprise managers, decision makers and relevant practitioners can quickly understand the whole picture of the tourism market. Figure 4 shows a schematic representation of the running structure of the visual model. We can draw the flow map of tourists in the national tourist hot spots, and use the markers of different colors and sizes to indicate the number and density of tourists in each region, so as to have a clear understanding of the macro situation of the whole tourism market [16-17]. In addition to the overall situation, the visual model also helps users dig deep into the details of the data. For example, for a particular tourist scenic spot, through the bar chart show different periods of visitors into the park, line chart presents the changing trend of ticket income, pie chart analysis of tourist age, gender, region, can make the scenic spot managers accurately grasp the scenic spot operation details, including tourist flow peak time, the main customers and tourist group characteristics, in order to better develop marketing strategy and resource allocation plan [18]. Therefore, in order to reflect the combination of visualization effect and risk assessment, we established the following relationship according to the red tourism culture platform and brand building of the risk model

$$R_{c\,\mathrm{var}}=R_{\mathrm{var}}+\frac{1}{1-\varepsilon}\sum_{s=1}^{S}p_{s}X_{t}^{t|X^{c}} \tag{17}$$

$$R_{\mathrm{var}}\geq 0 \tag{18}$$

$$R_{c\,\mathrm{var}}\geq 0 \tag{19}$$

S represents the number of red tourism industry, P_s represents the probability of the number of red tourism industry s, R_{var} is the risk value of the number platform of red tourism industry and the brand, and $R_{c\,\mathrm{var}}$ is the dynamic risk value established by a specific red tourism platform.

To assess the quality of the solution decision, and thus to simulate multiple iterations until the best value is reached, this important function can be interchangeably called the fit function or the objective function. In the above expression, $R_{c\,\text{var}}$ is the conditional risk value of the model, so we can substitute the risk value into the objective function, and the inserted objective function is

$$C_{cr} = \min\left[C_g + \sum_{s=1}^{S} p_s\left(C_r + C_o\right)\right] + \beta R_{\text{var}} \tag{20}$$

In the above formula, C_{cr} represents the use of CVaR for risk performance, and β is the risk avoidance factor, which reflects policy regulation and industry risk preference to a certain extent.

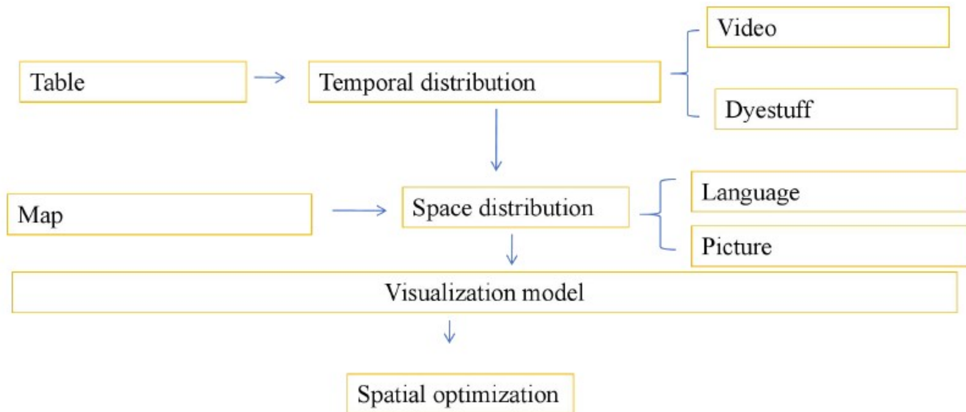

Fig. 4. Logic diagram of the operation in the red tourism culture platform and the brand visualization model

4. Results and discussion

In order to promote the development and innovation of the red tourism industry, this paper uses big data, computer visualization model and risk assessment model to decide the strategic research and policy regulation of the construction of the red tourism culture platform and brand development. Ten red scenic spots with similar relative variables were randomly selected and divided into control group and experimental group. The control group still adopts the original management mode, while the experimental group adopts the optimized management mode of the above model, and ensures that the policies are fluctuating during the experimental cycle. By comparing the risk degree and the popularity of the scenic spots, the actual number of visitors is the basis for measuring the construction of the red tourism culture platform and brand development, and the reform of the red tourism industry in the new era under big data.First of all, it is necessary to conduct a homogeneous analysis of the two groups of scenic spots, based on the risk degree, the popularity of the scenic spots, and the actual number of visitors. The results are shown in Figure 5. It can be known that there is almost no clear difference between the control group and the experimental group, and the actual number of visitors before the big data analysis and optimization, which ensures the reliability of the experimental data comparison in the next step. Where Cx is the control group and Ex is the experimental group.

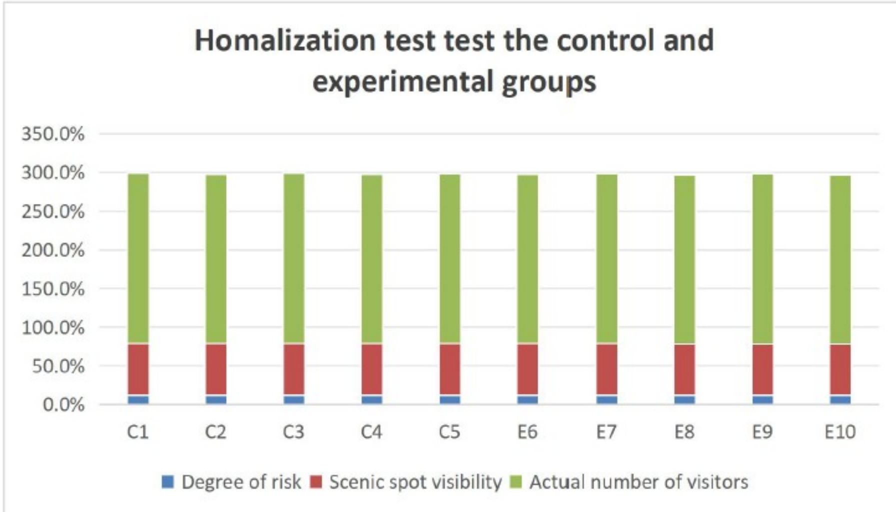

Fig. 5. Homalization test between control and experimental groups

As can be seen from Figure 6, the number of tourists in the experimental group is significantly higher than that of the control group, and showed a gradual upward trend, from 423,000 person-times to 48,300 person-times. This indicates that the operation of the experimental group not only improved the visibility of the scenic spots, but also attracted more tourists, and the visibility of the experimental group was significantly higher than that of the control group, between 97.60% and 97.80%. This indicates that the measures taken by the experimental group had a significant effect on improving the visibility of the scenic spots, and the risk degree was significantly lower than that of the control group, and the value was between 2.70% and 2.90%.This indicates that the measures taken by the experimental group may be effective in reducing the risk. The experimental group has achieved significantly better effects than the control group in reducing the risk degree, improving the visibility of scenic spots and increasing the actual number of tourists, which shows that the joint use of big data analysis model and risk assessment model has effectively promoted the construction of red tourism culture platform and brand development.

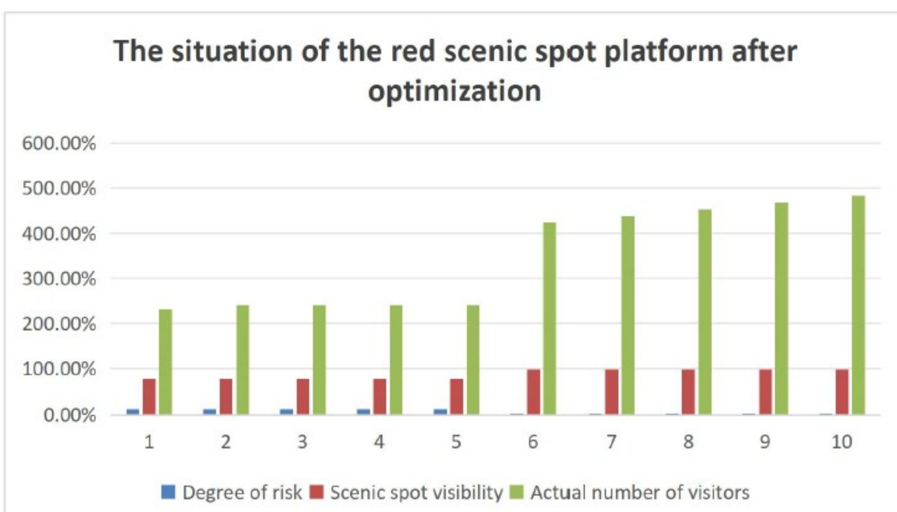

Fig. 6. Influence of red tourism culture platform construction and brand development before and after big data simulation optimization

From Figure 7, it can be seen that people aged 16-30 have the highest satisfaction, reaching 98.31%, and those aged 50-65 have the lowest satisfaction, 96.99%. The satisfaction of other age groups is relatively close, all about 97%, with little fluctuation. Age 8 was 97.23% aged 16,97.46% aged 30-50, and 97.29% aged 65-80. Compared with Figure 1, the satisfaction of different age groups with red scenic spots increased sharply, with an average increase of nearly 25%.This shows that the model plays a key role in the strategic decision-making of red tourism culture platform construction and brand development. The use of this model overcomes the differences in market performance of different ages and meets the characteristics and needs of different age groups. It adopts differentiated strategies in promotion, product optimization and service improvement, so as to improve the attraction, satisfaction and market share of red scenic spots.

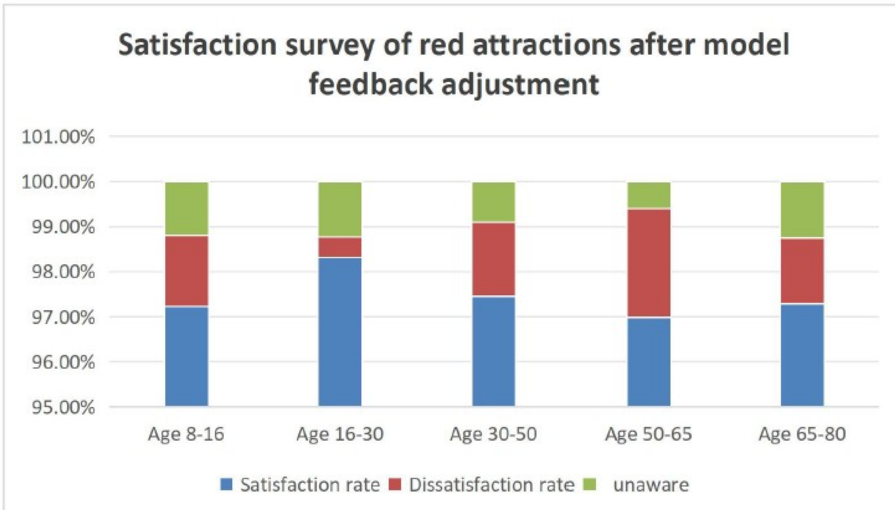

Fig. 7. Satisfaction survey of different population groups on the red scenic spots after the feedback adjustment of the model

5. Conclusion

This study is based on big data data collection and analysis of the national red tourist attractions business situation and traffic, a comprehensive analysis of brand construction, at the same time with the visual model of dynamic red tourism experience application, dynamic real-time monitoring attractions red platform and brand construction, with the help of computer aided decision support system for the national red tourism culture platform construction and brand development strategy research, realize the experiment group attractions visibility significantly higher than the control group. This indicates that the measures taken by the experimental group had a significant effect on improving the visibility of the scenic spots, and the risk degree was significantly lower than that of the control group, and the value was between 2.70% and 2.90%.This indicates that the measures taken by the experimental group may be effective in reducing the risk. The experimental group has achieved significantly better effects than the control group in reducing the risk degree, improving the visibility of scenic spots and increasing the actual number of tourists, which shows that the joint use of big data analysis model and risk assessment model has effectively promoted the construction of red tourism culture platform and brand development. At the same time, relative to the optimization before different age groups for the satisfaction of red attractions, rose nearly 25% on average, reached more than 98%, the model in the red tourism culture platform construction and brand development strategic decision played a key role, also for the inheritance and protection of red culture provides a new idea and methods.

Reference

[1] Wu, F.L. Land financialisation and the financing of urban development in China. Land Use Policy 2022, 112, 104412.

[2] Hong, X.M.; Zhang, M.; Liu, Q.; Zhong, B.; Li, H. Preschool Education Demand in China by 2035: A Prediction Analysis. Early Educ. Dev. 2022, 33, 391 - 406.

[3] Buda, D. Dark tourism, thanatourism and dissonance in heritage tourism management: New directions in contemporary tourism research. Journal of Heritage Tourism, 2018. 13(1), 1 - 14.

[4] Arksey, H., & O'Malley, L.Scoping studies: Towards a methodological framework. International Journal of Social Research Methodology, 2005. 8(1), 19 - 32.

[5] Slunjski, E. Multidisciplinary Approach to Designing Space of Early Childhood Education Institutions as a Condition for High-Quality Education Process. Croatian Journal of Education- Hrvatski Casopis Za Odgoj I Obrazovanje 2015, 17, 253-264.

[6] Li, Y., Wu, M., & Han, X. Can Red Tourism build red memories? Evidence from Mount Jinggang, China. Journal of China Tourism Research, 2019. 15, 385-402.

[7] Mitchell, A.C.; Ferris, F.G. The coprecipitation of Sr into calcite precipitates induced by bacterial ureolysis in artificial groundwater: Temperature and kinetic dependence. Geochim. Cosmochim. Acta 2005, 69, 4199 - 4210.

[8] Wang,Z.M.;Dong, W.J. Statistically Based Assessment and Decision-Making in Preschool Education. Math. Probl. Eng. 2022, 2022, 7447246.

[9] Governa, F.; Sampieri, A. Urbanisation processes and new towns in contemporary China: A critical understanding from a decentred view. Urban Stud. 2020, 57, 366 - 382.

[10] Wu, L.;Zhao,J.C.;Yang,Y.H. Strategies of Preschool Teachers' Professional Growth in Underdeveloped Region in the East China-A Case Study of Linyi City, Shandong Province. Educ. Sci.-Theory Pract. 2018, 18, 3230 - 3238.

[11] Gough, D., Thomas, J., & Oliver, S. Clarifying the differences between review designs and review methods. Systematic Reviews, 2012 1(1), 1-9.

[12] Huang,D.X.;Chan,R. On 'Land Finance' in urban China: Theory and practice. Habitat Int. 2018, 75, 96-104.

[13] Tao,Z.L.;Cheng,Y. Modelling the spatial accessibility of the elderly to healthcare services in Beijing, China. Environ. Plan. B-Urban Anal. City Sci. 2019, 46, 1132- 1147.

[14] Hong, X.M.;Zhang,M.;Liu, Q.;Zhong,B.;Li,H. Preschool Education Demand in China by 2035: A Prediction Analysis. Early Educ. Dev. 2022, 33, 391- 406.

[15] Kitsios, Fotis, Ioannis Giatsidis, and Maria Kamariotou. Digital transformation and strategy in the banking sector: Evaluating the acceptance rate of e-services. Journal of Open Innovation: Technology, Market, and Complexity. 2021. 7: 204.

[16] Wewege, Luigi, Jeo Lee, and Michael C. Thomsett. Disruptions and digital banking trends. Journal of Applied Finance and Banking .2020. 10: 15-56.

[17] Dixon-Woods, M., Agarwal, S., Jones,D., Young, B.,&Sutton,A. Synthesising qualitative and quantitative evidence: A review of possible methods. Journal of Health Services Research & Policy.2005. 10(1),45-53.

[18] Yhee,H.;Kim,S.;Kang,S. GIS-Based Evaluation Method for Accessibility of Social Infrastructure Facilities. Appl. Sci. 2021, 11, 5581.