Analysis of Digital Cultural Heritage Tourism Experience Perception Based on Data Mining Technology

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Abstract. In order to explore the effects of cultural heritage tourism experience perception, this paper uses the niche hybrid leapfrog algorithm to analyze cultural heritage tourism experience perception data.Through information transmission, local information and global information can be exchanged, so that when looking for the optimal solution, the local optimal can be jumped out, and the information exchange mechanism between the population individuals can find the global optimal solution.In addition, this article combines the investigation method for data processing, analyzes the problems of cultural heritage tourism, and proposes corresponding countermeasures and suggestions based on the perception of cultural heritage tourism experience.Finally, through data analysis, it can be known that the perception of cultural heritage tourism experience can effectively enhance tourists' tourism experience and play a certain role in the promotion of cultural heritage tourism.Smart Tourism Cities

1 INTRODUCTION

Experiential tourism and tourism experience are the products of the combination of tourism and experience. Experiential tourism emphasizes the specific content of tourism, while the latter focuses more on the feelings of individual tourists. If we analyze the relationship between supply and demand, tourism experience will integrate a specific physical form and use experience as a product that attracts tourists.For the individual tourist, the travel experience is a series of things worth remembering and nostalgic to experience and obtain from the travel experience in a personal way. This unforgettable travel experience not only satisfies the psychological needs, but also reflects his own cultural taste [2].

Perception is the use of consciousness to interpret the signals received by body organs, that is, the direct reflection of various organs of the human body to objective stimuli. In a sense, perception is the psychological process by which humans acquire knowledge and experience and use knowledge and experience to reflect and judge external signals. In other words, perception is divided into feeling and perception. The difference between the two is that feeling is a direct response to objective things, and perception includes the judgment and interpretation of objective things by the human subject [5].Judgment and explanation of all things start from feeling, and then through perception, the attributes of things are interpreted and practice is guided. Perception is first affected by the attributes of objective things. Moreover, due to differences in people's own knowledge structure, cognition, hobbies, etc., the level of the result of perception is also very different. That is, perception is a comprehensive reflection beyond the level of direct reflection of perception, and is the overall feedback and comprehensive impression that is systematically processed and re-optimized based on its own knowledge structure of external information [5].

In the context of tourism, this study believes that "perception" is more relevant to the study of tourist experience, and tourist perception can be understood as the perception of tourists. Simply speaking, tourist perception is the process of receiving and analyzing information about the characteristics, overall image, and surrounding environment of the scenic area. , Comprehensive experience of distance, traffic conditions, surrounding scenic spots, etc. The feedback of tourists to the scenic area's perception can promote the rationalization of scenic area tourism development, and tourism perception has become an important measurement standard that cannot be ignored in the sustainable development of scenic area tourism. The suitability of tourism development not only has tourism value and development conditions, but also includes the function of attracting tourists to browse and sightseeing. In order to realize the sustainable development of tourist attractions, it is necessary to make breakthroughs in tourism. The limitation of the perspective of objects and mediators breaks the limitation of the attributes that tourism objects cannot perceive value and the economic benefits of tourism mediators. With the help of cognitive evaluation theory, pay attention to the role of tourism perception, pay attention to value protection and comprehensive utilization of value, and comprehensively measure tourism The suitability of destination tourism development can truly give full play to the role of tourists' perception as a new source of competitive advantage for tourism destinations.

2 RELATED WORK

In the high-level tourism activities of aesthetic experience, landscape appreciation and leisure and entertainment, it is to promote tourism related parties (subject, mediator, object) to actively participate in the development of heritage tourism [7].In the related literature, it is found that in terms of the research on the suitability of tourism development, some scholars have proposed the dimensions and index system to measure the suitability of tourism development in tourist destinations. However, most of the research is based on the value of tourism resources itself as a judgment, and the important factor of tourists as the main body of tourism activities has not been fully considered [9].The literature [10] proposed to use satisfaction or pleasure as a tool to measure the quality of tourism experience, and on the empirical level, the evaluation of element satisfaction was used to measure the quality of tourist experience.The literature [11] proposed a "motivation-process-objective" model based on tourists' travel motives, and obtained a higher-quality travel experience through this model. The literature [12] demonstrated through empirical research and structural equations that the RBD visitor experience can be deepened by improving tourist integration and interactive participation.

The literature [14] believed that travel experience is a ubiquitous and widely popular consumer behavior, and ordinary mass tourists are only interested in those pseudo-events.The literature [15] believed that "travel experience is essentially a behavior (aberration) of people deviating from their

daily life, which may exist in most people's hearts (malaise)".Compared with the former's negative view, the "positive view" of literature [15] believed that travel experience is a positive response to people's "dissatisfaction" with the current life state, and people pursue the experience of "authenticity" in order to eliminate the pressure of current life.MacCannell put forward "stage authenticity", which emphasizes the experience of the prototype of things and is a real experience.

The literature [16] proposed five ways to realize the "central pursuit" of tourism experience. The literature [17] divided travel experience into five aspects: amusement, change, interest, rapture and mastering.The literature [18] proposed five models for studying tourism experience: the "level model" of experience, the "standard model" of experience, the "purposeful behavior model", the "typological model" of experience, and the "insider-outsider" model.

The literature [19] proposed the "Travel Career Ladder" on the basis of Maslow's hierarchy of needs theory. Tourists experience five levels from low to high, followed by relaxation, stimulation, relationship, self-esteem and development, and realization.Experienced tourists are at the top of this level, they are more capable of fulfilling their needs, so the quality of experience will be higher. Regarding the measurement of tourism experience quality, different scholars have conducted research from different angles and proposed several different measurement dimensions.The literature [1] divided the factors that affect tourism experience into main factors, secondary variables, behaviors and results, and believed that the interaction of these factors ultimately leads to different tourism experience quality.

The development of tourism may bring the benefits of economic growth and prosperity to local communities, such as increased employment opportunities and improved infrastructure, but it will also have a negative impact on society and the environment [3].Specifically, the influx of tourists will disrupt the daily lives of residents [8], such as overcrowding, rising prices, traffic congestion, noise, garbage, crime and other social expenses [6].Community residents' perception of tourism impact refers to the community residents' subjective perception of the human-land relationship and changes in the material environment in the development of tourism in their own residential space. The literature [13] called the perception of positive or positive effects of community residents on tourism as benefit perception, and called perception of negative or negative effects as cost perception.The literature [4] believed that the impact of tourism development on the community can be divided into economic, social and cultural impacts and environmental impacts from three perspectives: economy, social culture, and environment.

3   ACTUAL MINING ALGORITHM FOR CULTURAL HERITAGE TOURISM

This paper uses the niche hybrid leapfrog algorithm to analyze cultural heritage tourism experience perception data.

When the niche hybrid frog leaping algorithm is used to solve the optimization problem, the problem can be transformed into the following optimization problem

$$\min_{u \in U} J_k\left(u_k\right) \tag{1}$$

When using the optimization control of the niche hybrid frog leaping algorithm to find the optimal solution, we use the parameter optimization index function to give the following optimization objective function

$$\begin{cases} \min_{u \in U} J_{k+1}(u_{k+1}) \\ J_{k+1}(u_{k+1}) = \|e_{k+1}\|^2 + \|u_{k+1} - u_k\|^2 \end{cases} \quad (2)$$

The fitness function is calculated, and the fitness function is used to search for the optimal solution u^*_{k+1} in the next population. Among them, there is $y_{k+1}(t) = [Pu_{k+1}](t)$, and then the optimal solution is found so that the following equation holds.

$$\|e_{k+1}\| \leq J_{k+1}(u_{k+1}) \leq \|e_k\|_2 \quad (3)$$

Then, the optimal input can be obtained from the above formula

$$u_{k+1} = u_k + p^* e_{k+1} \quad (4)$$

Among them, p^* is the adjoint operator of P. In the discrete linear time-invariant system, it satisfies formula (5)

$$\|e_{k+1}\| \leq \frac{1}{1+\sigma} \|e_k\| \quad (5)$$

NSFLA is used to solve optimization problem $\min_{u_{k+1} \in U} J_k(u_{k+1})$. We assume that there is at least one optimal solution u^*_{K+1}, and e_{K+1} is the system tracking error. We assume that the initial frog population is U(k), and a new population U(k+l) is formed after evolution. U(k+l) must have the optimal solution u^*_k in U(k).

Then, for the non-optimal frog $u_{k+1} = u^*_k$, it satisfies formula (6)

$$\|e^*_{k+1}\|^2 \leq J_{k+1}(u^*_{k+1}) \leq J_{k+1}(u^*_k) \leq \|e^*_k\| + \|u^*_k - u^*_k\|^2 = \|e^*_k\| \quad (6)$$

That is $\|e^*_{k+1}\|^2 \leq \|e^*_k\|$.

4 EXPERIMENTAL SIMULATION

4.1 The Simulation of the Constrained Linear System is Input

The linear system equation is

$$\begin{cases} x_i(i+1) = -0.1x_3(i) + u(i) \\ x_i(i+1) = x_1(i) \\ x_3(i+1) = x_2(i) \end{cases} \quad (7)$$

The expected output of the system is:

$$\begin{cases} y_d(i) = 0, i = 1 \\ y_d(i) = \sin(0.05\pi(i-2)), 2 \le i \le 23 \end{cases}$$

(8)

The input constraints of the system are:

$$u_i^{\min} \le u_i \le u_i^{\max}, i = 2, 3, ..., 23$$

(9)

The fitness function value can be obtained by using NSFLA, which can be transformed into solving the following objective function:

$$J_{k+1}(u_{k+1}) = \left\| u_{k+1} - u_k \right\|^2 + \alpha \left\| e_{k+1} \right\|^2$$

(10)

The following uses Genetic Algorithm (GA), Clonal Selection Algor Algorithm (CSA) and Niche Shuffled Leaping Frog Algorithm (NSFLA) to simulate the linear system experiment.
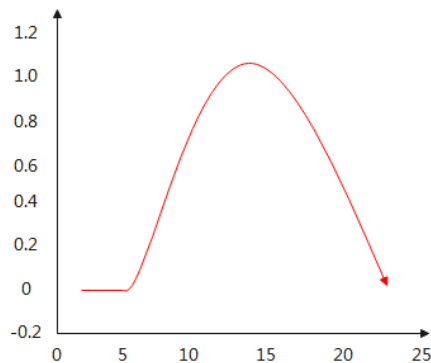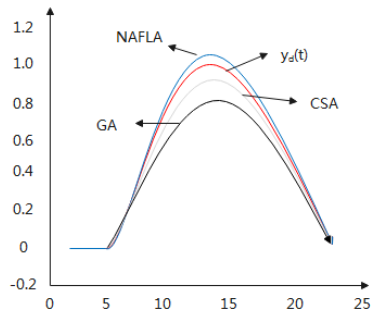

**Figure 1:** Expected Output Curve of Linear System (-1.5≤u$_i$≤1.5) .
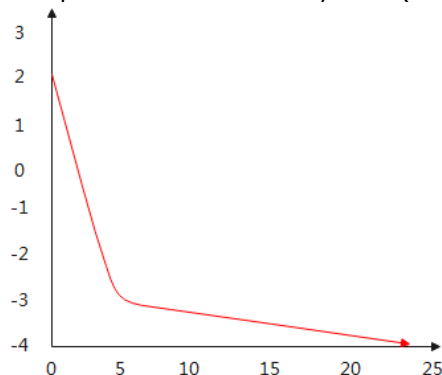
Figure 2: Convergence Curve of Linear System Iteration Domain $\log \left\| e_k(t) \right\|$.

Figure 1 and Figure 2 respectively show the tracking curve and the convergence curve of the error log when the control system is in the interval $[-1.5, 1.5](-2 \leq u_i \leq 2, \ i = 1, 2, \ldots 23)$.


Figure 3: The Output Tracking Curves Obtained by The Three Algorithms Respectively. (iteration 10 times).
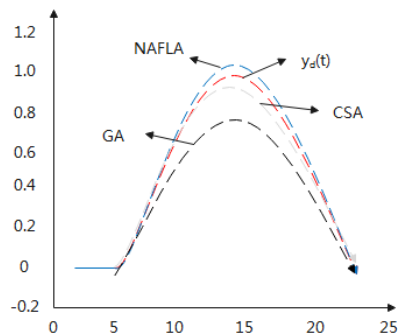
Figure 4: The Output Tracking Curves Obtained by the Three Algorithms (15 iterations).

Figures 3 and 4 show the comparison of the tracking trajectories of GA algorithm, CSA algorithm and NSFLA algorithm when the number of iterations is 10 and 15, respectively. It can be seen that when the number of iterations is 10 and 15, the tracking effect of the NSFLA algorithm is better than that of the CSA algorithm and the GA algorithm. The comparison of GA algorithm, CSA algorithm and NSFLA algorithm shows that as the number of iterative learning increases, the output trajectory of the system is closer to the desired trajectory.
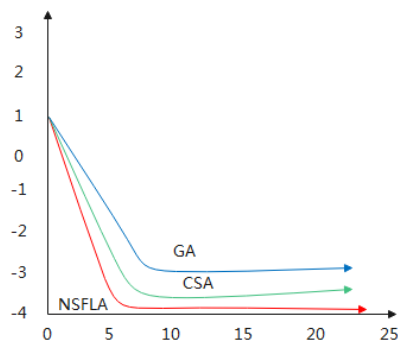
Figure 5: Error Convergence Curves Obtained by the Three Algorithms Respectively.

Figure 5 shows the error convergence curve when NSFLA algorithm, CSA algorithm and GA algorithm are used for this system. It can be seen from the figure that as the number of iterations increases, the logarithm of the errors of the three algorithms decreases.

4.2 Simulation of Nonlinear Control System

Aiming at a class of nonlinear systems in industrial control, the control system consists of a linear part and a nonlinear part. Among them, the non-linear part expression is

$$z(t) = \begin{cases} k\beta, u(t) \geq \beta \\ ku(t), |u(t)| < \beta \\ -k\beta, u(t) \leq -\beta \end{cases}$$

(11)

The transfer function of the linear part is
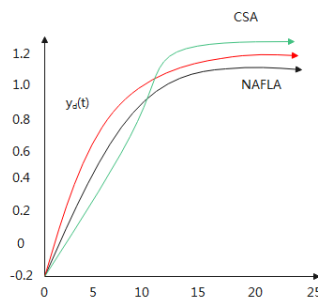
$$G(s) = 1/(2s^2 + 2s + 1)$$

(12)

The expected output is
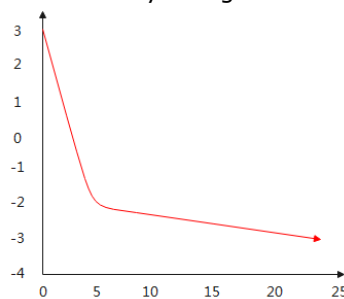
$$y_d(i) = 1.2(1 - 1/(1+i)^3), \quad i \in [0, 25]$$

(13)

The input constraint is

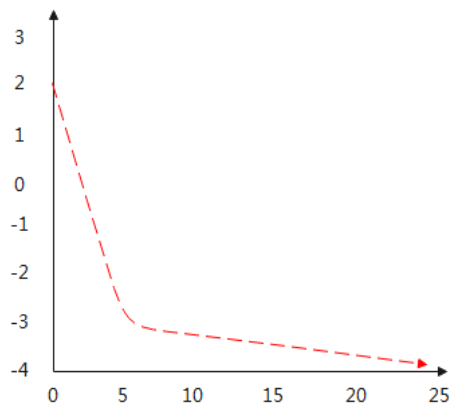$$u_i^{min} \leq u_i \leq u_i^{max}, i = 1, 2, ..., 25$$
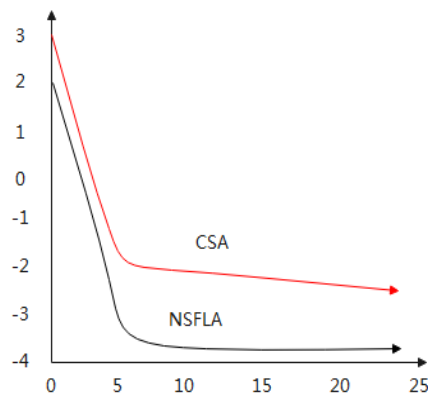
(14)

Figure 6: Tracking Curves Obtained by Using NSFLA-ILC.CSA-ILC (10 iterations).

Figure 7: Error Convergence Curve Obtained by Using CSA-ILC.

Figure 8: Error Convergence Curve Obtained by Using NSFLA-ILC.

Figure 9: Error Convergence Curves Obtained by Using NSFLA-ILc.cSA-ILC Respectively.

Figure 6 shows the tracking curve of the NSFLA algorithm and the CSA algorithm when the nonlinear system is iterated 10 times. Figures 7 and 8 are the convergence curves of the NSFLA algorithm and the CSA algorithm, respectively. After applying the NSFLA algorithm and the CSA algorithm, good convergence results have been achieved. Figure 9 shows the comparison of the error convergence curves of the NSFLA algorithm and the CSA algorithm applied to nonlinear systems. The tracking effect of the system applying the NSFLA algorithm is better than that of the CSA algorithm. NSFLA requires less iterations to fully track the desired trajectory, which verifies that the NSFLA algorithm has fast convergence speed and high iterative learning efficiency.

5 PERCEPTION ANALYSIS OF HERITAGE TOURISM EXPERIENCE BASED ON DATA MINING TECHNOLOGY

This paper combines data mining technology to analyze the perception data of heritage tourism experience.During the questionnaire survey, this article designed two parts in the pre-travel information search behavior of tourists.One is how tourists first learned about Pingyao. The second part is to ask tourists whether they have any further information searching behavior after they know Pingyao.Figure 10 shows the propagation mode of authenticity perception.
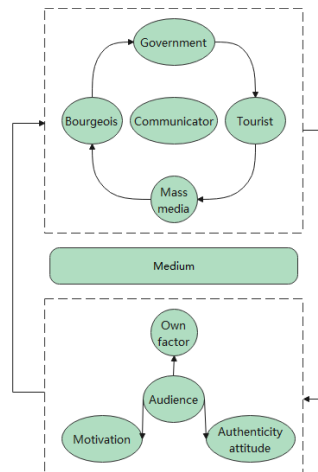
Figure 10: The Propagation Mode of Authenticity Perception.

This article combines the model of this article to analyze the survey data. This article aims to explore the sustainable development of local cultural heritage tourism.The sustainable development of local cultural heritage tourism is to maintain the authenticity of cultural heritage as the core. This requires that in the process of tourism development and planning, the goal of sustainable tourism development must be followed.Therefore, from the perspective of residents, this article explores the relationship between residents' perception of authenticity, local attachment and identity, residents' attitudes towards tourists, and residents' attitudes towards tourism development. Moreover, this article seeks a sustainable development path from the perspective of residents. In addition, from the perspective of tourists, this article explores the relationship between the authenticity of tourists, sense of place, attitude and loyalty of tourists, and seeks a sustainable development path from the perspective of tourists.

Through the corresponding analysis of the results, the following basic research conclusions are drawn: First, from the perspective of residents. Residents' perception of authenticity significantly positively affects residents' attitudes towards tourists and tourism development. At the same time, place identity and local attachment play a part of the mediating role between authenticity and residents' attitudes towards tourists and tourism development. This shows that if the residents have a high authenticity perception of the local cultural heritage, it can indicate that the local commercialization is low or moderate, which will further enhance the residents' local attachment and at the same time enhance the residents' sense of local identity. It will allow residents to have a friendly attitude towards tourists, and at the same time, it will also allow residents to support local tourism development. From the perspective of residents, it promotes the protection of local cultural heritage by residents and maintains the authenticity of cultural heritage resources. It also enhances residents' awareness of protection. At the same time, the development of tourism also drives the local socio-economic development, which promotes the sustainable development of tourism from the perspective of residents. Second, from the perspective of tourists. The authenticity perception of tourists significantly positively affects the attitude and loyalty of tourists. At the same time, the sense of place plays a part of the mediating role between authenticity and the attitude and loyalty of tourists. This shows that if the authenticity of a place is high, it can indicate that the degree of commercialization of the place is low or moderate, which will further enhance the tourist's sense of place, make tourists have a good impression of the locality, and create safety in this place. The sense of belonging and belonging will further enable tourists to have a good attitude towards this

tour, indicating that tourism can provide tourists with a good travel experience, and at the same time will enhance tourists' willingness to revisit and recommend willingness, thereby enhancing local economic development. Enhance residents' awareness of environmental protection and improve the local social environment, which promotes the sustainable development of tourism from the social, economic and environmental aspects. Thirdly, take the popularity degree perceived by tourists as a moderating variable between the authenticity perception of tourists and the sense of place, and according to the analysis results, the degree of popularity perceived by tourists has a significant moderating effect. This shows that under the influence of the popularity of tourists, the relationship between the authenticity of tourists and the sense of place is not a simple linear relationship. The relationship between authenticity, sense of place, tourist attitude and loyalty is also changing due to the popularity of tourists. For tourists with high feelings of popularity, higher authenticity will bring higher loyalty and a good attitude of tourists, and the mediating effect of the sense of place will also increase; if the perceived popularity of tourists is not high, then Higher authenticity will not bring higher loyalty and good attitudes of tourists, and the mediating effect of the sense of place will also be weakened. This has a positive impact on tourists' perception of authenticity from the perspective of residents, and establishes a connection between residents and tourists. Promote tourists' attitudes towards local cultural heritage tourism through the friendly attitude of residents, so as to form a virtuous circle and promote the sustainable development of regional tourism.

Through data mining, the people's recognition and satisfaction of the tourism experience perception are calculated, and the results shown in Table 1 are obtained.

Number	Recognition	Satisfaction	Number	Recognition	Satisfaction	Number	Recognition	Satisfaction
1	89.94	89.90	28	83.13	90.61	55	81.17	93.15
2	82.06	95.65	29	91.97	95.56	56	85.39	85.95
3	80.70	94.38	30	88.05	86.81	57	87.65	95.52
4	86.58	86.04	31	80.40	87.29	58	80.60	95.94
5	85.09	86.63	32	91.93	91.72	59	87.02	95.72
6	84.02	87.78	33	87.45	92.36	60	90.67	95.58
7	79.04	92.88	34	83.81	95.57	61	80.73	93.89
8	80.83	92.92	35	85.53	95.49	62	80.47	90.66
9	85.95	95.05	36	89.77	95.32	63	89.89	88.06
10	87.64	92.88	37	88.54	91.89	64	82.98	84.86
11	87.51	85.70	38	83.19	88.23	65	83.22	90.00
12	88.61	85.40	39	79.83	93.18	66	80.71	86.96

13	84.86	93.78	40	82.83	88.91	67	83.80	86.90
14	80.13	93.92	41	83.02	92.98	68	88.41	88.17
15	84.47	89.17	42	90.92	84.40	69	89.51	91.82
16	86.34	86.51	43	79.62	88.15	70	79.55	87.15
17	90.20	94.46	44	89.04	91.56	71	84.17	92.52
18	88.11	94.57	45	86.12	84.61	72	79.68	90.64
19	85.28	90.18	46	81.35	95.19	73	80.97	93.25
20	80.64	84.98	47	85.10	90.16	74	80.44	89.85
21	80.78	95.57	48	79.00	87.27	75	82.88	90.72
22	88.94	95.57	49	91.31	90.19	76	83.51	94.44
23	90.14	90.94	50	88.39	87.66	77	91.12	86.55
24	84.33	89.08	51	85.26	95.02	78	87.67	84.65
25	84.68	85.70	52	89.09	90.93	79	82.11	94.79
26	90.30	94.77	53	90.85	95.66	80	85.47	84.59
27	81.13	89.14	54	88.43	95.09	81	80.41	84.35

Table 1: People's Recognition and Satisfaction of Tourism Experience Perception.

Authenticity perception will significantly affect the attitude and loyalty of tourists, as well as residents' attitudes towards tourists and tourism development. In particular, objective authenticity has a more significant impact on tourists and residents.The enlightenment of this research to the developers and managers of local cultural heritage tourism is that in the development of local cultural heritage, the authenticity of cultural heritage should be maintained on the basis of maintaining the original historical appearance of cultural heritage.When the local cultural heritage is combined with the tourism industry, it should also conform to the local culture and maintain the original local characteristics. Only in this way can it bring tourists a real travel experience, thereby increasing their loyalty, and generating a good attitude towards local cultural heritage tourism.At the same time, it will bring residents a sense of local identity, and make residents have a good attitude towards tourists, and further maintain a positive attitude towards local tourism development. At the same time, the authenticity perception of tourists and residents should be further improved.In addition, the focus is to dig deeper into the cultural connotations of local cultural heritage, so that tourists and residents have a more in-depth understanding of the local culture. Through the identification of the local culture, the attachment to the place is generated, and the spiritual experience is obtained

at the same time, and then the authentic self can be found through the travel experience. This is the authentic perception of existence.

Local cultural heritage is our common wealth. Both tourists and local residents have the responsibility and obligation to protect them. We can carry out appropriate development on the basis of protection. This is the "activation" of heritage. Among them, it includes both the "activation" of material cultural heritage and the "activation" of intangible cultural heritage.At the same time, we can strengthen the development of cultural and creative IP, which can not only extend the industrial chain, increase brand aggregation, increase brand exposure, but also spread brand awareness, so that local cultural heritage tourist destinations can release strong value even if they do not rely on ticket revenue.In addition, cultural and creative products and derivatives can not only reflect local characteristics, but also enhance tourists' sense of place.Furthermore, we can learn from Hangzhou's experience to create an international access point for social resources. This is to "activate" the cultural heritage, and display the solid cultural heritage more intuitively on the basis of protecting the heritage, so that people can not only understand the heritage from the perspective of viewing, but also understand the cultural connotation behind the heritage, thereby enhancing the sense of place for tourists.

Local cultural heritage sites are the living spaces for local residents to survive. With the development of tourism, it will destroy the living environment of local residents and at the same time damage the local culture. In order to protect local culture, reduce residents' emigration, and allow residents to gain a sense of local identity and attachment, it is important to promote cultural protection with communities as the mainstay. The protection of local cultural heritage is inseparable from the active participation of community residents. Therefore, certain measures should be taken to reduce the migration of residents, and at the same time, certain preferential policies should be given to the residents to attract the residents to move in again. Local residents can carry out appropriate business activities in commercial blocks, improve housing environmental facilities for community residents, and meet the accommodation needs of community residents, so that community residents can also benefit from the development of local tourism, thereby supporting the development of local tourism. Local tourism development contributes its own strength. In addition, strengthen the cultural awareness education and cultivation of community residents, and improve residents' cultural protection awareness. On the one hand, the government and other relevant departments can actively promote and create a cultural atmosphere; on the other hand, school education can be used to enhance the awareness of the next generation. In this way, the protection and inheritance of local cultural heritage by community residents will be formed, so as to deepen local attachment and local identity, support the development of local tourism, and realize the sustainable development of local cultural heritage tourism.

6   CONCLUSION

Research on the suitability evaluation of heritage tourism is to make heritage tourism not only a high-level tourism activity that satisfies tourists' aesthetic experience, landscape appreciation and leisure and entertainment, but also promotes tourism related parties (subject, mediator, object) to actively participate in the development of heritage tourism.This research is mainly from the perspective of the main body of tourism activities, exploring the paths that can realize the full participation of tourists, and give full play to the educational function of heritage to residents and tourists in tourism activities in a more vivid and vivid form. This not only realizes the sustainable development of heritage resources, but also indirectly drives employment, develops the regional economy, improves the quality of life of residents, and forms a regional economic belt centered on the location of heritage resources.In addition, this paper uses the niche hybrid leapfrog algorithm to analyze cultural heritage tourism experience perception data. Finally, this article combines the investigation method to carry out data processing, analyzes the problems of cultural heritage

tourism, and combines cultural heritage tourism experience perception to put forward corresponding countermeasures and suggestions. Through data analysis, it can be known that the perception of cultural heritage tourism experience can effectively enhance the tourist experience and play a certain role in the promotion of cultural heritage tourism.

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