Research on Temporal and Spatial Differentiation Characteristics of Tourists' Emotions in the Western Sichuan Grand Ring Road Based on Emotional Maps

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Abstract: Against the backdrop of the in-depth development of the experience economy, tourists' travel demands have fully transformed from traditional landscape sightseeing to emotional experience-oriented. The quality of emotional experience has become a core indicator measuring the competitiveness of tourist destinations, profoundly influencing tourists' travel decisions, destination satisfaction, and word-of-mouth communication. As a highly representative ecological and cultural tourism corridor in western China, the Western Sichuan Grand Ring Road connects diverse high-quality tourism resources such as plateau snow-capped mountains, glacial lakes, and Zang-Qiang-Yi folk cultures, and has become a popular choice for domestic long-distance travel in recent years. However, the ring road spans a wide area with a complex geographical environment, and there are significant differences in resource endowments, infrastructure, and service levels among various scenic spots, leading to complex differentiation characteristics of tourists' emotional experiences. Currently, academic research on the temporal and spatial differentiation laws of tourists' emotions in this specific linear tourism space is insufficient. Based on this, this paper selects 9 core scenic spots of the Western Sichuan Grand Ring Road as the research objects, takes 5772 valid tourist review texts from Ctrip Platform from January 2022 to December 2024 as the data foundation, and comprehensively uses methods such as emotional analysis, emotional map visualization, and spatial statistical analysis to systematically explore the temporal and spatial distribution laws and inherent differentiation characteristics of tourists' emotions. The research results show that: tourists' overall emotional tendency in the Western Sichuan Grand Ring Road is predominantly positive, with positive emotional review texts accounting for 88.1%; spatially, tourists' emotions show a significant agglomeration distribution, with high emotional experience areas concentrated in regions such as Seda and Danba Jiaju Zang Village, and the spatial autocorrelation is significant (global Moran's I = 0.8214); temporally, tourists' emotions exhibit strong seasonal differences-summer is the peak tourist season with relatively high emotional evaluations, while winter sees a sharp drop in tourist volume and low emotional evaluations. Scenic spots such as Seda and Daocheng Yading have drastic emotional fluctuations (standard deviations of 11.47 and 7.16 respectively), while scenic spots such as Siguniang Mountain and Mose Stone Park have relatively stable emotional experiences

(standard deviation ≤ 1.96). The research results provide precise decision-making basis for the optimization of tourism routes, service improvement, and the integrated development of culture and tourism in the Western Sichuan Grand Ring Road, and expand the application scenarios and research boundaries of emotional geography theory in plateau ring-shaped tourism spaces.

1. Introduction

1.1 Research Background

With the continuous growth of residents' disposable income and the increase of leisure time in China, the tourism consumption market has shown explosive growth, and the tourism consumption structure has also undergone a fundamental transformation-from a single sightseeing mode to an experiential tourism mode that emphasizes emotional resonance and spiritual satisfaction. In this context, tourists' emotional experience is no longer an accessory product of the travel process, but a core factor affecting destination attractiveness, tourist satisfaction, and revisit intention. Relevant studies have shown that positive tourist emotional experiences can significantly improve the efficiency of destination word-of-mouth communication and promote the secondary transformation of tourism consumption[1], while negative emotional experiences may spread rapidly through social media, causing irreversible negative impacts on the destination image[2].

As a linear tourist destination spanning multiple Zang autonomous prefectures on the Western Sichuan Plateau, the Western Sichuan Grand Ring Road covers well-known scenic spots such as Daocheng Yading, Seda Larung Gar Buddhist Academy, and Siguniang Mountain. It boasts rich and unique types of tourism resources, attracting millions of tourists every year. However, restricted by the complex geographical environment of the plateau, there are significant differences in traffic accessibility among various scenic spots on the ring road. Some scenic spots have incomplete infrastructure construction, and coupled with the significant changes in natural landscapes in different seasons, tourists' emotional experiences vary obviously. For example, popular scenic spots in peak seasons often face problems such as tourist congestion and skyrocketing accommodation and catering prices, while off-seasons are confronted with dilemmas such as idle service facilities and reduced landscape appreciation. These factors all directly affect tourists' emotional perception.

Currently, research on tourists' emotional experiences mostly focuses on urban tourist destinations, single scenic spots, or short-distance tourism routes. For large-scale, cross-regional linear tourism spaces like the Western Sichuan Grand Ring Road, key issues such as the temporal and spatial differentiation laws of tourists' emotions, core influencing factors, and optimization paths have not been systematically addressed. This makes it difficult for destination management departments to obtain precise and scientific basis when carrying out route planning, service improvement, and other work.

As an important research tool integrating emotional geography and geographic information science, emotional maps can intuitively present the spatial distribution pattern and differentiation characteristics of emotions by associating abstract emotional data with specific geographical locations, providing a new research perspective for the spatial planning and service optimization of tourist destinations[3]. In recent years, emotional maps have been widely applied in fields such as urban tourism and rural tourism, achieving a series of research results. However, most studies focus on centralized tourism spaces such as cities or single villages, and insufficient attention has been

paid to linear tourism spaces like the Western Sichuan Grand Ring Road, which have large spans, diverse scenic spot types, and significant temporal and spatial heterogeneity. In addition, existing studies mostly focus on the analysis of the spatial distribution characteristics of tourists' emotions, and the research on the dynamic temporal changes of emotions and their temporal-spatial linkage laws is relatively weak, making it difficult to fully reveal the complex differentiation characteristics of tourists' emotions in linear tourist destinations[4]. Based on this, this paper takes the Western Sichuan Grand Ring Road as a research case, combines emotional map method with spatial statistical analysis, time series analysis, and other methods to systematically explore the temporal and spatial differentiation laws of tourists' emotions, fill the gaps in existing research, and provide practical support for the precise management and high-quality development of destinations.

1.2 Research Significance

1.2.1 Theoretical Significance

Firstly, it enriches the application scenarios of emotional geography. Existing emotional geography research mostly focuses on centralized tourism spaces such as cities and villages. This paper applies it to the large-scale, cross-regional plateau linear tourism space of the Western Sichuan Grand Ring Road, expanding the application boundary of emotional geography theory in special tourism scenarios. Secondly, it improves the research method system of temporal and spatial differentiation of tourism emotions. This paper comprehensively uses a variety of research methods to construct a complete research framework of "data collection-emotional calculation-temporal and spatial analysis-law revelation", providing a referable method paradigm for subsequent research on tourists' emotions in similar linear tourist destinations. Thirdly, it deepens the understanding of the temporal-spatial linkage laws of tourists' emotions. Existing studies mostly analyze the spatial distribution or temporal change characteristics of emotions separately. This paper focuses on exploring the temporal-spatial linkage laws, enriching the theoretical connotation of tourism emotional experience research.

1.2.2 Practical Significance

Firstly, it provides a basis for tourism enterprises to optimize routes. By revealing the differentiation characteristics of tourists' emotions in different scenic spots and seasons, tourism enterprises can design differentiated tourism routes targeted to improve the overall emotional experience of tourists. Secondly, it provides support for management departments to regulate resources. According to the distribution characteristics of high and low emotional experience areas, management departments can allocate tourism resources precisely, increase investment in infrastructure and service improvement in low emotional experience areas, and strengthen the demonstration and leading role of high emotional experience areas. Thirdly, it helps the integrated development of culture and tourism in the Western Sichuan Grand Ring Road. Combined with tourists' emotional feedback on different types of tourism resources, it deeply excavates the emotional value of resources such as Zang-Qiang-Yi folk culture and plateau ecological landscapes, promotes the precise development and integrated innovation of cultural and tourism resources, and realizes the sustainable development of the tourism industry.

1.3 Research Content

Centering on the core research issue of the temporal and spatial differentiation characteristics of tourists' emotions in the Western Sichuan Grand Ring Road, this paper focuses on three aspects of research: Firstly, the collection, preprocessing, and emotional value calculation of tourist review

text data. We systematically collect review text data from mainstream tourism platforms, and obtain valid data through preprocessing such as data cleaning, deduplication, and noise removal; construct an emotional value calculation model based on emotional dictionaries, quantitatively calculate the emotional value of each valid review, and classify the emotional tendency types. Secondly, the construction and optimization of the tourism emotional map of the Western Sichuan Grand Ring Road. With the help of geographic information system software, we associate tourists' emotional data with the geographical coordinates of each scenic spot, conduct spatial visualization processing through natural breaks classification method, kernel density analysis, etc., and construct an accurate and intuitive emotional map to present the spatial distribution pattern of tourists' emotions. Thirdly, the systematic analysis of the temporal and spatial differentiation characteristics of tourists' emotions. Spatially, we analyze the emotional differentiation laws among different scenic spots and regions, and explore the distribution characteristics and spatial correlation patterns of high-value areas and low-value areas; temporally, analyze the dynamic change characteristics of emotions in different seasons and months, and the temporal fluctuation laws of emotions in each scenic spot; combined with the results of temporal and spatial analysis, reveal the core influencing factors of emotional temporal and spatial differentiation, laying a foundation for the formulation of optimization strategies.

2. Research Methods and Data Processing

2.1 Research Area

This paper selects 9 core scenic spots of the Western Sichuan Grand Ring Road as the research area, namely Daocheng Yading, Seda Larung Gar Buddhist Academy, Siguniang Mountain, Danba Jiaju Zang Village, Xinduqiao, Hailuogou, Mugecuo, Cuopugou, and Mose Stone Park. The selected scenic spots cover various types of tourism resources such as plateau snow-capped mountains, glacial hot springs, religious culture, folk villages, and geological wonders, which can fully reflect the resource endowment characteristics of the Western Sichuan Grand Ring Road.

In terms of spatial distribution, these scenic spots are evenly distributed along the ring road, covering major regions such as Garzê Zang Autonomous Prefecture and Ngawa Zang and Qiang Autonomous Prefecture. The total length of the ring road is about 2400 kilometers, involving a total tourism area of about 253,000 square kilometers. This area is located on the southeastern edge of the Qinghai-Zang Plateau, with a complex and diverse geographical environment and a large altitude difference (from about 1500 meters to more than 6000 meters). The climate shows significant vertical differentiation and seasonal differentiation characteristics, which not only creates rich and diverse natural landscapes but also has an important impact on tourists' travel experience and emotional perception. In addition, this area is the core region of the Zang-Qiang-Yi cultural corridor. The unique national culture, religious beliefs, and folk customs provide rich cultural experience scenarios for tourists, making tourists' emotional experiences more complex and diverse. Selecting these core scenic spots as research objects can comprehensively and accurately reveal the temporal and spatial differentiation laws of tourists' emotions in the Western Sichuan Grand Ring Road.

2.2 Data Source and Processing

2.2.1 Data Collection

Ctrip Tourism Platform has a large user base, high-quality review texts, and a wide coverage of scenic spots. This paper selects this platform as the main data source for tourist review texts. The

Octopus Data Collector is used for data crawling, with the crawling time range from January 1, 2022, to December 31, 2024. The crawled information includes fields such as tourist nickname, review time, review content, rating star, travel mode, and accompanying personnel. Taking 9 core scenic spots as keywords, we search for tourist reviews of each scenic spot one by one, and obtain a total of 7648 original review texts, providing a sufficient data foundation for subsequent research.

2.2.2 Data Preprocessing

To ensure the accuracy and effectiveness of research data, systematic preprocessing is carried out on the original review texts: Firstly, noise data removal. We manually screen and eliminate noise data such as advertising promotions, duplicate reviews, meaningless characters, and reviews unrelated to scenic spot experiences, totaling 1876 pieces removed; Secondly, text standardization processing. We correct typos and variant characters, convert dialect expressions and internet buzzwords into standard Mandarin, and perform word segmentation and stop-word removal; Thirdly, data integrity verification. We conduct integrity checks on the processed review texts to ensure that each review contains effective emotional expression content. Finally, 5772 valid review texts are obtained, with an effective data rate of 75.5%.

2.2.3 Emotional Value Calculation

The BosonNLP Chinese Emotional Dictionary is selected as the basic emotional dictionary[5]. This dictionary contains a large number of Chinese emotional words and assigns corresponding emotional weights, which can better adapt to the emotional analysis needs of Chinese review texts. At the same time, a negative word dictionary and a degree adverb dictionary are supplemented to construct a complete emotional value calculation model. The formula is $S=Se \times Sm \times Sn$ (Se is the emotional word weight, Sm is the degree adverb weight, and Sn is the negative word identifier). Through this model, the emotional value of each valid review text is calculated, and the emotional tendency types are classified: emotional value > 0 is positive emotional review, emotional value = 0 is neutral emotional review, and emotional value < 0 is negative emotional review.

2.3 Research Methods

2.3.1 Emotional Map Method

The ArcGIS 10.8 geographic information system software is used to construct the tourists' emotional map of the Western Sichuan Grand Ring Road. Firstly, obtain the accurate geographical coordinates of the 9 core scenic spots and establish a scenic spot spatial database; Secondly, associate and match the emotional values of valid review texts with the corresponding geographical coordinates of scenic spots to form a spatial attribute data table; Thirdly, use the natural breaks classification method to divide the tourists' emotional values of each scenic spot into three levels: high, medium, and low; Finally, divide the research area into 1km×1km grid units through gridding processing, calculate the average emotional value in each grid unit, and generate a gridded emotional map to intuitively present the spatial distribution pattern of tourists' emotions.

2.3.2 Spatial Analysis Method

Spatial statistical analysis methods are used to explore the spatial differentiation laws and spatial correlation characteristics of tourists' emotions, mainly including kernel density analysis and spatial autocorrelation analysis. Kernel density analysis uses ArcGIS software tools, takes the emotional value of each scenic spot as the weight, sets a reasonable search radius, analyzes the spatial

agglomeration characteristics of tourists' emotions, and identifies the distribution range of high-value emotional agglomeration areas and low-value agglomeration areas[6]; Spatial autocorrelation analysis calculates the global Moran's I and local Moran's I through GeoDa software. The global Moran's I judges the emotional spatial correlation pattern in the entire research area, and the local Moran's I identifies the local emotional agglomeration types, revealing the non-random characteristics of emotional spatial distribution[7].

2.3.3 Statistical Analysis Method

Statistical analysis methods are used to explore the temporal differentiation characteristics of tourists' emotions[8]. Firstly, seasonal difference analysis. We divide the research time into four seasons: spring, summer, autumn, and winter, count the number of reviews and average emotional values of different scenic spots in each season, and analyze the seasonal change laws of emotions; Secondly, fluctuation characteristic analysis. We use the standard deviation as the core indicator to measure the degree of emotional fluctuation, calculate the standard deviation of emotional values of each scenic spot during the research period, and analyze the core influencing factors of emotional fluctuation combined with the current situation of tourism development in the scenic spots.

3. Research Results

3.1 Overall Characteristics of Tourists' Emotions

The calculation and statistical analysis of emotional values of 5772 valid review texts show that the overall emotional tendency of tourists in the Western Sichuan Grand Ring Road is dominated by positivity, presenting the characteristic of "positive emotions accounting for an absolute advantage, and neutral and negative emotions accounting for a relatively low proportion". Specifically, there are 5087 positive emotional review texts, accounting for 88.1% of the total valid reviews. Such reviews mainly express high recognition of the natural landscapes, cultural atmosphere, and service quality of the scenic spots; there are 157 neutral emotional review texts, accounting for only 2.7%, most of which are simple factual statements without obvious emotional tendency; there are 528 negative emotional review texts, accounting for 9.1%, mainly resulting from problems such as incomplete infrastructure, poor service quality, and the impact of seasonal factors in the scenic spots.

From the overall distribution of emotional values, the average emotional value of positive emotional reviews is 0.85, the average emotional value of neutral emotional reviews is 0, and the average emotional value of negative emotional reviews is -0.62. Positive emotions are also in an absolute advantage in terms of emotional value intensity. This result indicates that the rich natural and humanistic tourism resources of the Western Sichuan Grand Ring Road can better meet the emotional needs of tourists, and tourists are generally satisfied with the overall travel experience of the ring road.

3.2 Characteristics of Emotional Spatial Differentiation

3.2.1 Spatial Distribution Pattern

The distribution map of scenic spot emotional levels constructed based on ArcGIS software shows that the spatial distribution of tourists' emotions in the Western Sichuan Grand Ring Road presents significant imbalance characteristics, and the distribution of high, medium, and low emotional experience areas has obvious regional agglomeration. There are 2 high emotional experience scenic spots (Seda Larung Gar Buddhist Academy and Danba Jiaju Zang Village), accounting for 22% of the total number of scenic spots. These two scenic spots are famous for their

unique humanistic landscapes and cultural atmosphere, and tourists' emotional evaluations are generally high; there are 3 medium emotional experience scenic spots (Cuopugou, Daocheng Yading, and Xinduqiao), accounting for 33% of the total number of scenic spots. These scenic spots have high-quality natural landscape resources, but tourists' emotional experiences vary to a certain extent due to seasonal changes, infrastructure, and other factors; there are 4 low emotional experience scenic spots (Siguniang Mountain, Mose Stone Park, Mugecuo, and Hailuogou), accounting for 44% of the total number of scenic spots. Most of these scenic spots are dominated by natural landscapes, and some have problems such as incomplete infrastructure, low standardization of tourism services, and tourist congestion in peak seasons, leading to relatively poor tourists' emotional experiences. In terms of spatial distribution, high emotional experience areas are mainly distributed in the western and central regions of the Western Sichuan Grand Ring Road, while low emotional experience areas are concentrated in the eastern edge regions, presenting a spatial distribution pattern of "high in the west and low in the east".

3.2.2 Kernel Density Characteristics

Calculated by the kernel density analysis tool of ArcGIS software, the high kernel density areas of tourists' emotions are mainly distributed in point-like agglomeration around three core regions, namely the core area of Seda Larung Gar Buddhist Academy, the Danba Jiaju Zang Village-Xinduqiao linkage area, and the core area of Daocheng Yading. Among them, the core area of Seda Larung Gar Buddhist Academy has the highest kernel density value, forming a core area of high emotional value agglomeration; the Danba Jiaju Zang Village-Xinduqiao linkage area has the second highest kernel density value, and the integration of folk culture and plateau natural scenery enriches tourists' emotional experiences; the core area of Daocheng Yading ranks third in kernel density value, and the magnificent natural landscapes arouse strong positive emotions among tourists. From the spatial gradient of kernel density distribution, the emotional values of high kernel density core areas gradually decrease to the surrounding areas, forming obvious gradient distribution characteristics. The farther away from the core areas, the weaker the intensity of tourists' emotional experiences, reflecting the core influencing role of tourism resource endowments on tourists' emotional experiences.
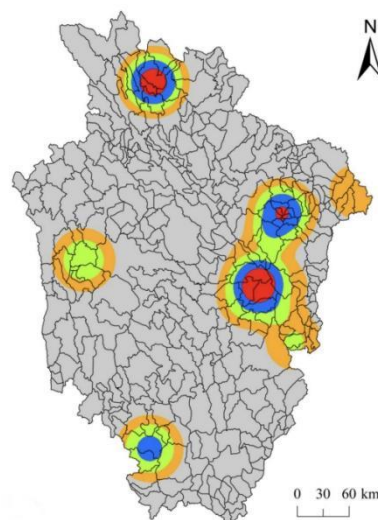

Figure 1: Emotional Kernel Density Analysis of Tourists on the West Sichuan Grand Loop

Notes: Gao qing gan means "High emotion", denotes the strongest emotional impact of destinations on tourists; di qing gan means "low emotion" refers to the relatively weak emotional intensity

tourists experience in the area. White represents low emotion, while red represents high emotion.

As shown in Figure 1, the emotional kernel density map of tourists on the Western Sichuan Grand Ring Road uses circular areas of different colors to represent the density distribution and intensity of tourists' emotions.

In terms of distribution, the high-emotion areas (marked in red) show an obvious point-like distribution, located in the northern, east-central, mid-eastern, and southern parts of the map respectively. These areas act as core nodes, centered on Seda, Xinduqiao, and Danba Zang Village. They transition outward to blue, green, and orange in sequence, forming a layered diffusion pattern. This suggests that these core areas have the strongest emotional impact on tourists, and the emotional intensity gradually weakens as the distance from the core areas increases.

3.2.3 Spatial Autocorrelation

Calculated by GeoDa software, the global Moran's I of tourists' emotional values in the Western Sichuan Grand Ring Road is 0.8214, which passes the significance test of p=0.001, indicating that tourists' emotions present a significant positive spatial autocorrelation characteristic in space, and the emotional spatial distribution has obvious agglomeration rather than randomness. The local Moran's I analysis shows that local emotional agglomeration is mainly divided into four types: "high-high" agglomeration type (Seda Larung Gar Buddhist Academy and its surrounding areas, Danba Jiaju Zang Village-Xinduqiao linkage area), "low-low" agglomeration type (Siguniang Mountain, Mose Stone Park and their surrounding eastern areas), "high-low" agglomeration type and "low-high" agglomeration type (with few distributions). This indicates that the local spatial correlation of tourists' emotions in the Western Sichuan Grand Ring Road is mainly homogeneous agglomeration, with few heterogeneous agglomerations.

3.3 Characteristics of Emotional Temporal Differentiation

3.3.1 Seasonal Differences

The statistical analysis of the number of tourist reviews and average emotional values in different seasons shows that tourists' emotions in the Western Sichuan Grand Ring Road present significant seasonal differences, which are highly consistent with the distribution of peak and off-seasons of tourism. Summer (June-August) is the peak tourist season with cool climate and beautiful natural landscapes. The number of tourist review texts in various scenic spots reaches the peak, with an average emotional value of 0.78, which is the season with the highest emotional evaluation throughout the year; Autumn (September-November) is the secondary peak tourist season. The autumn scenery of the Western Sichuan Plateau is picturesque, with an average of about 120 reviews per month and an average emotional value of 0.65, slightly lower than that in summer; Spring (March-May) is the flat tourist season. The climate gradually warms up, but the natural landscapes of some scenic spots have not yet fully presented. The number of tourists is relatively small, with an average of about 80 reviews per month and an average emotional value of 0.52; Winter (December-February of the next year) is the off-season of tourism. The climate is cold, some scenic spots are closed, and traffic accessibility is poor. The number of tourists drops sharply. Most scenic spots have less than 50 reviews per month on average, with an average emotional value of only 0.31, which is the season with the lowest emotional evaluation throughout the year.

3.3.2 Fluctuation Characteristics

By calculating the standard deviation of emotional values of each scenic spot during the research period, it is found that the emotional fluctuations of tourists in different scenic spots are

significantly different, which can be divided into two categories: drastic fluctuation type and stable fluctuation type. Scenic spots with drastic fluctuations mainly include Seda Larung Gar Buddhist Academy (standard deviation 11.47) and Daocheng Yading (standard deviation 7.16). Emotional fluctuations are mainly affected by seasonal changes, religious activities, and tourism events; scenic spots with stable fluctuations mainly include Siguniang Mountain (standard deviation 0.82), Mose Stone Park (standard deviation 1.75), Mugecuo (standard deviation 2.11), and Hailuogou (standard deviation 1.96). Most of these scenic spots are mature natural landscape scenic spots with improved tourism infrastructure and high service standardization. Tourists' emotional experiences are relatively less affected by seasonal changes, and emotional fluctuations are relatively stable.

4. Discussion and Optimization Suggestions

4.1 Theoretical Implications

By combining emotional map method with spatial statistical analysis and time series analysis, this paper systematically explores the temporal and spatial differentiation laws of tourists' emotions in the Western Sichuan Grand Ring Road, and obtains theoretically valuable research implications: Firstly, it verifies the applicability of emotional geography in large-scale linear tourism spaces. Taking the linear tourism space with significant temporal and spatial heterogeneity such as the Western Sichuan Grand Ring Road as a research case, this paper successfully constructs a tourists' emotional map and reveals the temporal and spatial differentiation laws of emotions, proving the applicability of emotional geography theory and methods in such special tourism spaces and expanding their application boundaries. Secondly, it enriches the theoretical cognition of the temporal and spatial differentiation of tourism emotions. This paper focuses on exploring the temporal-spatial linkage laws and finds that there is a significant correlation between the spatial differentiation and temporal fluctuation of tourists' emotions. For example, high emotional experience areas generally have drastic emotional fluctuations, while low emotional experience areas have relatively stable emotional fluctuations. This finding enriches the theoretical connotation of tourism emotional experience research. Thirdly, it improves the empirical support of the experience economy theory. Through empirical research, it is found that tourists' positive emotional experiences mainly come from the uniqueness of tourism resources and the superiority of service quality, while negative emotional experiences mainly come from the imperfection of infrastructure and the limitation of seasonal factors, providing solid empirical support for the application of the experience economy theory in the tourism field.

4.2 Practical Optimization Suggestions

4.2.1 Spatial Dimension Optimization Suggestions

Firstly, strengthen the "dual-core" leading role of high emotional experience areas. For Seda Larung Gar Buddhist Academy and Danba Jiaju Zang Village, we deeply excavate the connotation of religious culture and folk culture, develop immersive cultural experience projects, improve the infrastructure and service supporting facilities around the scenic spots, enhance the carrying capacity and attractiveness of the scenic spots, and give play to their radiating and driving role on the surrounding areas[9-11]. Secondly, implement the "emotional restoration" project in low emotional experience areas. Local authorities for low emotional experience scenic spots such as Siguniang Mountain and Mose Stone Park, accurately locate the root causes of problems and carry out targeted optimization and improvement work: Siguniang Mountain optimizes the standardized process of mountaineering services, improves infrastructure, and launches mountaineering routes of

different difficulties; Mose Stone Park improves the geological landscape interpretation system to enhance tourists' cognition and experience; Hailuogou and Mugecuo optimize the tourist diversion mechanism in peak seasons, improve infrastructure, and enhance the professional quality of service personnel. Thirdly, construct a regional linkage development pattern. Local authorities make full use of the "high-high" agglomeration effect of emotional spatial autocorrelation, promote the linkage development of high emotional experience areas, and design cross-scenic cultural experience routes; for the eastern region with "low-low" agglomeration, strengthen cooperation among scenic spots, integrate tourism resources, create characteristic tourism products, and realize the coordinated improvement of emotional experience[12-16].

4.2.2 Temporal Dimension Optimization Suggestions

Firstly, implement seasonal differentiated operation strategies. Local authorities in peak seasons (summer and autumn), implement an intelligent appointment and diversion mechanism to control the number of tourists in scenic spots and avoid tourist congestion; launch off-peak tourism activities to further improve tourists' positive emotional experiences[17-18].Local authorities in off-seasons (winter and spring), create characteristic thematic IPs, such as launching ice and snow tourism festivals in winter, promoting characteristic products such as hot spring skiing and winter religious cultural activities; launch plateau flower viewing routes in spring to attract tourists and alleviate the problem of insufficient tourist volume in off-seasons[19-21]. Secondly, establish a scenic spot emotional fluctuation regulation mechanism[22]. Local authorities for scenic spots with drastic fluctuations such as Seda and Daocheng Yading, design gradient cultural experience routes[23-24], launch niche high-quality experience projects in off-seasons[25], and establish a service compensation mechanism to provide ticket discounts, accommodation subsidies, and other benefits for tourists traveling in off-seasons to stabilize tourists' emotional experiences[26-27]; for scenic spots with stable fluctuations such as Siguniang Mountain and Mose Stone Park, further optimize emotional touchpoints[28], improve service details, and continuously maintain a stable level of emotional experience[29]. Thirdly, construct an emotional public opinion monitoring and emergency response system. Local authorities establish an emotional public opinion monitoring mechanism based on tourism platform review texts, track the dynamic changes of tourists' emotions in real time, and timely discover and solve problems reflected by tourists[30]; establish a rapid emergency response system for emergencies, release relevant information in a timely manner, carry out effective communication and comfort work, and reduce the risk of negative emotional diffusion[31].

5. Conclusions

Taking 9 core scenic spots of the Western Sichuan Grand Ring Road as research objects, based on 5772 valid tourist review texts from Ctrip Platform from 2022 to 2024, this paper comprehensively uses research methods such as emotional analysis, emotional map, and spatial statistics to systematically explore the temporal and spatial differentiation characteristics of tourists' emotions. The main research conclusions are as follows: Firstly, from the perspective of overall emotional characteristics, tourists' emotions in the Western Sichuan Grand Ring Road are dominated by positivity, with positive emotional review texts accounting for 88.1%, and neutral and negative emotions accounting for a relatively low proportion, reflecting tourists' high recognition of the tourism resources of the ring road. Secondly, from the perspective of spatial differentiation characteristics, tourists' emotions present a significant spatial distribution pattern of "high in the west and low in the east". High emotional experience areas are concentrated in regions such as Seda and Jiaju Zang Village, showing point-like agglomeration distribution, with significant spatial

autocorrelation (global Moran's I = 0.8214), and obvious characteristics of "high-high" agglomeration and "low-low" agglomeration. Thirdly, from the perspective of temporal differentiation characteristics, tourists' emotions present significant seasonal differences, with summer being the peak of emotional evaluation and winter being the trough. The emotional fluctuations of different scenic spots are significantly different. Scenic spots such as Seda and Daocheng Yading have drastic fluctuations, while scenic spots such as Siguniang Mountain and Mose Stone Park have stable fluctuations.

This study visually presents the temporal and spatial laws of tourists' emotions through emotional map visualization, providing precise and scientific basis for the optimization of tourism routes and service improvement in the Western Sichuan Grand Ring Road. At the same time, this study also has certain limitations: Firstly, the data source is relatively single, only selecting review text data from Ctrip Platform. In the future, it can be expanded to multiple platforms and combined with questionnaire survey data to improve the comprehensiveness and accuracy of research results; Secondly, the analysis of emotional influencing factors is relatively preliminary. In the future, in-depth quantitative analysis of emotional influencing factors can be carried out to explore the influence degree and mechanism of different factors on tourists' emotions. Subsequent research can be carried out around the above deficiencies to further deepen the research on tourists' emotional experiences in the Western Sichuan Grand Ring Road.

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