

## **Research on Spatial Perception of World Heritage City Based on Network Text Analysis**

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### **Abstract**

Heritage tourism, as a pivotal cultural travel form, is critical in fostering cultural continuity and sustainable development. Accurately understanding tourists' spatial perception of world heritage cities is vital for grasping the authenticity of heritage sites and represents a fundamental factor and avenue for achieving their sustainable development. Therefore, this study focuses on Quanzhou, a prominent world maritime trade center during the Song and Yuan dynasties in China, as the research subject. By integrating spatial perception theory and employing network semantic analysis methods, the study aims to quantify tourists' spatial perception of world heritage sites, deeply analyze tourists' spatial environmental cognition, activity patterns, and emotional states, and propose corresponding preservation and revitalization measures. This research provides theoretical underpinnings and empirical insights for the sustainable development of world heritage sites while offering valuable guidance for shaping distinctive urban spaces.

*Keywords:* Spatial Perception; World Heritage; Network Text; Tourist

### **Introduction**

World heritage represents a highly valued resource for humanity, embodying universal significance that transcends national boundaries. Furthermore, as globally important tourism assets, they have attracted widespread attention and recognition. Their unique historical, cultural, and natural characteristics draw global visitors seeking exploration and experience. However, the tourist experience at world heritage sites is deeply influenced by tourists' spatial perception and emotional experiences, which play critical roles in these sites' management, conservation, and sustainable development. Spatial perception is a fundamental process through which tourists comprehend and experience world heritage sites. Tourists' spatial perception of world heritage sites involves the memories and imaginings of intuitive sensory experiences. It may also provoke emotional states through reinterpretation and attribution of new meanings. These emotional experiences directly affect tourists' spatial satisfaction and willingness to revisit world heritage sites.

Nevertheless, a significant challenge facing heritage tourism is the mismatch between the spatial representation of heritage sites and tourists' spatial perception. This discrepancy can lead to misunderstandings of heritage values among tourists and differences in perception among different visitor groups. This phenomenon contradicts the sustainable development guidelines advocated by UNESCO and I.C.O.M.O.S., directly impacting the genuine conservation and management of world heritage sites. In-depth research into tourists' spatial perception at world heritage sites is crucial to address this challenge. Understanding and analyzing tourists' spatial perception can help uncover world heritage sites' unique value and significance while providing theoretical foundations and practical strategies for their conservation and management.

With the development of globalization and the digital age, emerging platforms such as social media play an increasingly important role in shaping tourists' views and experiences of world heritage. By analyzing and understanding the content tourists share on social networks, we can better grasp tourists' needs and expectations, offering more effective pathways and strategies for managing and sustainable development of world heritage sites. Therefore, this paper aims to explore tourists' spatial perception characteristics and emotional experiences at world heritage sites based on perception theory. By analyzing tourists' cognitive features, emotional states, and behavioral patterns regarding world heritage site spaces, we aim to gain deeper insights into the essence and characteristics of world heritage tourism experiences, providing theoretical support and practical guidance for the conservation and management of world heritage sites.

## **Literature review and study area**

### ***Spatial Perception***

Spatial perception refers to the direct experiences and sensations that individuals undergo in their surrounding environment during a specific period, involving a combination of perception and sensation. This concept was initially proposed by Merleau-Ponty in 1945, emphasizing the significance of perception and experience in the interaction between individuals and their environment. Spatial perception entails the processing and comprehending spatial elements within the objective environment by the perceiving subject, thereby forming a cognitive understanding and experience of the environment and assigning meaning to space through cognitive processes. Research on spatial perception addresses individual perceptual abilities and emotional states and considers the impact of environmental characteristics and cultural backgrounds on spatial experiences. Scholars such as Gartner (1994), Baloglu (1999), and Santana (2018) have made notable contributions to the study of spatial perception, developing models that encompass spatial cognition, emotional perception, and behavioral patterns. Du Cros (2020), Wei (2022), and others have further explored how tourists' behavioral activities and emotional states in heritage spaces dynamically influence heritage values, following a sequence of "spatial environment - emotional state - behavioral patterns."

### ***Study Area***

This study focuses on Quanzhou City, situated along the southeastern coast of Fujian Province, China, with an area of approximately 11,000 square kilometers. Quanzhou is recognized as one of the three major central cities in Fujian Province and stands out as a significant port city along the Maritime Silk Road. It was one of China's four major foreign trade ports during the Tang Dynasty. It later became the bustling commercial hub at the eastern terminus of the thriving Asian maritime trade network from the 10th to the 14th century, earning the title of "the largest port in the East." Moreover, Quanzhou City is distinguished as one of the first 24 historical and cultural cities designated by the State Council of China and was honored as the inaugural "Capital of East Asian Culture." In 2021, UNESCO's World Heritage Committee approved the inclusion of "Quanzhou: Emporium of the World in Song-Yuan China" in the World Heritage List<sup>29</sup>. This study selected World Heritage sites in the old city of

Quanzhou as the research object, including seven sites: the Site of Maritime Trade Office, Site of Deji Gate, Tianhou Temple, Site of Southern, Clan Office Confucius Temple and School, Kaiyuan Temple, Qingjing Mosque, etc. world heritage site (Fig. 1).

**Fig. 1** World Heritage Site Overview of Quanzhou Old City



## Methodology

### Overall research framework

This study utilizes three methodologies—high-frequency word analysis, semantic network analysis, and sentiment analysis—to comprehensively investigate tourists' spatial perception characteristics and patterns towards world heritage sites (Fig. 2). Specifically:

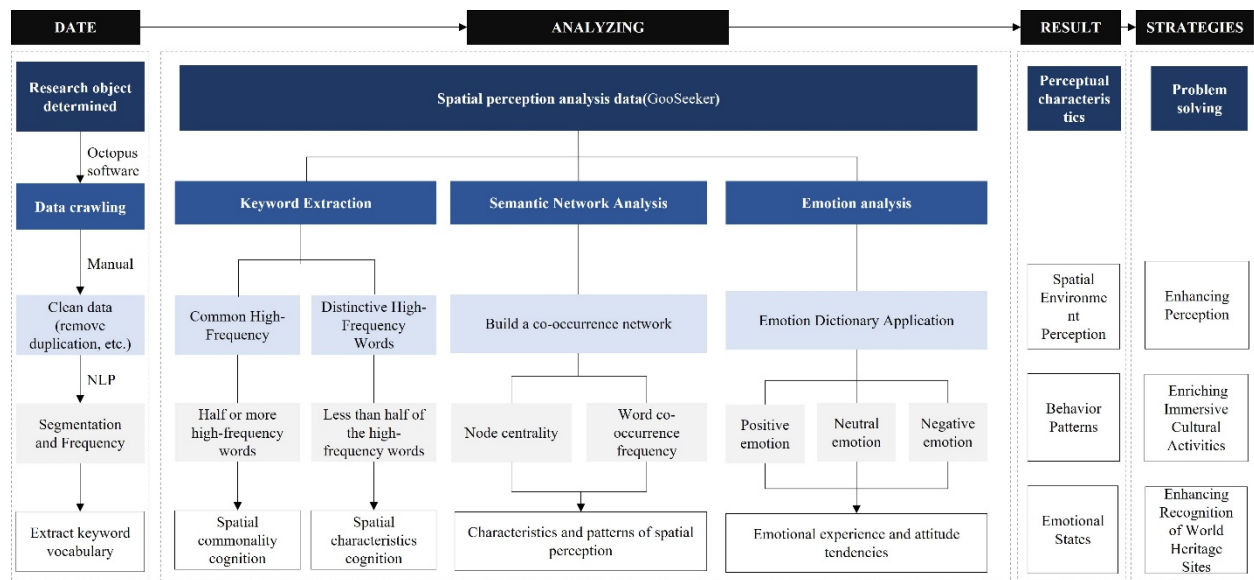
Firstly, high-frequency word analysis involves summarizing and analyzing the top 30 high-frequency words extracted from data related to various world heritage sites, including nouns, verbs, adjectives, and adverbs. The aim is to reveal tourists' impressions, emotions, and behavioral patterns towards world heritage sites. Spatial impression cognitive vocabulary primarily consists of nouns and adjectives, reflecting tourists' evaluations and impressions of world heritage sites, including geographical locations, landmark names, specific cultural heritage elements, etc. Emotional perception vocabulary mainly comprises adjectives used to express tourists' sentiments and feelings post-visitation, encompassing positive, negative, or neutral emotions. Behavioral preference vocabulary mainly involves verbs identifying tourists' activities and behaviors at world heritage sites, such as sightseeing, cultural experiences, and interactive engagements.

Secondly, semantic network analysis aims to explore the associative directional properties among high-frequency words, analyzing the direct or indirect relationships reflecting tourists' perceptions of world heritage sites. This study combines VOSviewer and Gephi to

construct a visual semantic network using high-frequency word lists, feature word lists, and co-occurrence matrix word lists. In the co-occurrence relationship network graph, denser connections (more frequent co-occurrences) between words are represented by denser lines, indicating stronger associations in tourists' perceptions between the co-occurring words.

Lastly, sentiment analysis relies on GooSeeker's sentiment analysis module, utilizing its built-in sentiment lexicon. This analytical approach relies on sentiment lexicons compiled from commonly used emotional vocabulary within the network, ensuring scientific validity. Researchers can customize and manage sentiment lexicons based on research requirements. During sentiment analysis, sentiment scores for each comment text are computed based on the significance of sentiment words, including favorable terms, unfavorable terms, negations, and intensity modifiers. This comprehensive analysis provides insights into tourists' emotional experiences and attitude inclinations within the spatial context of world heritage sites.

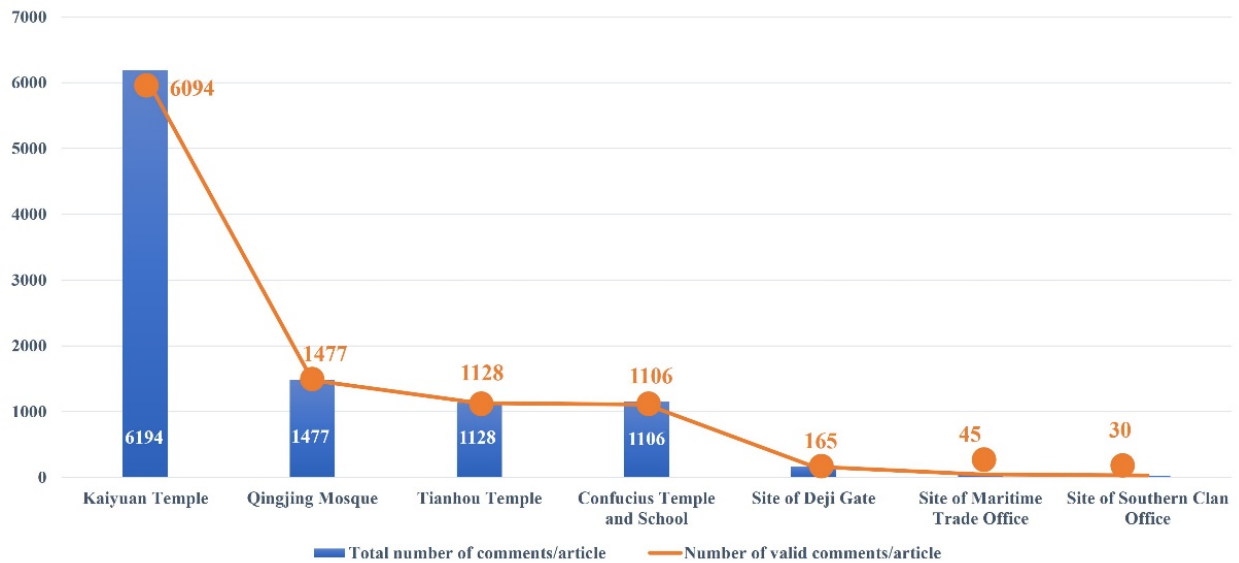
**Fig 2. The overall research framework**



### Data Collection

The data for this study was primarily obtained from user comments and online travelogues sourced from Ctrip Travel and Dianping websites. Ctrip Travel is China's largest online travel service platform. At the same time, Dianping is a leading local life information and transaction platform in China and one of the earliest websites globally to establish third-party consumer reviews. Data was collected using the Octopus software, with the seven UNESCO World Heritage sites in Quanzhou as search terms and corresponding rules to extract critical information, including user I.D.s, star ratings, comment text, evaluation time, and user interactions such as likes. After applying a time-based filter, comments and online travelogues were gathered up to March 1, 2024. The data was then manually cleaned to remove duplicate or irrelevant content, and typographical errors within the text were corrected. A valid dataset of 10,194 attraction comments and 10,045 online travelogues was obtained (Fig.3).

**Fig. 3 Comment Statistics**



### **Data Preprocessing**

To establish an effective spatial perception analysis database, this study utilized segmentation and classification retrieval modules within the GooSeeker software, complemented by natural language processing (N.L.P.) algorithms, including the word segmented from the Institute of Computing Technology (N.L.P.I.R.) and the part-of-speech tagger from H.A.N.L.P. The following steps were undertaken:

- (1) Filtering Stop Words: A "stop words list" was created containing pronouns and non-spatially relevant words such as "this," "those," "if," etc.
- (2) Customized Vocabulary: An "user-defined words list" was compiled with proper nouns like " Site of Maritime Trade Office," " Site of Deji Gate," " Tianhou Temple," etc., to ensure accurate segmentation.
- (3) Merging Synonymous Words: A "synonym list" was established to combine synonymous or related terms like "night" and "evening" to enhance segmentation efficiency.
- (4) Segmentation and Frequency Analysis: Evaluation texts for each World Heritage site were segmented, and a high-frequency feature word library was determined through frequency analysis.
- (5) Keyword Extraction: Based on the requirements of the spatial perception analysis model, the top 30 high-frequency words were summarized, and relevant keywords and feature words related to spatial perception were selected to construct a comprehensive spatial perception analysis database (*Table 1*).

This preprocessing methodology ensures the accuracy, efficiency, and relevance of the dataset used for spatial perception analysis.

**Table 1** High-frequency feature words (top 30)

World Heritage sites	High-frequency Words		
	Spatial Environment	Behavioral Patterns	Emotional State
Site of Maritime Trade Office	Quanzhou, Site, Alley, Maritime Trade Office, Trade, History, Customs, Marine, Song - Yuan Dynasties, Management, Organization, Establishment, Watergate, Licheng District, National Affairs, China, Water Ditch, Water Pass, Building, World, Scenic Spot, Museum		Not bad 、 Good
Site of Deji Gate	Quanzhou, Site, Tianhou Temple, Site of Quanzhou, Site, Site of Deji Gate, City Gate, Song - Yuan Dynasties, History, City Wall, Stone Carvings, Quanzhou Old City, Archaeology, Building, South Gate, Ruins, Square, Preservation, Religion, Moat, Islam, Zayton City, Protection, Christianity, Arch Bridge, Hinduism, Passageway, Buddhism		
Tianhou Temple	Tianhou Temple, Mazu, Quanzhou, Building, Temple, Culture, Incense, Grandest, Southern Fujian, Worship, Faith, Blessings, Fujian, Site, Sea God, Characteristic, Scenic Spot, History, Mountain Gate, Taiwan, Sacrifice, Tianhou Road, Ancient Building, Peace, Cultural Heritage Protection, Stage, Southern Song Dynasty.	Sightseeing, Worship	
Site of Southern Clan Office	Quanzhou, Site, Southern Clan Office, Song Dynasties, History, Clan, Royal Family, Ocean, Trade, Building, Museum, Old City, Gurong Alley, Government Office, World Heritage, Scenic Spot, Historical Site, Licheng District, Commerce, Management Organization, Archaeology, Zixinzhai, Furongtang, Treasure, Exhibition Hall, Ceramics, Components, Museum		Not bad, Like
Confucius Temple and School	Quanzhou, Confucius Temple, Building, Culture, Confucius, History, Building Complex, Square, Dacheng Hall, Scenic Spot, Southern Fujian, Tourist Attraction, Features, Cultural Heritage Protection, Grand Scale, Long History, Licheng District, Banyan Tree, Ancient Building, Beautiful, Historical Site, Southeast Region, Tumen Street	Sightseeing, Worship	Not bad
Kaiyuan Temple	Kaiyuan Temple, Quanzhou, Temple, Scenic Spot, History, Twin Towers, Buddhism, Fujian, West Street, Architecture, Stone Pagoda, Unique, Furongtang, China, Master Hongyi, Free,	Sightseeing, Photography , Strolling	Worth seeing; it is not bad

	Photography, Precepts, Incense Offering, Memorial Hall, Culture, Licheng District, Beautiful, West Pagoda, Quiet		
Qingjing Mosque	Quanzhou, Qingjing Mosque, Islam, China, Admission Ticket, Building, Mosque, Temple, Arab, Ancient, History, Muslim, Religious Belief, Islamic, Culture, Site, Chapel, Scenic Spot, Guandi Temple, Gatehouse, Not Large, Building Style, Fujian, Guanyue Temple, Minshan Hall	Sightseeing, Photography	Worth seeing

## Results

### *Spatial Environment Perception*

#### ***Commonalities and Characteristic Cognition***

The spatial environment perception is conducted by extracting and summarizing high-frequency vocabulary and viewpoints to understand tourists' profound impressions and evaluative tendencies toward the seven World Heritage sites. The analysis of high-frequency words is divided into standard and distinctive categories.

**Common High-Frequency Words:** These are words that appear in half or more of the World Heritage sites, reflecting the typical characteristics of each site. According to the analysis of common high-frequency words, tourists' perception of the seven World Heritage sites primarily focuses on aspects such as "Song-Yuan," "Quanzhou," "Site," "Building," "History," "Culture," and "Scenic Spot." In other words, as relics of the Song-Yuan period in Quanzhou, these World Heritage sites are recognized by tourists for their historical and cultural value. They are considered unique "scenic spots."

**Distinctive High-Frequency Words:** These appear in fewer than half of the World Heritage sites and are selected from the top five high-frequency words, excluding common ones and those related to the sites. They mainly reflect the World Heritage sites' unique characteristics or current issues. Based on the analysis of distinctive high-frequency words, the World Heritage sites can be categorized into three types of perception: spatial value perception, cultural value perception, and historical function dominance.

### ***Spatial Value Perception***

#### ***(1) Kaiyuan Temple***

Kaiyuan Temple, the largest and most prominent official Buddhist temple in Quanzhou during the Song-Yuan period, is typically recognized by visitors through "West Street." In addition to perceiving its function as a Buddhist temple, tourists describe its iconic architecture, the "Twin Towers," and the "Stone Pagoda," which exemplify its material characteristics. A semantic network diagram illustrates that tourists' attention to this temple primarily centers around "Kaiyuan Temple" and "Quanzhou," forming associations with "Temple" as another critical concept (Fig.4). Firstly, Kaiyuan Temple is the primary focus of tourist attention, forms close associations with terms like "West Pagoda." This association reflects tourists' recognition

and focus on the iconic West Pagoda within Kaiyuan Temple, emphasizing its significance as a temple structure. Secondly, the text indicates associations between "Quanzhou" and "China" and "Worth seeing," indicating that tourists view Quanzhou as a noteworthy destination within China, recognizing its importance and appeal nationwide. Additionally, the text mentions associations between "Temple," "Master Hongyi," and "photography," indicating that tourists not only focus on the temple itself and its iconic architecture but also associate it with the renowned monk and the act of taking photographs.

## ***(2) Confucian Temple and School***

The Confucian Temple and School was a sacrificial site and Quanzhou's highest-level educational institution. Visitors demonstrate a high level of awareness of the main building, the "Dacheng Hall," and the "Architectural Complex" and "Square" surrounding it, reflecting a comprehensive understanding of its spatial layout. Additionally, tourists strongly recognize its historical function as a "Confucian Temple" and the historical figure "Confucius" embodying its cultural characteristics. A semantic network diagram shows that tourists' focus on this site primarily centers around "Quanzhou," forming associations with "Building" and "Confucian Temple" as another critical concept (*Fig.5*). Firstly, Quanzhou, as the primary focus of tourist attention, forms close associations with terms like "long history" and "Building complex." This association reflects tourists' emphasis on Quanzhou as a city with a rich architectural heritage and highlights its importance and integrity as a historical and cultural heritage. Secondly, the text indicates associations between "Building" and "Scenic Spot," "Cultural Heritage Protection," as well as associations between "Confucian Temple" and "Building Complex," "Dacheng Hall," indicating tourists' awareness and attention to the Quanzhou Confucian Temple and Academy as a tourist attraction and significant cultural heritage site. In particular, the Dacheng Hall within the Confucian Temple complex, as an essential element of the architectural ensemble, also receives tourists' attention and recognition.

## ***(3) Site of Deji Gate***

The Site of Deji Gate is the southern gate relic of Quanzhou during the Song-Yuan period. Visitors recognize its location through "Tianhou Temple" and perceive it mainly through the "City Gate," "City Wall," "Stone Carvings," and "Quanzhou Old City," which reflect its material spatial value. A semantic network diagram indicates that tourists' attention to this site primarily focuses on its material spatial value preserved as an archaeological discovery, demonstrating a certain degree of recognition of its importance in the historical context of Quanzhou Old City (*Fig.6*). Firstly, "Site" as a core concept is closely related to terms like "Site of Deji Gate," "Preservation," "Archaeology," reflecting tourists' emphasis on the Site of Deji Gate as an archaeological discovery and preserved relic site, emphasizing its importance as a historical spatial artifact. Secondly, "Quanzhou" is another critical concept that demonstrates tourists' recognition of the Site of Deji Gate's position and significance in the historical context of Quanzhou. For example, associations between "Quanzhou" and "Quanzhou Old City" "Moat"



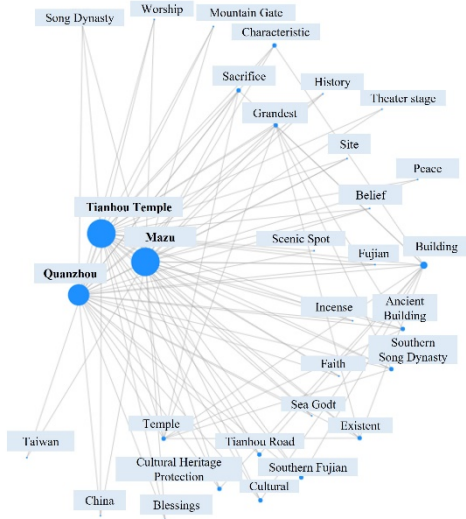


around "Tianhou Temple" and "Mazu," forming associations with "Quanzhou" as another critical concept (*Fig.7*). Firstly, Tianhou Temple, as the primary focus of tourist attention, forms close associations with terms like "Characteristic," "Highest specifications," "ancient building." This association reflects tourists' emphasis on Tianhou Temple as a unique, highest-specification, and ancient temple with historical and cultural significance. Secondly, the text indicates direct associations between "Mazu" and terms like "rituals," "temple," and "prayers," indicating tourists' understanding and interest in Mazu worship and the significance of rituals performed at Tianhou Temple. Additionally, the association between "Quanzhou" and "tourism" indicates tourists linking Tianhou Temple with Quanzhou as a tourist destination. This association demonstrates that tourists perceive Tianhou Temple from comprehensive perspectives involving material space, intangible space, and behavioral patterns, showcasing a holistic understanding of Tianhou Temple's value.

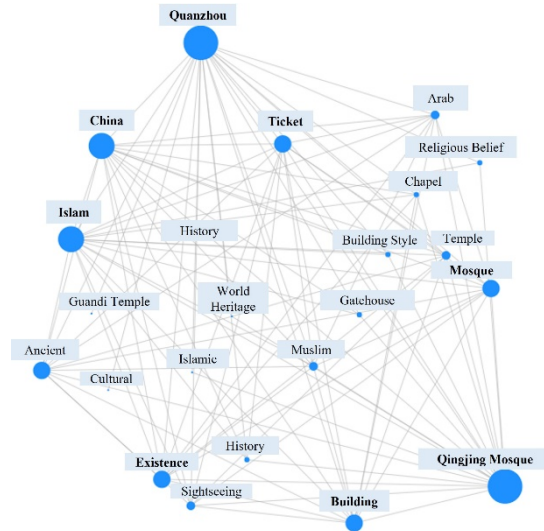
## **(2) Qingjing Mosque**

Qingjing Mosque, as evidence of Persian, Arab, and other Muslim merchants and communities conducting business in Quanzhou during the Song-Yuan period, is associated with high-frequency terms such as "Islam," "Temple," "Mosque," "Arab," "Muslim," reflecting tourists' understanding of its representation of foreign cultures, religions, and life traditions. A semantic network diagram shows that tourists' attention to this mosque primarily centers around "Quanzhou" and "Qingjing Mosque," forming associations with "China" and "Islam" as other key concepts (*Fig.8*). Firstly, Quanzhou, as the primary focus of tourist attention, forms close associations with terms like "ancient." This association reflects tourists' recognition and interest in Quanzhou as an ancient cultural city, emphasizing its long history. Secondly, the text indicates associations between "Qingjing Mosque" and "Mosque" "Architecture," indicating tourists' perception of Qingjing Mosque as a form of mosque, with an understanding and interest in its architectural features and historical background. Additionally, the text mentions associations between "China" and terms like "existing" and "Arab" and associations between "Islam" and terms like "ticket" and "Muslim," indicating tourists view Qingjing Mosque as an important historical witness to cultural exchanges between China and the Arab world, acknowledging its status and significance as a Muslim Mosque.

**Fig. 5** *Tianhou Temple Semantic Network Diagram*



**Fig. 6** *Qingjing Mosque Semantic Network Diagram*



## Historical Function Perception

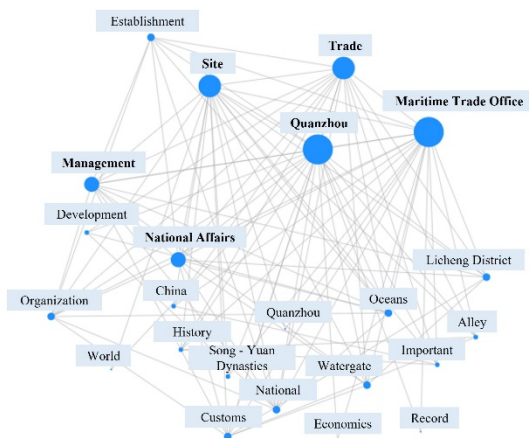
### (1) *Site of Maritime Trade Office*

The Maritime Trade Office Site represents the administrative institution established during the Song-Yuan period in Quanzhou to manage maritime trade affairs. Tourists' understanding of its historical function is mainly reflected in high-frequency terms such as "alleyways," "trade," "customs," "maritime," and "institution." A semantic network diagram indicates a close correlation between "Quanzhou" and "Maritime Trade Office," reflecting tourists' recognition of the Maritime Trade Office Site as an essential historical overseas trading center (Fig.9). For example, the association between "Quanzhou" and "customs" highlights the historical status of the Maritime Trade Office as a customs institution. At the same time, the connection between "Maritime Trade Office" and "national affairs" and "maritime" implies its role and position in national maritime trade management. Additionally, the association between "site" and "trade" is another critical concept group that emphasizes tourists' attention to the historical function of the Maritime Trade Office Site. For instance, the association between "site," "affairs," and "customs" indicates tourists' recognition of the historical importance of the Maritime Trade Office in trade activities and customs affairs. Furthermore, the connection between "trade" and "management" and "water gates" also suggests the Maritime Trade Office's position in trade management and maritime gateway functions.

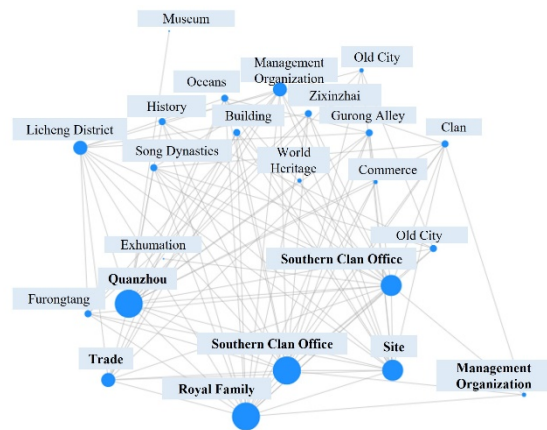
**(2) Site of the Southern Clan Office**

The Site of the Southern Clan Office, serving as the administrative institution of the relocated Song Dynasty imperial family in Quanzhou, is associated with keywords such as "imperial family," "royal family," "maritime," "trade," "political," reflecting tourists' awareness and interest in its political, social function, and historical background. A semantic network diagram shows tourists' focus on this site primarily centered around "Quanzhou," "imperial family," and "Site of the Southern Clan Office," forming associations with "site" and "Southern Song" as other key concepts (Fig.10). Firstly, Quanzhou, the imperial family, and the Site of the Southern Clan Office, as the primary centers of tourist attention, form close associations with terms like "World Heritage." This association reflects tourists' emphasis on the Site of the Southern Clan Office as a historical heritage site of world significance associated with the imperial family, emphasizing its importance as a historical and cultural heritage and administrative institution. Secondly, the text indicates associations between "imperial family" and terms like "Fu Rong Tang" and "administrative institution" and between "Site of the Southern Clan Office" and terms like "commerce" and "Li Cheng District." This shows tourists' understanding and interest in the imperial family's history and the site of the Southern Clan Office's role in commercial activities and development in the Li Cheng District. Additionally, mentioning associations between "site" and "clan," "Southern Song," and "historical sites" indicates tourists linking the Site of the Southern Clan Office with clan relations and historical relics from the Southern Song period. This association highlights tourists' focus on the historical functions and value of the Site of the Southern Clan Office in the Li Cheng District of Quanzhou.

**Fig. 7** Site of Maritime Trade Office Semantic Network Diagram



**Fig. 8** Site of the Southern Clan Office Semantic Network Diagram



**Behavior Patterns**

Behavioral pattern vocabulary identifies activity types that attract high attention from tourists. However, terms related to tourist behavior patterns did not appear among the top thirty high-frequency words for the Maritime Trade Office Site, Site of Deji Gate, and Site of the Southern Clan Office. Regarding common high-frequency words, "sightseeing" appeared for four World Heritage Sites: Tianhou Temple, Quanzhou Confucius Temple and Academy, Kaiyuan

Temple, and Qingjing Mosque. This indicates that sightseeing is an everyday activity type at World Heritage Sites.

Distinctive high-frequency words indicate unique activity vocabularies for each World Heritage Site, mainly categorized into everyday leisure and cultural experiences. Based on the frequency of appearance of each activity type, the perceived situation of different activity types at each World Heritage Site is summarized as follows:

- (1) Maritime Trade Office Site: Tourists have a solid overall perception of cultural experience activities, primarily reflected in recognizing the "museum" function.
- (2) Tianhou Temple and Quanzhou Confucius Temple and Academy: Strong perception of religious and cultural experiential activities, mainly reflected in aspects like "praying" and "rituals."
- (3) Kaiyuan Temple and Qingjing Mosque: Cultural experience and everyday leisure activities dominate the perception, mainly reflected in activities such as "Photography" and "strolling."

These analysis results demonstrate that tourists exhibit different activity preferences and focal points at different World Heritage Sites, reflecting the diversity and attractiveness of World Heritage Sites as tourist destinations.

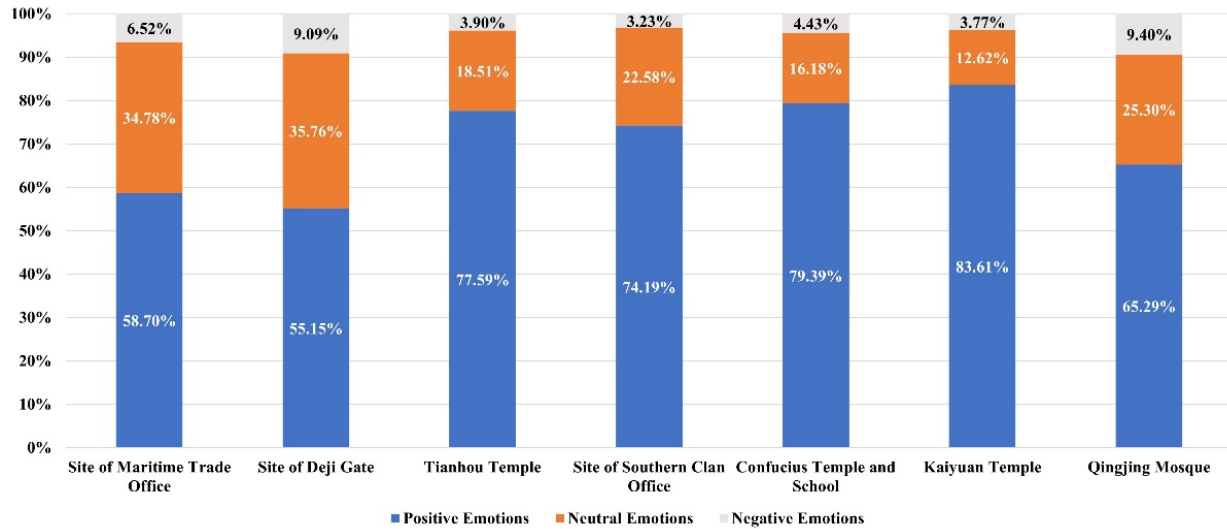
### ***Emotional States***

A significant divergence in emotional evaluations of world heritage sites is revealed through an analysis of emotional and high-frequency vocabulary used by tourists (*Fig.11*). The findings indicate that tourists frequently employ positive expressions such as "good" and "like," suggesting an overall favorable attitude towards these sites. Notably, for landmarks like Kaiyuan Temple, Quanzhou Confucius Temple and Academy, and Tianhou Temple, the prevalence of positive emotions exceeds 75%, categorizing them as locations eliciting relatively strong emotional responses. Tourists' nuanced recognition of unique attributes, such as the "distinctiveness" of Kaiyuan Temple, the "characteristics" of Confucius Temple and School, and the "prestige" of Tianhou Temple, underscores positive sentiments.

Conversely, the proportion of positive emotions among tourists at the Site of Southern Clan Office and Qingjing Temple ranges between 65% and 75%, indicating milder emotional responses. Negative emotions are primarily manifested in assessments describing the Site of Southern Clan Office as "unremarkable" and expressing disappointment at Qingjing Temple's experience. For sites like the Site of Maritime Trade Office and Site of Deji Gate, tourists' positive emotions range from 55% to 65%, reflecting the weakest emotional responses, with negative sentiments directed towards challenges in locating the Site of Maritime Trade Office and a perceived lack of interest in the Site of Deji Gate.

In conclusion, tourists exhibit more positive emotional evaluations of world heritage sites possessing unique features and spatial characteristics. Conversely, sites with lower recognition and less fulfilling experiences evoke higher negative emotions among tourists.

**Fig. 9** Tourists' Emotional Perceptions of World Heritage Sites



## Strategies for Enhancing Tourists' Perception of World Heritage Sites

### Enhancing Perception of "Less Popular" World Heritage Sites

In world heritage tourism, specific sites are often categorized as "less popular" due to inadequate promotion and attention, such as the Maritime Trade Office, Site of Southern Clan Office, and Site of Deji Gate in Quanzhou. These sites need widespread recognition of their cultural value and consequently attract fewer visitors. To advance the development of world heritage tourism, the following strategies can be implemented:

- (1) **Promotion and Platform Enhancement:** Utilize online maps, travel apps, and essential platforms to intensify the promotion of "less popular" world heritage sites. Employ multimedia methods, including textual content, imagery, and videos, to vividly portray these sites' historical, cultural, and distinctive aspects to elevate visitor awareness and interest.
- (2) **Establishment of World Heritage Themed Routes:** Analyze the preferences of diverse visitor demographics (age, gender, etc.) and devise thematic routes that interconnect various world heritage sites. Crafting these routes allows "less popular" sites to be seamlessly linked with other renowned landmarks, guiding visitor flow and augmenting visitation rates. Offer immersive cultural experiences.

### ***Enriching Immersive Cultural Activities***

While tourists possess a certain level of perception regarding the historical functions of Quanzhou's seven world heritage sites, their understanding primarily focuses on material aspects. Deeper insights into traditional culture, religious beliefs, and other dimensions still need to be improved. To enrich the immersive cultural experience at these sites, consider the following strategies:

- (1) **Creation of Immersive Cultural Districts:** Develop diverse and immersive cultural districts showcasing traditional culture, religious beliefs, and local lifestyles. Utilize historical sites and spatial conditions to offer engaging experiences through cultural exhibitions, interactive activities, and performances. This allows visitors to gain profound insights into Quanzhou's world heritage sites' cultural significance and historical heritage.
- (2) **Integration of Virtual and Augmented Reality Technologies:** Implement virtual reality (V.R.) and augmented reality (A.R.) technologies to showcase historical and cultural landscapes, particularly highlighting cultural education activities at Fuwen Temple. Visitors' perception and understanding of Confucian culture through interactive and engaging displays showcased ancient Song-Yuan Dynasties Quanzhou's political and cultural landscape.

### ***Enhancing Recognition of World Heritage Sites***

During perceiving world heritage sites, iconic streets and buildings in the vicinity often play critical roles in spatial cognition. However, negative sentiments expressed by tourists, such as "narrow alleys," "unremarkable surroundings," and "poor environment," underscore certain deficiencies in the spatial system of these sites. To enhance recognition and attractiveness, consider the following strategies:

- (1) **Improvement of Surrounding Environment Design:** Enhance the design and beautification of the surrounding environment of world heritage sites, including roads, landscapes, lighting, etc., to enhance visitor comfort and experiential quality. Install prominent wayfinding systems and information signs to guide visitors to the world heritage sites accurately, thereby enhancing recognition and accessibility.
- (2) **Creation of Iconic Architecture and Landscapes:** Develop distinctive architectural and landscape features around world heritage sites to create unique spatial characteristics, enhancing visual appeal and recognition. Establish landmark cultural symbols that integrate world heritage sites into the city's cultural and geographical environment, making them integral cultural nodes within the cityscape.

### ***Conclusion and Future Prospects***

World heritage sites, representing invaluable resources of rich historical, cultural, and societal significance, demand sustained protection due to their irreplaceable and non-renewable nature. The convergence of culture and tourism has elevated heritage tourism to a pivotal role in fostering cultural prosperity. As a distinct demographic, tourists play a crucial role in shaping the value of urban heritage through their attitudes and behaviors, thereby influencing heritage tourism, the transmission of heritage values, and the development and conservation of heritage sites.

By adopting the tourist's perspective, exploring their spatial perceptions within world heritage cities enriches the methodological framework of heritage research. It provides novel insights for perpetuating and safeguarding the values embodied in world heritage sites. Future research endeavors should delve deeper into assessing the efficacy of multimedia technologies in promoting world heritage sites. This involves a comprehensive analysis of how different media formats impact tourist cognition and behavior, along with exploring the potential applications of emerging technologies like virtual reality (V.R.) and augmented reality (A.R.) in world heritage tourism, aimed at enhancing promotional effectiveness and visitor experiences.

These research directions are poised to advance the amalgamation of world heritage conservation with sustainable tourism development, fostering a more profound and comprehensive understanding of heritage protection and transmission. Ultimately, this will contribute to effectively promoting sustainable utilization and development of heritage sites.

**Note:** Zhang Wanjia collected the data presented in this paper.



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