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Article

Research on the tourist destination image of the Huaiyang Canal based on network data

Wei Huang, Xinwei Su*

International College, Krirk University, Bangkok 10220, Thailand
*** Corresponding author:** Xinwei Su, suxinwei01@126.com

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Abstract: The Huaiyang Canal, a significant section of the Grand Canal, boasts representative tourist attractions. This study analysis of online reviews from Ctrip and Mahive using R language, Gephi, ROST CM, and SPSS has provided insights into tourists' perceptions of the Huaiyang Canal's image. Key findings include: (1) Dominant landscape images encompass gardens, canals, and buildings, emphasizing the historical and cultural assets. Both cultural and natural landscapes equally captivate tourists. (2) The canal's tourism image perception follows a "garden-history-canal" hierarchy with the canal as the central space and history expanding its tourism features. (3) The perceptions can be categorized into historical and cultural landscapes, man-made projects, and attraction perception. Despite varying tourist numbers in Huaian and Yangzhou, scenic spot experiences are similar. The overall perception of tourists is largely positive, but some express concerns about service attitudes and travel time planning.

Keywords: Huaiyang Canal; canal tourism; tourist destination; web text

1. Introduction

The Grand Canal of China, the earliest and largest man-made canal in the world, was successfully inscribed on the World Heritage List in 2014. In 2019, the Chinese government issued the Outline of the Plan for the Protection, Inheritance and Utilization of Grand Canal Culture, which clearly proposes to build a splendid cultural belt and a colorful tourism belt along the Grand Canal. The historical and cultural heritage of the Grand Canal has attracted countless tourists and promoted the development of cultural tourism industries in cities along the route (Chen et al., 2022; Yongle et al., 2021). The Huaiyang Canal, which evolved from the ancient Han Ditch, is an important section of the Grand Canal in China and the earliest section of the Grand Canal with a clear age record. The Huaiyang Canal is a canal from Huaian to Yangzhou, also known as the Li Canal. The Huaiyang Canal starts from Qingkou in Huaiyin in the north and ends in Guazhou in Yangzhou in the south, with a total length of more than 330 miles. There are many lakes along the way, and the Huaiyang Canal has historically been known as the "Lake Trough". The Huaiyang Canal plays an important role in the circulation between the Yangtze River and the Huaihe River as well as in the transportation of water and salt between Northern and Southern China. Huaiyang culture is a regional culture with distinctive regional characteristics and charm. Because of the profound historical and cultural deposits, the Huaiyang Canal has great tourism value.

Worldwide, research on canal tourism started earlier, involving the influence of canal tourism development (Yongle et al., 2021), tourism product development (Bruin et al., 2013; Sparks et al., 1995), market demand and the marketing of canal tourism

(Donohoe, 2011; Xu et al., 2020) and other fields. At the same time, further studies have evaluated canal tourism resources (Jiang et al., 2023; Long and Zhen-fang, 2007; Shi et al., 2023; Thurau et al., 2007), the development of tourism resources (Ji et al., 2017; Ping-bin and Hong-xin, 2002; Yongle et al., 2021), the spatial pattern of canal tourism (Hao and Tiefei, 2013;Wen et al., 2017; Yang et al., 2022; Zhao et al., 2023) and the ecological index of canal tourism (Li et al., 2021; Wang et al., 2023; Zhang et al., 2023). However, there are few studies on canal tourism development from the perspective of tourists' travel experience. In addition, in the context of the continuous development of digital network technology, the internet has become an important tool for studying image perception and performing emotional evaluation. By investigating the behavior of current and potential Chinese outbound tourists using the internet to make travel decisions, Sparks et al. concluded that the influence of the internet on travel intentions is mainly regulated by subjective perception and behavioral control (Sparks and Pan, 2009). Zhang investigated tourists' perception of the tourism image of the Huashan scenic area by performing text analysis of tourists' blogs (Zhang et al., 2021). Relying on the rapid development of the internet and sharing economy platforms, compared with research on tourists' image perception of tourist destinations through network logs (Hang and Yue-wei, 2018), online tourist evaluation has the characteristics of timeliness, a large sample size and fragmentation (Goodrich, 1978) and has become an emerging channel and tool for researchers to study tourist destinations through tourist behavior. It can effectively reflect tourists' image perception and emotional evaluation of tourist destinations (Xingming and Xuecai, 2005). Zhang studied the image perception of tourist destinations in Xi'an by combining a questionnaire survey with online text research and verified the high reliability and authenticity of the image perception of tourist destinations in this study by using the online comment data of tourists (Zhang et al., 2023). Huang found that the destination image of Chinese mainland tourists to Australia is the comfortable natural living conditions but the lack of cultural atmosphere and historical heritage (Huang et al., 2010). Based on the online review data of Chinese tourists to Australia, Li found that Chinese tourists' preference for tourist destinations is related to urban characteristics and resource richness (Li et al., 2021).

In summary, the results of current research on canal tourism and tourism evaluation network text are relatively rich, but research on Huaiyang Canal tourism is limited, and there is a lack of network text research on Huaiyang Canal tourists' perceptions. Therefore, this study takes the Huaiyang Canal as the case, takes Mahive and Ctrip travel notes and comments as the original data sources, uses R language, Gephi, ROST CM and SPSS to conduct content analysis on the network text, studies the structure and quality of tourists' experience elements, and discusses the destination image of Huaiyang Canal tourism to promote the sustainable development of tourism along the Huaiyang Canal.

2. Literature review

Huaiyang culture of Huaiyang Canal is a regional culture with distinctive regional characteristics and charm. The profound historical and cultural deposits make the Huaiyang Canal of great tourism value. Tourist destination image, that is, tourists'

comprehensive perception and evaluation of a tourist destination, is an intangible value that enhances the inner spirit and external value of a tourist destination. With the development of network technology, the innovation of research methods and the increase in research data, research on tourism destination image perception has become a hot spot for tourism geographers (Yi et al., 2021). At present, research on tourism destination image mainly focuses on the following aspects.

First, the formation factors of tourist destination image are studied. Since tourism destination image may be affect-ed by many factors in the formation process, it can be concluded from the review and analysis of the literature that the influencing factors can be classified into two categories: information factors and tourist personal factors. On the one hand, from the perspective of information factors, newspapers, as a more traditional print media, play a particularly important role in the image of tourist destinations (Castelltort and Mäder, 2010). However, with the development of science and technology, the channels for tourists to obtain destination information have gradually been diversified. As a new medium, the internet is gradually becoming an irreplaceable information source. Yin discussed the relationship between the perception of the uniqueness of the destination and electronic word of mouth in the image of the destination with the increasing popularity of online short videos (J et al., 2023). This study provided feasible guidance for effectively improving destination characteristics through electronic word of mouth in short tourism videos. At the same time, some scholars point out that inaccurate publicity information on tourist destinations may lead to negative evaluations by tourists. Therefore, a new method is proposed to measure the consistency between tourists' projected image and the received image of the destination (Li et al., 2023). On the other hand, from the perspective of tourists' individual factors, Li et al. adopted a mixed approach to study tourists' views on social hospitality in their personal or unplanned interactions with local people and found that only "equal communication with tourists" in social reception can directly affect the image of the destination (Li et al., 2023). However, the impact of "concern for tourist safety" on the image of the destination must be completely mediated by emotional solidarity (Li et al., 2023).

Second, the relationship of tourism destination image is studied. From the perspective of research, most scholars focus on the relationship between destination image and tourists' satisfaction, loyalty, place attachment and willingness to revisit when discussing the relationship between destination image and tourism destination image (Juraturgunov et al., 2023). For example, examined the determinants of destination loyalty to world heritage sites (WHSs) along the Silk Road in Uzbekistan. By profiling inbound tourists visiting WHSs and identifying important determinants of destination loyalty, the findings provided Uzbekistan's inbound tourists with valuable empirical evidence of Silk Road tourism. At the same time, Wu conducted research on how the creativity and authenticity of destination short videos affect the audience's attitude toward videos and destinations and found that the quasi-social interaction between emotion and internet celebrities has an indirect influence in the model (Wu et al., 2023).

Finally, the tourist destination image is measured and evaluated. The measurement and evaluation of tourism destination image can provide references for the design, positioning, marketing and planning of destination tourism image. Scholars

mainly carry out research based on two aspects: on the one hand, the "projected image" and "perceived image" of a destination are compared and analyzed, and the perception and projected online destination image reflected in the content generated by tourists and the content generated by tourism organizations are examined. Through visual content analysis, photographic data scene analysis, text data content analysis and perception mapping analysis, the differences between the perceived and projected online DI in Eastern Taiwan were discussed (Mak, 2017). On the other hand, by constructing a destination image measurement model, the specific destination image is measured. The importance of measuring the image of a destination has been highlighted to identify successful tourism promotion strategies that are likely to enhance the competitiveness and attractiveness of a destination in a highly competitive and changing environment. This study carried out qualitative exploration on the basis of previous studies, used the semantic difference scale obtained from the literature to quantitatively measure brand image, and made adjustments based on expert suggestions. The results raise the question of adjusting the scale internationally, despite the appropriate use of several nationally valid scale operating procedures (Gadhoumi et al., 2023).

3. Research data and methods

3.1. Research area and object

The Huaiyang Canal is also known as the Han Ditch, Canal Water, Hanjiang River, Zhongdu Water, Huainan Canal, Li Canal, etc. The Ming and Qing dynasties began to use the name Huaiyang Canal, and in modern times, it has been called the Li Canal. The total length from the Huaiyin ship lock in Huaian city in the north to Liuwei in Yangzhou city in the south is 168 km. The Huaiyang Canal, which evolved from the ancient Han Canal more than 2500 years ago, is the earliest canal clearly recorded in Chinese history and the most representative linear living cultural heritage of Chinese water civilization (Huaiyu and Xin, 2017). The "China Grand Canal World Heritage Application text" says that this section of the canal is the Huaiyang Canal, and the local government and people are used to calling it the Li Canal. The Li Canal was originally called the Li River (Huaiyu and Xin, 2017). Yangzhou and Zhuan have great responsibilities in the construction of the Grand Canal cultural belt, while the scenic spots in the Huaiyang area with the characteristics of canal regional culture have attracted much attention from tourists.

3.2. Data sources

Ctrip and Mabeehive are the two major Online Travel agencies (OTAs). As a result, in this paper, the data come from the Ctrip and Mahive networks. Octopus Collector was selected to collect all online reviews of Huaian Canal-related scenic spots, and duplicate reviews were removed. Finally, 631,170 words were captured. The scenic spots involved in the research are the Huai'an Canal Governor's Mansion, the Huai'an Government Office, Huai'an River Ancient Town, the Yangzhou Dongguan Street Historical Block, Huai'an Wu Chengen's former residence, the Zhuanli Canal Cultural Corridor, the Yangzhou Ancient Canal, the Huai'an China

Canal Museum, the Yangzhou Grand Canal Museum, the Yangzhou Ji Garden, and the Yangzhou He Garden.

3.3. Research methods

This study explores the destination image in the eyes of tourists, so it studies the online speech of tourists about the destination, which needs to use the text analysis. First, R language is used to segment the network text data into words, extract the list of high-frequency words, and complete the visualization of word cloud rendering to obtain the perceptual composition of the tourism image of the Huaiyang Canal. Second, the co-word matrix of high-frequency words is obtained by using ROST CM, and the complex semantic network of high-frequency words is obtained by importing the co-word matrix into Gephi. Then, Excel is used to transform the co-word matrix into a correlation matrix and a dissimilarity matrix, and SPSS is used for co-word clustering and multidimensional scaling analysis. Finally, the emotional analysis function of ROST CM is used to obtain tourists' overall emotional perception of Huaiyang Canal tourism.

4. Analysis of the Huaiyang Canal tourism image perception

4.1. Structure of the Huaiyang Canal tourism image perception

R language was used to segment the online text of Huaiyang Canal tourism reviews, remove single words and invalid words, and extract the top 50 high-frequency words (**Table 1**). Then, R language was used to draw a word cloud map to visualize the high-frequency words of the Huaiyang Canal tourism image (**Figure 1**). In the word cloud map, the higher the word frequency is, the larger the word shape; conversely, the lower the frequency is, the smaller the shape of the word.

Table 1. List of high-frequency words in Huaiyang Canal tourism network text.

No.	Frequently used words	Word frequency	No.	Frequently used words	Word frequency
1	扬州 (Yangzhou)	3283	26	运河 (canal)	587
2	不错 (good)	2493	27	喜欢 (like)	587
3	值得 (worthy)	1998	28	特别 (special)	584
4	园林 (garden)	1969	29	文化 (cultre)	583
5	个园 (Geyuan)	1888	30	江南 (jiangnan)	575
6	东关 (Dongguan)	1659	31	导游 (tour guide)	554
7	非常 (very)	1635	32	晚清 (late Qing Dynasty)	545
8	何园 (He Yuan)	1552	33	晚上 (evening)	544
9	历史 (history)	1464	34	推荐 (recommended)	528
10	景色 (scenery)	1319	35	古镇 (ancient town)	517
11	很多 (many)	1146	36	四季 (four seasons)	508
12	特色 (characteristics)	1043	37	门票 (tickets)	487
13	地方 (place)	1024	38	漕运 (Canal transport)	463
14	景点 (attractions)	961	39	第一 (first)	448

Table 1. (*Continued*).

No.	Frequently used words	Word frequency	No.	Frequently used words	Word frequency
15	建筑 (architecture)	916	40	盐商 (salt merchant)	443
16	淮安 (Huai'an)	906	41	风景 (view)	441
17	假山 (rockery)	868	42	了解 (understand)	425
18	感觉 (feel)	797	43	景区 (Scenic spot)	424
19	比较 (Comparison)	776	44	小吃 (snack)	418
20	园子 (garden)	728	45	性价比 (Cost performance)	418
21	里面 (inside)	720	46	夜景 (night scene)	394
22	中国 (China)	709	47	竹子 (bamboo)	388
23	古运河 (ancient canal)	705	48	精致 (delicacy)	386
24	讲解 (explanation)	651	49	体验 (experience)	386
25	方便 (expediency)	590	50	值得一看 (Worth seeing)	365

Figure 1. Word cloud map of high-frequency words in Huaiyang Canal tourism network text.

Through the analysis of the list of high-frequency words and the word cloud map, it can be seen that among the high-frequency words of city names, "Yangzhou" is the most frequent, occurring 3283 times, while "Huai'an" is less frequent but still on the list of high-frequency words, ranking 16th and occurring 906 times. It can be seen that in the tourist destinations along the Huaiyang Canal, tourists are more interested in the attractions of Yangzhou city. Among the high-frequency words of scenic spots, the frequency of occurrence (in descending order) is "garden", "Geyuan", "Dongguan", "He Yuan", "ancient canal", "canal" and "ancient town", indicating that tourists pay more attention to the gardens in the Huaiyang Canal region than to the canal itself as a cultural carrier. In addition, the ancient towns along the canal are tourist destinations with relatively high concentrations of tourists. In the high-frequency words of cultural symbols, "history", "scenery", "night scene", "characteristics", "late Qing Dynasty", "first", "architecture", "rockery", "salt merchant", "snack", "explanation" and "tour guide" appear repeatedly. It can be seen that the Huaiyang Canal is most attractive to tourists because of its unique historical heritage and landscape characteristics, among which architecture and rockery are more eye-catching. Salt merchant culture and local snacks also receive a certain degree of attention. For tourist attractions, many tourists

choose to follow the guide's explanation to understand history and culture. Among the high-frequency words in the category of emotional evaluation, the words "good", "worthy" and "special" appear frequently, indicating that in general, tourists have a good travel experience along the Huaiyang Canal.

4.2. Analysis of the semantic complex network of the Huaiyang Canal tourism image perception

ROST CM was used to construct the co-word matrix of the top 50 words on the high-frequency feature word list (**Table 2**), and the generated co-word matrix was imported into Gephi software. The data were visualized and analyzed by building a complex semantic network. Compared with the word frequency table and word cloud map, the semantic complex network can display the logical structure and hierarchical relationship between morphemes by using the topological relationship between nodes.

Table 2. Co-word matrix of high-frequency words in Huaiyang Canal tourism (part).

	扬 (Yangzhou)	**园林 (garden)**	**东关 (Dongguan)**	**历史 (history)**	**景色 (scenery)**	**建筑 (architecture)**	**值得 (worthy)**	**特色 (characteristics)**
扬州 (Yangzhou)	12,510	652	638	470	187	263	177	306
园林 (garden)	652	11,280	168	136	224	407	238	297
东关 (Dongguan)	638	168	4200	343	0	0	0	186
历史 (history)	470	136	343	4432	0	170	0	131
景色 (scenery)	187	224	0	0	1596	0	0	0
建筑 (architecture)	263	407	0	170	0	3284	0	186
值得 (worthy)	177	238	0	0	0	0	830	0
特色 (characteristics)	306	297	186	131	0	186	2496	4998

In this paper, the Fruchterman Reingold mode (force-guided layout algorithm) in Gephi software is selected. This algorithm has better symmetry and local convergence. The closer the node is to the center, the more saturated the color and the larger the font. It is also shown that the higher the degree of connection with other nodes, the more important the node is in the whole complex semantical network. The semantic complex network diagram of the tourism network text presents a "single core-transition-edge" pattern of "garden-history-canal" (**Figure 2**). From the perspective of tourists' image perception, "garden:" has the highest correlation with other nodes and is the core of the complex semantic network. The figure also shows the main position of "garden" in the tourist destination of the Huaiyang Canal area, which also reflects the local characteristics of the Huaiyang Canal area. The "history" node is the second core after "garden", and tourists visit tourist attractions and are attracted by historical heritage. The "canal" node is the more marginal word among high-frequency words, indicating that tourists are concerned about the history and culture of the local canal itself, but it is not the content of highest interest. An interesting point is that on the edge layer, "Suzhou" appears and is associated with a single core, "garden". The content of the standard comments shows that in comments on the Huaiyang Canal, involving the scenic spots of the gardens in the Huaiyang area, tourists often mention

the gardens in Suzhou, and the comments mostly indicate that the two places have their own characteristics.

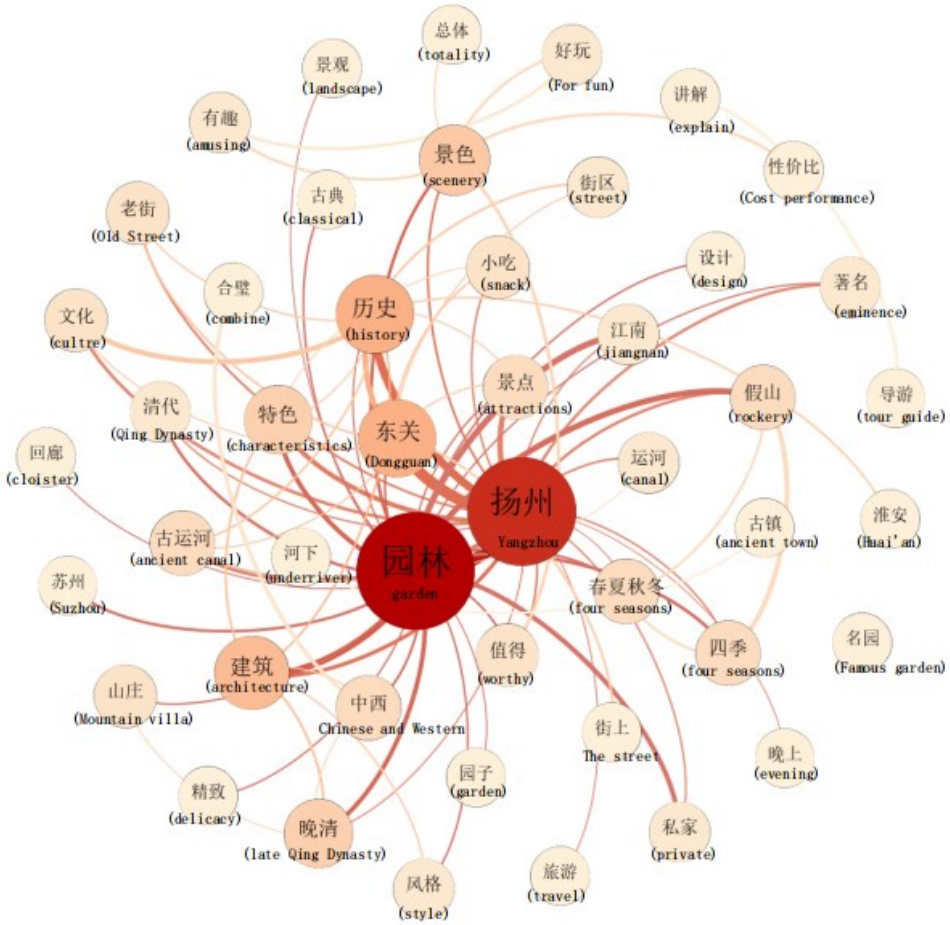

Figure 2. Semantic complex network analysis of Huaiyang Canal tourism network text.

4.3. Co-word clustering and multidimensional scale analysis of high-frequency words

First, cluster analysis and multidimensional scaling analysis need to take a dissimilarity matrix as basic data. Therefore, it is necessary to use the data analysis in Excel to replace the co-word matrix with the correlation matrix (**Table 3**). Due to the large number of 0 values in the matrix, it is easy to have large statistical errors; thus, 1 is subtracted from each value in the correlation matrix to obtain a different matrix (**Table 4**). The number in the difference matrix represents the degree of difference between the two words, and the greater the value is, the greater the difference.

Table 3. Correlation matrix analysis of high-frequency words in Huaiyang Canal tourism (part).

	扬州 (Yangzhou)	园林 (garden)	东关 (Dongguan)	历史 (history)	景色 (scenery)	建筑 (architecture)	值得 (worthy)	特色 (characteristics)
扬州 (Yangzhou)	1.0000	0.0088	0.0273	−0.0379	−0.5480	−0.1334	−0.4816	−0.1527
园林 (garden)	0.0088	1.0000	−0.2458	−0.2080	−0.5096	−0.0292	−0.4484	−0.1834
东关 (Dongguan)	0.0273	−0.2458	1.0000	−0.0581	−1.0000	−0.1890	−0.4907	−0.2387
历史 (history)	−0.0379	−0.2080	−0.0581	1.0000	−1.0000	−0.3015	−0.5308	−0.2553
景色 (scenery)	−0.5480	−0.5096	−1.0000	−1.0000	1.0000	1.0000	1.0000	−1.0000
建筑 (architecture)	−0.1334	−0.0292	−0.1890	−0.3015	1.0000	1.0000	−0.7518	−0.2881
值得 (worthy)	−0.4816	−0.4484	−0.4907	−0.5308	1.0000	−0.7518	1.0000	0.9997
特色 (characteristics)	−0.1527	−0.1834	−0.2387	−0.2553	−1.0000	−0.2881	0.9997	1.0000

Table 4. Analysis of the difference matrix of high-frequency words in Huaiyang Canal Tourism (part).

	扬州 (Yangzhou)	园林 (garden)	东关 (Dongguan)	历史 (history)	景色 (scenery)	建筑 (architecture)	值得 (worthy)	特色 (characteristics)
扬州 (Yangzhou)	0.000	0.991	0.973	1.038	1.548	1.133	1.482	1.153
园林 (garden)	0.991	0.000	1.246	1.208	1.510	1.029	1.448	1.183
东关 (Dongguan)	0.973	1.246	0.000	1.058	2.000	1.189	1.491	1.239
历史 (history)	1.038	1.208	1.058	0.000	2.000	1.302	1.531	1.255
景色 (scenery)	1.548	1.510	2.000	2.000	0.000	0.000	0.000	2.000
建筑 (architecture)	1.133	1.029	1.189	1.302	0.000	0.000	1.752	1.288
值得 (worthy)	1.482	1.448	1.491	1.531	0.000	1.752	0.000	0.000
特色 (characteristics)	1.153	1.183	1.239	1.255	2.000	1.288	0.000	0.000

Furthermore, the dissimilarity matrix shown in **Table 4** was imported into SPSS for systematic clustering analysis. Cluster analysis is a commonly used statistical analysis method in co-word analysis. Based on the basic idea that "birds of a feather flock together", this method gathers keywords with a high co-occurrence frequency into a category, thus simplifying the complex network relationship of the co-word matrix into the relationship between several relatively large categories and expressing the relationship between the research objects in the form of a visual genealogy chart. It is helpful for us to objectively and intuitively analyze the research topic of a certain subject field. The category formed in cluster analysis is the main research topic of a field, and the content and structure of words in this category also represent the content and structure of the corresponding research topic. In this paper, SPSS statistical analysis software is used to perform cluster analysis by using the intergroup link analysis method in systematic clustering, and the tree diagram of the co-word distribution of keywords is obtained (**Figure 3**). Based on the results of the cluster analysis, the tourism evaluation of the Huaiyang Canal can be divided into three categories: the historical and cultural landscape, man-made planning project and tourist attraction perception. In terms of the natural historical landscape, tourists are very interested in garden buildings, rockeries, etc., and they pay more attention to the history of the late Qing Dynasty in the Huaiyang area. In addition, tourists believe that

the scenery here is suitable for all four seasons, and they have high expectations for night tours. In terms of planning projects, tourists prefer to taste local snacks and are willing to buy tickets and follow the tour guide to understand the local culture based on the guide's explanation. In terms of tourists' perception of scenic spots, tourists think that the garden design is exquisite, the Huaiyang Canal has a long history, and the scenic spot facilities bring greater convenience for tourism visits.

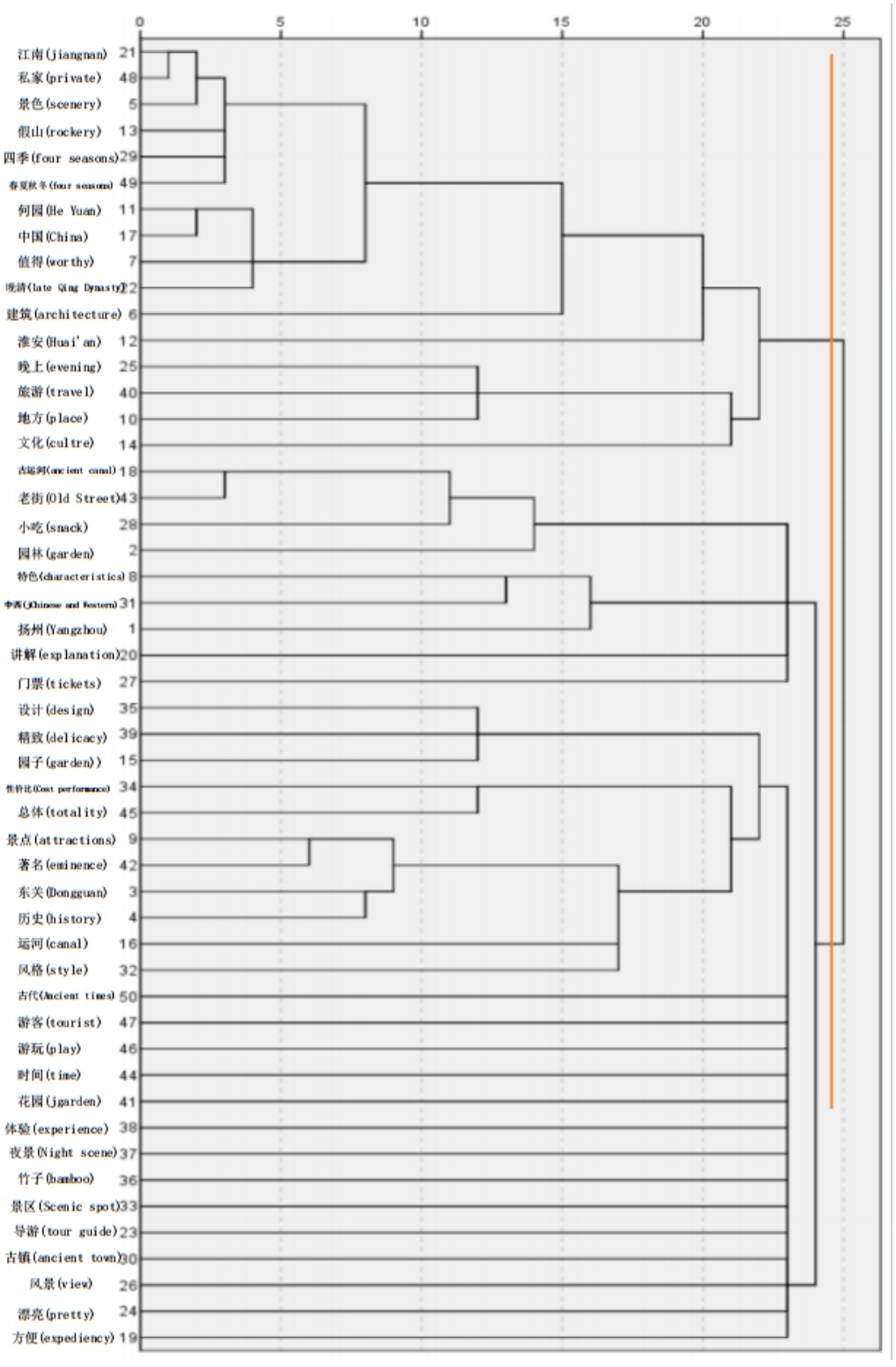

Figure 3. Cluster analysis of high-frequency words in Huaiyang Canal tourism.

Finally, the dissimilarity matrix is used in SPSS to conduct multidimensional scaling analysis. Class analysis can effectively aggregate the keywords with a high co-occurrence frequency into a category so that we can intuitively see which keywords have the closest co-occurrence relationship, but it requires the uniqueness of cluster membership. In fact, in addition to having a relationship with the keywords in the category, each keyword may also have a certain affinity with the words outside the category. For this reason, it is generally necessary to carry out in-depth multidimensional scale analysis to reflect the research topic and its structure more accurately and comprehensively. Multidimensional scaling analysis is the most commonly used and main method of drawing knowledge maps in co-word analysis. In the knowledge graph drawn by this method, the objects to be analyzed are represented by points, the plane distance reflects the similarity between objects, and the objects with a high correlation are gathered together to form a cluster. Therefore, the knowledge graph formed by multidimensional scale analysis can intuitively display the research topic and content structure in a certain field. In this paper, SPSS statistical analysis software and the Euclidean distance model were used to conduct multidimensional scale analysis on the dissimilarity matrix of high-frequency keywords in Huaiyang Canal tourism, and a visual knowledge map of high-frequency words in Huaiyang Canal tourism was obtained (**Figure 4**). The results of multidimensional scale analysis are consistent with those of cluster analysis, which verifies the correctness and reliability of the above cluster analysis results. It is worth noting that in the multidimensional scale analysis results, it can be seen from the keyword distance that “Huai’an” and “Yangzhou” have certain similarities, indicating that the scenic spot experience of the two places is relatively different.

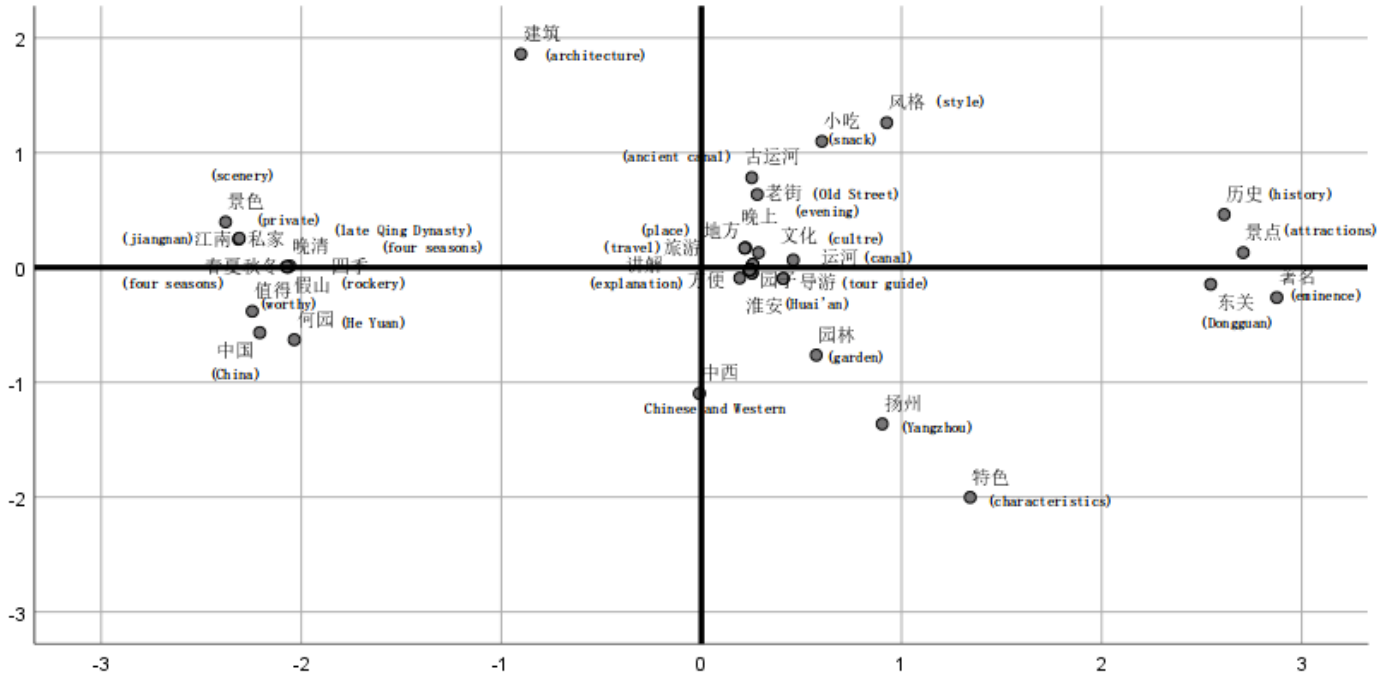

Figure 4. Multidimensional scale analysis of high-frequency words in Huaiyang Canal tourism.

4.4. Emotional perception of Huaiyang Canal tourism

In the Huaiyang Canal tourism image perception, tourists' emotional perception is the key part. The basis of emotional perception is the cognition of the destination image. The emotion analysis function of ROST CM was used to analyze the network text of Huaiyang Canal tourism evaluation (**Table 5**), and the results show that positive emotion accounted for the highest proportion of tourists (61.36%). Negative emotion accounted for a relatively low proportion (9.09%); the proportion of neutral emotion was the lowest (29.55%). It can be seen that tourists have a good evaluation of the tourism image of the Huaiyang Canal, and the emotions generated by tourists after the tourism experience are mainly positive, which is consistent with the conclusion that positive words are mainly found in the analysis results of high-frequency words above. However, the negative emotion in the evaluation of tourists needs to be adjusted in the future, and managers should pay attention to it. Negative morphemes include "cold", "perfunctory night tour", "dark", "nothing to watch", "not knowing when to open" and so on. Comments on the appearance of negative morphemes found that tourists' satisfaction with night scenery is very low, which is due to the neglect of landscape design by the competent authorities, on the one hand, and the lack of travel time arrangements by management personnel, on the other hand.

Table 5. Emotion analysis of Huaiyang Canal tourism network text.

Affective category	Scale (%)	Intensity	Scale (%)
Positive emotion	61.36	Normal	38.64
		Moderate	20.45
		Altitude	2.27
Neutral emotion	29.55		29.55
Negative emotion	9.09	Normal	6.82
		Moderate	2.27
		Altitude	0

5. Countermeasures and suggestions

5.1. Canal tourism image optimization based on quality management

The negative feelings of tourists focus on the staff service and opening hours of the Huaiyang Canal scenic area (Hosany et al., 2006). Therefore, the Huaiyang Canal scenic area needs to urgently improve its quality of service, which can be improved through service level training and in other ways. On the one hand, the business training plan for scenic spot staff should be arranged, and assessment and supervision should be strengthened. On the other hand, through offline and online channels, we can understand tourists' dissatisfaction with the scenic spot and then address the shortcomings of the current service and management of the scenic spot to improve the service level of scenic spot staff, enhance tourists' satisfaction with the scenic spot, and enhance the tourism image of the Huaiyang Canal (Veasna et al., 2013).

5.2. Improving the image of canal tourism based on history and culture

The special natural environment and historical background gave birth to the formation of the Grand Canal cultural heritage. Natural elements and human elements together constitute the core and the most profound background of the canal, which is the basis for constructing a different tourism image of the Huaiyang Canal scenic area. The Huaiyang region was linked by canals and historically prospered due to canals (Xu, 2022). The canal is the most unique tourism resource in the Huaiyang area. The geographical advantages of the canal should be fully utilized, the gardens and ancient town resources along the canal should be connected, and whole area tourism should be vigorously developed to realize a one-stop tourist experience, form the leisure cultural tourism brand of the Huaiyang Canal, and enhance the tourism image and influence of the canal (Huete-Alcocer et al., 2019).

5.3. Image building of canal tourism based on night tour characteristics

Tourists pay great attention to the night tour project on the Huaiyang Canal, but the evaluation of the night tour experience is low. Therefore, the canal night tour has become the largest tourism image of the Huaiyang Canal. We should increase the lighting arrangement along the canal, make efficient use of traditional festivals such as the Shangyuan Festival, and set up canal lighting fairs. A cruise boat with the characteristics of the Huaiyang area should be designed, and professional audio about the history of the Huaiyang Canal should be played on the cruise ship so that tourists can gain a deep understanding of the canal culture during the tour. In addition, the safety factor of the night tour is strictly super-vised to ensure that tourists can enjoy canal tours in a safe environment (Daye, 2010).

6. Conclusions and shortcomings

As scholars before, this paper uses R language, Gephi, ROST CM, SPSS software, text analysis, semantic networks, statistical analysis and sentiment analysis methods to discuss the destination image of the Huaiyang Canal based on the aspects of destination image perception and tourists' emotional perception (Xu et al., 2020; Yang et al., 2022). The conclusions are as follows: (1) The main component of tourists' perception of Huaiyang Canal tourism is Yangzhou, followed by Huaian. The images of gardens, canals and buildings are representative of the landscape. The tourism of the Huaiyang Canal has a strong orientation toward historical and cultural resources. Tourists pay equal attention to the perception of the cultural and social landscape and the perception of the natural landscape. (2) Tourists' perception of the tourism image of the Huaiyang Canal presents a "single core-transition-edge" hierarchical pattern of "garden-history-canal", with the Huaiyang Canal as the main space and history as the temporal driving force for expanding the tourism characteristics of the Huaiyang Canal. (3) Tourists' perception of the Huaiyang Canal tourist destination can be divided into three categories: the historical and cultural landscape, man-made planning project and tourist attraction perception. In addition, although there is a large difference in the number of tourists between Huaian and Yangzhou, there is a small difference in the experience of scenic spots. Tourists' overall image perception is positive, and a comprehensive positive perception accounts for a relatively high proportion. However,

at present, there are still some negative perceptions, which are mainly reflected in the service attitude and the rationality of travel time arrangements. In this paper, only Ctrip and Mahive online travel service websites are selected for the collection of research travel notes, while the collection of comments on other government service websites and foreign travel websites is relatively insufficient. Second, only the text part of online comments is studied, and the picture data and location data in the comments are eliminated. Therefore, the diversity of the research has certain deficiencies. In future research, we should pay attention to multichannel data sources and diversified research methods to enhance the scientificity and persuasiveness of the research conclusions.

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