

# Social Network Analysis on Tourist Perception of Museum Tourism

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## ABSTRACT

Based on the comments of museum tourists, social network-based tourist perception analysis is conducted for tourists in different types of museums. This paper collects the evaluative text information of museum tourists on *dianping.com*, and analyzes these comments of museum tourists by using high frequency words and structural homomorphism to find out the key factors that affect the development of museum tourism. The research shows that tourists have formed certain brand awareness about museums in Shaanxi Province as a whole, showing the cognition and definition around the profound historical and cultural deposits. Combined with the structural homomorphism of high frequency words used by museum tourists, this paper makes a comparative analysis of different types of museums, and finally gives the support for making decisions on the development of museums around the three dimensions of the exhibition contents, the tourist experience and tour modes.

**Keywords:** *tourism management; web text analysis; tourist perception; museum*

effective suggestions to promote the development of museum.

## 1. INTRODUCTION

Museum tourism is a new type of tourism that has gradually emerged in recent decades. It has promoted tourism activities from general sightseeing to high-cultural content of recreational activities [1]. With the increasing demands of people on the contents and forms of material culture, the function and influence of museum in social life are also gradually increasing, and they undertake important tasks such as relic collection, culture carriers, economic income and tourism communication. However, compared with western countries, China's museum tourism started relatively late. At the same time, China's tourism population has a large base, and museum has many resources which are not easy to manage. On the basis of in-depth analysis of the functions of museum, it's a question worthy of further study to explore the real needs of tourists in museum tourism, so as to reduce the misallocation and waste of museum tourism resources as well as enhance the service function of museum.

In recent years, with the widespread use of mobile social networking, real comments on social media have provided new data resources for analyzing tourist needs. This paper uses the evaluative text information of museum tourists collected on social media to analyze the tourist perception in different types of museums. Through the high frequency words analysis and the structural homomorphism of social network analysis, this paper obtains the focus of museum tourists on different types of museums, explores the real needs of tourists and existing problems, and then gives

## 2. LITERATURE REVIEW

The research on museum tourism mainly focuses on the combination of museum and tourism, and the development of museum tourism, museum tourism resources and related products. The research on the behavior characteristics of tourists and the perception of tourist experience started relatively late [2]. After analyzing the tourist experience of folk museum, Zhu Ye put forward the corresponding solutions and suggestions to improve the market competitiveness of local folk museum [3]. Using the method of questionnaire and interview, Liu Jun analyzed the behavior characteristics of tourists in Museum of the Western Han Dynasty Mausoleum of the Emperor of Nanyue in Guangzhou, and dissected the problem that the museum lacked the ability to attract the tourists from other provinces [4]. Shi Ping conducted a sample survey on the tourist market of museums in Shanghai, in order to seek the breakthrough of museum development in the future market [5]. Gao Jie and other two conducted a questionnaire survey on the tourist perception of museum tourism in Shaanxi Province, and analyzed the current operation status and existing problems of museum [6].

In recent years, the online comment data of tourists based on the Internet has exploded, and more studies have used user-generated content such as blogs, social media and online comments of target groups to peep into the complete psychology of their research objects [7]. By using the method of social network analysis and from the perspective

of cross-cultural communication, Song Zhenchun and other two researchers found that the social cognition of Chinese people on outbound tourism is becoming increasingly rational, but it is still influenced by traditional culture and has obvious characteristics of collectivism [8]. By collecting online comments from [www.ctrip.com](http://www.ctrip.com), Sun Xiaodong and another researcher analyzed these comments and explored the perception of image, emotion and satisfaction for cruise tourism of Chinese tourists [9]. Compared with the traditional questionnaire method, the acquisition of web texts is more economical, convenient and timely. To some extent, it can avoid the external factors affecting the tourist perception in the traditional collection channels, and reduce the difficulty of using text data to mine tourists emotional perception [10-11]. To sum up, previous research shows the effectiveness of tourist perception analysis based on web text, which provides an available reference and methods for museum tourists perception analysis based on tourists' messages.

### **3. ANALYSIS OF MUSEUM TOURIST PERCEPTION**

#### **3.1. Text Collection and Pre-processing**

In this paper, the comment texts of museum tourists in Shaanxi Province were collected from [dianping.com](http://dianping.com) and integrated into the data set of this paper. The data set covers all comment texts of various types of museums in Shaanxi Province from 2006 to 2018, totaling 17739. In the data pre-processing stage, according to the definition and scope of museums and the nature of museums, they could be divided into four categories: history, natural science, art and thematic museums. The corresponding comment texts were categorized accordingly. After classification, there are 19 historical museums, 18 thematic museums, 16 art museums, and 3 natural science museums.

#### **3.2. Data Analysis**

##### **3.2.1. Analysis of High Frequency Words**

To find the core information hidden in the comment texts, we use the TF-IDF, an effective text mining method, to weights the importance of the words in the comment texts. TF-IDF is a weighting scheme that assigns each term in a document a weight based on its term frequency (tf) and inverse document frequency (idf). The terms with higher weight scores are considered to be more important [12]. For the word  $t_i$  in the comment text  $D$ , the term frequency  $Tf_i$  of  $t_i$  is denoted as:

$$Tf_i = \frac{n_i}{\sum_k n_k} \quad (1)$$

Where  $n_i$  is the frequency of  $t_i$ , and  $\sum_k n_k$  is the total number of words in  $D$ .

The inverse document frequency of  $t_i$  is denoted as:

$$idf_i = \log \frac{|D|}{|\{d: t_i \in d\}|} \quad (2)$$

Where  $|D|$  is the number of comments in the data set,  $|\{d: t_i \in d\}|$  is the number of comments including word  $t_i$ . Then the  $Tf - idf$  score of  $t_i$  is calculated by multiplying  $Tf_i$  and  $idf_i$ , which is denoted as:

$$Tf_i - idf_i = Tf_i \cdot idf_i \quad (3)$$

The words from the comments with higher scores of  $Tf - idf$  are considered to be more critical.

Next, we summarize the word frequency of the texts classified according to the type of museums to obtain the corresponding high-frequency words and the co-occurrence matrix of these words.

After calculation, the top10 high frequency words in the ranking of centrality are shown in Table 1. Among them, the “museum”, “Shaanxi” and “Xi'an” are shared high frequency words in various categories of museums, indicating that tourists have formed a certain brand awareness of museums in Shaanxi Province. In particular, the high frequency word “history” appears with a higher frequency in the statistics, which shows the special tourists perception brought by museums in Xi'an due to their profound historical background and cultural deposits.

##### **3.2.2. Analysis of Structural Homomorphism**

In order to further understand the role of high frequency words reviewed in various stages and various types of museums in their respective social networks, structural homomorphism was carried out on the classified texts. Here, Archimedean Distance was selected for structural homomorphism analysis. In this analysis, the closer the nodes are in the structural homomorphism, the smaller the distance value is, which means the structures are more similar. In the same social network, people with structural homomorphism play a similar role and can be classified into the same category.

The list of structural homomorphism analysis of high frequency words is shown in Table 2.

According to the analysis of structural homomorphism, perceptions of different types of museums are analyzed differently. Among them, tourist perceptions of history museums and science museums are embodied in three dimensions: exhibition content, tourist experience and tour mode, while that of art museums is embodied in exhibition content and tourist experience, and that of thematic museums is reflected in exhibition content and tour mode. The specific findings of the comparative analysis are as follows:

- 1) The exhibition content is the common concern of tourists of all kinds of museums. With regard to the theme of each museum, there are exhibits with different characteristics.
- 2) The tourists of history museums pay more attention to tour mode, showing the diversity of customer demands, especially paying more attention to the supporting guided tour service, ticket purchase, reservation service and the flow of museums. The tourist experience shows

“deserving”, “shocking” and other contents, which reflects that the tour arouses stronger tourist perception.

- 3) Tours to science museums reflect the contents of “abundant”, “fun” and “happy”, which is consistent with the knowledge, science popularization and interest of the exhibition contents. The transportation convenience, explanation and other supporting services in the tour mode are the main contents that tourists pay attention to.
- 4) Art museums pay more attention to inscriptions, murals and works of famous artists. The tourist experience shows

that tourists to art museums are mainly art hobbyists who come to learn and appreciate.

5) In thematic museums, different types of exhibits will be exhibited according to different themes, and tourists have made up the gaps in coin history, porcelain art and history of other types of museums by visiting thematic museums. The tour mode shows that tourists pay significant attention to explanation service, the design of museums and objective environment.

**Table 1.** List of high frequency words and centrality

<i>History</i>		<i>Art</i>		<i>science</i>		<i>Thematic</i>	
<i>High frequency word</i>	<i>Centrality</i>						
History	1139	Stone Forest	2886	Nature	1139	Museum	1228
Explanation	651	Museum	2115	Children	651	Culture	364
Free	523	Xi'an:	1483	S&T	523	Exhibition	286
Ticket	516	Calligraphy	1481	Museum	516	History	250
Tour guide	383	History	775	Dinosaur	383	Xi'an	232
Deserve	377	Art	708	Animal	377	Shaanxi	144
Queue up	328	Culture	682	Specimen	328	Development	86
Shock	211	Stone carving	491	Fossil	211	Food	82
Qin Emperor	155	Explanation	471	Insect	155	Display	80
Culture	117	China	438	Visit	117	Explanation	78

**Table 2.** Structural homomorphism of high frequency words

<b>Museum</b>	<b>Dimension</b>	<b>High frequency words</b>
History	Exhibition content	Treasure Museum, Cultural relics, Exhibit, Mural, Museum, Tang Dynasty, Terra-Cotta Warriors.
	Tourist experience	Cost, Spend money, Cast only a passing, Glance at, Deserve, Shock.
	Tour mode	Tour guide, ID card, In advance, Reservation, Online, Queue up, Crowded.
Science	Exhibition content	Technology, Children, Experience, Knowledge, Popularization of science, Science, Education, Weekend Experience.
	Tourist experience	Deserve, Abundant, Suitable, Fun, Happy.
	Tour mode	Subway, Service, Explanation, Free, Convenience.
Art	Exhibition content	Exhibit, Zhaoling, Tablet inscription, Inscription, Confucius temple, Yan Zhenqing, Wang Xizhi, Mural, Epigraph.
	Tourist experience	Hobbyist, Incomprehension, Learning, Appreciation, Research, Deserve.
Thematic	Exhibition content	Collection, Coin, Porcelain, Art, Cultural relics, China, Ancient times, Tradition, Feature.
	Tourist experience	Local, Environment, Space, Service, Design, Explanation.

In terms of the tour service experience, explanation service, visiting environment and transportation environment of the museum are the key contents that tourists pay attention to. In terms of cost and the convenience of ticket purchase, most history museums in Shaanxi Province can enjoy a free visit, online booking and ticket purchases, thus greatly reducing the cost and time of tourists, bringing good experience to tourists and attracting a large number of people. However, due to the nature and cost limitation of thematic, science and art museums, it is difficult to realize the free visit. Therefore, it is more appropriate to improve the satisfaction of tourists from cultural transmission and supporting services of knowledge explanation. Science museums and art museums can focus on the particularity of tourist groups, and then design the corresponding exhibition contents and special services to attract

#### 4. SUGGESTIONS

According to the data analysis results, museums can be constructed from the following aspects, so as to improve the quality of museum tourist perception, attract tourists and promote the development of museum tourism.

First of all, the exhibition content is the essential core of the existence of the museum and a key factor to attract tourists. The museum should have a clear positioning, improve the identification, vigorously develop the construction of the content, carefully arrange the exhibition form, highlight the characteristics and novelty, and give knowledge guidance and pleasure to tourists from the content.

tourists. For example, science museums play an important role in education, which can bring children the experience of combining textbooks knowledge with reality and stimulate their enthusiasm to explore nature and understand science. Art museums are aimed to special groups of art hobbyists, while it can be built as a platform for communication and learning in the field of art, widening and enriching people's spare time life and spiritual pursuit.

## 5. SUMMARY

This paper collects the web evaluative texts, and then studies the tourist perception of museum through the analysis of high frequency words in these texts and the analysis of the network structural homomorphism. However, there are still deficiencies and defects in the study, which need further research. Firstly, in terms of data processing, the data only comes from the website dianping.com, and it needs to further verify whether the scope of data collection is reasonable, and at the same time, more efficient means should be adopted to filter false or useless comments. In terms of analysis, the results of structural homomorphism are sorted out manually according to the tree diagram output by the software, so there are some errors. In spite of the above shortcomings, the results of this study can still reflect the phenomena and problems in reality, put forward policy suggestions for the development of museum tourism, and provide new ideas for the follow-up study on tourist behaviour and perception.

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