

Innovative Research on the Dissemination of Intangible Cultural Heritage and Tourism Development in Shaanxi Province Driven by Data

Xingru Liu, Lingling Cui, Ziqi Wang, Yueyi Wang, Meijuan Shan

Xi'an Eurasia University, Xi'an, Shaanxi, 710065, China

Abstract: With the strengthening of the state's protection policies for intangible cultural heritage, the importance of intangible cultural heritage has become increasingly prominent. However, the attention paid to intangible cultural heritage in the field of tourism remains relatively low. Based on the data of intangible cultural heritage in Shaanxi Province, this paper analyzes the current situation and potential value of intangible cultural heritage through the application of visualization techniques, K-means clustering, and the Apriori algorithm. For this purpose, the concept of the Qingxing Travel APP is proposed to meet people's tourism needs in a brand-new way of traveling, while achieving the effect of promoting tourism with culture and promoting culture with tourism.

Keywords: Intangible Cultural Heritage; Qingxing Travel APP; K-means Clustering; Apriori Algorithm.

1. Introduction

1.1. Project Background

With the acceleration of the urbanization process, the cultures in some intangible cultural heritage areas have gradually shrunk, and rescuing intangible cultural heritage has become an urgent task. Culture is the core of tourism resources. China boasts abundant intangible cultural heritage resources, with 1,372 national-level projects, establishing a solid foundation for the development of intangible cultural heritage tourism. President Xi Jinping has emphasized the need to protect intangible cultural heritage systematically, meet the people's spiritual and cultural needs, and promote Chinese culture to the world. Therefore, this paper proposes the development of the Qingxing Travel APP.

1.2. Current Situation Analysis

From the political aspect, Since August 2013, President Xi Jinping has emphasized on 14 occasions the need to

strengthen the protection and inheritance of cultural heritage. In September 2023, the Ministry of Culture and Tourism officially issued the "Notice on Promoting the In-depth Integrated Development of Intangible Cultural Heritage and Tourism", which is conducive to promoting the integration of intangible cultural heritage and tourism in a wider range, at a deeper level, and at a higher level. From the economic aspect, tourism income is increased through innovative models such as "intangible cultural heritage + homestay"; from the social aspect, cultural inheritance and social cohesion are promoted; from the technical aspect, Immersive experiences are provided by using technologies such as VR, such as the Yantai Paper-cutting and the Shaanxi Terracotta Army Digital Museum, attracting more people to understand and inherit intangible cultural heritage.

2. Qingxing Travel APP Introduction

2.1. Product Framework

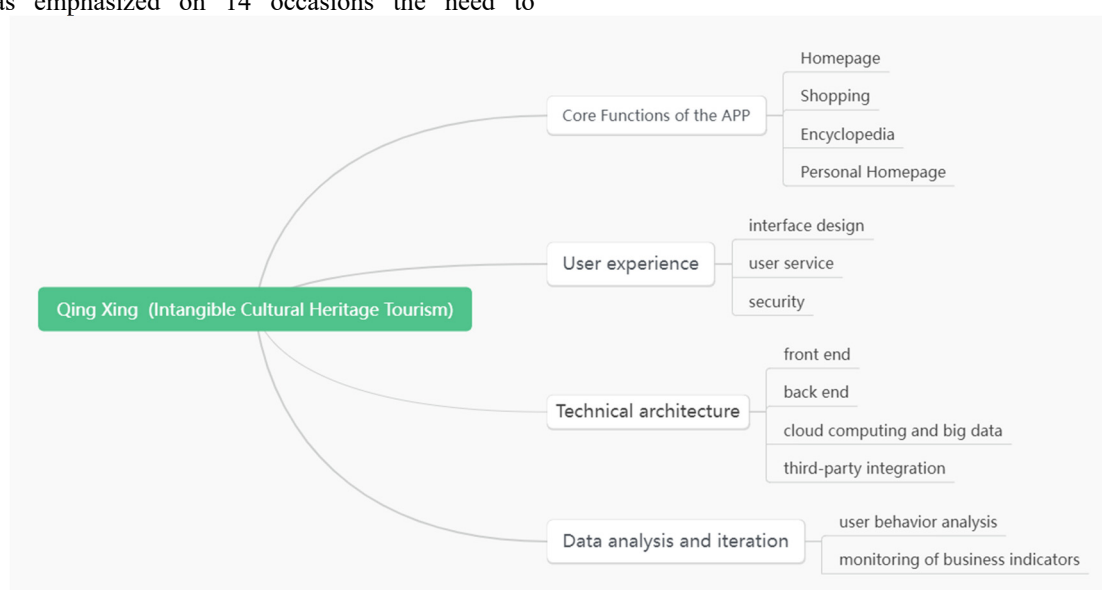


Figure 1. Product framework

2.2. The Use of Mobile App



Figure 2. APP icon diagram



Figure 3. APP entry page

The Qingxing Travel APP has changed the traditional travel planning mode by mining intangible cultural heritage and effectively connecting it with the tourism industry, allowing tourists to experience the charm of intangible cultural heritage. After registering and logging in, the homepage carousel will recommend relevant intangible cultural heritage pictures based on the user's location or selected city. Users can click to learn more about the content they are interested in. If the user decides to travel, the APP can generate a detailed intangible cultural tour plan based on budget, number of people, food preferences, etc. Users can manually adjust and export the plan to their mobile phones if they are not satisfied. During the intangible cultural tour, users can participate in the check-in activity based on the local tourist features and win the corresponding cultural and creative products. When a user travels alone and feels lonely, they can also view and access friends on the homepage's social option or post their travel needs and choose friends with the same destination or interests to travel with.

In the shopping section, users can click or search for related intangible cultural products to purchase, or customize the material, pattern size, etc. to become their own personalized products. In the encyclopedia interface, users can search for the intangible cultural knowledge they are interested in or browse the knowledge they want to know. In the "My" interface, users can view their online time, lit footprints, and personal check-in photos. Users can improve their authenticity and credibility by registering information and usage time, ensuring the orderly conduct of group activities, and the system's back-end will conduct user safety checks and information protection.

3. Intangible Cultural Heritage Tourism

3.1. Visual Presentation and Analysis of Intangible Cultural Heritage Data in Shaanxi Province

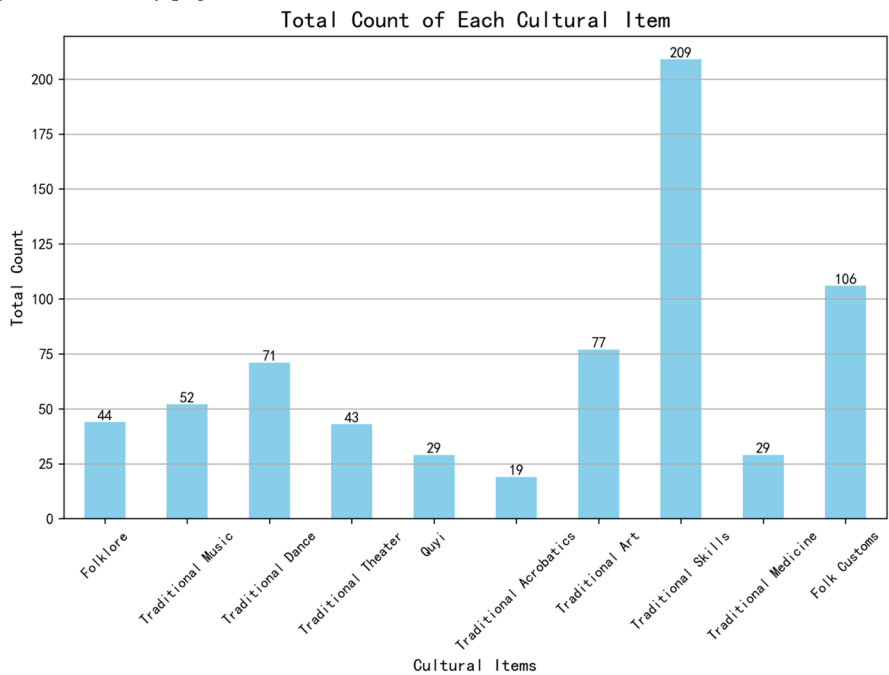


Figure 4. Histogram of the total number of traditional cultural programmes

Intangible cultural heritage, including folklore and traditional arts, has important cultural value and social significance. As one of the important birthplaces of Chinese civilisation, Shaanxi Province has a rich and colourful intangible cultural heritage. According to the Shaanxi Intangible Cultural Heritage Protection Centre, Shaanxi Province currently has 679 items of intangible cultural heritage, and there are 581 intangible heritage bearers dedicated to the inheritance and protection of these precious cultural heritages. The following figure shows a bar chart of the total number of traditional cultural items in Shaanxi Province.

As can be seen from Figure 4, ICH is divided into 10 categories: folklore, traditional music, traditional dance, traditional theatre, performing arts, traditional sports, performing arts and acrobatics, traditional fine arts, traditional arts and crafts, traditional medicine and folklore. The number of 'traditional arts' is the highest, with 190 items, while the number of 'performing arts' is the lowest, with 18 items. Most of the intangible cultural heritage projects are clustered between 40 and 80, while those over 100 include traditional arts and folklore, and those below 20 include musical theatre.

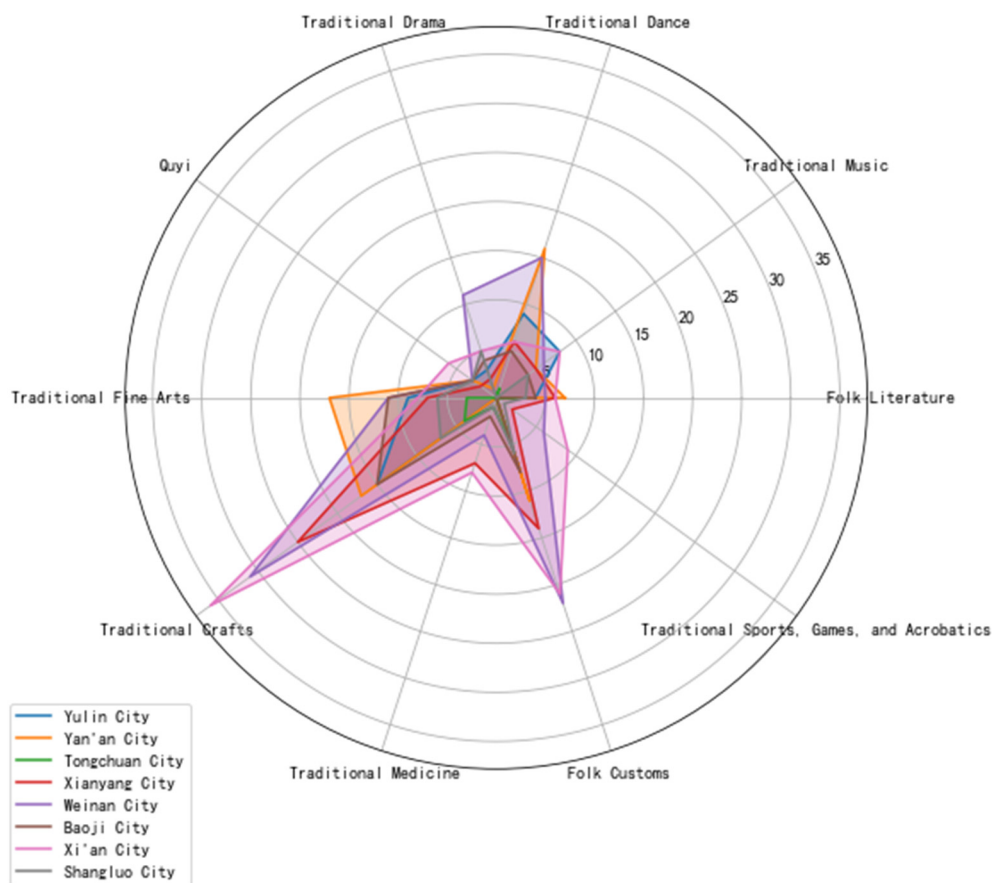


Figure 5. Radar Chart of Intangible Cultural Heritage Distribution by Categories in Different Regions

Analysis of Traditional Crafts Intangible Cultural Heritage in Cities of Shaanxi Province. Traditional craftsmanship-related intangible cultural heritage accounts for a high proportion across various cities in Shaanxi Province. In Yulin City, the proportion of traditional crafts is the highest, indicating a deep-rooted background in manual skills and traditional arts. Yan'an City has a high proportion of both traditional music and traditional crafts, showcasing strong traditions in music culture and manual arts. The non-heritage projects in Tongchuan, Ankang, and Hanzhong cities are evenly distributed, indicating comprehensive protection and development of intangible cultural heritage in these areas. In non-heritage protection and transmission, it is advisable to further strengthen the heritage work of traditional craftsmanship intangible cultural heritage to showcase the unique charm of each city's non-heritage.

3.2. Research on Intangible Cultural Heritage Based on K-means Clustering and Apriori Algorithm

3.2.1. K-means clustering algorithm result analysis

K-means clustering is a commonly used clustering algorithm based on the division method, and its core idea is to divide the data set into clusters, each cluster contains a center point, which is the average position calculated by the distance of the data points in the cluster. The k-means algorithm uses the contour coefficient method for the selection of k-values to find the maximum value of the mean contour coefficient of all the sample points in the data set under the k-categorization, and the corresponding k-value is the optimal number of clusters.

Figure 6 shows the clustering of different types of traditional cultural items and their corresponding view count data. The different types of traditional cultural items are better clustered into 2 different clusters, which shows that the K-means clustering algorithm has a better effect on this dataset.

The number of objects in Cluster 0 is 22 and the number of objects in Cluster 1 is 98, which indicates that most of the traditional cultural items have similar characteristics in terms

of the number of views, while a few items have different characteristics.



Figure 6. K-means clustering results

The weighting calculation shows that traditional skills account for the largest proportion, 0.42%, and most of the views are distributed between 2000-6000, indicating that traditional skills have attracted the attention of a certain number of viewers or users. It is possible to further increase its popularity and attractiveness through effective promotion or marketing strategies, and traditional skills have the potential to attract more viewers and users, thus realizing greater market value.

3.2.2. Heritage Research based on Apriori Algorithm

The Apriori algorithm is a classic algorithm used for association rule mining. It is designed to discover frequent itemsets within large datasets, which can then be used to generate association rules. Through the analysis of support, confidence, lift, and frequent itemsets, the algorithm derives association rules.

Table 1. Association Rules

Antecedents	Consequents	Support	Confidence	Lift
Page View Range 1000-5000	Category Traditional Drama	0.166667	0.217391	1.003344
Category Traditional Drama	Page View Range 1000-5000	0.166667	0.769231	1.003344
Category Traditional Crafts	Page View Range 5000-10000	0.125000	0.294118	1.357466
Page View Range 5000-10000	Category Traditional Crafts	0.125000	0.576923	1.357466

From the analysis, it can be seen that: Rule 1: Among samples with page views in the range of 1000-5000, 21.7% belong to the category of traditional drama, indicating a high level of attention for traditional drama within this range. Rule 2: Among samples of the traditional drama category, 76.9% have page views within the 1000-5000 range, indicating a high level of attention for the traditional drama category within this range. Rule 3: Among samples of the traditional crafts category, 29.4% have page views within the 5000-10000 range, with a lift of 1.292308, indicating a high level of attention for the traditional crafts category within this range. Rule 4: When the page view range is 5000-10000, there is a 57.7% probability that it belongs to the traditional crafts category. The lift for this rule is 1.357466, indicating a high probability of the traditional crafts category appearing within the 5000-10000 page view range.

Through the analysis using the K-means clustering algorithm and the Apriori algorithm, it is found that the page views for the traditional drama category are mainly concentrated in the 1000-5000 range, while those for the traditional crafts category are mainly concentrated in the 5000-10000 range. Additionally, these categories have a high level of attention within their respective page view ranges.

4. Project Promotion

This article will fully utilize the personalized customization function of the Qingxing Travel APP to create a series of high-quality tourism routes themed around traditional Shaanxi opera and craftsmanship for users. Through the interactive map and detailed guides within the APP, users can gain a deeper understanding of the front and backstage of traditional

opera and craftsmanship such as Qinqiang, Wanwanqing, shadow puppetry, paper cutting, and clay sculpture, as well as the exquisite craftsmanship behind these intangible cultural heritage projects. In addition, the APP will launch a "non-heritage treasure hunt" activity to encourage users to find and check in at non-heritage landmarks in various parts of Shaanxi during their travels, and to stimulate their interest and desire to explore non-heritage culture by exchanging tickets for cultural and creative products. Through these promotion methods, this article aims to promote traditional Shaanxi opera and craftsmanship and other intangible cultural heritage projects to a wider audience, and to promote the development of other intangible cultural heritage project categories, thereby promoting the inheritance and innovation of Shaanxi intangible cultural heritage.

5. Summary

This paper analyzes the data of intangible cultural heritage in Shaanxi Province, utilizing visualization techniques, K-means clustering, and the Apriori algorithm, and finds that traditional Shaanxi dramas and crafts have high attention and appeal within the realm of intangible cultural heritage. Based on this, the paper innovatively proposes a conceptual framework for the Qingxing Travel APP, aiming to enhance tourists' cultural experiences and strengthen the dissemination

and influence of intangible cultural heritage through digital means. The APP offers services such as tourism navigation and information inquiry, presenting rich intangible cultural heritage in an intuitive manner, achieving a win-win situation for culture and tourism, and promoting the protection and innovation of intangible cultural heritage. This concept holds significant theoretical and practical value.

Acknowledgments

Conventional Project of Shaanxi Provincial Sports Bureau 20240209.

References

- [1] Qi Yukun. Intangible in the new era to glow the new vitality [N]. People's Daily, 2024-10-31 (011). DOI: 10.28655 / n.c. Nki NRM RB. 2024.012425.
- [2] Niu Jiaxin. Inheriting intangible cultural heritage skills to light up a better life [N]. China Tourism News, 2024-11-05(002).
- [3] WANG Sen, Liu Chen, XING Shuaijie. K means clustering algorithm study review [J]. Journal of east China jiaotong university, 2022, 33 (5): 6, 119-126. The DOI: 10.16749 / j. carol carroll nki jecjtu. 20220914.001.
- [4] Lu Lina, Chen Yaping, WEI Hengyi, et al. Research on Apriori algorithm in Mining association rules [J]. Small Microcomputer Systems, 2000, (09):940-943.