

Enhancing Personalized Services in Tianfu Cultural Tourism: Pathways and Strategies Based on User Profiling

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Abstract: Against the backdrop of a burgeoning global cultural tourism industry, Tianfu cultural tourism has emerged as a vital driver of economic growth in Sichuan, owing to its unique natural and cultural resources. To address the growing demand for personalized experiences among tourists, this study explores the application of user profiling technologies to enhance the delivery of personalized services in Tianfu cultural tourism. Leveraging big data and artificial intelligence, the study proposes a service optimization framework centered on data collection, profile analysis, and precise content delivery. By examining domestic and international case studies, the research underscores the importance of policy support, industry collaboration, and service innovation. Personalized services significantly enhance tourist experiences and loyalty, fostering the digital transformation and sustainable development of the cultural tourism industry.

Keywords: Tianfu Cultural Tourism; User Profiling; Personalized Services; Big Data Technologies

1. Introduction

In the context of globalization, cultural tourism has become a pivotal force driving regional economic development, particularly in resource-rich countries like China. Tianfu cultural tourism, a treasure trove of Sichuan's historical heritage, is currently experiencing a golden era of rapid development, propelled by its profound cultural legacy and unique geographical advantages. However, as living standards rise and tourism demands diversify, traditional models of cultural tourism services

struggle to meet the evolving expectations for personalized experiences. Additionally, the insufficient level of digitalization within the cultural tourism sector hinders precise marketing and poses challenges in identifying and addressing tourists' needs. Consequently, innovating service delivery and enhancing tourist experiences have become core imperatives for the industry's growth.

The concept of personalized services has emerged as a solution, offering tailored experiences based on tourists' unique characteristics, preferences, and needs, thereby significantly improving satisfaction and loyalty. User profiling, as a foundational technology for personalized services, uses behavioral data, preferences, and historical records to construct detailed depictions of tourist demands, providing critical data support for tailored service delivery. This study aims to explore the application of personalized services based on user profiling in Tianfu cultural tourism, promoting a transition from traditional sightseeing to in-depth cultural experiences, while offering theoretical and practical guidance for the industry's development.

The research focuses on identifying pathways and strategies for enhancing personalized services in Tianfu cultural tourism through user profiling. Specifically, it addresses the following objectives: Investigate the current state and challenges of personalized services in Tianfu cultural tourism, analyzing existing service models and their inadequacies in meeting personalized needs. Explore how big data technologies and social media analytics can be employed to construct user profiles and design personalized services. Examine how user profile analysis and technological innovation can elevate the quality of personalized services in Tianfu cultural

tourism.

This study aspires to provide actionable strategies for improving personalized services in Tianfu cultural tourism and to offer theoretical and practical references for the sustainable development of the cultural tourism sector.

2. Theoretical Foundations and Related Research Review

2.1 Theoretical Framework of User Profiling

User profiling is a virtual persona model constructed through the analysis of multidimensional data related to users' behaviors, needs, and interests [1]. This model extracts user characteristics, capturing individual preferences and behaviors. User profiles encompass not only basic demographic information such as age, gender, and occupation but also delve into behavioral traits and interests to accurately identify user needs and behavioral patterns. The methodology for constructing user profiles generally follows these steps: Gather user behavior data from various platforms, including social media activity, purchase records, and online search habits. Perform data cleaning, deduplication, and formatting to ensure accuracy and consistency. Utilize data analysis and machine learning algorithms to extract features such as interests, purchasing preferences, and sentiment tendencies. Common techniques include clustering analysis and association rule mining. Develop a multidimensional user profile model that includes demographic, behavioral, and psychological traits. Apply user profiles in scenarios such as recommendation systems, targeted advertising, and customized services, with dynamic updates based on user behavior changes.

2.2 Theories on Personalized Services

Personalized service refers to the provision of tailored products or services based on the unique needs, interests, and preferences of customers [2]. With advancements in big data and artificial intelligence, personalized services have evolved from manual customization to intelligent and automated solutions. Initially emerging in the retail sector, personalized services relied on purchase

histories and preferences to recommend products and enhance the shopping experience. Technological progress has extended personalized services across industries, enabling deeply customized solutions through data analysis and intelligent recommendations. The implementation of personalized services involves several pathways: Analyzing users' historical behavioral data, interests, and preferences to recommend relevant products or services. Identifying similarities among users and recommending products or services based on shared interests or behavioral patterns. Combining content-based recommendations and collaborative filtering models to improve accuracy and user experience. In the field of cultural tourism, personalized services involve precise user profile analysis, customized cultural tourism products, intelligent recommendations, and guided experiences to enhance tourists' overall satisfaction.

2.3 Research Review on Tianfu Cultural Tourism

Research on Tianfu cultural tourism, both domestic and international, primarily focuses on resource development, cultural heritage preservation, and the sustainable development of the tourism industry [3]. Scholars emphasize the richness of Tianfu cultural tourism resources and their significant role in local economic development. However, challenges remain in delivering personalized services, particularly in leveraging modern technologies to enhance tourist experiences and meet individual needs. Fan et al. [4] explored the application of digital technologies and big data analytics in enhancing personalized services for Tianfu cultural tourism. They highlighted the importance of utilizing user profiling technologies and intelligent recommendation systems to deliver customized tourism services based on personal interests. Gan et al. [5] emphasized that improving tourist experiences and satisfaction depends not only on precise service delivery but also on optimizing service environments and streamlining tourism processes.

While existing research has examined the application of personalized services and user profiling in Tianfu cultural tourism, practical implementation, particularly in enhancing overall tourist experiences and satisfaction, requires further exploration. Integrating

modern technological tools and user behavior analysis can offer new directions for advancing personalized services in Tianfu cultural tourism, paving the way for future developments in the cultural tourism sector.

3. Analysis of the Current State of Tianfu Cultural Tourism

3.1 Resources and Characteristics of Tianfu Cultural Tourism

Rooted in Sichuan Province, the Land of Abundance, Tianfu cultural tourism integrates natural landscapes with historical and cultural elements, evolving into a comprehensive industry encompassing culture, tourism, leisure, and experiential activities. Sichuan attracts numerous tourists with its profound historical and cultural heritage, unique folk traditions, and abundant natural resources.

The resources of Tianfu cultural tourism encompass diverse natural and cultural assets. The region is renowned for its varied natural landscapes, including UNESCO World Heritage Sites such as Mount Emei, Mount Qingcheng, and the Dujiangyan Irrigation System [6]. These iconic landmarks not only showcase the natural beauty of Sichuan but also embody rich cultural significance. Tianfu culture blends traditional historical relics, folk customs, and modern cultural activities. As a "cultural powerhouse," Sichuan is home to intangible cultural heritage such as Sichuan opera face-changing, Sichuan cuisine, and tea culture. Chengdu, the heart of Tianfu culture, is not only recognized as a "City of Creativity" but also hosts numerous modern art galleries, cultural museums, and historical sites, reflecting the fusion of traditional and contemporary culture.

The Tianfu cultural tourism market is evolving toward greater diversity and sophistication. With rising living standards, tourism demand has shifted from sightseeing to immersive cultural experiences, attracting a growing number of tourists interested in culture and history. Sichuan appeals not only to domestic travelers but also to international visitors from Japan, South Korea, Southeast Asia, and beyond. The diversification of the tourist demographic necessitates more targeted and personalized tourism products and services.

3.2 Implementation of Personalized Services

Tianfu cultural tourism has made initial progress in the implementation of personalized services. Some tourism platforms and attractions leverage big data analytics and intelligent recommendation technologies to offer customized travel itineraries based on tourists' interests and historical behaviors. For example, Chengdu tourism platforms analyze browsing histories, search preferences, and social media interactions to recommend personalized cultural attractions or activities. High-end travel companies and agencies have introduced bespoke tourism products themed around Tianfu culture, catering to individual preferences such as visits to cultural heritage sites or participation in folk festivals. Attractions and cultural institutions organize cultural-themed activities, such as Buddhist and Taoist cultural experiences, which enhance tourists' cultural identity through immersive experiences.

However, there remain deficiencies in the promotion and application of personalized services. User profiles lack precision, personalized service recommendations are insufficiently accurate, and the level of personalized service among small-to-medium-sized tourism companies and local attractions remains low.

3.3 Challenges and Issues

The implementation of personalized services in Tianfu cultural tourism faces several challenges and issues. **Difficulties in Big Data Collection and Analysis.** Tourist behavior data is fragmented, posing challenges for data collection and integration. **Some attractions and tourism enterprises lack the technical capacity for data collection and processing.** **Low-Level User Profiling.** There is insufficient systematic understanding of tourists' interests, needs, and behaviors, leading to mismatches between personalized service recommendations and actual tourist demands. **Inadequate Professional Skills and Technical Support.** Employees in tourism enterprises and attractions often lack awareness and professional skills for delivering personalized services. **Additionally, the digital infrastructure in local attractions is underdeveloped.** **Insufficient Policy Implementation and Funding:** Policies related to Tianfu cultural tourism have not been fully implemented, and inadequate funding affects technological

development, market promotion, and service improvement.

Intensifying Domestic and International Competition. Tianfu cultural tourism faces challenges in maintaining its market share, requiring enhanced personalized services to improve tourist loyalty and market competitiveness. While progress has been made in promoting personalized services in Tianfu cultural tourism, further efforts are needed to strengthen technological innovation, enhance the professional skills of service personnel, and provide greater policy and financial support to facilitate the high-quality development of the industry.

4. Personalized Service Enhancement Pathways Based on User Profiling

4.1 Construction and Analysis of User Profiles

In the context of Tianfu cultural tourism, enhancing personalized services hinges on the precise construction and analysis of user profiles. User profiling, as a virtual model capturing tourists' interests, needs, behavior patterns, and personality traits, forms the cornerstone of personalized service delivery [7].

The process begins with data collection and integration. This involves gathering tourist data from multiple channels, including tourism websites, social media platforms, and mobile applications, to obtain browsing histories, search behaviors, reviews, and purchase records. Social media activities, such as posts, comments, likes, and shares, along with behavior tracking data within tourist attractions—such as location data, dwell time, and visitation routes—are critical sources for analyzing tourists' interests and behaviors.

User profile construction encompasses multiple dimensions, including demographic characteristics, interests, consumption habits, behavioral preferences, and social interactions. For example: Historical behavior data helps identify preferences for cultural art, historical sites, or natural attractions. Purchase records can predict budget ranges and preferred service types. Browsing histories and interactions reveal decision-making paths and selection preferences. Once constructed, user profiles are analyzed and applied to service delivery. Tourists can be categorized into distinct groups,

such as families, young travelers, high-end tourists, and culture enthusiasts, each with unique needs and preferences. Based on user profile data, recommendation algorithms, including collaborative filtering, content-based recommendations, and deep learning can provide customized travel itineraries, attraction recommendations, and activity arrangements.

Real-time updates to user profiles enable the continuous optimization of tourism services. By collecting feedback data such as online reviews and satisfaction surveys, personalized services can be adjusted to further enhance the tourist experience. Behavioral tracking for different tourist groups supports ongoing service innovation.

4.2 Design of Personalized Service Enhancement Pathways

Enhancing personalized services in Tianfu cultural tourism is a systematic process involving precise data collection and analysis, iterative user profile optimization, and innovative service delivery technologies.

Data Collection and Integration: This foundational step involves collecting tourist data from diverse sources, such as behavioral data from tourism platforms, social media interactions, and location and access data from mobile applications. These sources provide comprehensive insights into tourists' basic information, browsing histories, purchase records, and social behaviors. Integration of data from various platforms and channels enables a holistic view of tourist profiles. High-frequency, real-time data collection and updates are essential to ensure that user profiles reflect tourists' latest needs and interests. This process relies on big data analysis platforms and intelligent data processing technologies for efficient handling and storage of large-scale data while ensuring timely updates.

User Profile Analysis: This core step leverages collected data to identify diverse tourist needs, segment tourist groups, and design tailored service offerings for each group. Analysis spans demographic characteristics, interests, needs, social behaviors, and feedback. For instance, demographic data such as age, gender, profession, and spending power can provide preliminary insights into tourists' preferences and purchasing potential. Behavioral data from tourism platforms, including search records

and consumption habits, offer deeper understanding of interests and needs. Social media interactions and online reviews further refine the analysis of tourists' preferences, enabling accurate predictions of demand types (e.g., cultural experiences, leisure activities, or natural attractions) and the delivery of customized tourism products and services.

Precision Marketing: Targeted information delivery and product recommendations form a critical part of the personalized service enhancement pathway. Based on deep user profile analysis, tourism enterprises can push tailored content and offerings to tourists. For example, personalized advertisements can be delivered through digital platforms, customized travel packages can be designed, and special offers and rewards can be provided to specific tourist groups, enhancing loyalty and engagement.

Intelligent Recommendations and Automated Services: These technologies are central to personalized service delivery. Using user profile data, tourism enterprises can employ recommendation algorithms to offer tailored content and service suggestions. Intelligent recommendation systems dynamically adjust strategies based on real-time data updates, ensuring alignment with tourists' evolving needs. Automated service systems, such as intelligent voice assistants and robotic guides, provide precise assistance during travel, boosting satisfaction and overall service quality.

4.3 Technological Support and Innovative Applications

In modern tourism, advancements in artificial intelligence (AI), big data, and cloud computing have become key drivers of personalized service enhancements [8]. These technologies play critical roles in user profile construction and service optimization, offering immense potential for delivering tailored experiences.

Big Data Technologies: These provide the foundational data infrastructure for user profiling. By collecting and analyzing vast datasets from multiple channels, tourism enterprises can gain comprehensive insights into tourists, including basic information (e.g., age, gender, and spending capacity) and dynamic data on behaviors, interests, and social activities. For instance, analyzing search

histories, review records, and mobility patterns can reveal travel intentions and cultural preferences, enabling the creation of richer, more precise user profiles.

Artificial Intelligence: AI applications in personalized services are expanding rapidly. Machine learning and natural language processing enable AI systems to learn from tourist behavior data and optimize service recommendations. Deep learning algorithms can predict future needs based on past behaviors, generating customized travel itinerary suggestions. AI-powered intelligent recommendation systems integrate user profiles and real-time data for dynamic content suggestions, enhancing user engagement and platform loyalty.

Cloud Computing: This technology provides the computational and storage capabilities necessary for implementing personalized services. In the tourism industry, cloud computing centralizes disparate data sources, enabling real-time computation and analysis through cloud platforms. This supports rapid construction and updates of user profiles, ensuring seamless delivery of personalized services across devices and platforms. Cloud-based systems analyze tourist behavior data in real-time, offering tailored travel advice and services through mobile devices or websites.

The integration of AI, big data, and cloud computing creates intelligent service systems that enable automated personalized service delivery. By continuously learning and optimizing based on user profiles, tourism platforms dynamically adjust service content to align with tourists' changing needs. This flexible delivery model improves tourist satisfaction while enhancing service precision and effectiveness. Leveraging these technologies, Tianfu cultural tourism can provide more accurate, intelligent, and convenient personalized services, enriching the overall tourist experience and driving high-quality development of the cultural tourism industry.

5. Key Strategies for Enhancing Personalized Services in Tianfu Cultural Tourism

In the process of enhancing personalized services in Tianfu cultural tourism, the government plays a pivotal role in guidance and support. Policy backing not only provides

the industry with a stable development environment but also effectively facilitates the implementation and promotion of personalized services. The government can incentivize investment in personalized services by tourism enterprises and cultural institutions through financial support and tax incentives. By establishing dedicated funds or reward mechanisms, the government can encourage the adoption of advanced technologies such as big data and artificial intelligence to improve service intelligence and personalization. Additionally, the government should actively formulate industry standards, specifying evaluation criteria and service processes for personalized services, offering enterprises standardized guidance. These standards not only help elevate the overall service level of the industry but also enhance tourists' trust in personalized services, promoting a healthy and orderly market development.

The government should also emphasize policy innovation, particularly in fostering cross-regional collaboration and building public service platforms. Through policy guidance, it can promote the sharing of cultural tourism resources across regions and establish information-sharing platforms that provide tourists with personalized cross-regional travel experiences. Policy support should also include building a socialized service system that fosters collaboration between the government and the industry, driving deep integration among tourism, culture, and technology sectors. This integration facilitates efficient resource allocation and utilization, providing sustained momentum for innovation in personalized services.

At the industry level, collaboration among tourism enterprises, cultural institutions, and technology companies is a critical factor for enhancing personalized services in Tianfu cultural tourism. First, tourism enterprises should work closely with cultural institutions to deeply explore the unique charm and local characteristics of Tianfu culture. By aligning with tourists' interests and needs, they can develop culturally distinctive personalized tourism products. For example, collaborative efforts can create themed tourism routes and customized cultural experiences, which not only strengthen tourists' cultural identity but also enhance their engagement and satisfaction. Furthermore, tourism enterprises should

partner with technology companies to incorporate advanced technologies such as big data analytics and AI-powered recommendation systems to increase the precision and intelligence of personalized services. With technological tools, enterprises can analyze tourists' behavioral data and preferences more accurately, enabling them to recommend the most suitable tourism products and services.

Cross-industry collaboration also represents a significant pathway for innovation. Partnerships between cultural tourism enterprises and other sectors can effectively expand service boundaries and enhance the comprehensiveness and diversity of offerings. For instance, collaborations with retail and e-commerce platforms can provide tourists with an integrated cultural tourism shopping experience. Partnerships with the dining and accommodation sectors can deliver fully personalized travel packages encompassing transportation, lodging, and meals. Such cross-sector cooperation not only broadens the range of tourist choices but also extends and integrates the industrial value chain, further improving the quality and innovation of tourism services.

The construction of shared platforms is another critical measure for fostering innovation in personalized services. By creating open shared platforms, tourism enterprises can integrate diverse cultural, service, and technological resources to offer tourists a one-stop personalized service solution. For example, through such platforms, tourists can select and book a variety of personalized services—including attractions, accommodations, dining, transportation, and cultural activities—based on their interests and needs. This seamless integration creates a comprehensive service ecosystem with shared resources. Such platforms not only enhance resource utilization efficiency but also provide tourists with a more convenient and personalized experience.

6. Case Studies

Globally, many countries and regions have successfully integrated personalized cultural tourism services with user profiling, achieving remarkable results. For example, the tourism industry in Paris, France, has effectively combined big data with user profiling to deliver personalized cultural tourism

experiences [9]. The Paris Tourism Board analyzed data from various platforms, including tourists' social media activities, historical travel records, and interests, to construct precise user profiles. These profiles enabled tourism agencies to tailor personalized travel itineraries and cultural activity recommendations. Depending on tourists' interests in art, history, or gastronomy, exclusive experiences such as museum tours, art exhibitions, or culinary journeys were curated. This initiative not only enhanced visitor satisfaction but also promoted the diversification of local cultural industries.

In Japan, Kyoto has implemented user profiling-based personalized services, particularly in designing tourism products that blend traditional culture with modern technology [10]. By collaborating with local businesses and service providers, Kyoto utilized tourists' preference data to offer customized traditional cultural experiences, such as tea ceremonies and kimono rentals. Tourists could explore their cultural interests beforehand and book personalized experiences through dedicated online platforms. Additionally, Kyoto leveraged data analytics systems to monitor tourists' consumption habits in real time, helping businesses adjust marketing strategies and product designs. This personalized recommendation approach enriched tourists' travel experiences and effectively promoted the preservation and development of local culture.

Tianfu cultural tourism can adapt these successful practices by aligning them with its unique cultural resources and market demands. The Tianfu region boasts abundant cultural heritage and natural landscapes, such as the Wuhou Shrine and Mount Emei, as well as distinctive elements like Sichuan opera and tea culture. By analyzing precise tourist profiles, Tianfu cultural tourism can introduce customized cultural experiences, such as Sichuan tea culture workshops or Sichuan opera performances, to create more personalized travel itineraries. Additionally, Tianfu can draw on Paris and Kyoto's successful experiences by utilizing big data and artificial intelligence technologies to collect and analyze tourist data, enabling real-time adjustments and service optimization.

Tianfu cultural tourism could also integrate service platforms by adopting practices from

other regions. For instance, a digital platform encompassing cultural tourism, smart navigation, and online booking could be developed to provide tourists with one-stop personalized services. Through an intelligent recommendation system on the platform, tourists could select appropriate travel products based on their interests, achieving precise service delivery and enhancing the convenience and personalization of their trips. In summary, Tianfu cultural tourism can learn from domestic and international success stories, leveraging technological innovation and deeply integrating cultural resources to deliver personalized cultural tourism services with local characteristics. This approach would promote the high-quality development of the Tianfu cultural tourism industry.

7. Conclusion

This study explores pathways and strategies for enhancing personalized services in Tianfu cultural tourism based on user profiling, focusing on the current application, improvement pathways, and key strategies for personalized services in cultural tourism. The findings indicate that constructing precise user profiles allows tourism enterprises to gain a deeper understanding of tourists' personalized needs, enabling optimization of data collection, behavior analysis, and service delivery processes. Specific pathways include leveraging big data and artificial intelligence technologies to support precision marketing, customized services, and intelligent recommendations, thereby improving visitor satisfaction and travel experiences.

Additionally, strategies such as policy guidance, industry collaboration, and service quality enhancement provide robust support for advancing personalized services. Successful examples from Paris, France, and Kyoto, Japan, further validate the feasibility of personalized service models based on user profiling and offer valuable insights for Tianfu cultural tourism. By adopting these strategies, Tianfu cultural tourism can achieve sustainable development and elevate its standing in the global cultural tourism market.

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