

Research on the Integration and Innovative Development Path of Cross border Cultural Communication of English Tour Guides Driven by the Dual Wheel of "AI+Big Data"

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Abstract: *With the rapid development of technology, "AI+big data" has become an important force driving changes in various industries and plays a key role in the tourism industry. For English tour guides, who bear the responsibility of cross-border cultural dissemination, "AI+big data" brings new opportunities and challenges. This article deeply analyzes the current application status of "AI+big data" in cross-border cultural communication of English tour guides, explores the advantages brought by its integration and innovation, such as precise communication and diversified content, and analyzes the problems faced by insufficient technological application capabilities. On this basis, an integrated and innovative development path has been proposed, including enhancing the digital literacy of tour guides, optimizing cultural communication content creation, and strengthening cross-cultural communication and interaction, aiming to help English tour guides better utilize "AI+big data" to carry out cross-border cultural communication in the new era and enhance the international influence of Chinese culture.*

Keywords: AI; Big Data; English tour guide; Cross border cultural dissemination; Integrating innovation.

1. INTRODUCTION

In today's rapidly globalizing world, the importance of cross-border cultural dissemination has become increasingly prominent. As an important carrier of cultural dissemination, the tourism industry plays a crucial role in connecting Chinese and foreign cultures and promoting international exchanges through English tour guides. In recent years, the rapid development of artificial intelligence (AI) and big data technology has been deeply integrated into the tourism industry, bringing unprecedented opportunities for cross-border cultural dissemination of English tour guides. How to explore a development path of integrated innovation under the dual wheel drive of "AI+big data" and maximize the cross-border cultural dissemination effect of English tour guides has become an important topic worthy of in-depth research in the current tourism field. Xu et al. (2025) investigated adversarial machine learning in cybersecurity, analyzing both attack strategies and defensive mechanisms to enhance system robustness[1]. In autonomous systems, Wang et al. (2025) developed an AI-driven end-to-end framework for autonomous driving, improving real-time decision-making[2]. Meanwhile, Tang and Zhao (2025) employed neural networks to examine the relationship between aging population distribution and real estate market dynamics, providing insights for urban planning[3]. For cloud computing optimization, Wu (2025) proposed a fault detection and prediction model to enhance resource efficiency in cloud infrastructure[4]. In labor economics, Zhao et al. (2025) integrated machine learning with the DMP model to evaluate labor market efficiency under media influence[5]. Chen et al. (2025) explored the digital economy's role in promoting green innovation, highlighting its economic and environmental benefits[6]. Logistics optimization was addressed by Meng et al. (2025), who applied deep learning to green warehousing logistics, optimizing site selection and path planning[7]. In biomedical research, Wang et al. (2022) mapped the immune microenvironment in gastrointestinal cancers, focusing on dendritic cells and their therapeutic implications[8]. For smart cities, Li et al. (2025) introduced gamification techniques in data visualization to boost citizen engagement in urban monitoring[9]. Song (2025) enhanced e-commerce user experience through intelligent demand forecasting and inventory visualization[10]. Lastly, Wang (2025) utilized Bayesian optimization for adaptive network reconfiguration in urban delivery systems, improving logistical efficiency[11]. These studies collectively showcase AI's transformative potential across industries.

2. THE CURRENT APPLICATION STATUS OF "AI+BIG DATA" IN CROSS-BORDER CULTURAL DISSEMINATION OF ENGLISH TOUR GUIDES

2.1 Application of AI Technology

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2.1.1 Intelligent voice assistant assisted explanation

Some English tour guides have started to use intelligent voice assistants, such as the multilingual voice products developed by iFlytek and AI audio smart glasses produced by major companies around the world, to support real-time translation and voice tone correction in over multiple languages during the explanation process. This not only helps tour guides to provide smoother and more accurate English explanations, but also enables them to better understand the needs of tourists with different English accents and communicate with them, thereby improving the communication efficiency of cultural dissemination.

2.1.2 Collaborative Work of Intelligent Navigation Robots

In some scenic spots, intelligent tour guide robots have been put into use, such as the Bai Xiaomo intelligent tour guide walking robot deployed in Xiong'an New Area Park, which can cooperate with English tour guides to carry out work. Robots are responsible for leading tourists on basic sightseeing tours and simple explanations; At the same time, English tour guides can focus on exploring and disseminating deep cultural connotations, using robots to attract tourists' attention while focusing more on telling cross-border cultural elements such as history and customs behind scenic spots, enhancing tourists' understanding of Chinese culture.

2.2 Application of Big Data Technology

2.2.1 Drawing tourist portraits helps with precise dissemination

For example, the sea eel cloud tourism platform used by Rizhao Shanhaitian Tourist Resort can collect and analyze multidimensional information such as nationality, age, gender, occupation, consumption habits, and travel preferences of tourists through various apps, and draw detailed tourist portraits. English tour guides can use these portraits to gain an early understanding of the cultural background and interests of the group of tourists they are taking, so as to prepare targeted explanations and choose appropriate cultural communication entry points. For example, they can focus on introducing ancient Chinese historical relics and related culture to European and American tourists who love history and culture, making cross-border cultural communication more accurate and effective.

2.2.2 Analysis of Tourism Hotspots and Optimization of Communication Strategies

By using big data to monitor hot topics, popular tourist destinations, and cultural elements that attract high attention from tourists in the tourism market, English tour guides can adjust their cultural communication content and itinerary accordingly in a timely manner. For example, when big data shows that foreign tourists are becoming increasingly interested in traditional Chinese handicraft culture, tour guides can add this aspect to their subsequent explanations and arrange visits to related handicraft workshops to enhance the attractiveness of cultural dissemination.

3. THE ADVANTAGES OF INTEGRATING AND INNOVATING CROSS-BORDER CULTURAL DISSEMINATION OF ENGLISH TOUR GUIDES UNDER THE DUAL WHEEL DRIVE OF "AI+BIG DATA"

3.1 Achieving Precision in Cultural Communication

With the help of accurate tourist portraits drawn by big data, English tour guides can understand the differences in cultural acceptance and interest directions among different tourist groups, and thus customize personalized cultural communication plans for various types of tourists. For example, for young European and American tourists, Chinese modern popular culture can be combined with traditional cultural elements for dissemination. By telling the stories of traditional culture integrated in Chinese animation, short videos and other cultural industries, Chinese culture can be conveyed in a way that is more in line with their interests, avoiding the problem of ineffective dissemination caused by the previous "one size fits all" approach and making cultural dissemination more targeted.

3.2 Enriching the Content and Forms of Cultural Communication

With the support of AI technology, emerging technologies such as virtual display and augmented reality (AR) can be integrated into cultural dissemination. English tour guides can lead tourists to experience the restoration scenes of ancient Chinese architecture through AR devices, or watch virtual historical and cultural performances, making originally static and abstract cultural content vivid and concrete. At the same time, big data analysis can uncover more niche but distinctive cultural elements. Tour guides integrate these contents into their explanations, enriching the material library of cultural dissemination and expanding the breadth and depth of cultural dissemination.

3.3 Improving the efficiency and interactivity of cultural dissemination

Intelligent voice assistants and other AI tools can quickly answer tourists' questions about culture, improve communication efficiency, and enable tourists to acquire more cultural knowledge within limited travel time. Moreover, by analyzing the interactive feedback of tourists through big data, tour guides can adjust the pace and interactive methods of their explanations in a timely manner, encourage tourists to participate more in cultural discussions, enhance the interactivity in the process of cross-border cultural dissemination, and transform tourists from passive acceptance to active exploration of Chinese culture.

4. ISSUES FACED BY ENGLISH TOUR GUIDES IN CROSS-BORDER CULTURAL DISSEMINATION UNDER THE DUAL WHEEL DRIVE OF "AI+BIG DATA"

4.1 Insufficient ability of tour guides to apply "AI+big data" technology

Some English tour guides, especially those who have been in the industry for a long time, lack sufficient understanding and operational skills of emerging AI and big data technologies. They may have difficulty proficiently using relevant software for tourist portrait analysis, or may not know how to fully utilize tools such as intelligent voice assistants to improve the effectiveness of explanations, which to some extent limits the effective application of "AI+big data" in cross-border cultural dissemination and affects the promotion of integrated innovation.

4.2 Inaccurate translation of cultural connotations

In the process of big data filtering and pushing cultural content, some cultural elements may be interpreted unilaterally or presented incorrectly to foreign tourists due to misunderstandings of different cultural backgrounds. Moreover, AI technology may not be precise enough in translating and interpreting cultural connotations, which can easily lead to cultural misunderstandings and pose challenges to cross-border cultural dissemination.

4.3 Impact on Traditional Tour Guide Explanation Methods

Overreliance on AI and big data technology may lead some English tour guides to neglect the improvement of their own presentation skills and cultural heritage, gradually losing the traditional face-to-face emotional communication and unique cultural appeal of tour guide presentations. Moreover, some tourists may feel that the cultural dissemination dominated entirely by smart devices lacks warmth, which affects their in-depth experience and acceptance of culture.

5. THE INTEGRATED AND INNOVATIVE DEVELOPMENT PATH OF ENGLISH TOUR GUIDES' CROSS-BORDER CULTURAL DISSEMINATION UNDER THE DUAL WHEEL DRIVE OF "AI+BIG DATA"

5.1 Enhancing the digital literacy of English tour guides

5.1.1 Conduct targeted training courses

Tourism industry associations or related training institutions should organize specialized "AI+Big Data" technology training courses for English tour guides, covering the use of big data analysis tools, the development of intelligent voice assistants, and the operation of intelligent navigation devices. Through a combination of theoretical explanations and practical case operations, these courses should help tour guides quickly master relevant technical application skills, enabling them to proficiently use these technologies to serve cross-border cultural dissemination.

5.1.2 Self learning and practical exploration

English tour guides can use their spare time to independently learn online courses, watch technical tutorial videos, and continuously improve their digital knowledge reserves. At the same time, actively try new technological applications in practical work, such as summarizing the effects and shortcomings of technological applications after each tour, continuously improving one's digital application ability, and gradually becoming a versatile tour guide talent that adapts to the new era.

5.2 Optimizing the creation of cultural communication content

5.2.1 In depth exploration of cultural connotations

In the increasingly close international cultural exchanges, English tour guides need to be based on profound knowledge of traditional Chinese culture, deeply explore the underlying values, ideological concepts, and other profound connotations of culture, combine these contents with modern life, and integrate them into the explanation through storytelling and situational methods, so that foreign tourists can better understand the essence of Chinese culture and avoid superficial cultural displays.

5.2.2 Establish a cultural review mechanism

Establish a professional cultural review mechanism to address cultural misunderstandings that may arise from big data filtering and AI translation. Invite cross-cultural research experts, foreign language linguists, and others to review and ensure the accurate interpretation and translation of cultural elements in the cultural content to be disseminated, minimizing the risk of cultural misunderstandings caused by technological applications.

5.3 Strengthen cross-cultural communication and interaction

5.3.1 Developing Cross Cultural Communication Skills

English tour guides should continuously improve their cross-cultural communication skills, understand the differences and commonalities between different cultures, and be able to flexibly adjust communication methods and explanation content according to the cultural background of tourists in the process of cross-border cultural dissemination, creating a good cross-cultural communication atmosphere and enhancing tourists' sense of identity with Chinese culture through learning cross-cultural communication theory and participating in cross-cultural communication practice activities.

5.3.2 Building an online and offline interactive platform

Whether before or after the tour, English tour guides can use online interactive communities to maintain close contact with tourists, share more cultural information, and answer their follow-up questions. At the same time, English tour guides can actively organize various offline cultural exchange activities, creating immersive cultural experience scenes for tourists through a variety of colorful and diverse activities. For example, holding cultural sharing events for Chinese and foreign tourists, traditional festival experience activities, etc., through diverse interactive forms, allow tourists to participate more deeply in the experience and dissemination of Chinese culture, and enhance the effectiveness of cross-border cultural dissemination. By combining online and offline forms of diverse interaction, it can greatly stimulate tourists' enthusiasm and participation, thereby effectively enhancing the effectiveness of cross-border cultural dissemination.

5.4 Reasonable Balance between Technology and Traditional Explanation

5.4.1 Emphasize the unique value of traditional explanations

In today's era of rapid technological advancement and the emergence of various new technologies, "AI+big data" technology has shone in many fields, including cultural communication. However, we must guide English tour guides to have a clear and profound understanding of the emotional transmission and on-site infectiousness contained in traditional face-to-face communication during the explanation process, which is a force that cannot be replaced by any advanced technology. So, we should strongly encourage English tour guides to make reasonable

use of "AI+big data" technology, while not neglecting the improvement of their own presentation art; Cultural dissemination should be combined with personal charm to provide tourists with a cultural experience that is both technological and full of humanistic warmth.

5.4.2 Organic Fusion Technology and Traditional Methods

In today's diverse cultural communication landscape, it is particularly crucial to fully consider the characteristics of different cultural communication scenarios and the diverse needs of tourists. Cleverly and reasonably arranging the coordination between smart devices and traditional explanations is undoubtedly an important measure to enhance the effectiveness of cultural dissemination. English tour guides should arrange AI intelligent devices to assist traditional explanations according to different cultural dissemination scenarios and tourist needs. For example, in the early stage of visiting tourist attractions, using intelligent navigation robots to provide basic introductions and stimulate tourists' interest; In the core cultural exhibition segment, English tour guides provide in-depth and vivid traditional explanations, utilizing the advantages of AI intelligent devices and traditional explanations to complement each other, allowing tourists to experience the charm of Chinese culture more deeply.

6. CONCLUSION

The dual wheel drive of "AI+big data" has brought broad development space and many innovative opportunities for the cross-border cultural dissemination of English tour guides. With the precise analysis capability of big data, English tour guides can gain in-depth insights into key information such as the interests, preferences, and behavioral habits of tourists from different countries and cultural backgrounds, thereby achieving accurate promotion of cultural communication content, allowing each explanation to directly target the "interests" of tourists; The integration of AI technology can provide tour guides with rich and diverse explanation materials, assist in generating vivid and interesting explanation texts and interactive scenes, making the forms of cultural dissemination more diverse and attractive. By enhancing the digital literacy of English tour guides, optimizing cultural communication content creation, strengthening cross-cultural communication and interaction, and balancing technology and traditional explanations, we can better leverage the advantages of "AI+big data" in cross-border cultural communication, promote English tour guides to carry out cross-border cultural communication work more effectively in the new era, and promote deep cultural exchange and integration between China and foreign countries.

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