

Opportunities, Challenges and Coping Strategies of the New Ecology of Culture and Tourism Driven by Artificial Intelligence

Jialei Cao, Ying Gao

School of Marxism, Chang'an University, Xi'an 710064, Shaanxi, China

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Abstract: High-quality development is the primary goal of building a modern socialist country. The digital transformation of the cultural and tourism industry is crucial for achieving industrial upgrading. With the rapid advancement of artificial intelligence (AI) technology, its application in the cultural and tourism sector has become increasingly widespread, driving the digital transformation and innovative development of this industry. This article explores the new ecosystem of cultural and tourism driven by AI, analyzing the opportunities it brings, such as enhancing visitor experiences, optimizing resource allocation, and innovating cultural heritage. It also discusses the challenges faced, including technical adaptability, data security and privacy, and a shortage of interdisciplinary talent. Finally, it proposes strategies to address these issues, such as strengthening infrastructure, promoting industrial collaboration, and improving policies and regulations, aiming to provide a reference for the high-quality development of the cultural and tourism industry.

Keywords: artificial intelligence; new ecology of culture and tourism; opportunities; challenges; coping strategies

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1. Introduction

In the global wave of digital transformation, artificial intelligence (AI), as a cutting-edge technology, is profoundly reshaping the operational models and development paths of various industries. The cultural and tourism sector, a key area where economy and culture are deeply integrated, is actively exploring the application of AI technology to achieve industrial upgrading and innovative development. A thorough exploration of the new ecosystem of cultural and tourism driven by AI, analyzing the opportunities and challenges it presents, and proposing corresponding strategies, is crucial for the sustainable development of the cultural and tourism industry.

2. Opportunities of the new cultural tourism ecosystem driven by artificial intelligence

2.1. Improve the tourist experience: cultural and tourism consumption demand is younger and more digital

In the digital age, the demand for cultural and tourism consumption is undergoing a transformation towards younger

demographics and digitalization. Firstly, the application of artificial intelligence (AI) technology has opened up new opportunities for the cultural and tourism industry, particularly in enhancing visitor experiences. AI can accurately identify tourists' personalized preferences and needs through big data analysis and machine learning algorithms, providing them with customized travel services. For example, intelligent tourism recommendation systems can tailor travel routes, recommend attractions, hotels, and restaurants based on visitors' historical behavior, interests, and budget. This personalized service not only better meets tourists' needs but also enhances their satisfaction and loyalty. Secondly, within scenic areas, intelligent navigation systems and virtual digital avatars can offer real-time navigation and commentary services to tourists. Tourists can access detailed introductions, historical backgrounds, and cultural insights about attractions through mobile apps or smart devices. Through VR and AR technologies, tourists can travel through history in virtual spaces, experiencing the charm of culture. They can experience the construction process of ancient buildings through VR devices or see virtual historical figures and stories in real-life settings through AR technology. This immersive experience not only enhances tourists' engagement and interactivity but also boosts the appeal and competitiveness of cultural and tourism projects. Thirdly, AI technology can create immersive cultural and tourism experiences for tourists. For example, by utilizing holographic projection technology, intelligent lighting, and sound systems, immersive cultural performances and theme park projects can be created. Visitors can experience an almost real-life setting, as if they were in a virtual world. This immersive experience not only enhances visitor engagement and interactivity but also boosts the appeal and competitiveness of cultural tourism projects.

2.2. Optimize resource allocation: enrich and diversify the application scenarios of AI in culture and tourism

Artificial intelligence (AI) technology is increasingly being applied in the cultural and tourism industry, providing robust support for optimizing resource allocation. Firstly, AI can accurately gauge market demand through big data analysis and predictive models. By analyzing tourist behavior data, cultural and tourism enterprises can better understand tourists' preferences and needs, allowing them to adjust the supply structure of tourism products and achieve efficient resource utilization. Predicting the tourism market enables companies to prepare in advance, reasonably allocate human, material, and financial resources, and enhance operational efficiency. Secondly, in scenic area management, AI technology can enable intelligent scheduling and management. Through intelligent monitoring systems and data analysis platforms, managers can monitor real-time tourist flow, distribution, and facility usage, making timely adjustments to crowd control and distribution to prevent congestion and safety incidents. The intelligent scheduling system can also optimize staff work schedules and tasks based on resource usage, improving work efficiency. Lastly, AI technology can optimize the supply chain management of the cultural and tourism industry. Through intelligent logistics systems and data analysis platforms, enterprises can achieve real-time monitoring and optimized management of the supply chain. By using data analysis to predict market demand, companies can adjust inventory levels in advance, avoiding stockpiling or shortages. Intelligent logistics systems can also optimize delivery routes, enhancing logistics efficiency and reducing costs.

2.3. Innovation in cultural inheritance: digital culture and tourism industry big data platform and intelligence

The big data platformization and intelligence of the digital cultural tourism industry are crucial for cultural heritage innovation. Firstly, artificial intelligence (AI) technology offers new methods and forms for the protection and inheritance of cultural heritage. By using generative AI, historical stories can be transformed into animated shorts and interactive games, achieving artistic restoration and integration of ancient and modern elements in cultural IPs. Secondly, AI technology is used to digitize and store cultural heritage, establishing a shareable and traceable database of cultural resources, which enhances the protection and inheritance of cultural heritage. The Dunhuang Academy has utilized digital technology to collect and store Dunhuang murals, creating a digital cultural resource library that allows people worldwide to appreciate the exquisite art of Dunhuang murals through the internet. Thirdly, AI technology can also drive cultural

innovation and dissemination. With intelligent creation tools and algorithms, artists and cultural workers can produce more innovative and engaging cultural works. Fourthly, AI technology can facilitate the widespread dissemination of culture through social media and online platforms. Through intelligent recommendation systems, cultural works can be precisely delivered to interested users, expanding their influence and reach. Lastly, AI technology can be applied to cultural education and popularization. Through intelligent educational platforms and virtual reality (VR) technology, students can learn about historical and cultural knowledge in a virtual environment, enhancing the fun and interactivity of learning^[1]. Additionally, AI technology can provide cultural explanations and educational services to tourists through intelligent voice assistants and smart tour guide systems, improving public understanding and appreciation of culture.

3. The challenges of the new cultural and tourism ecology driven by artificial intelligence

3.1. Data barriers block synergistic effects

In the digital transformation of the cultural and tourism industry, data integration and sharing are crucial for driving industry growth. However, significant data barriers exist in the current digitalization process, hindering the realization of data synergy and impacting the industry's efficiency and innovation. Firstly, tourism statistics, as the top source of tourism data, primarily rely on traditional sampling methods, which often result in limited and uneven sample sizes, failing to fully reflect the actual conditions of the tourism market. Moreover, there is a lack of effective alignment between the measurement systems of tourism enterprises and those of the national economy, and inconsistencies in statistical techniques at both the national and local levels further exacerbate the issue of 'horizontal incomparability and vertical non-additivity' in data. Secondly, while big data technology provides robust support for data analysis and decision-making, its analytical capabilities are limited in the multi-source and heterogeneous environment of tourism data. This makes it difficult to accurately match user needs through intelligent tracking of content based on user searches, thereby affecting the user experience. Additionally, the aggregation of online and offline data faces challenges in sharing data barriers, which not only limits data synergy but also hinders the industry's further development.

3.2. Technical adaptability and cost

Currently, the application of artificial intelligence (AI) technology in the cultural and tourism sector faces challenges related to technical compatibility. Different cultural and tourism enterprises have varying business models and needs, making it difficult for general AI solutions to meet their specific requirements. Small and medium-sized cultural and tourism enterprises often lack the capability for customized development, and general AI solutions may not fully align with their business processes and management needs. This makes it challenging for many enterprises to effectively integrate AI technology into their operations, thereby affecting the effectiveness of AI technology. Additionally, the research and development and application of AI technology require substantial financial investment. For small and medium-sized cultural and tourism enterprises, these high costs can be challenging to bear. Moreover, the application of AI technology requires specialized technical personnel for maintenance and management, which further increases operational costs^[2].

3.3. Data security and privacy protection

In the new ecosystem of cultural and tourism driven by artificial intelligence, data is a core resource. However, data security has become a significant challenge. Cultural and tourism enterprises collect and store vast amounts of personal information and behavioral data from tourists. If this data is leaked or misused, it can pose serious threats to tourists' privacy and security. For example, hacker attacks and data breaches can lead to the theft of tourists' personal information for illegal purposes^[3]. As AI technology becomes more widely used, the issue of data privacy protection has become increasingly prominent. Cultural and tourism enterprises must comply with relevant laws, regulations, and privacy policies when collecting and using tourist data to ensure that tourists' privacy is fully protected. However, in practice, some companies

may infringe on tourists' privacy due to a lack of awareness of data privacy protection or insufficient technical measures. Some travel apps may also collect users' personal information without their consent or use user data for commercial purposes^[4].

3.4. Shortage of compound talents

The new ecosystem of cultural and tourism driven by artificial intelligence requires composite talents who understand both the principles of tourism operations and the characteristics of AI technology. However, there is currently a severe shortage of such composite talents. Cultural and tourism enterprises generally lack professional technical personnel and managers, making it difficult to promote the application and dissemination of AI technology. For example, when implementing AI projects, companies may struggle with effective technical development and maintenance due to a lack of technical talent, leading to slow project progress or failure. The cultivation and introduction of composite talents are key to addressing the talent shortage. However, there are still some issues in talent cultivation. The relevant majors and course systems in universities and vocational colleges may not align with market demands, resulting in the trained talents failing to meet the actual needs of enterprises. When cultural and tourism enterprises recruit talent, they may find it challenging to attract top technical talent due to a lack of appeal or inability to compete with large tech companies^[5].

4. Coping strategies for the new cultural tourism ecology driven by artificial intelligence

4.1. Build a big data platform for culture and tourism

In the digital age, the transformation and upgrading of the cultural tourism industry face unprecedented opportunities and challenges. Key to this process is eliminating data silos and promoting efficient resource integration and sharing. From a governmental perspective, it is crucial to break free from the constraints of traditional administrative management models and overcome the fragmented structure. For instance, the Lu'an City Cultural Tourism Comprehensive Service Management System has successfully dismantled data barriers between multiple government departments, including the Development and Reform Commission, Public Security Bureau, and Transportation Bureau, by forming a dedicated government task force. This has facilitated data interconnectivity and laid a solid foundation for the coordinated development of the cultural tourism industry. Additionally, the construction of a public management platform for cultural tourism is essential. This platform can effectively break down information silos, preventing the creation of data systems solely based on internal needs within the cultural tourism system, thereby reducing information redundancy and repetition. Furthermore, it is necessary to bridge the data gap between government departments and leading tourism enterprises, establishing an integrated model of the cultural tourism big data platform. Collaboration with enterprise OTA platforms is a vital approach to achieving this goal, as it can help break down data silos between government departments and tourism enterprises, enabling the sharing of vast user resources and injecting strong momentum into the innovative development of the cultural tourism industry^[6].

4.2. Promoting industrial collaborative innovation

Cultural and tourism enterprises should collaborate with tech companies and research institutions to form innovation consortia, sharing the risks of technology R&D. Through industry-university-research collaboration, the application and promotion of artificial intelligence (AI) technology in the cultural and tourism sector can be advanced. For instance, universities and research institutions can offer technical support and talent development services to businesses, while companies can provide practical bases and application scenarios to these institutions, thereby achieving resource sharing and complementary strengths. The government should enhance policy support for the cultural and tourism industry, fostering a collaborative innovation ecosystem. This can be achieved through measures such as setting up special funds and offering tax incentives to encourage AI technology R&D and application by cultural and tourism enterprises. Additionally,

the government can organize events like cultural and tourism science and technology innovation competitions and industry forums to promote exchanges and cooperation among cultural and tourism enterprises, driving the innovative development of the industry^[7].

4.3. Improving policies and regulations

The government needs to enhance relevant policies and regulations, and strengthen the supervision of data security and privacy protection. Firstly, it should promote the development of a data element market, improve data platform construction, and continuously leverage the amplifying and additive effects of digital technology on the economy, providing solid support for the digital transformation of the cultural and tourism industry. Secondly, it should expedite the formulation of laws, regulations, management norms, administrative rules, evaluation systems, and industrial statistical systems that suit the development of the digital cultural and tourism industry, creating a favorable development environment and ensuring the industry operates within legal and compliant frameworks. Thirdly, the government should introduce supportive policies, focusing on land use, energy consumption, and innovation, to assist digital cultural and tourism enterprises in reducing operational costs, enhancing innovation capabilities, and promoting industrial upgrading. Fourthly, it should study and formulate relevant laws, regulations, and industry guidelines, clarifying the direction, principles, tasks, methods, and safeguard measures for industrial development, providing clear guidance and planning for the digital development of the cultural and tourism industry, ensuring the systematic and coherent development of the industry^[8].

4.4. Cultivate compound and digital talents

First, schools can offer interdisciplinary courses in artificial intelligence and fields like tourism, culture, and technology to foster students' interdisciplinary thinking, innovation, and practical skills. This helps students understand how AI technology is applied in the cultural and tourism industry and how to integrate these technologies with tourism management, cultural heritage, and innovation. Second, cultural and tourism enterprises should actively recruit and develop AI talent to enhance their technological innovation and market competitiveness. Companies can attract top technical talent by offering attractive salaries, career development opportunities, and innovative incentive programs. Additionally, companies should collaborate with universities and research institutions to jointly undertake R&D and talent development projects, promoting the integration of industry, academia, and research. Third, to further attract and retain talent, cultural and tourism enterprises can provide internship and training opportunities, allowing students and new employees to learn and grow in real-world work environments. This approach not only helps companies cultivate the technical talent they need but also provides ongoing career development support for employees^[9].

5. Conclusion

Artificial intelligence (AI) technology has brought unprecedented opportunities for the innovative development of the cultural and tourism industry, driving it towards smarter, more personalized, and more diverse directions. In the future, as AI technology continues to evolve and improve, its application in the integration of culture and tourism will become even more extensive and profound, creating a brighter future for the integrated development of the cultural and tourism sectors^[10].

Disclosure statement

The author declares no conflict of interest.

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