

## A Study on the Construction and Dissemination Pathways of Chinese Cultural Tourism Metaverse (Postprint)

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### Abstract

[Objective] The cross-boundary integration of cultural tourism and the metaverse has become an important development direction for the cultural tourism industry. [Methods] Through specific approaches such as creating virtual digital humans, transforming cultural and creative products into digital collectibles, constructing virtual scenarios, and developing interactive games, we construct China's cultural tourism metaverse. [Results] This showcases the unique charm of Chinese culture to a global audience and promotes the development of China's cultural tourism industry. [Conclusion] The cultural tourism metaverse, supported by both cultural and technological foundations, will not only transform the foundational architecture of the communication landscape but also redefine the dissemination of cultural tourism resources through immersion and innovation.

### Full Text

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#### Research on the Construction and Communication Paths of China's Cultural Tourism Metaverse

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### Abstract

**Objective:** The cross-border integration of cultural tourism and the metaverse has become a crucial development direction for the cultural tourism industry. **Method:** This paper proposes constructing China's cultural tourism metaverse

through specific approaches: developing virtual digital humans, transforming cultural creative products into digital collectibles, weaving virtual scenes, and creating interactive games. **Result:** This approach will showcase the unique charm of Chinese culture to the world and promote the development of China's cultural tourism industry. **Conclusion:** A cultural tourism metaverse supported by both cultural and technological foundations will not only transform the basic architecture of communication patterns but also redefine the dissemination of cultural tourism resources through immersion and innovation.

**Keywords:** Virtual digital humans; Cultural tourism metaverse; Digital collectibles; Virtual scenes

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## 1. Current Challenges in China's Cultural Tourism Metaverse

### 1.1 Insufficient R&D and Production Capacity for Cultural Products

Many cultural products remain superficial, lacking depth and connotation, with relatively lagging innovation and transformation in digitalization and virtualization. First, China's cultural and creative industry is not yet mature. Although it has received strong government support in recent years, it still lags significantly behind developed countries, with relatively insufficient R&D and production capabilities for cultural products. Second, the digital technology level is inadequate. The cultural tourism metaverse industry represents the integration of digital technology and cultural tourism, but a shortage of digital technology talent and relatively lagging technical levels have hindered the smooth digital transformation of cultural products, affecting the development and production of high-quality cultural products.

### 1.2 Monolithic Business Models

The cultural tourism metaverse requires cross-border integration, yet China still relies primarily on traditional tourism models, with insufficiently close collaboration between culture, tourism, technology, and other fields. Key issues include: first, enterprises in the cultural tourism metaverse sector are relatively concentrated, with a few large corporations occupying the vast majority of market share while small and medium-sized enterprises lag behind, reducing industry competitiveness and limiting innovation and development. Second, the technologies employed in the cultural tourism metaverse are relatively singular, mainly focusing on virtual reality (VR) and augmented reality (AR) applications and

cultural heritage digitalization. This monolithic business model prevents market demand from being fully satisfied and restricts the industry's growth potential.

### 1.3 Slow Technology Implementation

The cultural tourism metaverse relies on emerging technologies such as artificial intelligence, big data, and virtual reality, but China's cultural tourism metaverse technology remains in the exploration and development stage, with limited speed in technological R&D and innovation. Many technologies still face bottlenecks and difficulties, such as image recognition, scene reconstruction, and VR devices, resulting in relatively narrow application scenarios and limited scope and depth of application, with many potential scenarios yet to be fully developed. This has also led to a slow technology implementation process. As the cultural tourism metaverse is an emerging industry, many enterprises have limited investment, and coupled with non-unified industry standards, companies face numerous obstacles when developing products and services, such as data sharing and interoperability issues, further slowing the pace of technological R&D and application promotion.

### 1.4 Shortage of Interdisciplinary Talent

The cultural tourism metaverse requires talent with cross-disciplinary knowledge and skills, but such talent is currently scarce in the market, creating a talent bottleneck. The industry's emerging and interdisciplinary nature demands professionals with rich industry backgrounds and technical knowledge, yet these individuals are relatively rare in the current market. On one hand, China's education and training system for the metaverse is not yet complete. Few specialized metaverse-related majors or courses exist in the current higher education system, with only Nankai University and Nanjing University of Information Science and Technology offering relevant programs, resulting in a lack of systematic training and education for needed professionals. On the other hand, enterprise hiring needs are unclear. Due to the unique characteristics of the cultural tourism metaverse industry, enterprises often have ambiguous talent requirements and lack unified professional standards, increasing recruitment difficulties.

### 1.5 Urgent Need for Tourism Consumption Upgrading

Current tourism consumption remains dominated by low-cost, simplistic, and standardized products. The cultural tourism metaverse requires time to drive tourism consumption upgrading, primarily because this process is lengthy, requiring continuous enhancement of tourist demands and expectations, as well as ongoing improvement of cultural tourism add-on products and deep-level services to meet higher-level spiritual needs. Some cultural tourism destinations struggle to complete upgrades in the short term due to funding or technical limitations, while the consumer market also needs gradual cultivation to gain

acceptance from most consumers. Since the external equipment required for virtual tours is currently priced high in the market, it blocks the vast majority of consumers, making the consumer market await technological upgrades to lower entry barriers.

## 2. Specific Paths for Constructing China's Cultural Tourism Metaverse

### 2.1 Developing Virtual Digital Humans to Bridge IP Images and User Interaction

Virtual digital humans are computer-generated digital characters that appear and behave with human characteristics. They represent an AI application combining computer graphics, artificial intelligence, and machine learning technologies, typically employing 3D modeling and animation to achieve realistic appearance and movement. These digital humans can possess various attributes including age, gender, appearance, and personality, and feature voice interaction, natural language processing, and gesture recognition capabilities, enabling them to interact with people through various means such as providing services, answering questions, and showcasing products. According to the *Virtual Human Deep Industry Report*, China's overall virtual digital human market size is expected to reach 270.3 billion yuan by 2030, with "identity-type virtual humans" projected to dominate at 174 billion yuan, while "service-type virtual humans" will exceed 95 billion yuan. Some institutions further predict that the AI digital human market will reach 10.24 billion yuan by 2026 [1]. We argue that developing virtual digital humans suitable for the cultural tourism metaverse requires two key approaches.

First, integrate big data and artificial intelligence technologies to train language models for virtual digital humans using computational power, enabling them to automatically generate language, text, and behavioral responses. Because virtual digital humans can update their knowledge systems while outputting content, they can continuously improve their language models, achieving more intelligent interactive experiences as AI technology advances. For instance, virtual tour guides in tourism scenarios can use natural language processing to conduct voice conversations with tourists, answer questions, and even learn from tourists' behaviors, language, and interests to provide more personalized and customized services. Additionally, virtual digital humans could be integrated with advanced AI chatbots like ChatGPT to 赋予 greater intelligent capabilities, continuously training their language models through user interactions.

Second, create distinctive IP images to promote brand identity. As a new type of brand spokesperson distinct from traditional forms, virtual digital humans attract public attention more easily due to their scarcity and novelty, achieving promotional effects. Developing virtual digital humans with brand imagery to form IP industry chains enables multiple promotional campaigns from a single image. For example, the Guofeng virtual idol Ling (Ling) adopts traditional

Chinese cultural elements while incorporating modern popular trends, often appearing in Hanfu and modern fashion attire, singing, dancing, and interacting through livestreams. Ling performed a segment from the Mei School Peking Opera classic *The Heavenly Maiden Scatters Flowers* on CCTV's Guofeng youth program *Rising! Colorful Youth*, using digital technology combined with traditional art to convey the charm and confidence of Chinese culture to the public, showcasing a future Guofeng attitude [2]. This demonstrates that virtual digital humans in the cultural tourism industry should organically integrate their cultural heritage with contemporary youth cultural trends, 赋予 greater practical significance. Through VR and AR technologies, tourists can break through dimensional barriers, achieve cross-circle effects, and attract users across all age groups. The application of such virtual digital humans in the cultural tourism metaverse will bring more intelligent and personalized services and experiences to the industry while providing more possibilities for its future development.

## 2.2 Empowering Digital Collectibles Through Blockchain to Facilitate Digital Transformation of Cultural Creative Products

Digital collectibles are blockchain-based digital assets. Blockchain technology is considered crucial for building the metaverse because it provides a decentralized, secure, and transparent trading platform for virtual assets, offering a novel solution for digital content property rights that has attracted widespread attention in art, entertainment, and gaming. Unlike ordinary digital artworks, digital collectibles are unique and non-interchangeable, as each possesses a unique identifier recording its distinctive attributes and ownership information. Digital collectibles can represent various digital content including digital art, music, videos, virtual real estate, and game props, enabling owners to prove their exclusive ownership and sell or trade these assets on the market.

If the numerous cultural creative products from China's cultural tourism destinations could be transformed into digital collectibles, this would represent a breakthrough for online cultural creative products. Such transformation would not only help China's current cultural tourism industry internationalize and become more accessible to global users but also provide an important opportunity to disseminate and promote outstanding traditional Chinese culture. China's cultural creative product digital collectible transformation should adopt a gradual approach to align with international standards.

### 2.2.1 Creating Scarce Digital Collectibles Based on Local Characteristics

Digitalized cultural creative products require authentication to ensure their authenticity, uniqueness, and value, which can be accomplished through digital watermarks, blockchain technology, and other means to verify product origin and integrity. On November 3 and 4, 2022, AntChain's Treasure Plan launched Xi'an's first 3D architectural model digital collectibles, "Tang Dynasty Kaiyuan · Bell Tower" and "Tang Dynasty Kaiyuan · Small Wild Goose Pagoda," with 10,000 copies issued for each, selling out within seconds. "Tang

Dynasty Kaiyuan • Bell Tower” was priced at 19.9 yuan. After purchase, users receive a unique digital certificate through AntChain’s blockchain authentication, ensuring authenticity and uniqueness in purchase and collection while effectively protecting cultural heritage digital copyrights [3]. This demonstrates that integrating regional culture into digital collectibles enhances their scarcity and uniqueness, maximizing value.

**2.2.2 Establishing a Comprehensive Digital Collectibles Trading Market** With the rapid development of the digital art market, increasing numbers of artists and collectors are exploring digital art transactions. To facilitate the transformation of cultural creative products into digital collectibles, reliable trading platform support is essential. For example, in March 2021, Chinese painter Qi Baishi’s *Group of Shrimp* digital collectible sold for 300,000 yuan at Shanghai Jiahe’s first winter auction, demonstrating the enormous potential of the digital collectibles market to both cultural tourism and art industries.

**2.2.3 Integrating Virtual and Real: Coordinated Online-Offline Development** As infrastructure for the metaverse industry, digital collectibles are inseparable from the metaverse. The digital collectibles industry is gradually “moving from virtual to real,” and its close integration with physical industries will create more possibilities for metaverse development. For instance, iBox Chain Box and Futures jointly launched an empowered physical collectible tightly binding digital collectibles with limited-edition tickets, representing a typical development paradigm of virtual-real integration. Similarly, Xinhua Digital Collectibles and Sanxingdui Museum jointly launched the *Ancient Shu Legends* series, using virtual-real combination forms to bring cultural artifacts into public life, enabling customers to experience cultural creative products both online and offline.

In summary, achieving the transformation of cultural creative products into digital collectibles requires joint efforts from government, creators, and enterprises. Through continuous innovation, marketing promotion, strengthened copyright protection, and trading platform support, China’s cultural creative products can successfully transition to digital collectibles and gain greater development opportunities in the new digital economy era.

### **2.3 Weaving Virtual Scenes: Digital Reconstruction of Traditional Physical Spaces**

The core of the cultural tourism metaverse lies in using digital twin technology to create 1:1 replicas of real cultural tourism destinations. This process requires modeling various physical phenomena such as gravity, collision, and reflection, while simultaneously employing augmented reality technology to integrate virtual objects with real cultural tourism scenes, creating more authentic sensory experiences. The cultural tourism metaverse can include real cultural tourism attractions and intangible cultural heritage resources, as well as fictional cultural

elements to enhance user engagement and interactivity. Through preliminary surveys of museum buildings, artifacts, and intangible cultural heritage, precise digital modeling and subsequent algorithmic software debugging achieve digital restoration, delivering consistent virtual projections to consumer terminals. Depending on development levels, digital reconstruction of physical scenes can be constructed through several approaches.

**2.3.1 Producing 360-Degree Promotional Videos for Traditional Media** Due to low market acceptance and insufficient capital utilization, the early stages of cultural tourism metaverse development can involve producing 360-degree promotional videos for distribution through traditional 2D media platforms such as Douyin and Bilibili, using this low-threshold approach to guide market audiences toward accepting the cultural tourism metaverse. Currently, major scenic areas including Taihang Mountain and Yingtian Longhu Mountain have already released 360-degree promotional videos to introduce the metaverse, allowing users wearing VR glasses to observe scenic areas from unique perspectives.

**2.3.2 VR Creation to Generate Narratives for Users** “Content is king” represents the core of creating digital twin virtual spaces, and using technology to empower cultural tourism narratives constitutes the ultimate pursuit of the cultural tourism metaverse. New consumption perspectives suggest that the boundaries between production and consumption of cultural tourism products in the metaverse have become blurred, with individual cultural tourism creation ubiquitous everywhere. The process of consuming cultural tourism products has essentially become the process of creating them, thereby universalizing and democratizing cultural tourism products [4]. For example, Dunhuang’s Mogao Caves span millennia of historical narratives. In the metaverse world, this history can be segmented into different historical stories presented in an interlocking manner, enabling viewers to personally experience the processes of ancient craftsmen shaping Buddhist sculptures from wood and clay, witnessing the exquisite artistry of works like the *Sutra of the Nine-Colored Deer* painted in Cave 257 of the Northern Wei Dynasty, traveling through time to experience China’s millennia-old cultural heritage. While constructing virtual spaces, their intrinsic meanings are subtly conveyed.

**2.3.4 One-Stop Linkage: Online Metaverse Radiating to Offline Cultural Tourism Markets** Linking multiple online cultural tourism destinations enables users to browse virtual spaces of different scenic areas across various regions in a one-stop manner, generating interest in offline visits and achieving the goal of driving offline traffic from online engagement. Online virtual promotion provides continuous traffic for offline cultural tourism industries. For example, Travel World VR digitally models major global tourist destinations such as the Eiffel Tower in Paris and the Egyptian pyramids, allowing users to conduct one-stop virtual tours online through VR devices, subsequently provid-

ing sustained motivation for offline visits to these destinations.

## 2.4 Diversified Interactive Games to Create Immersive Experiences

Developing virtual game worlds based on scenic areas allows players to experience the charm of these locations through gaming. Common metaverse interactive games include metaverse murder mystery games and AR/VR interactive games.

**2.4.1 Metaverse Murder Mystery Games** Metaverse murder mystery games integrate traditional murder mystery games with virtual reality technology, using cultural tourism scenic areas as game backgrounds to allow tourists to participate in gameplay while visiting attractions. Tourists can search for clues and solve puzzles within scenic areas to ultimately crack cases. This approach enhances tourist engagement and experience, attracting more visitors and enabling more immersive participation. Another approach transforms murder mystery games into cultural performance forms, using VR technology to present game scenes to audiences. Participants can engage with cultural stories within the games, experiencing characters' emotions and experiences to enhance their connection with the narratives. Thus, China's cultural tourism metaverse murder mystery games can be rooted in traditional Chinese culture, organically integrating games with cultural elements. For example, the creative team behind the script *Thousand Buddha Dreams* spent five years researching Dunhuang culture, using Dunhuang artifact auctions as the story's starting point to connect historical memories of cultural relic loss, popularizing relevant Dunhuang culture in an educational and entertaining manner [5].

**2.4.2 AR/VR Interactive Games** Based on augmented reality (AR) or virtual reality (VR) technology, these games combine game content with the real world, enabling players to interact with the real world within virtual environments. For instance, in museums, players can scan QR codes on exhibits or use mobile applications to enter virtual game worlds, interacting with exhibits and learning related knowledge. While providing gaming services, reasonable payment systems such as membership, point cards, or buyout models can be implemented, referencing online game recharge designs. If high-quality game content can be created to provide excellent user experiences, users' spontaneous promotion will positively impact the dissemination of both tangible and intangible cultural heritage [6]. When promoting China's metaverse overseas, language and cultural differences may become significant barriers, but translation technologies without borders can help China's metaverse overcome language obstacles, enabling overseas users to more easily understand and accept Chinese metaverse culture, products, and services, thereby facilitating international exchange and cooperation.

With the continuous development and popularization of VR, AR, artificial intelligence, blockchain, and other technologies, China's cultural tourism metaverse,

as a new form of cultural tourism experience, will become increasingly mature and sophisticated, possessing enormous development potential. In the future, it will become an intersection of cultural tourism and the digital economy, bringing more realistic and immersive tourism experiences to visitors while injecting new vitality into the global dissemination and promotion of Chinese culture. Simultaneously, the cultural tourism metaverse creates new business opportunities and development space for cultural tourism and performing arts industries. Through digital innovation, more artistic and commercially valuable cultural tourism products and performances can be created, broadening industry development paths and methods. As one of the important directions for China's future cultural tourism and digital economic development, the cultural tourism metaverse will become a new engine and growth point for China's cultural tourism industry.

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