

The Evolution of Memory Construction in Cultural Heritage Documentaries in the Digital Era (Postprint)

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Abstract

[Purpose] In the context of the digital era, cultural heritage documentaries enhance the visual expression and immersive experience of video content through digital technologies and innovative aesthetic means, thereby promoting their dissemination in the process of constructing cultural memory of heritage.

[Method] This paper explores the path transformation of digital technology in enhancing audience experience and expressing cultural memory by analyzing technological innovations in cultural heritage documentaries across visual presentation, narrative form, and sound design.

[Result] Cultural heritage documentaries in the digital era have achieved a transformation in multidimensional approaches to memory construction, not only strengthening the expression of cultural memory but also prompting audiences to resonate with collective identity memory during interactive processes, thereby fostering identification and cultural edification.

[Conclusion] With the exploratory integration of artificial intelligence technology, the creation of cultural heritage documentaries has once again ascended to new heights, achieving a dual leap in both the depth and breadth of memory transmission.

Full Text

Preamble

A Study on the Evolution of Memory Construction in Cultural Relic Documentaries in the Digital Age

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Abstract

[Objective] In the context of the digital age, cultural relic documentaries enhance visual expression and immersive experiences through digital technology and innovative aesthetic approaches, thereby promoting the dissemination of cultural memory during the construction process. **[Method]** This paper explores the evolution of digital technology's role in enhancing audience experience and cultural memory expression by analyzing technological innovations in visual presentation, narrative forms, and sound design of cultural relic documentaries. **[Result]** Cultural relic documentaries have achieved a multidimensional transformation in memory construction in the digital age, not only strengthening cultural memory expression but also fostering resonance between audiences and collective identity memory during interactive processes, thereby promoting cultural identity and edification. **[Conclusion]** With the exploratory integration of artificial intelligence technology, the creation of cultural relic documentaries has once again ascended to new heights, achieving a dual leap in both the depth and breadth of memory transmission.

Keywords: cultural relic documentary; cultural memory; digital technology; artificial intelligence; memory transmission

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1. The Evolutionary Impact of Digital Age Technological Innovation on Cultural Relic Documentaries

Given that analyzing the digital age's impact on cultural relic documentaries benefits from a historical perspective, we briefly divide the development of cultural relic documentaries into three stages for holistic discussion: early, development, and innovation. The early stage spans from the early 20th century to the mid-20th century. In other words, from the birth of documentaries in China to the prosperous period of news documentaries in the mid-20th century. The 1905 filming of *Dingjunshan* inaugurated Chinese documentary production. Influenced by political turmoil, early documentaries primarily served propaganda functions. In 1918, the Commercial Press established its Motion Picture Department, producing five categories of films: scenic, current affairs, educational, ancient drama, and new drama [1]. Scenic films such as *Putuo Scenery* and *Beijing Scenic Spots* introduced the nation's historical sites and could be considered the early stage of cultural relic documentary development, though these works mostly adopted an "observational" approach, failing to fully contextualize these landmarks. During this period, documentaries were produced on film using tra-

ditional equipment and techniques, resulting in low image flexibility, numerous group shots, linear narrative structures, and monotonous visual effects. In early documentary creation, scenic, current affairs, and educational films all fell under the category of news documentaries, bearing strong propaganda and historical value, thus cultural relic subjects were incorporated into news documentaries.

On December 24, 1953, the Central People's Government Administrative Council's decision on strengthening film production stated: "News documentaries should more timely and truthfully report the achievements of our people in socialist industrialization and transformation, as well as their contributions to world peace, and systematically film our motherland's beautiful rivers, scenic spots, historical sites, important products, and cultural relics" [2]. Cultural relic documentaries thus entered a developmental stage. For instance, the 1958 Central Newsreel and Documentary Film Studio production *Underground Palace* used mobile dolly shots to authentically record the initial excavation of Dingling, prompting public reflection on archaeological discoveries. The 1979 production *Silk Road*, involving natural, ethnic, and cultural relic elements along the Silk Road, presented the prosperity of this ancient route through combined macro and micro perspectives, introducing open production consciousness to the documentary field. Notably, this work broke from the conventional format of narration over static images, employing host interviews to investigate Great Wall sites and local living conditions—a documentary style attempt that profoundly influenced later documentary creation.

From the perspective of digital age development, the Ministry of Industry and Information Technology divides China's digital transformation into three stages based on information technology maturity: informatization (1956–2003), business digitalization (2003–2016), and digital transformation (2016–present) [3]. Evidently, the early stage of cultural relic documentaries had not yet entered the digital era. By the development stage, with national policy support and the rise of digital technology, documentary production underwent increasing changes, and under these dual influences, the aforementioned works with high cultural and historical value gradually emerged. During this period, documentary concepts began to update, with the number of cultural relic documentary works rising rapidly and production quality steadily improving. Since the 21st century, digital technology has comprehensively permeated all industries. Driven by technological progress, applications such as high-definition imaging, 3D reconstruction, and CG have significantly enhanced visual expression and immersive experiences. Cultural relic documentaries have thus entered an innovation stage, undergoing substantive transformation. Works such as *Masters in the Forbidden City* (2016), *Every Treasure Tells a Story* (2018), and *Paintings Within Paintings* (2022) employ flexible perspectives, vivid scenarios, and diverse styles to create masterpieces in cultural relic documentary production.

The digital age refers to a stage of social development driven by the internet and digital technology as core forces, encompassing digital education, digital technology, and digital life, which has profoundly transformed people's production,

lifestyle, and modes of thinking. “Digital existence” has prompted continuous application of technological products such as computer technology, digital technology, and advanced photography in image production. Since their inception, documentaries have been renowned for their “authenticity,” which refers to an assumed authenticity—whether constrained by external or internal factors, works cannot guarantee complete authenticity. The rise of digital technology has, to some extent, opened another path for creative treatment of reality in documentary production.

As the era has progressed, documentary genres have continuously enriched. Cultural relic documentaries focus on presenting objects with historical, cultural, artistic, or scientific value. After the founding of New China, cultural construction flourished, and cultural relic documentaries gradually emerged. Early works mostly featured static displays of cultural relics, emphasizing their historical value and archaeological discoveries. Entering the new era, under the influence of “digital existence,” cultural relic documentaries integrate the static and dynamic aspects of objects, the reproduction and generation of images, and emotional resonance and interaction, constructing profound cultural landscapes from multiple dimensions. These changes manifest not only in form but also in content. Transformations in technical means and aesthetic innovation are reshaping the expression of cultural memory, while audiences engage in aesthetic reception within the digitally constructed image world, forming a bidirectional interactive model.

2. The Evolutionary Path of Memory Construction in Cultural Relic Documentaries in the Digital Age

Human memory construction is a dynamic process involving encoding, consolidation, and reconsolidation—each stage being crucial for memory maintenance. As science and technology advance daily, documentary expression methods continue to innovate, and collective memory undergoes continuous integration and reshaping. Just as museums serve as “sites of memory” —important venues for preserving national memory—cultural relics, as media carrying historical culture, can trigger deep-seated memory switches in audiences’ hearts [4]. Documentaries focusing on cultural relics, as unique storage media for memory, break through spatiotemporal limitations to reshape and vividly present historical memory.

2.1 From Representation to Reconstruction: Reconfiguring Memory Contexts

Historicity, as an essential characteristic of cultural relic documentaries, means that audiences inevitably experience a sense of unfamiliarity when encountering cultural relic content bearing cultural memory. To break this strangeness, documentary creators have transitioned from planar to three-dimensional generation in filming cultural relic documentaries, surpassing previous single-dimensional appearance representation and moving toward multidimensional reconstruction

and dynamic derivation, thereby creating diverse memory contexts for audiences and enhancing memory penetration. The documentary *Paintings Within Paintings*, when presenting Zhang Xuan's Tang Dynasty painting *Spring Outing of the Lady of Guo State*, employs digital restoration and 3D modeling to transform static relics into dynamic forms, unveiling millennia-old mysteries. The production meticulously examines each figure in the painting, determining the specific location of the Lady of Guo State. Historical memory is flexibly interpreted through the dynamic trajectories of figures and scenery in the painting, full of rhythm and cadence, while concretely and perceptibly restoring the historical and cultural context of the event—presenting the high-spirited spring outing scene of the Lady of Guo State and her entourage in 752 CE.

Cultural memory functions through reconstruction, always connecting its knowledge to an actual or contemporary context [5]. As carriers of cultural memory, cultural relic documentaries transcend previous complete documentary records of relics, employing technological means to introduce new perspectives. Digital technology reconstructs memory contexts while imbuing them with new connotations. For instance, Episode 2 of the documentary *The Forbidden City in 100* extends from the center of the Forbidden City—the squares of the Hall of Supreme Harmony and the Gate of Supreme Harmony—to traditional Chinese courtyards, using 3D animation to generate courtyard layouts with changing seasons, presenting the entire mimetic field of the Forbidden City. Documentary creators fully utilize digital technology to conduct digital modeling of China's largest and most complete ancient architectural complex, then analogize it with familiar courtyards from daily life, fully stimulating audience imagination to understand the ethical significance of mutual care and watchfulness behind such interconnected courtyard designs, thereby activating the spatial domain of cultural memory.

Moreover, under technological iteration, new documentary forms gradually emerge—VR interactive documentaries, whose viewing methods transform, allowing audiences to continuously explore various forms of cultural memory generation within the image world. For example, *Ancient Books Journey* (2023), China's first VR interactive documentary recreating the four major ancient literature discoveries of the early 20th century, enables users to experience the history recorded in ancient books in a more immersive manner, achieving unprecedented “zero-distance” contact with cultural relics. Additionally, the currently in-production large-scale 8K historical relic documentary *Millennium Relics* will incorporate cutting-edge technologies such as 8K+VR, endowing cultural relic display with new vitality and enabling precious cultural heritage to be “unlocked” by modern audiences in more authentic and vivid ways. VR interactive documentaries not only enhance the sense of immersion in cultural memory but also provide audiences with opportunities to understand history from different perspectives, making cultural heritage more vivid and multidimensional, and allowing memory contexts to be modernistically reconstructed. This form not only revives relics and memories but also continues cultural veins and resonance through the fusion of technology and emotion.

2.3 From Macro to Micro: Extending Memory Pathways

As media continuously evolve, the forms of memory inevitably change accordingly. With the rise of the digital age, cultural relic documentaries, while narrating historical memory, also integrate contemporary communicative memory content in their fusion performances, creating a unique contemporary context that connects past and present, spanning China and beyond. Moreover, documentary performance methods are continuously innovating with digital progress, enabling emotional identification and achieving cultural memory communities. China's first "famous paintings turned live-action" documentary *How to Interpret This Painting* selects fourteen representative figure paintings, such as *Emperor Taizong Receiving the Tibetan Envoy* and *Portrait of Prince Guo*, breaking traditional painting narration modes by having actors portray the figures to construct mimetic fields within the paintings, vividly portraying the various states and emotions of the figures in the works, thereby bridging the psychological distance with audiences in a relaxed and natural manner.

Cultural memory is being experienced and continued through narration and performance. Some documentary works, while interpreting plots, both restore historical contexts and continuously rewrite audience memory according to reconstruction principles. These rewriting principles involve not only combination and processing from the creator's perspective but also real-time interaction with audiences through bullet comments, indirectly allowing audiences to become weavers of past and present memories with a sense of virtual co-presence. The documentary *Starting from the River*, in its narration of the King of Painted Pottery—the water ripple painted pottery basin, incorporates numerous modern daily popular expressions such as "Taobao," "mix-and-match style," and "traffic password." The work contains both the timeless charm of classical culture and witty interpretations of modern culture.

"Media, as material support, plays a fundamental role in sustaining cultural memory and interacts with human memory" [6]. Under digital technology's impetus, new media forms—interactivity—enter narrative, and images possess a certain extensibility. Audiences intervene in memory generation while constructing memory, expanding the temporal and spatial scope of memory. When *How to Interpret This Painting* presents the Tang Dynasty masterpiece *Court Ladies Preparing Newly Woven Silk*, bullet comment interactions mostly consist of praise and reflective discourse. However, these cultural memory media rarely mention the exotic beasts and scenes referenced. During production, Feng Bin mentioned utilizing various AI tools such as ChatGPT, Midjourney, Jimeng, and Keling for script conception and animation generation, while also delving into ancient texts to find relevant materials, using AI to parse obscure vocabulary and optimize expression. With digital technology support, the documentary *Classic of Mountains and Seas* was completed vividly. The work showcases both the unique charm of ancient culture and innovative applications of artificial intelligence in creative fields.

In the digital cultural context, the fluidity, mobility, and interactivity of communication platforms have generated user-participatory content production models, strengthening immersive, fragmented, and fun-filled user experiences, gradually forming a decentralized and personalized trend in aesthetic evaluation. This creates a new aesthetic evaluation form that both confronts and coexists with traditional authoritative interpretation and criticism mechanisms [8]. To align with contemporary communication ecology, cultural relic documentaries have transformed in form and content, attempting to present works through “micro-production” formats—distinct from the serialized works of the development period. Thematic expression has also shifted from grand, magnificent relic records to detailed, exquisite relic narration, gradually expanding the scope of relics and extending the pathways of cultural memory construction. For instance, CCTV Documentary Channel’s *Every Treasure Tells a Story* carefully selects one hundred national treasures, narrating stories in five-minute episodes. To reveal relic details, it employs 3D capture, micro-trace extraction, and other technologies, increasing application of new multimedia technologies. Professor Zhang Tongdao, Director of the Documentary Center at Beijing Normal University, stated at the premiere: “*Every Treasure Tells a Story* conveys the weight of cultural relics through the most modern and popular artistic methods, making documentaries, especially short films, become light cavalry in civilization dissemination.”

Currently, an increasing number of cultural relic documentaries adopt “micro-documentary” expression methods to broaden relic narration pathways. China Media Group’s documentary *Art in China* uses 3D technology to vividly display classic works from major art museums nationwide, similarly employing short-episode formats to focus on specific artworks and relics’ details, narrating their historical, artistic, and cultural value to evoke audience resonance with national identity and history, enhancing multi-layered understanding of cultural memory. Other examples include *Relics Online* and *Stories in National Treasures*, all employing this narration method. While maintaining educational and artistic qualities, cultural relic documentary production trends toward micro-cosmic content and form. Through concise narration and high-quality visual effects, audiences can not only clearly understand each relic’s uniqueness but also find more personalized cultural experiences within fragmented information, forming new cultural identities and memory pathways.

Cultural relic documentaries in the digital age are not merely reproductions of history and culture but dynamic carriers of memory construction. While relics primarily rely on exhibition venues for memory restoration, daily temporal and spatial constraints create a certain “fluid gap” across regions. The rapid acceleration of the digital age allows audio-visual-based film art to stitch audience memory gaps anytime and anywhere, deepening communicative memory while expressing cultural memory’s unique charm. Given their encompassing social, historical, and artistic values, documentaries have effectively combined with relics from their inception and will continue to play a crucial role in relic documentation and dissemination as the era progresses. Evidently, the evolutionary

path of memory construction in cultural relic documentaries in the digital age will remain a dynamically developing process.

3. Digital Memory Exploration in Cultural Relic Documentaries Driven by Artificial Intelligence

Digital memory is cultural memory in digital form, carrying various genes and characteristics of cultural memory and digital information. Simply put, it is a memory form that collects, organizes, stores, and displays specific objects' historical and cultural information digitally, bearing, reproducing, and disseminating memory in cyberspace [9]. Against the backdrop of the digital age, the rise and development of artificial intelligence technology continuously empower film and television creation and communication while entirely reshaping cultural memory generation. Documentaries, as an art of "authenticity," face adaptation obstacles when encountering content generated by AI branches—generative artificial intelligence based on "authentic situations"—making the challenge of turning challenges into opportunities a question requiring time to answer. Whether documentary types focusing on cultural relics can employ emerging technological means for cultural recollection and scene reconstruction of past events, or conduct imaginative construction around relevant materials, also warrants in-depth analysis.

Generative artificial intelligence technology primarily involves four domains: text generation, image generation, audio generation, and video generation. In text writing, such technology can provide creators with rich inspiration sources and creative materials based on "authentic materials." For example, the May 2024 release of the new AI-archaeology documentary *Crossing Modaochan* successfully reconstructed prehistoric human images through advanced digital human technology and AI large models, enabling audiences to transcend spatiotemporal boundaries and directly observe and understand the physical characteristics of early Guangdong residents, stimulating audience interest and exploration desire while obtaining immersive experiences. AIGC clearly empowers cultural relic documentaries to simulate historical figures' reactions and states under the premise of restoring historical scenes, acquiring digital memory forms and making cultural memory generation more vivid.

In August 2024, Feng Bin' s original AIGC documentary *Classic of Mountains and Seas* followed the original work' s sequence, using digital technology to reproduce the exotic beasts and scenes described in the book. During production, Feng Bin mentioned utilizing various AI tools such as ChatGPT, Midjourney, Jimeng, and Keling for script conception and animation generation, while also delving into ancient texts to find relevant materials, using AI to parse obscure vocabulary and optimize expression. With digital technology support, the documentary *Classic of Mountains and Seas* was completed vividly. The work showcases both the unique charm of ancient culture and innovative applications of artificial intelligence in creative fields.

The October 2024 archaeological documentary *Jinling Memory: Changgan Ancient City* similarly introduced AIGC technology, presenting a new historical perspective of Nanjing and endowing traditional archaeological documentaries with new life. With artificial intelligence, documentary teams can achieve rapid data analysis and image generation, displaying more intuitive and vivid historical scenes.

We can see artificial intelligence technology being increasingly widely applied in film production. Although generative artificial intelligence demonstrates enormous potential in cultural relic documentary creation, it still faces numerous challenges, such as the authenticity and accuracy of generated content, how to effectively balance the relationship between AI and human creators, and intellectual property protection issues that require consideration.

However, we need not be overly concerned about the future development of generative artificial intelligence technology; instead, we can adopt a positive attitude. Just as previous technological revolutions have propelled human civilization forward, “the subject of future content creation will still be humans. The tool attribute of artificial intelligence will not change, only become increasingly powerful. It cannot replace the creative subject, whether professional or amateur creators” [10]. Artificial intelligence should be viewed as an auxiliary tool to help creators more efficiently realize conception and creation, thereby expanding artistic expression boundaries and enriching audience cultural experiences.

“If books disappeared, history would vanish, and humanity would perish. ... Books are not only the arbitrary summary of our dreams and memories; they also provide models for our self-transcendence.” Although Sontag’s subject was books, as memory carriers, documentaries similarly serve as cultural compendiums under different technological developments, providing audiences with different memory nutrients to achieve national identity and continuation of image culture. The new era’s directive on strengthening cultural heritage protection and inheritance, and promoting excellent traditional Chinese culture, states that we must “let relics speak, let history speak, let culture speak” [11]. Cultural relic documentaries precisely follow this development strategy for exploration. They not only bear the responsibility of explaining and interpreting historical relics but also play a crucial role in promoting traditional culture.

The rapid development of digital technology has driven innovation and transformation in cultural relic documentaries, endowing traditional culture dissemination with diversified expression. Through digital means, cultural relics are no longer confined to museums and history books; they integrate into public daily life in more vivid and immersive ways, allowing people to experience the weight of history and the charm of culture in relaxed and pleasant atmospheres. By connecting historical memory with contemporary memory through images, cultural relic documentaries not only achieve digital preservation of cultural memory but also bring entirely new possibilities for traditional culture dissemination. However, in the wave of artificial intelligence technology, while cultural

relic documentaries have encountered unprecedented opportunities, they have also entered a realm full of unknown challenges.

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