

Digitally Empowered Inheritance and Innovation of Arts and Crafts: Integration of AIGC and Cross-Disciplinary Technologies

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Abstract: As a vital vehicle for cultural transmission and a core of industrial innovation, arts and crafts hold an important place in both historical and national cultures. With the progression of the times and the maturation of digital technologies, new opportunities and challenges have emerged for the inheritance and innovation of arts and crafts. Artificial intelligence (AI) plays a key role in intelligent design, content generation, and recommendation systems, while virtual reality (VR) and augmented reality (AR) technologies are instrumental in immersive presentation and interactive experiences. Generative large models have enhanced design efficiency and creativity in the field of arts and crafts. This paper systematically analyzes the application of digital technologies and AIGC (Artificial Intelligence Generated Content) in arts and crafts, exploring how cross-disciplinary technological integration and continuous innovation provide new momentum and opportunities for their inheritance and development.

Keywords: Arts and Crafts; Digitization; AIGC; Virtual Reality

1. Introduction

1.1 Research Background and Significance

Arts and crafts serve as both a vessel of historical culture and a symbol of national identity, holding irreplaceable significance in cultural inheritance and industrial innovation. Their unique techniques and artistic styles vividly reflect the socio-cultural contexts, customs, and aesthetics of specific historical periods, enabling a deeper understanding of cultural connotations and artistic achievements across eras. As craftsman Chen Zhifo noted, the development of arts and crafts must resonate with the spirit of the times and cannot exist

detached from it. Their evolution embodies the integration of contemporary aesthetics and a strong sense of contemporaneity [1].

The techniques of arts and crafts, as key components of intangible cultural heritage, are crucial for preserving cultural diversity and richness. The design and production of crafts drive the development of related industrial chains, spurring economic activity across materials, manufacturing, and sales. Innovation in this domain spans improvements in techniques and materials as well as novel design concepts and forms of expression. As a pillar of the cultural and creative industries, arts and crafts provide a solid foundation for the sector's development, fostering mutual advancement with film, animation, games, and other creative fields through cross-disciplinary collaboration.

Today, the rapid advancement of digital technologies and AIGC (Artificial Intelligence Generated Content) has demonstrated immense potential across various sectors. Big data and cloud computing support comprehensive data collection, storage, and analysis, allowing industries to better understand market needs and user behaviors, thereby optimizing product design and services. AI—particularly deep learning and natural language processing—enables machine perception and understanding akin to humans, with widespread applications in image and speech recognition, and recommendation systems [2]. AIGC combines AI with content generation to produce text, images, music, and more. In arts and crafts, AIGC aids creation by offering inspiration and design schemes via generative models, greatly enhancing efficiency and innovation. It also plays a crucial role in virtual exhibitions by generating high-quality virtual content, enabling immersive experiences through VR and AR. Digital museums and online platforms allow users to interact with artworks remotely, breaking the limitations of traditional exhibitions. Altogether, digital technologies and AIGC foster

powerful innovation and deeper industry integration.

1.2 Research Purpose and Methodology

Amid the rapid development of digital technologies and AIGC applications, arts and crafts face unprecedented opportunities and challenges. This paper investigates how digital technologies specifically empower the inheritance and innovation of arts and crafts, proposing practical strategies to revitalize this traditional field in the modern era.

Using a literature review method, this paper surveys the current state and trends of digital technology and AIGC in arts and crafts, identifying key technologies and innovative models. It also employs case study analysis to explore successful domestic and international examples, examining practical effects and experiences of digital integration in the field.

2. Current Status of Inheritance and Innovation in Arts and Crafts

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2.1 Current Status of Inheritance

At present, arts and crafts are mainly inherited through four modes: traditional master-apprentice systems, vocational education and training, intangible cultural heritage protection projects, and digital documentation and dissemination. With technological advancement, digital methods play an increasingly important role. Techniques can be recorded comprehensively via video, images, and textual archives, enhancing the efficiency and accuracy of preservation and communication. The rise of internet media and self-media platforms has also opened broader and more convenient channels for dissemination [3]. However, field data reveals that many inheritors and practitioners lack digital literacy, leading to ineffective digital outreach and underutilization of internet and new media advantages. Thus, the transmission of arts and crafts—caught between traditional and modern approaches—faces challenges such as skill loss, market shifts, funding shortages, lack

of innovation, and slow digital promotion, all of which urgently require multifaceted solutions.

2.2 Current Status of Innovation

China's long-standing tradition in arts and crafts encompasses ceramics, lacquerware, embroidery, traditional calligraphy, clay sculpture, and more—each bearing rich cultural heritage. With the rise of the big data era, computer-aided design (CAD) is rapidly driving the industry forward. As an integral part of CAD, 3D digitalization complements rapid prototyping technologies and accelerates the transformation of traditional crafts towards intensification, intelligence, and diversification [4].

Traditional craftsmanship faces serious survival threats. Older artisans are dwindling, and younger generations lack effective pathways for learning, placing many forms of intangible heritage at risk. Meanwhile, modern society's limited awareness and preference for mass-produced goods over handmade art exacerbates the crisis.

Digital technologies have significantly fueled innovation in arts and crafts. CAD and 3D printing have made complex designs and intricate craftsmanship more accessible and efficient. These tools not only boost productivity but also broaden creative possibilities. Furthermore, VR and AR offer new presentation formats that are convenient and long-lasting [5], providing immersive experiences that expand the boundaries of traditional exhibitions. Audiences can appreciate and interact with artworks via online platforms, enriching both the reach and depth of artistic communication. Nonetheless, digital empowerment faces multiple challenges: traditional techniques are often too complex for simple "copy-paste" solutions; modern aesthetics differ from traditional ones, raising questions about how to honor tradition while meeting contemporary needs. Current digital tools tend to emphasize display and virtual printing, lacking the tactile engagement of manual creation, which may diminish artistic and cultural value.

3. Integrative Innovation of Digital Platforms and Arts and Crafts

3.1 Categories and Features of Digital Technologies

Big data enables deep cultural insights and market analysis through large-scale data collection and processing. Key characteristics

include vast volume, diversity, high speed, and low value density. In the cultural sector, big data is applied in behavior analysis, consumption trend prediction, and heritage preservation—helping institutions optimize content and outreach strategies.

AI—especially machine learning and deep learning—has wide-ranging cultural applications. It simulates human intelligence in learning, reasoning, and self-correction. In content generation, voice and image recognition, and recommendation systems, AI has drastically increased efficiency and creativity.

VR and AR technologies blend virtual elements with real-world scenes, making learning more interactive and engaging [6]. They immerse users in interactive environments with high realism. In the cultural field, applications include virtual museums, immersive exhibits, and AR navigation. VR allows users to explore famous global artworks, while AR adds historical and cultural information during real-world visits.

3.2 Presentation Modes of Integrated Platforms

Digital platforms incorporating VR, AR, interactive exhibitions, virtual museums, and AIGC greatly enrich the presentation, interactivity, and immersion of arts and crafts. These integrations not only enhance user experience and cultural dissemination but also support preservation and innovation, revitalizing traditional art through vivid, diverse forms in the digital age [7]. By merging AIGC and cross-disciplinary technologies, digital platforms offer new modes of presentation and engagement, enabling collaborative, open, and interactive environments for creation and inheritance.

These platforms replicate real-world art settings, transcending spatiotemporal limits and allowing intuitive public participation. Innovation lies in their cross-disciplinary nature. As key drivers of inheritance and innovation, they include novel displays, interactive experiences, and educational outreach—redefining and revitalizing crafts through art-tech integration.

3.2.1 VR and AR Display Modes

VR and AR play pivotal roles by creating immersive and interactive experiences. VR builds fully virtual 3D spaces, allowing users to explore artworks freely. Equipped with headsets, users can visit ‘virtual museums’ offering dynamic, multisensory engagement that meets modern audience expectations [8]. AR overlays

virtual content onto real environments via mobile devices or glasses, enhancing understanding through historical background, production process, and artist introductions.

3.2.2 Interactive Digital Exhibits and Virtual Museums

Interactive digital exhibits and virtual museums offer accessible and engaging digital experiences. Exhibits digitize physical displays for online viewing, with multimedia content such as videos, audio, 3D models, and animations. Technologies like touchscreens, gesture recognition, and voice commands enable personalized interaction. Virtual museums, built with VR, provide immersive, full-scale viewing anytime, anywhere. They can also showcase large or fragile artifacts that physical museums cannot, thus broadening cultural communication [9].

3.3 Representative Cases of Digital Integration

The "Digital Palace Museum" is a landmark example. By integrating big data, AI, VR, and AR, the Palace Museum has digitized heritage preservation and exhibition. Users can explore virtual displays and uncover historical narratives, while AI assists in artifact restoration and management. This not only expands display methods but also increases user engagement and interaction.

Google Art & Culture brings together global museums and cultural institutions on one digital platform. With high-res images and VR, users can view global artworks online. AI helps classify and recommend content based on user interests, overcoming geographical barriers and offering cultural exploration anytime.

4. Application of AIGC in the Inheritance and Innovation of Arts and Crafts

4.1 Applications of AIGC in AR and VR Environments

The integration of Artificial Intelligence Generated Content (AIGC) into Augmented Reality (AR) and Virtual Reality (VR) environments has significantly transformed how arts and crafts are displayed, experienced, and interpreted. Unlike traditional static or scripted digital content, AIGC-driven AR/VR experiences can dynamically adapt to user interaction, making them more personalized and immersive.

In AR scenarios, AIGC enables the real-time generation of contextual information based on the viewer's perspective or selected artifact. For example, when a viewer scans a traditional ceramic piece using a mobile AR app, AIGC can instantly generate a multimedia explanation—including spoken narrative, visual reconstruction of production techniques, or even a 3D rendering of its cultural origin—all tailored to the viewer's interest profile. This makes the learning process not only interactive but also adaptive, catering to a wider demographic with varying levels of expertise.

In VR environments, AIGC allows for the construction of generative exhibition spaces that evolve in real time. These environments are not pre-designed but are algorithmically composed based on thematic or emotional cues. For instance, when displaying a collection of Miao embroidery, the background scene can shift according to the color schemes or motifs selected by the user, thus enhancing the overall immersive narrative. Moreover, AIGC-powered virtual guides can simulate natural human behavior, allowing voice interactions, questions and answers, or recommendations based on the user's path through the virtual space. This dramatically elevates user engagement and cultural understanding, especially in remote education or virtual tourism contexts.

From an educational standpoint, these immersive learning environments democratize access to craftsmanship knowledge. Students can virtually "handle" artifacts, simulate traditional production steps, or even engage in gamified quizzes that test their knowledge—all generated in real time by AIGC models trained on domain-specific datasets.

4.2 Applications of AIGC in Virtual Exhibition Platforms

Virtual exhibition platforms benefit immensely from AIGC technologies, particularly in automating content creation and maintaining user interest through fresh, relevant, and personalized experiences. Traditional digital exhibitions require considerable manual input to develop exhibit descriptions, audio guides, and interactive elements. AIGC can streamline these processes by auto-generating multilayered content based on the characteristics of the exhibits and user data. For example, AIGC can automatically produce multilingual descriptions of artifacts, generate interactive timelines of historical evolution, or synthesize background

music aligned with the cultural context of an exhibit. This not only reduces the curatorial workload but also enriches the exhibition's depth and interactivity.

Furthermore, AIGC enables real-time adaptive storytelling. As a user browses through the exhibition, the platform can adjust the narrative style—shifting from academic to colloquial, or from linear historical storytelling to comparative cross-cultural analysis—based on user preferences and interaction history. Such adaptive systems help bridge the cognitive gap between general audiences and academic content, thereby expanding the reach and impact of cultural heritage education.

In terms of accessibility, AIGC-generated sign language interpretation, audio narration for visually impaired users, and simplified content summaries for children or non-expert audiences enhance the inclusiveness of virtual cultural platforms. It also allows integration with social platforms, enabling users to share AI-generated summaries or image-based stories of their virtual visits, thus amplifying digital dissemination of arts and crafts culture.

4.3 AIGC in Innovative Design of Traditional Crafts

In recent years, the traditional crafts industry has faced stagnation due to long production cycles, limited sales channels, and a shrinking workforce. According to the National Bureau of Statistics, from January to December 2021, the number of employees in large-scale arts and crafts manufacturing enterprises was 687,000, a 3.2% decrease year-on-year. AIGC can be applied in ceramics, brocade, woodcarving, and jewelry design, where generative models automatically produce innovative and aesthetically valuable designs. New ceramic patterns, textile motifs, carving models, and jewelry sketches can be generated, incorporating traditional cultural elements and modern design concepts [10]. Designers then select and refine AIGC-generated sketches to create unique products that are well-received by the market—greatly improving creative efficiency and artistic expression.

5. Conclusion

5.1 The Transformative Role of AIGC in the Inheritance and Innovation of Arts and Crafts

Artificial Intelligence Generated Content (AIGC) has emerged as a transformative force in the realm of arts and crafts, offering unprecedented tools and methodologies that bridge traditional techniques with the demands of the digital age. In terms of cultural inheritance, AIGC addresses many of the limitations associated with traditional pedagogical models, such as the inaccessibility of master-apprentice training or the gradual fading of intangible knowledge. By simulating traditional styles, mimicking historical motifs, and visualizing procedural workflows, AIGC provides learners, researchers, and artists with an expansive, low-barrier entry point into the world of craft traditions.

Through deep learning algorithms and pattern recognition, AIGC is capable of mining vast cultural databases to extract nuanced features of regional craftsmanship—such as brushstroke rhythms in calligraphy or proportional standards in woodcarving. These insights can then be algorithmically transformed into teaching aids, digital training modules, or even evaluation tools for novice practitioners, thereby standardizing the learning curve while maintaining aesthetic diversity.

From an innovation standpoint, AIGC fosters a new paradigm of co-creation between human imagination and machine computation. Whereas traditional innovation was constrained by time, material, and human capacity, AIGC enables rapid prototyping, cross-style blending, and idea amplification at unprecedented scales. For instance, combining Tang Dynasty silk patterns with Bauhaus geometries is no longer a hypothetical design challenge but a practical outcome of generative aesthetic algorithms. This aesthetic recombination opens the door for transnational and cross-temporal collaborations, making traditional crafts more accessible and relevant to global audiences.

Moreover, AIGC is aligned with the current movement toward sustainable and adaptive production. By minimizing manual iterations and reducing resource waste in the early design phase, AIGC empowers artisans and small workshops to produce customized, limited-edition works efficiently—an approach that aligns with modern consumer demands for uniqueness and ecological consciousness.

Perhaps most critically, AIGC shifts the role of the craftsman from a solely manual executor to a conceptual curator and creative director, enhancing their agency in the digital economy.

This reconceptualization strengthens the position of craftspeople within the creative industries value chain, potentially reversing the marginalization of traditional arts.

5.2 Future Directions and Outlook

The future development of arts and crafts under the influence of AIGC and cross-disciplinary integration is poised to enter a phase of comprehensive transformation. As AIGC technologies continue to evolve, their role will not be limited to auxiliary tools for design and display but will expand to become active participants in cultural production and dissemination. The inheritance and innovation of arts and crafts will increasingly rely on the collaborative synergy between human creators and intelligent systems, prompting a redefinition of traditional craftsmanship in the context of digital civilization.

To fully realize the potential of AIGC in this field, it is essential to construct domain-specific generative models grounded in authentic cultural databases. These models should incorporate regional styles, symbolic aesthetics, material processes, and historical narratives to ensure that the outputs of generative systems reflect cultural depth rather than superficial design patterns. Moreover, the ethical implications of AI-assisted design must be taken seriously. Issues such as authorship, intellectual property rights, and the possible decontextualization of traditional motifs call for clear regulatory frameworks and a heightened awareness of cultural sensitivity among practitioners and developers alike.

Education will also play a key role in shaping the future of AIGC-driven arts and crafts. Training a new generation of designers and artisans who possess both aesthetic literacy and computational thinking will be crucial. Universities and vocational institutions should incorporate AIGC tools into their curricula, fostering students' ability to critically assess and creatively engage with AI-generated content. This educational reform will help bridge the gap between traditional handcraft methods and algorithmic design logic, ensuring that human creativity remains central in the age of intelligent machines.

In addition, AIGC provides a unique opportunity for arts and crafts to transcend disciplinary and geographic boundaries. As digital craftsmanship merges with fields such as fashion, digital media, gaming, architecture, and cultural tourism, new

forms of hybrid design will emerge, blending traditional cultural elements with cutting-edge technologies. AIGC will thus become a vital connector between the heritage arts and the global digital economy, contributing to the construction of a more diverse and inclusive creative ecosystem.

From the perspective of cultural diplomacy, the algorithmic reinterpretation and international dissemination of traditional arts through AIGC can also enhance cultural exchange and national soft power. Digital exhibitions, virtual museums, and AI-curated cultural narratives can present the richness of intangible heritage to global audiences in more accessible and engaging formats, fostering intercultural dialogue and appreciation.

In summary, the integration of AIGC into the arts and crafts sector signifies not only a technical revolution but also a paradigmatic shift in how we understand, preserve, and innovate tradition. As digital intelligence and human creativity continue to intertwine, the arts and crafts of the future will be characterized by greater openness, personalization, and global connectivity—ushering in a new era where tradition is not preserved as a static relic, but dynamically regenerated through continuous reimagination and technological co-creation.

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