

A Study on the Pathways to Innovation in the Design of Enshi Nuo Mask Cultural and Creative Products Driven by AIGC

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Abstract: Against the backdrop of growing attention to digitalization and the preservation of intangible cultural heritage, Enshi Nuo masks—as a distinctive cultural symbol of the Tujia region—face developmental challenges such as a generational gap in transmission, insufficient exploration of their cultural significance, and homogenization of cultural and creative products. The in-depth application of Generative Artificial Intelligence (AIGC) technology offers new possibilities for overcoming these challenges. This paper first elaborates on the technical principles of AIGC and its current applications in the field of cultural and creative design; second, it systematically examines the regional cultural context, artistic characteristics, and transmission challenges of Enshi Nuo masks; subsequently, it outlines an innovative pathway for AIGC to empower the cultural and creative design of Enshi Nuo masks; finally, using the generative design practice of the picture book *The Little Carpenter and the Mask God* as a case study, it demonstrates the end-to-end application of AIGC tools in plot generation, storyboarding, character development, and illustration. The study indicates that AIGC technology can effectively enhance design efficiency and revitalize the cultural representation of intangible cultural heritage (ICH), but its successful application requires support from high-quality cultural databases and effective human-machine collaboration capabilities. In the future, we should adhere to the ethical boundaries of cultural authenticity and promote the deep integration of AIGC with the ICH cultural and creative industry.

Keywords: Generative Artificial Intelligence (AIGC); Enshi Nuo Masks; Regional Culture; Cultural and Creative Product Design; Intangible Cultural Heritage Preservation.

1. Introduction

Against the backdrop of accelerating globalization and modernization, intangible cultural heritage represented by the Enshi Nuo masks faces unprecedented challenges to its survival and development. As a key medium in Nuo opera for communicating with deities and conveying blessings and exorcism, the Nuo mask embodies rich religious, folkloric, and artistic significance. However, traditional Nuo mask culture faces issues such as a lack of successors to carry on the tradition, declining participation in folk activities, insufficient exploration of its cultural significance, and severe homogenization of related cultural and creative products. How to integrate this ancient culture with modern design concepts, digital technology, and market demands to explore a viable path for the inheritance and innovative development of intangible cultural heritage has become a pressing issue that urgently needs to be addressed.

In recent years, the explosive growth of generative artificial intelligence (AIGC) technology has opened up new technical avenues for the creative transformation of intangible cultural heritage. With its powerful multimodal content generation capabilities, AIGC has demonstrated immense potential in areas such as cultural IP development, creative design support, and the creation of immersive experiences. Intangible cultural heritage categories such as Shanxi's ancient architecture and paper-cutting art have successfully leveraged AIGC to enhance design efficiency and achieve innovative cultural revitalization. Against this backdrop, exploring how AIGC can empower the cultural and creative design of Enshi Nuo masks holds significant theoretical value and practical significance for addressing the challenges of its transmission

and promoting the high-quality development of the local cultural and tourism industry.

2. An Overview of Enshi Nuo Mask Culture and Design Challenges

2.1. The Origins and Development of Enshi Nuo Culture

The Nuo customs in southwestern Hubei have a long history. According to historical records, the poem **Liyang Kouhao** by Rongmei Tusi, written during the Tianqi era of the Ming Dynasty, already contained the description: "Every household has a Nuo troupe to ward off evil spirits." Enshi Nuo culture is a unique cultural form that blends local shamanic Nuo traditions, imported opera traditions, and other folk arts, embodying the distinctive characteristics of the Tujia people of Enshi [1]. In 2008, Enshi Nuo Opera was successfully inscribed on the National List of Intangible Cultural Heritage. The Nuo Opera practiced in Enshi City consists of two parts: "Nuo Yuan Xi" (Nuo Wish Opera) and "Tan Nuo" (Altar Nuo). The former has a history of over 320 years, while the latter originated during the Hongwu era of the Ming Dynasty and still preserves its complete ritual ceremonies to this day.

2.2. The Cultural Significance and Artistic Characteristics of Enshi Nuo Masks

Among Nuo opera performers, there is a saying: "Without the mask, I am merely human; with the mask, I am a deity." This fully illustrates the central role of the mask as a symbol of the divine [1]. The Nuo masks of Enshi are not merely performance props; they are also vital conduits connecting

humans with the divine and conveying wishes for blessings and good fortune.

2.2.1. Design Features

The artistic imagery of Enshi Nuo masks is rooted in Nuo opera culture and is primarily divided into three categories: performance masks (benevolent deities, malevolent deities,

and secular masks), ritual masks (Nuo Gong and Nuo Mu), and legendary figures (Hanba and Tunkou). As shown in Table 1. The primary aim of their design is not to achieve “likeness” but to capture the “spirit” of the subject; artisans employ techniques such as exaggeration and distortion to imbue the masks with a Powerful vitality.

Table 1. Classification of Enshi Nuo Masks

	Theatrical Masks				Ritual Objects Masks	Masks of Legendary Figures
	God Mask	Fiend Mask	The Mask of the World			
			Upstanding character	Comical character		
Features	Good-looking, upright, and principled	Gruesome and terrifying	Well-proportioned features, a warm and genuine demeanor	Exaggerated facial expressions and grinning widely	For worship	Imagination and Creativity

2.2.2. Design Features

Enshi Nuo masks are characterized by their vivid colors and a rustic, unadorned style, primarily featuring red, green, yellow, blue, white, and black. As shown in Table 2. Red symbolizes passion and bravery; green represents nature and

vitality; yellow embodies warmth and stability; blue symbolizes wisdom and decisiveness; white represents innocence and kindness; and black highlights simplicity and sincerity. The color schemes strictly adhere to the characters’ personality traits, endowing the masks with rich symbolic meaning.

Table 2. Common Colors of Enshi Nuo Masks

	Red	Green	Yellow	Blue	White	Black
Color Symbolism	Enthusiastic and heroic	Harmonious and serene	Friendly and composed	Wisdom and Courage	Innocent and kind-hearted	Down-to-earth and sincere



2.2.3. Ornamental patterns

The patterns on the masks can be broadly divided into three categories: dragon and phoenix motifs and animal-face designs associated with the worship of nature; cloud and floral motifs symbolizing good fortune; and geometric patterns such as triangles, circles, and spirals that reflect concepts of cosmic order.

2.2.4. Manufacturing Process

Enshi Nuo masks are primarily crafted from soft, crack-resistant poplar wood. The production process involves ten major steps: material selection, sketching, rough carving, fine carving, hollowing out, trimming, sanding, painting, varnishing, and assembly. As shown in Table 3. Each step embodies the wisdom and craftsmanship of the artisans.

Table 3. Classification of Enshi Nuo Masks

Material Selection	Sketch	Rough-milling	Roughing out the blank	openwork
				
Lighting Adjustment	Polishing	Painting	Topcoat	Accessories
				

2.3. The Current State of the Inheritance of Enshi Nuo Masks and Challenges in Cultural and Creative Design

Although local governments and cultural inheritors (such as Tan Xuechao and Wang Rubin) have promoted Enshi Nuo masks through initiatives like establishing master workshops in Enshi’s Nüercheng and hosting Nuo Culture and Arts Festivals under the “Intangible Cultural Heritage + Tourism” model, the transmission and cultural and creative development of Enshi Nuo masks still face multiple challenges [2]. First, cultural exploration remains insufficient; the deep cultural symbolism and spiritual essence behind the

Nuo masks have not been systematically organized or accurately interpreted. Second, product homogenization is severe; the market is dominated by simple replicas of traditional masks or crude souvenirs, lacking innovative designs that align with modern aesthetics. Third, dissemination methods are limited, relying primarily on static displays in scenic areas, with a lack of effective interaction with younger consumer groups; Fourth, design efficiency is low; the lengthy production cycles of traditional handcrafted methods make it difficult to adapt to rapidly changing market demands. These issues urgently require resolution through the application of new technologies and methods.

3. AIGC Technology and Its Current Applications in Cultural and Creative Design

3.1. The Technical Principles and Core Capabilities of AIGC

Generative Artificial Intelligence (AIGC) refers to a set of technologies that utilize massive pre-trained models to learn the distribution of vast amounts of data and automatically generate entirely new content based on user needs or specified conditions [3]. Its core characteristics are reflected in three aspects: first, multimodal input and output capabilities, enabling the simultaneous processing of various data types such as text, images, and audio; second, powerful semantic understanding and generalization capabilities, allowing it to recognize and reorganize traditional symbolic systems; third, significant interactivity and iterative capabilities, supporting collaborative, incremental optimization of creative output between humans and machines. Currently, AI tools such as Midjourney, Keling, Jimeng, and Doubao have been widely adopted in fields including text generation, image generation, audio synthesis, and creative design [4].

3.2. Trends in the Application of AIGC in the Design of Cultural and Creative Products Related to Intangible Cultural Heritage

Currently, the application of AIGC in the field of intangible cultural heritage (ICH) creative design is characterized by three major trends. First, the digital translation of cultural elements: through high-precision scanning and deep learning algorithms, the visual characteristics and structural rules of traditional crafts are converted into multidimensional data formats that can be parsed and reconstructed by computers. Second, the intelligent generation of creative designs: designers can input natural language descriptions or sketches, and AIGC can rapidly generate design proposals that adhere to traditional aesthetic principles while incorporating modern aesthetic elements. Third, the creation of immersive experiences: by leveraging AIGC and VR/AR technologies, exhibition spaces that blend the virtual and the real can be constructed, thereby reshaping the ways in which intangible cultural heritage is communicated and experienced. Successful cases such as Shanxi's ancient architecture-inspired cultural and creative products and digital paper-cutting designs demonstrate that AIGC can effectively enhance design efficiency and revitalize cultural representations. However, there is also a risk of a "discrepancy between form and spirit" due to algorithmic limitations, which requires support from high-quality cultural databases and robust human-machine collaboration capabilities [4].

4. Innovative Approaches to Designing Enshi Nuo Masks as Cultural and Creative Products Through AIGC

4.1. Accurate Identification and Digital Interpretation of Cultural Elements in Enshi Nuo Masks

4.1.1. Intelligent Extraction of Shapes and Patterns

Using AIGC's image recognition and 3D modeling technologies, we perform structural decomposition on the typical forms of Enshi Nuo masks (such as the "Doukou Lingguan," "Nuo Gong and Nuo Mu," and "Tunkou"), extracting core data such as facial proportions, facial features, and contour curvature. Simultaneously, auxiliary patterns—including animal-face motifs, cloud patterns, floral designs, and geometric patterns—are classified and annotated to establish a searchable, reusable database of structured visual elements.

4.1.2. Digital Encoding of Color Symbols

Drawing on the psychological symbolism of the six primary colors—red, green, yellow, blue, white, and black—found in Enshi Nuo masks, and utilizing AIGC color analysis tools, we have transformed traditional color-matching rules into a parametric color-matching mode. This provides a scientific basis for the color design of future cultural and creative products.

4.1.3. In-depth Exploration and Interconnections of Cultural and Spiritual Essence

Using AIGC's natural language processing technology, we conduct semantic analysis and tagging of the core spirit of Enshi Nuo masks—which is to "ward off evil spirits and disasters while inviting blessings and good fortune"—as well as the values embodied by different characters (benevolent

deities, malevolent deities, and secular figures). We then intelligently match these elements with various product design requirements to ensure that cultural and creative products accurately convey the cultural spirit.

4.2. User-Centered Design Based on AIGC Human-Machine Collaboration

4.2.1. Multidimensional Insights into User Needs

Using AI-powered big data analysis tools, we collected and analyzed target users' aesthetic preferences, consumption habits, and feedback on social media and e-commerce platforms [5]. At the same time, we combined offline interviews and observations to comprehensively assess users' acceptance of and demand for cultural elements of Nuo masks. This study found a market gap for educational products designed to introduce children aged 6–12 to this culture. Parents prioritize the educational value and cultural accuracy of such products, while children prefer bright colors and interactive elements.

4.2.2. Detailed User Profiling and Creative Concept Development

Based on the research findings, we developed a dual-core user persona comprising both children and their parents, establishing that the product should be engaging, educational, and culturally accurate. Guided by this approach, we selected the narrative framework of "The Little Carpenter Makes a Nuo Mask," combining the craftsmanship of Nuo mask-making and scenes from Nuo opera with the format of a children's picture book as the core creative direction for the cultural and creative design.

4.2.3. Intelligent Generation and Iteration of Multimodal Design Solutions

Designers input selected cultural elements, user preferences, and creative directions into AIGC tools, which then intelligently generate multiple versions of design concepts, storylines, and storyboard proposals. Through iterative screening and optimization involving human-machine collaboration, the optimal solution is ultimately identified—one that aligns cultural significance, user preferences, and product form.

4.3. AIGC Empowers Immersive Promotion and Smart Marketing of Cultural and Creative Products

4.3.1. Digital Displays and Immersive Experiences

Using AIGC technology, we transform a static picture book featuring Nuo masks into a dynamic video. By applying skeletal animation to each illustration and generating keyframe motion sequences, we bring the images to life. Additionally, the exported video can be embedded as a QR code on the back cover of the physical book, creating a seamless transition between the print reading experience and the digital experience.

4.3.2. Intelligent Generation and Promotion of Multimodal Content

Use AIGC tools to generate creative promotional posters, product descriptions with images, and animated demonstration videos for cultural and creative products. Leverage AI's data monitoring and analysis capabilities to precisely target and promote products to specific user groups (such as parents, educators, and culture enthusiasts) through major shopping apps and social media platforms, thereby increasing product visibility and conversion rates.

4.3.3. Virtual Avatars and Narrative Marketing

Virtual avatars could be introduced as ambassadors for Nuo mask culture. Taking on the personas of “Little Carpenter” or “Nuo Mask Heir,” they could use live streams and short videos to share the stories behind the masks [6], thereby enhancing the product’s cultural appeal and user engagement.

5. AIGC-Empowered Design Practices for Enshi Nuo Masks Cultural and Creative Products: A Case Study of the Picture Book *The Little Carpenter and the Mask God*

5.1. Early Design Phase: AIGC-Based Research, Analysis, and Positioning

This project centers on the culture of Enshi Nuo masks, with the story revolving around “The Little Carpenter Makes the Doukou Lingguan Marshal Ma Nuo Mask.” It is targeted at children aged 6–12 and their parents. Positioned as an “Introductory Picture Book on Intangible Cultural Heritage,” the design aims to convey the craftsmanship of Nuo masks, elements of Nuo opera, and their cultural symbolism to the younger generation in an intuitive and engaging manner through vivid and entertaining illustrated stories.

During the research phase, AI-powered big data tools were used to analyze user reviews and consumption trends in the children’s picture book market, establishing core design principles such as “balancing professionalism with readability” and “avoiding fear of the masks’ appearance.” Simultaneously, through a systematic review of literature and field survey data, a structured knowledge base was constructed covering Nuo mask designs, colors, patterns, production processes, and cultural symbolism, providing high-quality material support for subsequent AI-generated content.

5.2. Mid-Design Phase: AIGC-Based Concept Development and Proposal Generation

5.2.1. AI-Assisted Generation of Storylines and Storyboards

Using the Doubao AI tool, after entering instructions such as “Based on the Nuo masks of Enshi, Hubei, with a young carpenter as the protagonist, depicting the process of crafting a Nuo mask from wood and scenes from Nuo opera, aimed at introducing children to intangible cultural heritage,” the AI automatically generated a complete 16-page story outline for a picture book. Upon further input such as “Plan the 16-page storyboard and visual design” and “Design character dialogue and narration,” the AI provided a detailed storyboard script, including scene descriptions, character actions, dialogue, and narration text for each page.

5.2.2. The Intelligent Development and Evolution of the Protagonist’s Character

Using Doubao AI to generate a description of the young carpenter “A Mu”: “A boy around 12 years old, with a sturdy build, short black hair, thick, dark, arched eyebrows, and large, bright eyes. He wears a blue short-sleeved shirt, brown homespun pants, and a khaki canvas apron, incorporating typical features of the Tujia people of Enshi. The description was then converted into a prompt to generate a preliminary image in Midjourney, which was subsequently stylized using Jiemeng AI to produce a final image of the young carpenter that aligns with the concept. As shown in Figure 1-3.



Figure 1. MJ's screenshot



Figure 2. The screen after Ji Meng made the changes



Figure 3. Stylized image

5.2.3. Batch Generation and Style Control of Picture Book Illustrations Using AI

Based on the storyboard script, Midjourney prompts were generated page by page in the following format: “Cartoon illustration style + scene description + character actions + detail requirements + aspect ratio (16:9)”. Taking the second page as an example, the prompt reads: “A cartoon illustration shows a little boy standing in front of a wooden workbench, gently wiping the Nuo masks on the shelf with a soft cloth...”. Through multiple attempts and parameter adjustments (such as setting the diversity parameter chaos to 50), a draft meeting the requirements was obtained. As shown in Figure 4.

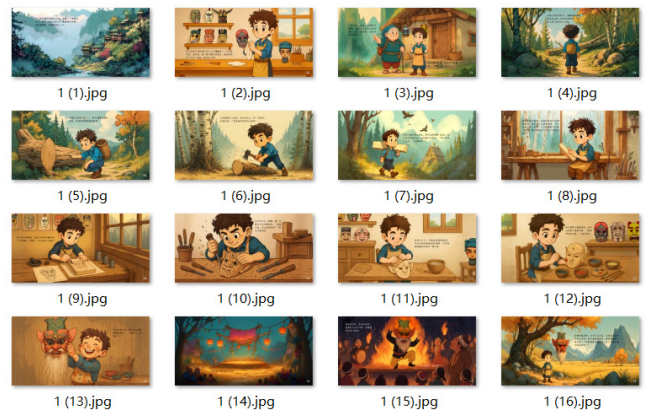


Figure 4. First draft visuals

5.3. Late-Stage Design: Optimizing and Implementing AIGC-Based Solutions

5.3.1. Detailed Image Correction and Human-Machine Collaboration Optimization

To address issues in the Midjourney-generated image—such as the Nuo masks not reflecting Enshi’s distinctive style and inaccuracies in the protagonist’s details—a three-step optimization method was employed: “ChatGPT image editing + Jiemeng AI image expansion + Procreate fine-tuning.” First, the image and the original character design were fed into ChatGPT together as reference images, with the instruction to “remove masks that do not reflect the local style while maintaining stylistic consistency.” Next, Jiemeng AI was used to restore the aspect ratio to 16:9, which had been distorted by ChatGPT’s processing. Finally, Procreate was used to manually add details of Enshi-style Nuo masks and refine other imperfections in the image, ensuring both cultural accuracy and visual appeal.

5.3.2. Generation of Dynamic Videos and Multimodal Content

Use each page’s illustration as a background image, combine it with the corresponding text, and utilize Midjourney’s video generation feature to create 16 animated clips. At the same time, use the Dubbing X voice-over software to assign distinctive voice qualities (such as an

elderly woman's voice or a young boy's voice) to different characters—including the narrator, the little carpenter, and the old woman—and add sound effects like doorbell chimes and background music. Finally, in Adobe Premiere Pro, synchronize and composite the video footage with the sound effects to create a complete animated picture book video.

5.3.3. Layout of Physical Picture Books and Smart Promotion

Use Adobe Photoshop to apply consistent color and stylistic adjustments across the entire video, ensuring visual harmony. Use Adobe Illustrator to professionally typeset the narration, character dialogue, and page numbers. Generate a QR code for the animated picture book video and place it on the back cover so readers can easily scan it to watch the video. Additionally, leverage AI data analytics to precisely target and promote the picture book to interest groups focused on parenting education and intangible cultural heritage, as well as e-commerce platforms, thereby achieving integrated online and offline promotion.

6. Conclusion and Outlook

This study systematically explores innovative approaches to designing cultural and creative products featuring Enshi Nuo masks through the application of AIGC technology, and validates these approaches through the design practice of the picture book *The Little Carpenter and the Mask God*. The findings indicate: First, AIGC technology can effectively enhance the efficiency of Enshi Nuo mask design, reducing the traditional manual production cycle—which typically takes weeks or even months—to just a few days. Second, through precise extraction, interpretation, and intelligent generation of cultural elements, AIGC helps revitalize the representation of intangible cultural heritage, allowing it to re-enter the public eye in forms that align with contemporary aesthetics and children's cognitive characteristics. Third, a human-machine collaborative workflow is key to the successful application of AIGC; designers' cultural judgment and aesthetic control complement the AI's efficient generation capabilities, jointly ensuring the cultural authenticity and artistic appeal of cultural and creative products.

However, this study also has certain limitations: AIGC technology relies heavily on high-quality cultural databases, and the current digital resources for Enshi Nuo masks remain

insufficiently systematic and comprehensive; AI-generated content may carry the risk of a “discrepancy between form and spirit,” requiring in-depth human intervention for cultural calibration. In the future, as AIGC technology continues to improve, efforts should focus on building a high-quality cultural database for Enshi Nuo masks and exploring optimized workflows for human-machine collaboration. At the same time, we must strictly adhere to the ethical boundaries of cultural heritage preservation to ensure that technological applications consistently serve the protection and revitalization of the authenticity of intangible cultural heritage. This will promote the deep integration and sustainable development of Enshi Nuo mask culture with the cultural tourism industry.

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