

RESEARCH ARTICLE

Innovative Design Applications of Sanxingdui Culture Enabled by AI-Generated Content (AIGC)

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Abstract

This study investigates how AI-Generated Content (AIGC) can facilitate the modern transformation and innovative design of Sanxingdui cultural symbols. It addresses key challenges, including the rigidity of symbol translation, the limited diversity of innovative forms within traditional design models, and the insufficient cultural semantic understanding embedded in current AIGC technologies. To tackle these issues, a comprehensive database of Sanxingdui cultural relic images was constructed. Using Midjourney as the primary generative tool, the study applied culturally informed keywords combined with modern aesthetic parameters to iteratively generate design concepts, enabling multi-dimensional cultural transformations. Findings reveal that AIGC can significantly accelerate the “culture–symbol–design” translation process, improving efficiency in the creation of patterns, colors, and textures. Nonetheless, human designer intervention remains essential to preserve cultural connotations and ensure ethical integrity. This research proposes a reusable methodological framework for AIGC-enabled cultural IP translation, offering both theoretical insights and practical strategies for the digital revitalization of other culturally significant heritage assets.

Keywords: AIGC, Midjourney, Sanxingdui Cultural Symbols, Cultural Translation.

1. Introduction

Against the backdrop of the national strategy of “cultural confidence”, the Sanxingdui Ruins have been inscribed on the list of major archaeological sites during China’s 14th Five-Year Plan period. Unearthed artifacts here—including bronze sacred trees, vertically elongated eye masks, golden scepters, and more—with their distinctive forms, enigmatic patterns, and profound spiritual connotations, stand as pivotal evidence attesting to the pluralistic unity of Chinese civilization. In recent years, the growing archaeological fascination with Sanxingdui has spurred a surge in cultural and creative products, films, animations, costumes, accessories, and other artistic works centered on this ancient site, gradually bringing them into the public eye. However, as technological barriers no longer constrain artistic development, traditional modes of communication

and design have struggled to meet contemporary society’s deeper needs for cultural inheritance, manifesting primarily in rigid symbol translation, simplistic formal innovation, and superficial design content.

Meanwhile, breakthroughs in generative AI (AIGC, Artificial Intelligence Generated Content) have introduced a transformative paradigm for innovating traditional culture. By harnessing deep learning algorithms, AIGC autonomously generates and refines visual, textual, and other content using vast datasets and knowledge repositories—effectively accelerating design workflows while simultaneously heralding the emergence of novel design forms. With AIGC’s integration, landmark achievements have materialized: the Palace Museum’s development of a “Digital Treasure Pavilion” and the Dunhuang Academy’s creation of virtual Feitian interactive

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scenarios via mural restoration, to name just two. These cases highlight AIGC's ability to bridge tradition and modernity, allowing cultural heritage to resonate with contemporary audiences through aesthetics that align with present-day sensibilities. Nonetheless, as a culturally distinct IP, Sanxingdui confronts significant challenges in balancing heritage preservation with innovative development amid its collaboration with AIGC. For this study, the author aims to leverage AIGC as a mediating tool to modernize the artistic characteristics of Sanxingdui artifacts, exploring innovative expressive pathways for these cultural treasures within today's cultural landscape. Ultimately, this research seeks to provide an instructive framework for the digital preservation and revitalization of traditional cultural IPs.

2. Introduction to the Sanxingdui Culture

2.1 The Historical Origins of the Sanxingdui Culture

As one of the earliest major archaeological sites uncovered in China during the nascent phase of modern archaeology, the Sanxingdui Site in Guanghan, Sichuan, has long captivated global attention with its profound antiquity, exquisite artifacts, distinct cultural identity, and enigmatic aura. Tracing its historical roots to the Baodun Culture of the Late Neolithic Period (circa 4,800 years ago), Sanxingdui culture evolved through successive phases—including the Guangyuanqiao Culture and the first-stage Sanxingdui site culture (circa 4,800–3,600 years ago)—before reaching its zenith during the mid-to-late Shang Dynasty (circa 3,600–3,000 years ago). This culmination forged a pinnacle of the ancient Shu civilization, centered on its bronze-based achievements. The discovery of Sanxingdui not only upended long-standing misconceptions about Bashu culture but also validated the historical accuracy of ancient textual accounts of the ancient Shu state, thereby drawing scholarly interest worldwide. From a design perspective, artifacts from this era showcase stunning creative vision in form and innovative craftsmanship. Take the Bronze Sacred Tree, modeled on the “Pillar Connecting Heaven”: its three-tiered, nine-branched structure transforms the mythic imagery of the Fusang Tree into tangible spatial symbolism. The Vertically Elongated Eye Masks transcend human proportions with their exaggerated “pillar-like protruding eyes”, merging beast-face motifs and cloud-thunder patterns to construct a visual language of “divine supremacy”. Meanwhile, the Golden Scepter, adorned with linear designs of fish, birds, and arrows, unifies symbols of

power and nature worship into a cohesive symbolic system. These designs not only reflect the ancient Shu people's understanding of the interconnectedness between heaven, earth, humanity, and deities but also synthesize cross-cultural elements to establish a unique aesthetic paradigm of ancient Shu design.

2.2 A Discussion on the Artistic Characteristics of Sanxingdui Culture and its Adaptability to AIGC

The artistic essence of Sanxingdui culture is defined by mystery, symbolism, and surrealism—qualities through which its bronzes forge a distinct aesthetic paradigm of ancient Shu via abstract, deformed modeling. Complementing these overarching traits, the Bronze Vertically Elongated Eye Mask transcends human proportions with its exaggerated pillar-like protruding eyes, complemented by spiral patterns adorning its kui-dragon-shaped ear flanges to evoke the visual concept of an “Eye of Divine Communication”. Equally striking is the Bronze Sacred Tree, designed with a three-tiered, nine-branched topological structure that emulates the cosmic model underpinning the Ten Suns Myth. Here, the placement of standing birds on its branches and hanging jade discs corresponds to celestial trajectories, materializing both nature worship and spatial order into tangible form. Artistically, its decorative system integrates the flowing rhythm of cloud-and-thunder motifs with the solemn, watchful gaze of beast-face patterns. Through deliberate contrast in line density and geometric segmentation, it generates a decorative language—a seamless blend of religious narrative and formal aesthetics. This underscores a profound congruence: the high degree of abstraction characterizing Sanxingdui's art aligns closely with the underlying logic of AIGC-generated imagery. Ultimately, the fusion of AIGC with Sanxingdui culture embodies a profound resonance—a dialogue between ancient Shu civilization and modern technology.

3. AIGC and the Transformation of Cultural Symbols

3.1 The Connotation and Development of AIGC

AIGC (Artificial Intelligence Generated Content) is a highly practical core technology in the current artificial intelligence (AI) landscape. Trained on massive structured and unstructured data, it leverages AI algorithms to build content-generation capabilities—powered by the synergy of cutting-edge techniques: Deep Learning provides the foundational framework, Natural Language Processing (NLP) ensures logical text generation via semantic understanding and

contextual modeling, and Generative Adversarial Networks (GANs) enhance the realism of visual content. AIGC can flexibly and automatically produce diverse creative outputs, including text, images, voice, and beyond. This technology has already demonstrated significant application potential across fields such as graphic design, UI/UX design, and product development, where it lowers creative barriers and boosts efficiency.

Tracing its origins to July 2015—when Google launched DeepDream, pioneering AI models that generate images from text—AIGC’s development gained momentum as OpenAI released the DALL-E model in January 2021, thrusting text-to-image generation into the mainstream. Later that July, independent lab Midjourney unveiled its namesake image generator: designer Jason Allen used it to create *The Space Opera*, which won first prize at the Colorado State Fair fine arts competition, sparking global debate with his remark, “Art is dead, humans have lost”. In August 2022, Stability AI’s open-source image model Stable Diffusion debuted, and by October, over 200,000 developers had downloaded it—these milestones ignited an AI art boom, marking AI’s formal entry into the art domain. OpenAI’s large language model ChatGPT, launched in December 2022, elevated AI to new heights: it enabled fluid human-AI dialogue and adapted to diverse content outputs like essays, poetry, code, calculations, and logic. March 2023 saw GPT-4’s release, which achieved multimodal (text-image) input and matched or exceeded human performance in specialized fields. Thus, 2022 is widely hailed as AIGC’s inaugural year. Today, AIGC has reached a relatively mature stage in text and image generation, but remains exploratory in high-complexity areas like video and 3D. The prevalence of AI-generated videos in modern self-media signals that the next phase of AIGC is imminent.

3.2 The Application of AIGC Technology in Design

In contemporary practice, the integration of AIGC (Artificial Intelligence Generated Content) into art and design manifests primarily through two key modalities. The first positions AIGC as an auxiliary tool, augmenting designers' creative workflows during brainstorming and exploratory phases. Here, designers input preliminary sketches—often in simplified form—into AI models, which then generate corresponding visual outputs or textual descriptions based on the provided keywords and sketch parameters. This collaborative dynamic substantially compresses design timelines while exponentially broadening the spectrum of creative possibilities. The second modality elevates AIGC to an autonomous design engine, harnessing its robust computational power to bridge conceptual ideation in early design stages with the realization of finalized outcomes. Within the AIGC technological landscape, AI-powered image tools stand out as the most widely adopted and promising applications. Rooted in deep learning and computer vision technologies, these tools converge on three core functionalities:

First, image generation tools (exemplified by Midjourney, Stable Diffusion, and DALL-E 2) produce context-specific (Figures 1 and Figures 2), full-style images from text prompts or sketches, serving as vital inspiration sources for creators. Second, image editing tools (such as Imagen AI and Chuangkit AI Painter) offer specialized features including intelligent watermark removal, style-filter customization, aesthetic adjustment, and resolution enhancement. Third, partial image modification tools, typified by Adobe Firefly, enable targeted edits—whether refining specific elements or adjusting layers incrementally—making them indispensable for secondary creation or post-production refinement.

Together, these applications underscore AIGC's dual role: both as a collaborative partner in human-centered design processes and as an independent driver of end-to-end creative production.

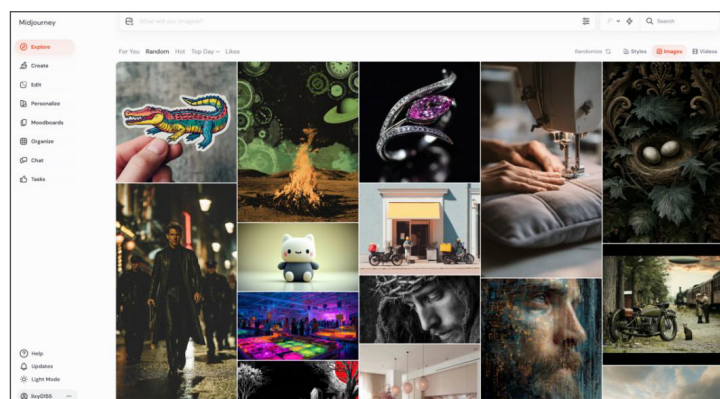


Figure 1. *Midjourney Interface*

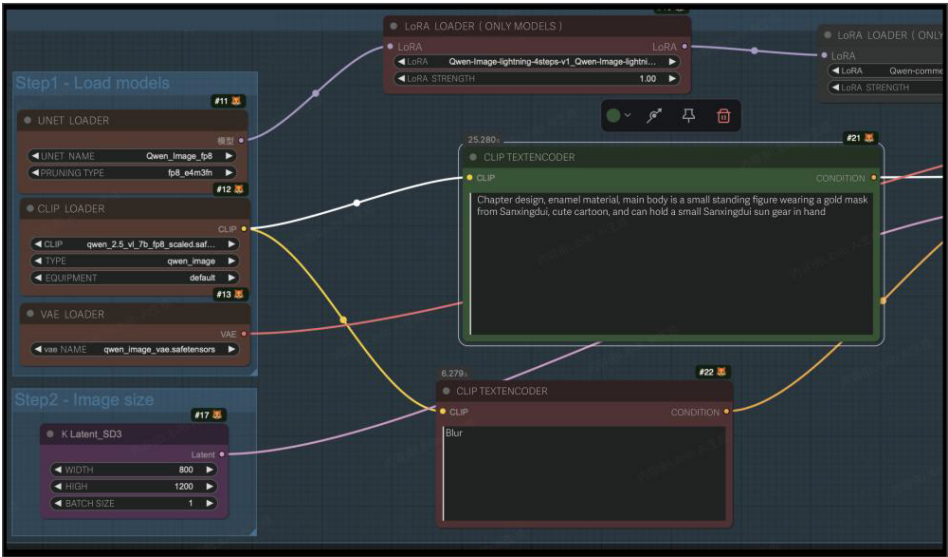


Figure 2. Stable Diffuse Interface

4. Sanxingdui Culture AIGC Innovative Cultural and Creative Design

4.1 Refinement of Sanxingdui Culture Elements







4.1.1 Extraction of Color Elements

The chromatic qualities of Sanxingdui cultural relics transcend mere visual manifestation; they constitute material embodiments of the “divine aesthetics” underpinning the ancient Shu civilization. The distinctive “bronze green”—a hue deriving from basic copper chloride (atacamite) crystals formed over three millennia of interment—interacts with localized corrosion products such as “cinnabar red” and “gilded mottling” to weave a chromatic narrative of ritual

practices. The former, cinnabar red, symbolizes blood sacrifices tied to divine authority, while the latter, gilded mottling, alludes to sun worship. Complementing this, pottery wares exhibit their unique and enigmatic tonality through the intense warmth of red pottery and the solemn gravity of black pottery. In their painted decorations, the deliberate use of cinnabar red, mimicking the hue of blood, embodies the ancients’ aspiration to mediate between the human and divine realms and exert mastery over nature.

This study selected representative Sanxingdui cultural artifacts for systematic color extraction, with the aim of informing and regulating symbol translation processes within AIGC applications. (Table 1)

Table 1. Extraction of color elements









Category	Cultural relics	Color elements	Cultural symbol
Bronze color			Ancient and mysterious atmosphere
Golden Lantern Yellow			Noble, glorious,extravagant
Terracotta color			Observation, love, simplicity

4.1.2 Pattern Element Extraction

This study focuses on the extraction of patterns from Sanxingdui cultural relics. Patterns are not merely a visual language—they are also an embodiment of a civilization’s spiritual aspirations. The spiral undulations of cloud-and-thunder patterns echo the rhythm of celestial and terrestrial breathing; the angular cuts of beast-face patterns mirror the sharpness of divine authority’s gaze; the flapping-wing arcs of bird patterns mimic the trajectories of the sun and

moon crossing. Adorning Sanxingdui bronze wares, these patterns serve dual roles: symbolic vehicles of sacrificial rituals and design archetypes of ancient Shu aesthetics. Beneath the patterns on different artifacts lie the distinct spiritual endowments of the ancient Shu people. By classifying, extracting, analyzing, and translating these patterns, we can generate aesthetic paradigms that embody both the spiritual connotations of ancient Shu civilization and align with modern aesthetics. (Table 2)

Table 2. Pattern element extraction






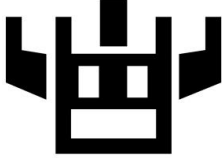
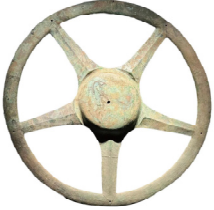
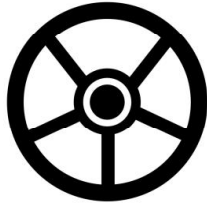
Category	Cultural relics	Pattern	Spiritual connotation
Bronze large mask			Praying for the protection of the gods and conveying the appeals of the people.
Bronze Divine Beast			Communicate with the heavens and worship the gods.
Bronze beast mask			Clan totem worship
Bronze Sun-shaped Artifact			Sun worship

4.1.3 Form Symbol Extraction

The exquisite corpus of cultural relics from Sanxingdui stands as an eloquent reflection of the spiritual world of the ancient Shu people, embodying the cosmological unity of Heaven, Earth, humanity, and the divine. Encompassing jade wares ritualistically crafted to venerate celestial and terrestrial realms, altars of singular form, masks with protruding eyes evoking otherworldly vision, deities conflating human and avian essences, phoenix figures poised for

ethereal flight, and sacred trees bridging terrestrial and celestial domains—these artifacts collectively encode profound reverence for celestial deities, earthly spirits, and all things in nature. They further manifest the transcendent imagination and extraordinary creative faculty of the ancient Shu civilization. This study refines the morphological characteristics of the Sanxingdui culture and extracts its symbolic elements. (Table 3)

Table 3. Form symbol extraction

Category	Cultural relics	Morphic symbol	Cultural symbol
Bronze large mask			Independently worshipping important rituals, constructing a worldview and a view of the divine.
Bronze Divine Beast			The visual expression of the sacrificial system symbols, cosmology, and the view of deities.
Bronze beast mask			“Tongshen” core symbol, building a bridge between the human world and the world of the gods.
Bronze Sun-shaped Artifact			Core symbols of sacrifice, constructing a cultural symbol system of diverse worship in ancient Shu.

4.2 AIGC Application Path

Prior to constructing the innovative translation framework for Sanxingdui cultural symbols, field data collection is a prerequisite: visit the Sanxingdui Museum in Guanghan to capture high-resolution images of unearthed cultural relics, categorize them systematically, and preprocess the images (e.g., noise reduction, color calibration) to ensure accurate, AI-ready data for subsequent modeling.

Relics can be initially classified by material type (bronzes, gold wares, jades, ivories, and bone artifacts) or, more deeply, by spiritual and cultural connotations—such as eye worship, sun worship, sacrificial rituals, and royal power symbolism. Meticulous categorization not only facilitates an in-depth study of Sanxingdui’s cultural essence but also ensures the retention of the spiritual core of original patterns after AI translation.

Conduct comprehensive literature reviews to analyze Sanxingdui’s pattern typologies, as well as their symbolism and cultural meanings. These patterns

are not merely decorative—they also reflect, to some extent, the daily life and cultural practices of the ancient Shu civilization.

Utilize AI tools (e.g., Midjourney) to import images from pre-screened groups that share similar aesthetic forms and a unified spiritual core. Perform deep learning via convolutional neural networks (CNN) to extract key visual features and store corresponding keywords—laying the groundwork for targeted symbol translation.

Take Midjourney as an example: leverage its advanced technologies (e.g., generative adversarial networks, GAN) to generate initial images. Adjustments can be made either subjectively (per designers’ creative intent) or by referencing existing database materials before fine-tuning parameters.

Export the AI-generated images, import them into image processing software (e.g., Photoshop, Illustrator) for final retouching, and integrate them into actual demonstration visuals for practical application.

4.3 AIGC Application Path

To ensure that Sanxingdui's symbol translation via AIGC not only inherits spiritual and cultural essence but also embodies artistry and innovation, this study organizes and classifies the collected image resources. It selects the Bronze Mask with Protruding Eyes, Large Bronze Mask, and Bronze Human Head from the category of bronzes as input data. We then use explicit prompts to integrate the aesthetic paradigms of the Sanxingdui Ancient Shu civilization with modern design aesthetics, translating Sanxingdui culture—centered on bronze masks and supplemented by other artifacts—into modern, abstract, and symbolic forms. This design takes Midjourney as the primary

AI tool, with the specific operational process detailed below

Visit the Midjourney homepage at www.midjourney.com. Upon logging in, navigate to the taskbar on the homepage and input your desired keywords (Prompt):

Abstract symbols showcase the Sanxingdui culture, vibrant colors, flat illustration style, structuralism, Eastern aesthetics, warm tones, white background.

The logic of generating words in Midjourney can be understood as “subject, state, background + style + atmosphere”. Similarly, for different design works in various fields, this logic can be used to input generating words. For example, in this generating word, “Abstract symbols showcase the Sanxingdui culture” serves as the “subject” generating word, confirming that the generated work has obvious characteristics of Sanxingdui art; “vibrant colors” and “warm tones” are the generating words that establish the color tone of the final output, which can be seen as the “atmosphere” generating words; “Eastern aesthetics” and “structuralism” are the “style” generating words, determining the stylistic tone of the AI-generated work. In addition, since the expected design outcome is in the field of graphic design, we included the generating word “flat illustration style”, which can be understood as the “state”. The generating word “white background” was added to manage the entire design process, as it is beneficial for post-processing adjustments of the generated images.

After completing the input of the above prompts, then adjust the mode parameters in the settings, select “Square” for “Image Size” to control the aspect ratio of the generated images, for the Model parameter, select “Standard” for Mode, and set the “Version” parameter to 7. Compared to “Raw”, the images

generated by Standard have more artistic and abstract processing, which is more in line with the expected output of this design.

According to the above instructions, import the images that have been collected and processed, such as the bronze vertical eye mask, into the “Starting Frame” taskbar, and input the “/submit” command to start generating the text and image model.

Midjourney generates four images of different styles in one command. If there are no satisfactory results among the generated images, there are two ways to make corrections: The first is to find images or videos in Midjourney's database that match your expected vision, copy their prompts, and extract key prompts to reference in your own command. You can also input the expected image from the database into “Image Prompts” or “Style References”. “Style References” imitates the aesthetic style of the reference image—such as texture, light and shadow, atmosphere, etc.—but allows free variation in content; while “Image Prompts” copies the specific content of the reference image—such as composition, elements, colors, etc.—to generate highly similar images. For example: /imagine prompt: Sanxingdui, pop art --sref Sanxingdui-style.jpg --sw 150 --image pop art.jpg --iw 0.8, which retains the artistic characteristics of Sanxingdui and incorporates the pop art style; The second method is to adjust parameters such as “Stylization”, “Weirdness”, and “Variety” in the “Aesthetics” section of the “settings”, then select images from the newly generated 4 images that match the expected result, and execute the commands “-V Subtle” or “-V Strong” to generate images with consistent style and diverse forms (Figure 3). In more advanced Midjourney subscription plans, you can perform “Personalizing Model”—that is, an AI model trained through a series of tests to cater to the user's personal style.

Finally, after generating the expected image based on a series of instructions, it is imported into Photoshop for refinement. A slight adjustment is made with reference to the color spectrum of Sanxingdui (Figure 4), resulting in a cultural and creative work that retains the original characteristics of Sanxingdui while also incorporating contemporary artistic style.

4.4 AIGC-Empowered Re-innovation

In this design process, we obtained AIGC-translated images via the aforementioned prompts and extended these graphic patterns to multi-dimensional transformations. Taking the Sanxingdui Bronze



Figure 3. Comparison of images before and after executing the 'V Subtle' command



Figure 4. Visual Handbook of Sanxingdui Culture Symbols

Mask as an example: we input the translated images into the “Starting Frame” tool, then entered the prompt: “Transform flat patterns into three-dimensional products, combining the mystery of Sanxingdui artifacts with modern minimalist aesthetics, featuring Eastern aesthetics, simple lines, precious textures, a white background, and independent cultural products.” The resulting image is shown in Figure 5. We next selected images aligning with design

expectations from the generated outputs and repeated the “-V Subtle” command to produce cultural and creative products that fuse the mysterious style of the ancient Shu civilization with modern trendy formal languages (Figure 6). Similarly, modifying the prompts enables the creation of CCPs with distinct styles while retaining Sanxingdui civilization’s characteristic features.



Figure 5. Sanxingdui cultural and creative products



Figure 6. Image after the 'V Subtle' command

In this design practice, by generating massive image materials through multiple iterations, precisely screening visual elements adapted to the project theme, and then completing the systematic arrangement and organic combination of visual symbols with the help of professional design tools. Throughout the process, we strictly follow the formal rules of layout design, and finally achieve the dual goals of the poster's visual expression—on the one hand, enhancing

aesthetic value through artistic composition and color matching; on the other hand, ensuring functional communication through clear information hierarchy and intuitive visual guidance—ensuring that the presentation of text information conforms to reading logic, that graphic elements are highly unified with the overall style, and comprehensively strengthening the communication effectiveness and artistic appeal of the poster (Figure 7)



Figure 7. Image after the 'V Subtle' command

5. Analysis and Results

5.1 An Exploration of AIGC-Traditional Culture Compatibility

Therefore, AIGC empowers the modern translation of traditional culture, with its applications expanding across intangible cultural heritage, humanities, and social sciences. In this study, by parsing Sanxingdui culture, extracting patterns, refining colors, and translating forms, we leveraged AIGC as a medium to achieve modular structuring/recombination of its patterns, reproduction/contextual adaptation of its original colors, and multi-dimensional transformation/deconstruction of its textures and forms. Specifically, for pattern modularization, AIGC analyzes geometric

forms to rapidly generate ancient Shu-aligned innovative graphics; in color application, it auto-corrects deviations via comparison with cultural relic color databases, endows colors with cultural meaning through archaeological insights, and uses its “color fine-tuning engine” to derive multiple styles from derivative colors efficiently; for texture/form transformation, it generates high-resolution normal/bump maps from relic surface structure data, enabling conversion of digital textures to physical materials via 3D printing. While AIGC enhances creative boundaries and design possibilities through efficient, multi-style unit generation, its cultural semantics understanding remains superficial—struggling with

deep-level meanings like religious metaphors or folk customs—which limits symbol use in serious cultural contexts. Thus, despite facilitating traditional symbol translation, AIGC still requires culturally proficient designers to ensure fidelity and effective application.

6. Conclusion

AIGC, with its cross-modal data parsing and generation capabilities, shortens cultural resource transformation—from traditional “excavation-refinement-recreation” to “intelligent recognition-dynamic recombination-instant output”—enabling rapid translation of cultural elements into design symbols. For instance, AI restores Dunhuang murals by analyzing oxidized fragments and texts, distilling Early Tang “Flying Apsara” cultural genes into reusable digital libraries. More strikingly, Wang Liuqi’s Milan Fashion Week project saw AI transform Longquan celadon’s ice-crackle patterns and minimalist lines into wearable designs; combined with 3D printing, this brought millennia of “Song charm” to global fast fashion markets in “minute-level” translation. This efficiency revolution lets designs meet fast fashion’s “small-batch, multi-style, time-sensitive” demands, turning cultural resources into instant innovation fuel.

Meanwhile, AIGC’s openness reshapes participatory art: traditional one-way “designer-led, user-receptive” dissemination is replaced by co-creation ecosystems where AI acts as a creative intermediary, translating user preferences into design parameters in real time. Users can even adjust elements (e.g., Dunhuang color ratios, celadon pattern density), evolving designs from “finished products” into “growing cultural carriers”. This deepens user engagement while making designs “living media” linking cultural memory to contemporary life—aligning with participatory art’s “everyone creates, everyone dialogues” ethos.

Yet AIGC’s potential isn’t boundless: its efficiency demands cultural depth to avoid data-cocoon homogenization; co-creation needs humanistic grounding to prevent tech rationality from eroding emotional resonance; and fast-fashion speed must balance design’s cultural responsibility, ensuring technology serves humanity.

Looking ahead, designers evolve into “cultural translators” and “ecosystem co-builders”: they leverage AIGC to accelerate “culture-symbol-design” transformation while grounding processes in humanistic depth; embrace participatory co-creation

while guiding users via tech ethics—ensuring design accelerates cultural inheritance, catalyzes fashion innovation, and bridges public engagement. This is both AIGC’s promise and design’s mission in the intelligent era.

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