

A R T I C L E

Innovative Design Research on Jiaodong Peninsula's Marine Folk Culture Based on AIGC

Qihao Liu^{1*}, Xihao Wang¹, Xinlei Xie¹, Wengang Wang¹, Lu Xu¹

1. School of Modern Art, Shandong University of Engineering and Vocational Technology, Jinan, China

Abstract

This study explores the digital innovation design pathways for the marine folk culture of the Jiaodong Peninsula through Artificial Intelligence Generated Content (AIGC) technology. It aims to promote the digital transformation and personalized innovation of traditional Chinese folk culture through the application of AIGC technology, thereby enhancing the market competitiveness of cultural brands and expanding their influence domestically and internationally. The significance of this study is primarily reflected in the capability of AIGC to enhance the modern expression and dissemination of intangible cultural heritage through large-scale generation and personalized customization. Especially in response to the digital needs of the younger generation, users can create virtual idols, scene models, and cultural derivative products through AIGC, thereby enhancing cultural interactivity and appeal. This study employs case study, and technology analysis methods. It begins with a detailed discussion of the development history and relevant applications of AIGC technology, followed by an analysis of the history and current status of marine folk culture in the Jiaodong Peninsula. Furthermore, it explores how to promote the digital innovation design of the Jiaodong Peninsula's marine folk culture brand within the context of AIGC. This study proposes a framework for constructing an innovative cultural brand IP based on AIGC, encompassing multiple aspects such as personalized generation, platform interaction, creative development, and data feedback. Finally, the study also presents practical cases that illustrate the design process of cultural products related to Jiaodong Seaweed Houses based on AIGC. It provides a new perspective for the digital design and global dissemination of marine folk culture of the Jiaodong Peninsula, while also offering theoretical and practical support for the application of AIGC technology in the field of intangible cultural heritage.

Keywords: Jiaodong Peninsula; Folk Culture; Intangible Cultural Heritage; AIGC

1. Introduction

With the rapid advancement of technology, Artificial Intelligence Generated Content (AIGC) has increasingly become a significant driving force in the cultural industry. AIGC technology, which leverages algorithms to generate high-quality content, offers new methods and platforms for cultural dissemination. The emergence of this technology has catalyzed a revolutionary shift in both the expression and transmission channels of traditional culture. As a coastal area in eastern China, the

Jiaodong Peninsula is rich in marine folk cultural resources, encompassing various traditional customs such as marine dietary habits, marine clothing styles, marine language and behavioral customs, marine handicrafts, and distinct coastal dwellings (Liu 2024). Among these, the culture surrounding seaweed houses is a prominent cultural symbol of the Jiaodong region, embodying the lifestyle wisdom and historical memory of the local people. The unique architectural form and



*Corresponding author: Qihao Liu: 1355801569@qq.com. Received on May 10 2024, Accepted on Sep 21 2024, Published on Oct 22 2024. This work is licensed under a Creative Commons Attribution 4.0 International License. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation DOI.

ecological principles of seaweed houses reflect the wisdom of harmonious coexistence between humans and nature. However, with the rapid advancement of modernization, the culture surrounding seaweed houses faces challenges in both preservation and development. Thus, in the context of today's rapidly advancing artificial intelligence, exploring how AIGC technology can be harnessed to drive the digital innovation and design of Jiaodong seaweed house culture holds not only theoretical significance but also substantial practical value.

This study aims to delve into the research status and importance of AIGC technology in the digital innovation and design of the Jiaodong Peninsula's maritime folk culture. Specifically, the objectives include analyzing the advantages of AIGC technology in generating content for intangible cultural heritage, and utilizing the Jiaodong seaweed house cultural brand IP as a practical case, proposing effective strategies for digital innovation design.

2. Related work

2.1 Research on AIGC Technology

Generative Artificial Intelligence (AIGC, Artificial Intelligence Generated Content) is a technology that generates content through algorithms and models. Its core lies in the use of advanced technologies such as deep learning, natural language processing, and computer vision to analyze vast amounts of data and produce creative and intelligent content in various forms, including text, images, audio, and video. Since the 1990s, AIGC has undergone several significant stages of development alongside the continuous advancement of artificial intelligence technologies. Initially focused on generating content through simple templates, it has evolved to incorporate deep learning models such as Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs), significantly enhancing its capabilities (Li and Zhang, 2024). In recent years, particularly with the advent of large language models like the GPT series, AIGC has achieved breakthroughs in the quality and diversity of content generation, enabling more natural interactions with humans and fostering its widespread application across various fields.

The application of AIGC technology in the field of intangible cultural heritage (ICH) is increasingly attracting attention and demonstrating significant potential for promoting cultural preservation and dissemination. Current research indicates that AIGC technology can play a vital role in various aspects of ICH, including digital archiving, communication, and education (Sun 2024). On one hand, researchers are exploring how to utilize AIGC technology to generate content related to intangible cultural heritage (ICH) and to digitally present and disseminate traditional Chinese culture. For example, some studies have systematically reviewed and discussed the current state of development of cultural and creative products within the framework of AIGC from three perspectives: design, marketing, and presentation. These studies conclude that AIGC, as a leading-edge technology in the field of artificial intelligence, plays a significant supportive role in the dissemination and development of intangible cultural heritage. On the other hand, some intangible cultural heritage (ICH) projects have utilized digital content generated by AIGC to develop related online courses and experiential learning activities, thereby attracting the younger generation to engage in the learning and transmission of ICH. These practices not only facilitate the digital transformation of ICH but also breathe new life into traditional culture in a contemporary context.

In summary, the research and application of AIGC technology in the field of intangible cultural heritage are continuously evolving, providing significant support for the protection, design, and innovation of culture.

2.2 The Marine Folk Culture of the Jiaodong Peninsula

The Jiaodong Peninsula refers to the region of Shandong Peninsula east of the Jiaolai Valley or Jiaowei Plain, bordered to the north by the Bohai Sea and the Yellow Sea, facing the Liaodong Peninsula, and to the east by the Yellow Sea. It mainly includes the cities of Qingdao, Yantai, and Weihai (Sui and Xiao 2022). Located along China's eastern coastline, the livelihoods of the people in the Jiaodong Peninsula are closely linked to the sea. Through long-term production practices, they have accumulated a wealth of marine experience, resulting in the unique regional characteristics of the marine folk culture of the Jiaodong Peninsula.

The marine folk culture of the Jiaodong Peninsula can be divided into two main types. The first type is "fishing culture" folk customs, which are formed based on production labor and daily life (Guo 2020). This includes marine dietary customs, marine clothing traditions, marine language and behavioral customs, marine handicrafts, distinctive marine residences, and marine festival celebrations (Guo 2020). The second type consists of folk customs related to the worship of sea deities, which are rooted in popular religious beliefs (Guo 2020). This includes legends of immortals, temple fairs, and other related practices (Guo 2020). The formation and evolution of these traditional folk customs are closely related to various factors, including the unique geographical environment, climatic conditions, cultural history, and religious beliefs of the Jiaodong Peninsula. They reflect the lifestyle, values, and aesthetic preferences of the local people, serving as an essential part of the cultural identity of the Jiaodong Peninsula. Currently, research on the maritime folk culture of the Jiaodong Peninsula is relatively limited, with a primary focus on the construction and dissemination of cultural tourism brands while exploring the potential for developing and utilizing maritime cultural resources. For instance, there have been studies on the current state of cultural development of the Tianheng Sea Worship Festival and strategies for enhancing its branding (Ding 2024).

Additionally, some research emphasizes cultural dissemination activities that integrate folk culture, communication activities, entertainment performances, and public festivities. For example, studies have examined the propagation and development of the Jiaodong Fishing Lantern Festival in modern society, which features entertainment activities centered on the Mazu Street patrol, sacrificial rites, and Yangge performances. The dominant symbols, such as music, dance, sacrificial offerings, and colors, are also rich in marine elements, permeating the entire festival process.

In addition, the seaweed house, as the most typical residential style in the marine culture of the Jiaodong Peninsula, is constructed with locally sourced granite walls and thatched roofs made from seaweed. This architectural form not only possesses significant ecological and aesthetic value but is also considered one of the most representative eco-friendly dwellings in the

world. The seaweed houses have a rustic and sturdy appearance, providing warmth in winter and coolness in summer, as well as remarkable durability, often lasting for centuries. These houses are a valuable architectural heritage in the region and a significant symbol of the Jiaodong marine folk culture. However, with social and economic development, residents' lifestyles have evolved, leading to the gradual decline of the traditional practice of constructing seaweed houses. Currently, research on Jiaodong seaweed houses primarily focuses on theoretical discussions surrounding the architectural entity, including topics such as "ecological characteristics and rural landscapes," "architectural features and construction techniques," "historical evolution and folk culture," and "protection and renewal strategies".

However, there has been relatively little attention given to practical issues in the current era of artificial intelligence, particularly on how to leverage modern AI-generated technologies for creative design and presentation of Jiaodong Peninsula's marine folk culture, such as the seaweed houses, in order to better promote and disseminate this cultural heritage. Therefore, this study will use the digital innovation of Jiaodong seaweed houses, a provincial-level intangible cultural heritage, as a practical case to analyze pathways for the digital innovation design of Jiaodong Peninsula's marine folk culture in the context of AI-generated content (AIGC).

3. The Current State of Digital Innovation Design and Dissemination of Jiaodong Peninsula Marine Folk Culture

In the context of AI-generated content (AIGC), the digital innovation design and dissemination of Jiaodong Peninsula marine folk culture are undergoing rapid development and transformation. Particularly, the application of artificial intelligence in cultural creation, digital display, and content generation has opened new pathways for promoting Jiaodong Peninsula's marine folk culture.

3.1 Digital Transformation and Content Generation

AIGC technology provides an opportunity for the digital transformation of marine folk culture in the Jiaodong

Peninsula. Through multimedia content generated by AIGC, local culture can be showcased in richer forms. For instance, elements such as seaweed house culture, marine dietary customs, and oceanic clothing traditions can be vividly presented through AI-generated animations, videos, or interactive applications.

This approach not only enhances the engagement and appeal of the content but also attracts a broader audience, particularly among younger demographics. Many local cultural institutions are actively exploring the use of AIGC technology to create digital display platforms, allowing Jiaodong Peninsula's marine culture to be presented in new forms and thereby enhancing its dissemination effectiveness.

3.2 Diverse Expressions of Innovative Design

AIGC technology offers diverse forms of expression for the innovative design of marine folk culture products in the Jiaodong Peninsula. For example, in the design of traditional handicrafts, designers can utilize patterns, models, and textures generated by AIGC, combining them with modern materials and techniques to create products that embody local characteristics while aligning with contemporary aesthetics. Taking seaweed house culture as an example, designers can use AIGC technology to develop modern home goods, such as decorative items featuring seaweed textures and furniture made from eco-friendly materials. These products not only preserve the core elements of traditional culture but also integrate modern design concepts, meeting the aesthetic and functional needs of contemporary consumers.

Additionally, AIGC can be applied to the generation of cultural and artistic products, such as digital artworks with ocean themes, audio, and video content. These materials can be widely disseminated on social media and online platforms, attracting greater interest and participation from young people in the inheritance and development of marine culture. This diverse range of innovative designs allows Jiaodong Peninsula's marine folk culture products to stand out in the market, appealing to consumers at various levels.

3.3 Applications of Personalized Customization

Another significant advantage of AIGC technology is its powerful ability for personalized customization. Through data analysis and user profiling, businesses can offer tailored cultural products based on consumers' preferences, interests, and consumption habits. For example, consumers can select specific marine folk elements, colors, and materials to create custom-crafted items or home goods that align with their personal styles. This level of personalization not only satisfies consumers' desires for uniqueness and exclusivity but also enhances the emotional connection between users and the products.

Some cultural institutions can also leverage AIGC technology to create online customization platforms where consumers can select different design templates and engage in DIY (do-it-yourself) creation. This approach not only makes the purchasing process of cultural products more interactive and enjoyable but also stimulates consumers' creativity and sense of participation. For instance, through simple AI tools, users can customize clothing, decorative items, or home goods themed around Jiaodong Peninsula's marine culture, ultimately generating unique cultural products (Yang and Chen 2024). This personalized experience not only enhances user satisfaction but also increases brand loyalty.

3.4 Social Media and Cross-Platform Dissemination

With the support of social media, the marine folk culture of the Jiaodong Peninsula can be disseminated over a broader range. AIGC technology can generate content suitable for various social platforms, helping cultural communicators quickly adapt to the needs of different audiences. For instance, AI-generated short videos, graphic content, and interactive mini-games can spark discussions on platforms such as Douyin, WeChat, and Weibo, thereby expanding the cultural impact.

Furthermore, the application of AIGC technology makes user-generated content (UGC) possible, allowing audiences to share their personal experiences and creations, further promoting the dissemination and diffusion of culture.

4. Digital Innovation Pathways for Jiaodong Peninsula Marine Culture Brand IP Based on AIGC

4.1 AIGC Empowering the Personalized Generation of Cultural Products

AIGC technology can automatically generate content and products related to Jiaodong Peninsula's marine folk culture based on user input and preferences. For example, users can select specific folk elements such as ocean rituals, fishing customs, or traditional crafts, and AIGC technology will create personalized images, videos, or audio based on these selections as part of the cultural product. Users not only have the opportunity to appreciate these cultural products but can also engage in cultural creation through interactive operations, allowing them to incorporate their own cultural understanding and innovative ideas into the process.

4.2 Online Platform Links and Convenient Operations

To enhance audience engagement and interactivity, official platforms can provide links or interfaces that allow users to customize and create cultural products generated by AIGC online. This platform can serve as the core for cultural dissemination and interaction, enabling users to upload their generated cultural content through simple clicks and selections for further optimization and processing. This convenient process allows more people to participate in cultural creation, thereby increasing the accessibility and appeal of the culture.

4.3 Customization of Physical Products and Cultural Creative Development

Based on the digital content generated by AIGC, the platform can also offer customization services for physical products. For instance, users can apply the generated cultural patterns to cultural creative products such as clothing, souvenirs, and decorations, and place orders for production through the official platform.

This approach not only enhances the interactive experience of culture but also promotes the development of the cultural creative industry, strengthening the effectiveness of cultural commercialization. Additionally, AIGC-generated content can be utilized in virtual displays and online exhibitions, further expanding the reach of dissemination.

4.4 Interaction and Sharing Mechanisms

To enhance user engagement and dissemination effectiveness, the official platform can implement interaction and sharing features. Users can share their generated cultural products on social media platforms, inviting friends and family to participate in the cultural experience. They can even promote the development of more creative cultural products through crowdfunding or collaborative design initiatives.

Through this interactive mechanism, Jiaodong Peninsula's marine folk culture will transition from traditional one-way communication to multi-directional interactive dissemination, creating a shared and co-created cultural ecosystem.

4.5 Data Feedback and Optimization

Another significant advantage of AIGC technology is its feedback mechanism. By analyzing user behavior and generated content, the platform can continuously optimize the algorithms for producing cultural products to better align with public aesthetics and needs. Additionally, data analysis can help the platform identify which cultural elements are more popular and which types of content possess greater dissemination potential, thereby providing data-driven support for developing effective cultural communication strategies.

With AIGC technology, the generation, dissemination, and innovation of Jiaodong Peninsula's marine folk culture products will enter a new era. Users can conveniently generate personalized cultural products through the official platform and transform them into tangible cultural creative products, further promoting cultural inheritance and innovation. This AIGC-based digital dissemination pathway not only enriches the diversity of cultural experiences but also enhances the interactivity of culture and the global impact of its dissemination.

5. Case Study on Digital Innovation Design of Jiaodong Seaweed House Culture Based on AIGC

5.1 Brand Positioning of Jiaodong Seaweed House Culture

Seaweed houses were originally constructed by local fishermen and farmers using marine resources to adapt to the humid and windy coastal climate. Made primarily from seaweed, these houses exhibit excellent insulation

properties and wind resistance, effectively withstanding the challenges posed by the marine environment. The architectural style of seaweed houses is unique, typically featuring a streamlined appearance. The roofs are woven from seaweed, resembling boats, which effectively facilitates water drainage and prevents the accumulation of snow and rainwater, thereby protecting the structure from erosion. In terms of architectural structure, seaweed houses are typically single or double-story constructions, often in circular or oval shapes. The roofs are steep, and the interior layout is simple, usually equipped with functional facilities such as stoves and storage cabinets, reflecting a design philosophy that emphasizes practicality and cost-effectiveness. In terms of decoration, seaweed houses often retain traditional folk elements, such as handmade woven ornaments, fishing nets, and other marine-related crafts, which enhance the cultural ambiance. The construction process of Jiaodong seaweed houses is environmentally friendly, utilizing natural materials that align with sustainable development principles, and they can naturally decompose at the end of their lifespan. As a symbol of marine culture, this architectural style not only showcases the wisdom of local people and their adaptability to the natural environment but also reflects the cultural traditions and lifestyles of the Jiaodong region.

The Jiaodong Seaweed House culture brand IP (intellectual property) refers to a collection of cultural symbols and content built around the unique seaweed house culture of the Jiaodong Peninsula, characterized by distinct cultural value, market value, and brand recognition. As a representative of traditional architecture in the Jiaodong region, seaweed houses are not only places where coastal residents live but also embody the concept of harmonious coexistence between local inhabitants and their natural environment over centuries. Developing this cultural symbol into a brand IP can enhance the visibility and influence of seaweed house culture while providing cultural support for the development of related products and services, promoting a deep integration of culture and economy. In the process of constructing the brand IP, emphasis is placed on the inheritance and innovation of seaweed house culture, utilizing modern design and technology to revitalize and breathe new life into it in contemporary society.

5.2 AIGC-Based Digital Creative Design for Jiaodong Seaweed Houses

AIGC-Based Digital Creative Design for Jiaodong Seaweed Houses focuses on utilizing AI-generated content to create culturally appealing products for young audiences. These products not only showcase the traditional architectural aesthetics formed under the influence of maritime folk culture but also integrate modern digital technologies to offer immersive, personalized, and interactive experiences that engage users in marine culture. The following sections will detail the design concepts and application areas of AIGC-driven digital creative design for Jiaodong Seaweed Houses.

5.2.1 Personalized Virtual Idol Creation

Users select several images of Jiaodong Seaweed House architectural styles and cultural backgrounds as either content images or style images, which they upload to the AIGC tool. The content images represent the elements the user wishes to retain, while the style images provide the aesthetic that the user wants to apply. The AIGC tool then combines the content features of the content images with the stylistic features of the style images to generate a new image. This process is guided by specific prompt words entered by the user, which control the AI to generate content in a particular type or style. Users can also iteratively adjust and refine these prompts to participate more actively in the content creation process, enabling AI-generated content to better align with their personalized preferences.

For instance, if a user wants to create a virtual idol based on Jiaodong Seaweed House culture, they can integrate visual symbols from Jiaodong Seaweed Houses - such as thatched roofs and stone walls—along with elements from Jiaodong Peninsula's maritime culture, like fishing children and sea deity legends. In the AIGC generation tool (Midjourney), the user could input a prompt as the following:

"Generate a fisherman's cartoon character with the background of the sea and seaweed house, the seaweed square roof is made of seaweed, and the walls are made of stone; the decorations are seaweed, large-leaf seaweed, shells, etc., cute, three-dimensional cartoon style, cute, lively and playful, delicate character design,

interesting character setting, strong expressive style, high-definition picture --s 243 - Variations (Strong)" (Figure 1)

By entering the prompt as the following, AI generates images in Figure 2.

"Generate a fisherman's cartoon character with the background of the sea and seaweed house, the seaweed square roof is made of seaweed, and the walls are made of stone; the decorations are seaweed, large-leaf seaweed, shells, etc., cute, three-dimensional cartoon style, bubble Matt style, cute and lively, delicate character design, interesting character setting, strong style expression, high-definition picture - Variations (Strong) "

They can then select their preferred images, save them, and upload them to the platform for the production of physical models.



Figure 1. AIGC-Based Virtual Idol Showcasing Jiaodong Seaweed House Culture.



Figure 2. AIGC-Based Virtual Idol Showcasing Jiaodong

Seaweed House Culture.

In the marketing process of customized cultural products, AIGC technology can assist enterprises in accurately analyzing market demand and consumer preferences, thereby formulating corresponding product strategies. By analyzing consumer behavior, companies can identify market trends and promptly adjust their product lines to meet the ever-changing market demands. This data-driven approach to customized production enhances the efficiency of intangible cultural heritage dissemination and lays a solid foundation for the sustainable development of the cultural industry.

5.2.2 Personalized Scene Model Design

By leveraging AIGC technology, users can create virtual scene models of Jiaodong Seaweed Houses, which are not only easy to upload for sharing on platforms but can also be directly 3D printed through these platforms. The virtual scenes generated by AIGC, with their high precision in rendering, not only delicately showcase the architectural details and environmental features of seaweed houses but also cleverly integrate the maritime landscape and folk characteristics of the Jiaodong Peninsula, creating a unique virtual cultural space. The prompt for Figure 3(A) was set as the following words:

"Generate a three-dimensional cartoon cabin model, like a fairy tale castle, the color should be bluish-gray or yellow-gray, with seaweed as the roof and walls as stones".

For Figure 3(B), the prompt was set as:

"with ocean elements, the house structure has one or two floors, the seaweed house is built on the sea, and shells are also used as decorations on the house --c 35 --iw 1.3 --s 337 - Variations (Strong) ".

For Figure 3(C), the prompt was set as:

"Make a three-dimensional cartoon house model, like a fairy tale castle, the color should be bluish-gray or yellow-gray, seaweed as the roof, walls as stones, with ocean elements, the house structure has one or two floors, the seaweed house is built on the sea, and shells are also used as decorations on the house --c 35 --iw 1.3 --s 337 - Variations (Strong) ".

Furthermore, users can modify the generation style

of AIGC through commands to create digital works that blend seaweed houses with other artistic styles, as shown in Figure 4. Figure 4 (A) was generated by the following prompt:

"Make a three-dimensional cartoon house model, like a fairy tale castle, the color should be bluish-gray or yellow-gray, seaweed as the roof, walls as stones, with ocean elements, the house structure has one or two floors, the seaweed house is built on the sea, the background is solid color, and the house is decorated with shells --c 35 --iw 1.3 --s 337 - Variations (Strong) ".



A B C

Figure 3. AIGC-Generated Digital Creative Design Models of Jiaodong Seaweed Houses.

For Figure 4(B), the prompt was set as:

"Make a three-dimensional cartoon house model, like a fairy tale castle, the color should be bluish-gray or yellow-gray, seaweed as the roof, walls as stones, with ocean elements, the house structure has one or two floors, the seaweed house is built on the sea, the background is solid color, and the house is decorated with shells --c 35 --iw 1.3 --s 337 - Image #2".

For Figure 4(C), the prompt was set as:

" Make a three-dimensional cartoon house model, like a fairy tale castle, the color should be bluish-gray or yellow-gray, seaweed as the roof, walls as stones, with ocean elements, the house structure has one or two floors, the seaweed house is built on the sea, the background is solid color, and the house is decorated with shells --c 35 --iw 1.3 --s 337 - Image #4".

Through these virtual scene models, young users can enjoy an immersive experience of life in seaweed houses online while engaging in interactive fun that connects with the real world. Additionally, these models are suitable for showcasing in online museums, promoting cultural tourism, and facilitating cultural

education platforms, providing young audiences with deeper opportunities for cultural exploration and learning. This enables them to gain a more comprehensive understanding and appreciation of the cultural charm of Jiaodong Seaweed Houses.



A B C

Figure 4. AIGC-Generated Digital Creative Design Models of Jiaodong Seaweed Houses.

5.2.3 Personalized Customization of Cultural Derivative Products

Through AIGC technology, users can integrate elements of Jiaodong Seaweed House culture into their daily lives based on their interests and needs. These products include but are not limited to clothing, home goods, handicrafts, and souvenirs (Yang and Chen 2024). For example, users can customize products according to their preferences by selecting colors, design patterns, or engraving personal names to create T-shirts, scarves, bookmarks, and other items that reflect the characteristics of Jiaodong Seaweed Houses. These cultural and creative products not only retain traditional cultural elements of seaweed houses, such as the texture of thatched roofs and the patterns of stone walls, but also attract the attention and purchases of young users through fashionable designs. This approach not only satisfies modern young people's pursuit of uniqueness but also enhances the cultural value and emotional connection of the products.

As shown in the figure, users can select images of the architectural style, traditional patterns, or colors of seaweed houses as reference images. They can then set the prompt in the AIGC tool (Midjourney) as follows:

"A canvas bag with a seaweed house pattern printed on it, as shown in the mat drawing, the roof is made of seaweed, shaped like a boat, round or oval, the roof is relatively steep, and the picture content contains the font 'Jiaodong Seaweed House', lattened --c 37 --ar 4:3 --s 331 - Variations (Strong)," to generate a Jiaodong

Seaweed House canvas bag, as shown in Figure 5.

In addition to canvas bags, T-shirts are also popular among young people. To combine Jiaodong Seaweed House culture with T-shirt design, the prompt words can be set as the following:

"Create a unique T-shirt design featuring the cultural essence of Jiaodong Seaweed Houses. Incorporate elements that highlight the traditional architecture, such as the unique thatched roofs and organic shapes. Use earthy tones and textures that evoke the coastal environment of the Jiaodong Peninsula. Include traditional motifs or patterns inspired by local craftsmanship, symbolizing the rich marine folklore and heritage. The overall style should be modern yet reflect the vintage charm of these historic structures, appealing to both locals and tourists who appreciate cultural authenticity. --c 58 --iw 1.2 --ar 3:4 --s 419 - Variations (Strong) " as shown in Figure 6.



Figure 5. AIGC-Based Personalized Customization of Canvas Bags.



Figure 6. AIGC-Based Personalized Customization of T-Shirts.

The inspiration for generating these cultural creative products is deeply rooted in the local culture of Jiaodong Seaweed Houses. In generative artificial

intelligence content tools, consumers can make adjustments according to their preferences by setting prompts for different patterns, colors, texts, and styles to produce works they love. This customization not only satisfies consumers' individual needs but also significantly enhances user engagement, positioning consumers not just as recipients of products but as active participants in cultural dissemination. To a certain extent, this promotes the transmission and recognition of intangible cultural heritage.

5.2.4 Digital Art and Interactive Experiences

AIGC-generated digital artworks are a popular form of creative products among young people in the modern society. AIGC can produce digital art pieces themed around Jiaodong Seaweed House culture, including abstract paintings, illustrations, animations, and game scenes, as shown in Figures 7. The prompt for Figure 7(A) was set as:

"addImg1 addImg2 addImg3 Animation derivative design: Image of a lovely fisherman, with the background of the sea and seaweed house, with strong waves and strong wind; the roof of the seaweed house is made of seaweed and the walls are made of stone; the decorations are seaweed, large-leaf seaweed, shells, etc.; the color is bluish-gray of stone, cute style, three-dimensional cartoon style, cute, lively and playful, delicate character design, interesting character setting, strong style expression, high-definition picture --c 45 --s 185 - Variations (Strong) ".

The prompt for Figure 7(B) was set as:

"addImg1 addImg2 addImg3 addImg4 Anime derivative design: Image of a lovely fisherman, with the background of the sea and seaweed house, with strong waves and strong wind; seaweed makes roofs and walls are made of stones; decorations are seaweed, large-leaf kelp, shells, etc.; The color is bluish-gray of stone, cute style, three-dimensional cartoon style, cute, lively and playful, delicate character design, interesting character setting, strong style expression, high-definition picture --c 45 --s 297 --iw 1 - Variations (Strong) ".

Users can showcase, trade, or collect their AIGC-created works on online platforms. Additionally, digital artworks can be interactively displayed in virtual

spaces, allowing users to engage with them through touchscreens, AR devices, and other technologies, thereby enhancing the immersive cultural experience.

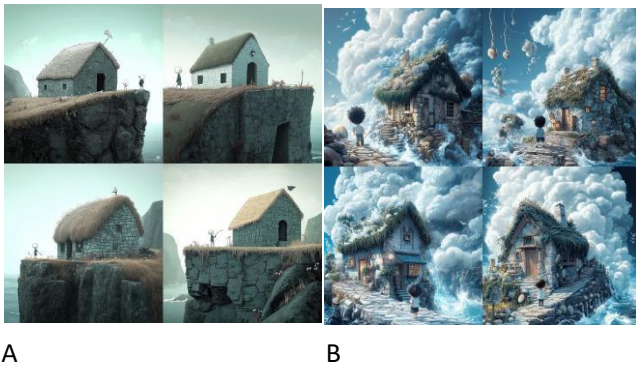


Figure 7. AIGC-Generated Game Scenes Featuring Seaweed House Elements.

Additionally, AIGC-generated interactive artworks can be widely shared on social media platforms, where users can easily customize certain elements of the artwork, such as changing colors, adding textures, or adjusting layouts. This form of interactive experience not only enhances the appeal of cultural products but also allows users to participate more directly in cultural creation, fostering their interest in and sense of connection with the culture.

5. Conclusion

This paper explores the digital innovation pathways of marine folk culture in the Jiaodong Peninsula against the backdrop of AIGC, using the digital innovation design of the Jiaodong Seaweed House cultural brand IP as a case study for practical application exploration. Through a analysis of relevant research on AIGC technology and the marine folk culture of the Jiaodong Peninsula, it becomes evident that AIGC provides new impetus for the digital transformation of traditional culture. It not only generates personalized cultural content but also creates vast opportunities for innovative expression and global dissemination of culture. In today's multimedia era, AIGC can make cultural products more appealing to the younger generation through diverse forms, promoting the dissemination and innovation of culture.

However, in the practice of digital innovation design based on AIGC for the marine folk culture of the Jiaodong Peninsula, several shortcomings and challenges can still be identified. Firstly, although AIGC technology can generate high-quality digital content, ensuring the cultural accuracy and authenticity of the generated

content remains a significant issue. The digital expression of intangible cultural heritage requires a high level of respect for the core values and traditional characteristics of the culture, while AIGC-generated content may sometimes deviate from the essence of traditional culture, posing a potential threat to cultural authenticity and integrity.

In summary, the digital innovation design of folk culture based on AIGC is not only an important avenue for the modernization of traditional culture but also opens new fields for the development of the cultural creative industry. In the future, with the continuous advancement of technology, the application potential of AIGC in the cultural sector will become even broader, further driving the ongoing innovation of the Jiaodong Seaweed House cultural brand IP and revitalizing Jiaodong Peninsula's marine folk culture on the global stage.

Disclosure statement: No potential conflict of interest was reported by the author(s).

Acknowledgments: This work supported by the College Student Research Project at Shandong University of Engineering and Vocational Technology, entitled "Research on Digital Innovation of Traditional Folk Customs in the Jiaodong Peninsula in the Era of Omnimedia".

References

- Ding Yixin. 2024. "Shaping and Promotion of the Cultural Brand of Jiaodong Marine Intangible Cultural Heritage Tianheng Sea Festival", *Journal of Screen Printing* (10):10-12.
- Guo Peichao. 2020. "The Evolution and Transmission of Traditional Marine Folk Culture in the Jiaodong Peninsula". *World Shipping*, 43(07):53-56.
- Li Jia and Zhang Jing. 2024. "Innovative Design and Digital Promotion of Shu Embroidery AIGC under the Threshold of Aesthetic Education, Packaging Engineering", *Packaging Engineering*, 45(04):485-490
- Liu Min. 2019. "Development of Marine Folk Culture Tourism in Jiaodong Peninsula", *Journal of Hubei University of Arts and Science*, 40(02):29-33.
- Sui Minghao and Xiao Shenghe. 2022. "The Study on the Time Value of the Characteristic Folk Residences of Haicao

House in Rongcheng City, Shandong Province", *Journal of Guilin University of Technology*,42(02):410-416.

Sun Wulin. 2024. "Research on English Translation of Intangible Cultural Heritage in the Age of AIGC", *Applied Mathematics and Nonlinear Sciences*, Vol.9,No.1.

Yang Jingling and Chen Yanwen. 2024. "Innovative Application of AIGC-based Taohuawu Woodcut New Year Paintings in Home Furnishing Design", *Packaging Engineering*, 45(12):465-473.