

AI-Driven Inheritance Mechanism of Shanghai Xiaojiaochang New Year Picture Cultural Genes

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Abstract:

Shanghai's Xiaojiaochang New-Year prints were a unique form of folk art in the Shanghai area during the late Qing Dynasty and the Republic of China period. They not only inherited the essence of Suzhou Taohuawu New Year Pictures but also integrated the regional characteristics and contemporary features of Shanghai, forming a style that was urbanized, fashionable, and commercialized. These New Year pictures often depicted scenes and subjects that were of general concern to the common people, exuding a strong sense of daily life and catering to the needs of the emerging urban middle class, thereby gaining immense popularity. However, with the introduction of modern Western printing technology, traditional woodblock New Year pictures gradually declined. Therefore, researching how to utilize AI technology to construct a cultural gene map of Shanghai's Xiaojiaochang New-Year prints and explore their inheritance mechanisms holds significant practical value.

Keywords:

Shanghai's Xiaojiaochang New-Year Prints, Cultural Gene Inheritance, AI-Driven Empowerment

1. The Role of AI in the Historical Reconstruction of Shanghai's Xiaojiaochang New-Year Prints

Shanghai's Xiaojiaochang New-Year prints distinguish themselves through a distinctive haipai idiom that synthesises Chinese and Western pictorial techniques. Characterised by daring perspectival shifts, a marriage of verisimilitude and allegory, refined linear articulation, and an unambiguous, luminous palette, these works display an imaginative breadth rarely matched in the genre. Thematically, Shanghai's Xiaojiaochang New-Year prints remained contemporaneous: beyond canonical motifs drawn from folklore, seasonal rites, and auspicious symbolism, the blocks recorded modern novelties and social fashions, endowing the genre with an unmistakable period charge.

Yet Shanghai's Xiaojiaochang New-Year prints represent the sole extinct branch of China's traditional woodblock New-Year picture, surviving today in only a handful of impressions. Despite their scarcity, their humanistic and artistic significance within xylographic studies remains undiminished. Recent computational techniques now afford unprecedented possibilities for historical reconstruction and cultural reanimation. Digital restoration, interactive encounters, derivative cultural products, and algorithm-assisted design not only safeguard this intangible heritage but also re-energise it within contemporary visual culture. As these technologies mature, Shanghai's Xiaojiaochang New-Year prints are poised to re-enter daily life in plural forms, functioning as a living conduit between tradition and the present.

As an important part of Shanghai's local culture, there are only over 1000 existing works of Shanghai's Xiaojiaochang New-Year prints, most of which are rare editions. AI technology can use image recognition and deep learning algorithms to perform high-precision scanning and digital processing on existing New Year paintings, achieving the restoration and restoration of New Year paintings. For example, Tencent Zhiying's AI technology can intelligently repair damaged or missing parts in New Year paintings through multimodal recognition and generation technology, while maintaining the style and artistic features of the original work. AI technology can analyze and simulate historical scenes in New Year paintings to recreate the social landscape of late Qing Shanghai. For example, by analyzing the "Chinese and Foreign Trade Celebrates with a Grand Display of Flower Lanterns" in the small school's New Year's painting, AI can generate dynamic 3D scenes to recreate the lively scene of the 50th anniversary celebration of Shanghai's opening to trade. This technology not only facilitates historical research, but also allows more people to understand the cultural connotations behind Shanghai's Xiaojiaochang New-Year prints through immersive experiences. AI technology can improve the efficiency and quality of New Year painting production, achieve digital processing of traditional New Year paintings, and provide designers with more design elements and sources of inspiration. In addition, AI technology can also achieve personalized customization of New Year paintings, meeting the diverse and personalized needs of modern people for home environments. Generative design: a dialogue between tradition and modernity; Immersive experience and dissemination of metaverse scene construction: Restoring Shanghai's Xiaojiaochang New-Year prints workshops in virtual space, users can experience processes such as rubbing and coloring through VR. Dynamic narrative extension: Using NLP technology to analyze New Year's painting stories and generate interactive animations or short plays. In addition, the extraction and digital protection of cultural genes, as well as the analysis of cultural gene elements and visual symbols, can be achieved through color systems (such as high contrast of peach red and bright yellow) and composition features (symmetry, scene narrative). Technical process: Woodblock carving, color printing and other intangible cultural heritage techniques. Spiritual core: values of praying for good fortune, common sense of humor, and integration of Chinese and Western cultures.

2. AI Technology Empowers the Digital Preservation and Revitalization of Shanghai's Xiaojiaochang New-Year Prints

As an important part of Shanghai's local culture, there are only over 1000 existing works of Shanghai's Xiaojiaochang New-Year prints, most of which are rare editions. These precious cultural heritages not only record the social landscape of late Qing Shanghai, but also showcase unique artistic styles and cultural values. However, due

to their age and limited storage conditions, many New Year paintings have already experienced damage and fading. In order to protect and inherit this intangible cultural heritage, the application of AI technology is particularly important. The application of AI technology in the restoration and restoration of New Year paintings. AI technology can use image recognition and deep learning algorithms to perform high-precision scanning and digital processing on existing New Year paintings, achieving the restoration and restoration of New Year paintings. For example, Tencent Zhiying's AI technology can intelligently repair damaged or missing parts in New Year paintings through multimodal recognition and generation technology, while maintaining the style and artistic features of the original work. This technology can not only repair the physical damage of New Year paintings, but also restore their original colors and details, giving them new vitality. The application of AI technology in the reconstruction of historical scenes. AI technology can not only repair and restore New Year paintings, but also analyze and simulate historical scenes in New Year paintings to recreate the social style of Shanghai in the late Qing Dynasty. For example, by analyzing the "Celebration of Sino Foreign Trade with a Large Display of Flower Lanterns" in the Shanghai's Xiaojiaochang New-Year prints, AI can generate dynamic 3D scenes to recreate the lively scene of the 50th anniversary celebration of Shanghai's opening to trade. This technology not only facilitates historical research, but also allows more people to understand the cultural connotations behind Shanghai's Xiaojiaochang New-Year prints through immersive experiences. The application of AI technology in the production and design of New Year's paintings. AI technology can improve the efficiency and quality of New Year painting production, achieve digital processing of traditional New Year paintings, and provide designers with more design elements and sources of inspiration. In addition, AI technology can also achieve personalized customization of New Year paintings, meeting the diverse and personalized needs of modern people for home environments. Through generative design, AI can combine traditional New Year painting elements with modern design to create works that have both traditional charm and modern aesthetics.

The application of AI technology in cultural gene extraction and protection: The extraction and digital protection of cultural genes, such as color system: Shanghai's Xiaojiaochang New-Year prints are known for their bright colors, such as peach red, bright yellow and other high contrast colors. AI technology can extract these color systems through image analysis and establish a digital color library, providing reference for subsequent design and research. Composition features: The composition of Shanghai's Xiaojiaochang New-Year prints has symmetry and scene narrative. AI technology can analyze these features, extract representative composition patterns, and provide inspiration for modern design. Technical process: Woodblock carving, color printing and other intangible cultural heritage techniques are important components of Shanghai's Xiaojiaochang New-Year prints. AI technology can record and simulate these skill processes, and through virtual reality (VR) technology, users can experience traditional techniques such as rubbing and coloring in virtual spaces, enhancing their awareness and protection of intangible cultural heritage. Analysis of the elements of cultural genes and visual symbols. Spiritual core: Shanghai's Xiaojiaochang New-Year prints not only have artistic value, but also carry rich cultural connotations, such as praying for blessings and auspiciousness, common sense of humor, and the values of integrating Chinese and Western cultures. AI technology can use natural language processing (NLP) technology to analyze the stories and meanings in New Year's paintings, generate interactive animations or short

dramas, and develop IP(Internet Protocol), allowing these cultural elements to be more widely disseminated in modern society.

3. Constructing the Cultural Genealogy of Shanghai's Xiaojiaochang New-Year Prints

To construct a cultural gene map of Shanghai's Xiaojiaochang New-Year prints, it is necessary to systematically sort out their historical, artistic characteristics, and styles. Through in-depth analysis of specific cases, explore their manifestations and application methods in the modern context. Systematically study the development history of Shanghai's Xiaojiaochang New-Year prints and understand their evolution from traditional woodblock New Year paintings to stone seal New Year paintings. Thoroughly analyze the thematic characteristics, artistic expression characteristics, and printing process characteristics of Shanghai's Xiaojiaochang New-Year prints. Using AIGC technology to digitize New Year paintings, extract their core design elements and color features, and systematically study the development history of Shanghai's Xiaojiaochang New-Year prints, understanding their evolution from traditional woodblock New Year paintings to stone seal New Year paintings. Thoroughly analyze the thematic characteristics, artistic expression characteristics, and printing process characteristics of small school New Year paintings.

Using AI technology to digitize New Year paintings and extract their core design elements and color features. Through deep learning techniques, AI models can automatically extract low-level features, such as color, texture, shape and high-level semantic features from images. AI models can help identify the distinctive visual elements of Shanghai's Xiaojiaochang New Year prints. such as multi viewpoint composition, a style that combines realism and symbolism, as well as delicate lines and bright colors. AI technology can analyze and extract colors from New Year paintings, identifying representative color combinations and tones. By using Generative Adversarial Networks (GAN) or Diffusion Models, the extracted color features can be optimized and adjusted to generate a color scheme consistent with the style of the original New Year painting. Using AI technology to digitize the New Year paintings of Shanghai small schools can not only achieve high-precision restoration of the paintings, but also generate new works of art. For example, through tools such as Stable Diffusion, new designs can be generated based on the style and elements of New Year paintings for the development of cultural and creative products. Using AI technology to digitize the New Year paintings of Shanghai small schools and extract their core design elements. Stylish generation framework: Build a dual channel generation model of "traditional New Year painting style+modern design language", such as Stable Diffusion fine-tuning, supporting controllable creation, control network adjustment of composition color. Human machine collaboration paradigm: Inheritors provide core cultural parameters , such as auspicious pattern rules, AI generates initial drafts in batches and manual screening and optimization form a closed loop. Exploring innovative applications of New Year paintings in home design, cultural and creative products, and other fields in response to modern design needs. AI technology can combine modern design concepts to transform classic elements of Shanghai's Xiaojiaochang New-Year prints into cultural and creative products. AI assisted cultural and creative derivative development technology path: use Midjourney+ControlNet to generate a new year picture style pattern library, which is applied to: new consumption scenarios: coffee cup covers, blind box stickers, game skins, such as the limited skin of Genshin Impact Shanghai style New Year pictures.

For example, the Shanghai Library team extracted visual symbols from Shanghai's Xiaojiaochang New-Year prints through AI technology, and developed three major theme series of cultural and creative products, namely Yeji, childlike fun, and Desheng. These cultural and creative products not only preserve the cultural connotations of New Year paintings, but also make them more relevant to contemporary life through modern design language. In addition, significant achievements have been made in the innovative application research of Taohuawu woodblock New Year paintings based on AI technology in home design, providing new ideas for the modern application of traditional culture. The characteristics of color and texture, although having great potential, also face various challenges.

4. Intelligent Creation Assistance and the Diversified Dissemination of Media

4.1. The Application of AI Technology in New-Year Picture Creation

Intelligent assisted creation: In the initial draft generation step, AI technology can use deep learning algorithms to generate initial drafts of New Year paintings for artists to create again. For example, by inputting the theme and style of a New Year's painting, AI can quickly generate a basic framework that artists can refine and optimize based on, thereby significantly improving creative efficiency. Secondly, AI can also provide inspiration and suggestions for creators by analyzing the style and theme of New Year paintings. For example, AI can analyze common color combinations, composition methods, and cultural symbols in small school New Year paintings, providing reference for creators and inspiring new creative inspirations. In terms of immersive exhibition experience. **Virtual Reality (VR) and Augmented Reality (AR):** AI technology can combine virtual reality (VR) and augmented reality (AR) technologies to create immersive exhibitions. Through AI generated 3D scenes and dynamic effects, viewers can immerse themselves in the historical scenes depicted in the Shanghai's Xiaojiaochang New-Year prints. For example, the audience can enter the virtual Yu Garden Lantern Festival through VR equipment, watch the animation of dragon dance, and feel the lively atmosphere of the Yuanxiao Festival. **Application scenario:** This immersive experience not only enhances the audience's sense of participation, but also improves the dissemination effect of New Year paintings. The application scenarios include subway digital art display windows, cultural and tourism AR guides, etc., providing audiences with a brand new cultural experience. **Social media and interactive platforms. Personalized New Year Painting Customization:** AI technology can enable more people to participate in the creation and dissemination of New Year paintings through social media and interactive platforms. For example, Tencent Zhiying's AI technology allows users to share personalized New Year picture dolls through social media. Users can upload photos, choose themes, such as "family photo" or "pet New Year's greeting", integrate AI with small school style to generate digital New Year paintings, and support blockchain authentication, such as Ant Chain to generate unique digital certificates. **Commercial value:** This interactive approach not only increases the dissemination scope of New Year paintings, but also stimulates public interest in traditional culture. For the consumption of "light intangible cultural heritage" among young people, the unit price ranges from 39 to 299 yuan, which has high commercial value.

4.2. Innovative Application Scenarios

Implementation of Dynamic Storytelling Technology for New Year Paintings: Combining text to video models, such as Sora to transform static New Year painting scenes into dynamic short stories. For example, if you input the New Year picture Yu Garden Lantern Festival, AI will generate the animation of dragon dance in the Yuanxiao Festival, retaining the woodblock printing texture. Application scenarios: subway digital art display windows, cultural and tourism AR guides, etc. Through dynamic narrative expansion, AI technology can transform static New Year paintings into dynamic visual content, enhancing audience participation and interactivity, making the dissemination of traditional culture more vivid and interesting. Personalized New Year Picture Customization. Technology Implementation: Develop a WeChat mini program, where users upload photos and select themes, such as “Family Photo” and “Pet New Year”, and AI integrates small school style to generate digital New Year pictures. Support blockchain based certificate storage, such as “ANTCHAIN” to generate unique digital certificates. Commercial value: Targeting the consumption of “Light Intangible Cultural Heritage(ICH)” among young people, with a unit price between 39-299 yuan, it has high commercial value. This personalized customization not only meets the demand of modern people for personalized products, but also provides a new way for the dissemination of traditional culture. Meta Heritage Workshop technology implementation: Build a virtual New Year painting workshop in Decentraland, where AI driven NPC teach printing skills. Users can experience the virtual engraving process through gesture recognition, such as Leap Motion. Application scenario: The metaverse scene is built in a virtual space to restore Shanghai’s Xiaojiaochang New-Year prints workshop. Users can experience traditional techniques such as printing and coloring through VR devices. This immersive experience not only enhances users’ understanding of intangible cultural heritage, but also provides new avenues for the dissemination of traditional culture.

4.3. Extraction and Digital Conservation of Cultural Genotypes

In terms of color system: Shanghai’s Xiaojiaochang New-Year prints are known for their bright colors, such as peach red, bright yellow and other high contrast colors. AI technology can extract these color systems through image analysis and establish a digital color library, providing reference for subsequent design and research. Composition features: The composition of Shanghai’s Xiaojiaochang New-Year prints has symmetry and scene narrative. AI technology can analyze these features, extract representative composition patterns, and provide inspiration for modern design. Technical process: Woodblock carving, color printing and other intangible cultural heritage techniques are important components of Shanghai’s Xiaojiaochang New-Year prints. AI technology can record and simulate these skill processes, and through virtual reality (VR) technology, users can experience traditional techniques such as rubbing and coloring in virtual spaces, enhancing their awareness and protection of intangible cultural heritage. Analysis of the elements of cultural genes and visual symbols. Spiritual core: Shanghai’s Xiaojiaochang New-Year prints not only have artistic value, but also carry rich cultural connotations, such as praying for blessings and auspiciousness, common sense of humor, and the values of integrating Chinese and Western cultures. AI technology can use natural language processing (NLP) technology to analyze the stories and meanings in New Year’s paintings, generate

interactive animations or short dramas, such as IP development like “The Cerini Circus”, and promote these cultural elements more widely in modern society.

5. Conclusions

In the digital age, AIGC technology provides unprecedented opportunities for the protection and inheritance of Shanghai’s Xiaojiaochang New-Year prints, but also brings many challenges. The content generated by AI may sometimes contain factual errors or inaccurate statements. When digitizing New Year’s paintings, there may be issues such as inaccurate color reproduction and loss of pattern details. This not only affects the artistic value of New Year paintings, but may also lead to incomplete cultural inheritance. At the technical level, the review and optimization of generated content are important steps in ensuring cultural consistency. Through manual review and algorithm optimization, errors and biases in the generated content are reduced, ensuring that the generated New Year paintings maintain a high degree of visual and cultural consistency with the original work. Designers can utilize the creative inspiration provided by AIGC technology, combined with their professional skills, to achieve a perfect integration of traditional art and modern technology. In the practice of cultural inheritance, the modern transformation of traditional handicrafts is the core. As a traditional handicraft, the protection and inheritance of Shanghai’s Xiaojiaochang New-Year prints need to be combined with modern technology. By combining traditional handicrafts with creative transformation through different media, exploring the relationship between the ontological language of small school New Year paintings and the context of media transformation is the key to achieving cultural revitalization. By improving data quality, establishing ethical frameworks, optimizing generated content, promoting human-machine collaboration, and strengthening education and training, we can better utilize AIGC technology to digitally protect and inherit Shanghai’s Xiaojiaochang New-Year prints. This not only helps to protect this precious cultural heritage, but also promotes its revitalization and innovation in modern society, injecting new vitality into the revival of traditional culture in Shanghai.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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