Innovative Expressions and Transformation Strategies of Painting in the Perspective of Multi-Source Information Fusion

Changhuan Chen
Academy of Painting Arts, Guangzhou Academy of Fine Arts, Guangzhou 510006, Guangdong, China
13826493167@163.com

Abstract: The study of innovative expressions and transformation strategies of painting under the perspective of Multi-Source Information Fusion (MSIF) represents a burgeoning research domain. With the continuous advancement of information technology, multi-source information fusion emerges as a pivotal research direction. Within the realm of painting, this integration can provide artists with abundant material and creative inspiration, while also offering viewers a more enriched visual experience. In today's era of informatization and digitization, multi-source information fusion has become a crucial instrument for artistic innovation. Painting, as a unique art form, encounters new opportunities for development when viewed through the lens of multi-source information fusion. By skillfully merging contemporary information technology, painting artists can draw upon a wealth of inspiration, achieving comprehensive innovation. Through multi-source information fusion, various creative methods are explored, not only enhancing the efficiency of painting creation but also expanding the creative space and expressive potential. This paper deeply analyzes, from three different angles—painting creative concepts, painting techniques, and innovative painting forms of expression—the innovative expressions of painting in the perspective of multi-source information fusion, depicting more realistic, three-dimensional, and vibrantly colorful image effects with a greater degree of expressiveness. Finally, based on the characteristics of new painting creative methods, it further explores related transformation strategies and application scenarios to better promote and apply these painting creation methods. This research aims to achieve groundbreaking innovation in painting from the perspective of multi-source information fusion, bearing significant importance in enhancing the expressiveness and perception of painting effects and possessing wide-ranging application value in actual production and creation.
Keywords: Multi-Source Information Fusion; Painting; Innovation; Computer-Generated Imagery; Photography

1. INTRODUCTION

1.1 Definition and Methodology

The rise of Artificial Intelligence is widely regarded as one of the driving forces behind the "Fourth Industrial Revolution." According to Klaus

Schwab (Klaus, 2016), founder of the World Economic Forum, the distinct characteristic of this revolution is the profound integration of technologies across multiple domains. This revolution, epitomized by cutting-edge technologies such as mobile internet, cloud computing, big data analytics, renewable energy, advanced robotics, and artificial intelligence, is progressively blurring the lines between physical, digital, and biological realms (Klaus, 2016). The Fourth Industrial Revolution is reshaping all facets of human society, from economic structures to daily life, undergoing unprecedented transformations. As these technologies continue to evolve and empower one another, we are entering a new era filled with opportunities and challenges that will fundamentally redefine the relationship between humans and technology, paving new pathways for sustainable development.

In the 1970s, the concept of information fusion appeared in several documents, though there was no unified definition at that time. However, with the extensive development of information technology and decades of research, information fusion now encompasses a broader concept. Mangolini views information fusion as a series of means, tools, and methods utilizing diverse data sources, with the core aim of enhancing information quality. Nevertheless, this definition primarily focuses on the methodological aspect and does not fully reflect its flexibility and diversity in practical applications. In contrast, Hall and Llinas's definition emphasizes the practical functionality of information fusion technology, which significantly enhances information accuracy through the integration of data from multiple sensors and related databases, enabling more detailed inferences.

Such inferences cannot be independently accomplished by a single sensor, demonstrating the vital value of information fusion technology in complex environments (Qiu et al., 2022). Multi-source information fusion, also known as multi-sensor information fusion, is a technology that integrates information from different sources, types, and spatial resolutions to obtain more comprehensive and accurate data. This technology is of great significance across various fields, enhancing decision-making quality and the ability to solve complex problems (Xinde et al., 2024). Humans use a "multi-sensor system" comprising the eyes, ears, nose, tongue, and body to collect information from multiple sources when describing things (see Fig. 1). This information is then integrated into the brain through Multi-Source Information Fusion (MSIF) to make final decisions (Zhang et al., 2021).

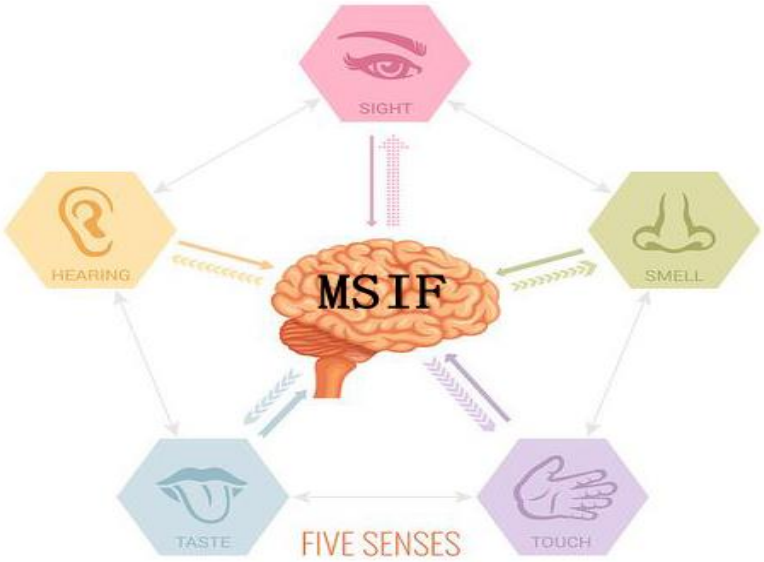

Figure 1: The Five Human Senses and Multi-Source Information Fusion

In the complex tapestry of nature, both humans and animals perceive objective phenomena not through a single sense, but as a result of the coordinated efforts of multiple senses. Our vision, hearing, touch, smell, and taste each gather information about objects from different perspectives, which the brain then integrates to form a comprehensive sensory experience. This integration of multi-sensory information is known as multi-source information fusion. The age-old story of "the blind man catching fish" illustrates how a person in a dark environment relies solely on touch to locate fish, which may lead to mistaking other objects for fish. This highlights the limitations of single-sense information. Compared to single-sensor measurements, Multi-Source Information Fusion (MSIF) can offer higher precision information and greater system stability, while also boasting advantages such as a broad spatial and temporal detection range, low cost, light weight, and minimal space occupation (Boström et al., 2007). Currently, research on multi-sensor information fusion focuses on how to utilize computers to process multi-source information to acquire integrable and applicable information theories and methods. It also explores the natural mechanisms of multi-sensory information fusion in human and animal brains, primarily aiming to propose theories and methods that address the similar or disparate feature patterns of multi-source information, ultimately obtaining information fusion characterized by both relevance and integration. Feature recognition and algorithm development have become the core focus of this research. In today's fast-paced information society, painting has embraced new concepts, with the fusion of multi-source information presenting fresh possibilities for the art of painting.

1.2 Significance of the Research

This study will enrich and expand the theoretical framework of painting art. The perspective of multi-source information fusion offers new approaches and methodologies for studying painting, helping to unveil new characteristics, principles, and trends in art during the information age. It provides theoretical support for the development of painting art, promoting innovation and growth. Under this lens, painting art must continually innovate and transform to meet the evolving needs of the times and its audience. This research will explore innovative forms of expression and strategies for transformation within the realm of multi-source information fusion, offering valuable insights for the innovative development of painting. Additionally, in the information age, art education in painting must advance with the times, cultivating talents with innovation and practical skills. This study will offer new concepts and directions for art education in painting.

1.3 Current State of Research Domestically and Internationally

The study of innovative expression modes and transformation strategies for painting from the perspective of multi-source information fusion is an emerging field, and domestic research in this area is currently in its nascent stages. With the ongoing advancement of information technology, multi-source information fusion has become a vital research direction. In the realm of painting, it can provide artists with more materials and creative inspiration, while offering audiences a richer visual experience. Domestically, there is still limited research on innovative expression modes and transformation strategies for painting through the lens of multi-source information fusion. Nonetheless, some scholars have begun to pay attention to this field, proposing preliminary ideas and explorations. For instance, The book "History of Digital Media Art," suggests that "the virtual world is ubiquitous, and digital technology is redefining reality." This book presents a fresh perspective on the development history of digital media art, with an emphasis on the influence of Western postmodern art on the evolution of digital art. "Research on the Digital Construction of Chinese Traditional Painting Based on Cross-Media Narratives," analyze the current state, future trends, and significance of the digital cultural industry while conducting practical explorations with the aim of finding cross-media construction paths between new media art and Chinese traditional painting in the new media era. This exploration seeks to delve into the unique charm of Chinese aesthetics through the cross-media narratives of traditional Chinese painting.

Internationally, "Understanding Media: The Extensions of Man" offers an innovative interpretation of the concept of media. The book identifies electronic media as a pivotal medium shaping human history, exploring in depth how it triggers social change and influences human cognition, thereby clarifying the relationship between art and media. Lev Manovich's (Lev et al., 2023)"The Language of New Media" examines how new media alters methods of artistic expression. In "Digital Aesthetics," Sean Cubitt, against the backdrop of the digital age, explores new aesthetic models of the era, questioning traditional aesthetic notions and offering theoretical support for the study of digital art. Likewise, "Mixed Reality Art" showcases artists' innovative practices in multi-source information fusion. For these scholars, media is seen not merely as a means of information exchange, but as a crucial tool in shaping thought and culture. In summary, domestically, research on painting methods through the lens of multi-source information fusion remains limited, largely confined to a few academic papers and studies. These have yet to form a complete theoretical and practical framework, necessitating further exploration and investigation. In the future, as information technology continues to develop and be applied, research on painting methods from this perspective is expected to gain increasing attention. We need to conduct deeper research and discussions to establish a comprehensive theoretical framework and practical approach, providing artists with more creative inspiration and technical support while offering audiences a richer visual experience. Thus, this topic holds significant research importance.

2. INNOVATIVE EXPRESSION MODES IN PAINTING THROUGH THE LENS OF MULTI-SOURCE INFORMATION FUSION

Max Dessoir, in Aesthetics and Theory of Art, states that the artist is like a sailor with an enterprising spirit, constantly venturing out to discover new 'continents' (Osborne, 1972). They often refuse to be constrained by traditional frameworks, daring to challenge established norms and boundaries to create novel and thought-provoking works. This spirit of innovation lies in their keen grasp of materials, fearless exploration of form, and reinterpretation of seemingly mundane matters. Artists typically possess keen imagination and abundant creativity, presenting personal emotions, social issues, and shared human experiences in unexpected ways, thereby not only provoking thought but also eliciting resonance and inspiration. Their innovation goes beyond technical breakthroughs and

often encompasses conceptual revolutions, continuously infusing the art domain with dynamism and novelty. This section delves into the innovation of painting from three perspectives—painting concepts, techniques, and modes of expression—under the scope of multi-source information fusion, elucidating its application in painting and the potential effects it may achieve.

2.1 Innovation in Painting Concepts Under the Perspective of Multi-Source Information Fusion

A novel and clear concept is paramount in painting creation. The concept is the core and soul of a painting, encompassing the artist's reflection and understanding of a theme, or the expression of certain emotions or atmospheres. When determining a concept, artists can draw from personal experiences, feelings, and philosophical contemplation to discover a personalized, unique theme.

2.1.1 Cultural Fusion as a Catalyst for Conceptual Innovation

The term "prime" signifies both "origin" and "end." "Multiculturalism," interpreted literally, refers to cultures originating from diverse beginnings. This "plurality" reflects the dialectical unity between "one" and "many." Cultural fusion is not about synthesizing different cultures into a new, uniform culture but represents a stratified, interactive process that endows traditional culture with new momentum. Culture is generally considered to consist of three aspects: material technology, institutional behavior, and spiritual ideology (Modood, 2014). Traditional painting focuses on specific cultural traditions and subjects, whereas contemporary artists embrace information from varied cultural backgrounds, transcending traditional limitations and integrating them into their work. Through the fusion of diverse cultures, artists demonstrate understanding and assimilation of different cultures, creating works with a more global perspective and vision. The conceptual framework of painting within the lens of multi-source information fusion leads artists to create uniquely styled works by incorporating elements from different cultures, thereby endowing the artwork with richer connotations and modes of expression. This cultural amalgamation not only enriches the content of paintings but also expands their expressive scope. The creative concepts of painting in the context of multi-source information fusion have catalyzed the globalization of painting art. With the advent of the information era, cultural exchange and fusion have become easier, allowing artists greater freedom to access information from various cultures and integrate it into their creations. This

globalized creative concept not only enriches the content of painting art but also extends its influence and dissemination channels.

2.1.2 Artistic Cross-Disciplinary Fusion and the Innovation of Creative Concepts

Within the framework of multi-source information fusion, beyond the assimilation of diverse cultures, the paradigm of painting creation has extended beyond traditional artistic forms and themes. It actively draws upon the creative methods and concepts from other artistic fields to achieve an innovative fusion of cross-disciplinary expressions. Traditionally, painting and other art forms, such as sculpture, existed independently. However, in contemporary society, cross-disciplinary fusion has become a common phenomenon. Artists incorporate techniques and ideas from music, dance, film, and other art forms to infuse their works with richer connotations and modes of expression. Lynn Hershman Leeson, one of the most influential pioneers in digital media art, has works and research spanning multiple domains including painting, photography, computer-generated imagery, interactive media, and virtual reality. She vividly demonstrates the role of digital technology in advancing the art of painting, promoting diversification in both creative methods and content. Her most renowned work from the 1970s involves the creation of a fictional persona named Roberta Breitmore. Using various tools like eyeshadow and brushes, she transformed the character's appearance and crafted photographic representations, simulating the character and her life within the real world (Figure 2).

Figure 2: Lynn Hershman Leeson, "Roberta Construction Chart #1," 1975

Leeson, recounting her journey in painting, stated: "For me, painting is akin to meditation. I firmly believe that all things originate from painting. Whenever I embark on a project, I always render it upon the canvas; it is the most fundamental language." With these paintings (see Figure 3), Leeson continues to add other elements based on her intuition and needs, often employing collage techniques. Sometimes she transforms the flat images into semi-relief wax figures and incorporates sound. For example, in her seminal work "Breathing Machine" (see Figure 4), she integrates the sound of breathing into the piece, conveying her personal experience of breathing difficulties.

Figure 3: Leeson, "Breathing Machine" Sketch

Figure 4: Leeson, "Breathing Machine"

The integration of diverse disciplines has brought a wealth of novel creative concepts to painting. Artists, by drawing upon techniques and expressive forms from other art fields, have infused paintings with a more diverse array of expressive possibilities. For instance, a piece might

incorporate the rhythmic qualities of music and the dynamism of dance, resulting in an artwork full of vitality and rhythm. This interdisciplinary fusion not only enriches the expressive capabilities of paintings but also broadens the aesthetic realm of the art, offering viewers a novel aesthetic experience. In this context, the lines, shadows, and colors in a painting are no longer merely static images but seem to possess dynamic life, sketching the melodies of music and the movements of dance, allowing observers to perceive the rhythm of music and the tempo of dance through visual experience. The renowned Chinese-French painter Hsieh Jinglan initiates dance from music, which then influences painting, combining the elements of painting, music, and modern dance to create a unique three-dimensional artistic language entirely her own. As she herself remarked: "The dynamism in painting comes from the voice and actions within the body."

Figure 5: Hsieh Jinglan and Her Works

Figure 6: Hsieh Jinglan, "Untitled" 1968

The integration of diverse disciplines has infused painting with a wealth of innovative elements. Artists, by assimilating novel concepts and techniques from other artistic realms, have brought new dynamism and creativity to the realm of painting. An artist might employ the editing techniques of film and the perspectives of photography to create paintings imbued with a cinematic quality, enhancing the dramatic tension of the work, as exemplified by the illustrations of Brazilian artist Rodolfo Damaggio. This interdisciplinary fusion not only enriches the depth of paintings but also propels the innovative development of painting as an art form, offering new insights and inspiration to the art world. In this process, painting transcends its traditional confines as a static, two-dimensional medium, embracing the dynamic essence of film, thus immersing viewers in successive scenes where they can feel the rise and fall of narrative arcs.

Figure 7: Illustration Works by Brazilian Artist Rodolfo Damaggio

The convergence of diverse disciplines offers an opportunity for interaction and synergy between painting and other art forms. By drawing on the creative concepts and expressive styles from various artistic fields, artists facilitate dialogue and exchange among different art forms. This intersection not only enriches the substance of painting but also expands channels for communication within the art world, establishing bridges for collaboration and innovation across diverse artistic disciplines.

2.2 Innovation in Painting Techniques under the Perspective of Multi-source Information Integration

Within the framework of multi-source information integration, the active application of technological advancements has fostered the renewal of painting creation concepts. With the rapid development of digital technology, painting has acquired entirely new forms of expression and creative methodologies. Traditional painting creation often relied on

manual skills and conventional tools; however, modern artists utilizing digital tools have not only enhanced the efficiency and quality of their work but also created more diverse and rich visual effects and forms of expression. Consequently, the application of technology has become a crucial driving force for innovative development in painting.

2.2.1 The Role of Digital Technology in the Innovation of Painting Techniques

Digital technology plays a pivotal role in the innovation of painting techniques within the context of multi-source information integration:

1) The application of digital painting technology enables artists to handle lines and colors with greater precision, achieving richer layers and textures. Through digital tools, artists can meticulously adjust each stroke and color, creating subtle effects that enhance the expressive power of their works. For instance, artists can use digital technology to simulate light and shadow effects that are challenging to achieve with traditional painting, thereby enhancing the three-dimensionality and depth of the artwork.

2) The use of computer-aided design allows artists more flexibility in creating and modifying their works. Compared to traditional manual processes, digital technology can increase the production efficiency of paintings and reduce errors during the creation process. Artists can make multiple adjustments on the computer until the desired effect is reached, making the artistic creation process more efficient and precise.

3) Digital technology provides a closer connection between painting and other art forms. Through digital means, paintings can be more easily integrated with photography, sculpture, and other forms of art, creating richer and more diverse expressions. For example, artists can combine photography with painting by using real scenes from photographs as the basis for their paintings, and then further processing and creating on the computer to imbue the work with deeper meaning and expressiveness.

4) The fusion of traditional techniques and modern technology endows paintings with greater expressiveness and innovation. Traditional techniques such as woodcut and engraving are often limited to manual operations, but with the aid of digital technology, artists can achieve their expressive goals more precisely. For instance, artists can use digital tools to repeatedly refine and adjust the original painting, resulting in works with richer layers and textures, thus enhancing their visual impact and emotional resonance. Given their multiplicity and printed nature, prints see even broader applications of digital technology compared to other painting categories, marking an important direction for innovation in printmaking. "The integration of digital technology with art expands the creative space,

and the unique characteristics and advantages of printmaking place it at the forefront of this fusion. The application of digital techniques in printmaking enriches its language and broadens its forms (Chittenden, 2021).Traditionally reliant on manual tools like woodcuts and copper engravings, printmakers are increasingly exploring computer-aided design to flexibly manipulate images and create more complex effects and expressions. As an expert in digital media art and theory, Lev Manovich (Lev et al., 2023) has conducted in-depth research on the integration of digital technology and painting. In his book, *The Language of New Media*, he explores the impact of digital technology on society and culture from multiple dimensions, discussing how its application in the realm of painting has given rise to new forms of artistic expression and their characteristics. Since the early 21st century, computational technology, data analysis, and artificial intelligence (AI) have gradually permeated the realm of aesthetics, finding widespread application in recommendation systems for art, music, books, and films, as well as in the automatic editing of images and videos. Meanwhile, AI has increasingly demonstrated its remarkable role in creating new human-made works across various domains, including art, music, design, and text. A representative example of the fusion between digital technology and painting is "The Next Rembrandt" project, created through the collaboration of the advisory teams from the Mauritshuis, TU Delft, the Rembrandt House Museum, and the creative teams from ING Bank and Microsoft in the Netherlands. Renowned Dutch painter Rembrandt van Rijn stands as one of the greatest masters of light and shadow in art history. Over three hundred years after his death, in our current information era, the question arises: what results can be achieved when data becomes the artist and technology the brush? In 2016, the creative team analyzed over three hundred of Rembrandt's paintings to learn the master's style, employing deep learning algorithms and facial recognition technology, ultimately generating a new portrait titled "The Next Rembrandt." The results were astonishing, not only replicating the form but also capturing the essence of Rembrandt's work. Researchers developed software to analyze Rembrandt's paintings, conducting high-resolution 3D scans of the 346 works he created between 1632 and 1642. They collected 168,263 painting fragments and 150GB of digital renderings, gathering 15GB of data in total. By analyzing features such as the age, gender, appearance, attire, and composition of figures in Rembrandt's works, they created a possible new depiction of what his next piece might look like, as shown in Figure 8. This project's developed technology is now also used to restore damaged and partially lost masterpieces, underscoring its significant implications.

Figure 8: "The Next Rembrandt" Project Artwork

2.2.2 Diverse Material Applications

The application of diverse materials is a crucial avenue for innovation in painting techniques. Traditional painting was often confined to materials such as paper and wood panels, but contemporary artists have begun to explore the use of various non-traditional materials. This exploration broadens the expressive forms and language of painting, with specific impacts as follows:

1) The use of non-traditional materials imparts unique textures and visual effects to artworks. Compared to traditional materials like paper and wood, materials such as glass, metal, plastic, and sand offer richer textures and expressiveness, making works more three-dimensional and tactile. For example, paintings created with metal materials can produce distinctive reflective effects under light, enhancing their visual impact and artistic appeal. Similarly, the domestic pioneering sand art new media product "The Mountain Guardian Liu Zhenmao: My Life Dedicated to Protecting Green Hills" vividly portrays the touching and legendary story of Liu Zhenmao.

Figure 9: "The Mountain Guardian Liu Zhenmao: My Life Dedicated to Protecting Green Hills," Sand Art, 2013, Xinhua News Agency

2) The application of diverse materials has expanded the expressive forms and language of painting. While traditional painting primarily focused on flat surfaces, modern artists utilize the properties of non-traditional materials to create more varied forms. For instance, paintings made with glass materials can exhibit transparency, enhancing the sense of depth and spatiality, thereby broadening the expressive forms of painting.

3) The diverse application of materials has enlarged the creative space of painting, enabling multiple possibilities. Traditional painting typically relies on specific tools and techniques, yet modern artists can flexibly select materials and methods according to the needs of their work, achieving more personalized and diversified creations. For example, artworks made with plastic materials can undergo transformations in form through processes like thermoforming, thereby enhancing creativity and expressiveness.

2.3 Innovative Forms of Artistic Expression in Painting from the Perspective of Multi-Source Information Integration

Under the perspective of multisource information integration, the expressive forms of painting art display a trend towards greater diversity and richness. This not only brings innovation to traditional two-dimensional expressions but also reveals new possibilities in dimensions such as space and time. This can be explored through the following aspects:

2.3.1 Innovative Fusion of the Planar and the Three-Dimensional

As an ancient visual art form, painting traditionally relies on two-dimensional surfaces. However, with technological advancements and evolving artistic concepts, the fusion of the two-dimensional and three-dimensional has become a pivotal direction for innovation in painting. In this fusion, artists integrate multisource information to create artworks with a sense of three-dimensional space, achieving an organic combination of flat and three-dimensional art. The application of 3D printing technology offers new possibilities for the three-dimensionalization of painting. 3D printing can convert traditional painting designs into three-dimensional models and introduce new materials and techniques in the painting process, enriching the expressive forms of painting. For example, through 3D printing, artists can achieve multi-layered relief effects on a single surface, providing artworks with visual depth and tactile richness. The introduction of augmented reality (AR) and virtual reality (VR) technologies further breaks the two-dimensional boundaries of painting.

Artists can use AR and VR to combine flat paintings with virtual three-dimensional spaces, allowing viewers to experience the virtual spaces constructed by the artwork using mobile devices or VR glasses. This method not only enhances the interactivity of painting but also offers viewers an immersive artistic experience, expanding the expressive dimensions of painting. The impact of installation art is also noteworthy. Many artists are beginning to combine painting with installation art, redesigning and reconstructing space to create paintings with a sense of spatiality and environmental engagement. For example, by printing traditional painting patterns on transparent acrylic panels and suspending them at specific angles and arrangements, viewers can experience varying spatial expressions of the artwork from different perspectives.

2.3.2 Application of Multimedia

The advancement of multimedia technology has vastly expanded the creative possibilities for expressive forms in painting art. The interdisciplinary integration of multimedia has not only enriched the visual effects of painting but also infused it with dynamic and auditory elements, rendering its expressive forms more diverse and contemporary. Firstly, the application of digital technology has introduced novel tools and methods for creating art. Digital painting, assisted by computer software, can achieve more complex pattern designs and color combinations, also allowing for easy modifications and adjustments, thus enhancing creative efficiency and flexibility. Furthermore, digital painting can utilize computer-generated imagery (CGI) technology to create effects that are challenging to achieve with traditional manual painting, such as surreal lighting effects and three-dimensional spatiality. Additionally, the incorporation of audio and video elements imbues paintings with dynamism and temporality. Artists can integrate sound installations within their works, using variations in sound and rhythm to amplify emotional expression and atmosphere. Moreover, the application of video projection technology allows static paintings to merge with dynamic video imagery, forming a new audiovisual artistic experience. For example, by projecting video onto a painting, a dynamic visual effect is created, enabling the audience to perceive motion and flow alongside the artwork. American new media artist Paul Brown has been devoted to the study of digital art, focusing primarily on innovations in digital painting and the application of technology. Driven by the rapid advancement of digital technology, Paul Brown has created numerous works utilizing computer, video, audio, and interactive technologies, as illustrated in Figure 10.

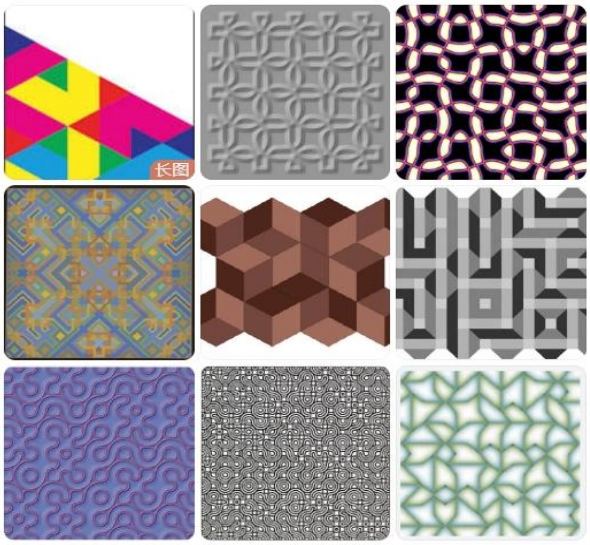

Figure 10: Digital Painting by Paul Brown

Furthermore, the application of interactive technology allows viewers to engage in the creation and transformation of artworks as they observe them. Through sensors and interactive devices, viewers can alter the presentation of a painting through touch, sound, or movement. For instance, in an interactive painting, a viewer's touch may trigger changes in patterns and colors, making the artwork more vibrant and dynamic with audience participation.

2.3.3 Interweaving and Transformation of Time and Space

In the perspective of multi-source information fusion, painting art has innovated not only in two-dimensional and three-dimensional forms but also in the intersection and transformation of time and space, revealing new possibilities. The integration of time and space transforms paintings from static visual art into a dynamic art form with a temporal dimension. When creating artworks, one can experience the passage of time and the progression of narratives. For example, through the introduction of a temporal dimension, paintings acquire narrative and temporal qualities. Artists can employ series of paintings or comic strips to tell a story or depict a process, illustrating a character's journey from birth to growth, thus turning paintings into a continuous narrative rather than a solitary static image. Moreover, the expansion of the spatial dimension allows paintings to be showcased and interacted with in diverse spaces. Artists can design and arrange exhibition spaces, enabling paintings to reveal different effects in various contexts. For example, by setting up different lighting and perspectives in an exhibition space, viewers can experience varied visual effects and emotional responses from different vantage points.

Additionally, the interweaving and transformation of time and space can be realized through digital technology and multimedia means. For instance, in the work "Today's Art Forum / Painting Today (Excerpt)" by Huang Yang, Yan Hui, and Gu Ancun, they explore the myriad possibilities of painting art. With the aid of digital technology, artists can utilize computer animation and video technology to create paintings with temporal and spatial variations, showcasing the evolution and flow of art over time, allowing audiences to experience the blending and transformation of time and space as they appreciate the work. Through computer animation technology, for instance, artists can exhibit changes and evolution in paintings, enabling the audience to perceive the flow of time and transformation of space.

2.4 Exploration of the Integration of Traditional Painting, Photography, and Computer-Generated Imagery

Based on the aforementioned research into creative concepts, painting techniques, and innovations in expressive forms, I propose a novel painting method that fuses photography, painting, and computer-generated imagery. This creative approach integrates available data resources, offering powerful expressiveness while breaking free from traditional constraints. The artworks produced through this method align with contemporary trends and exhibit new allure. Image processing is a technique that involves analyzing, processing, and manipulating images to satisfy visual, psychological, and other needs. It represents the application of signal processing in the field of images. Currently, most images are stored in digital form, and therefore, image processing often specifically refers to digital image processing (Dubey et al., 2014). In recent years, more than two-thirds of MSIF (Multi-Source Information Fusion) work has been completed through the implementation of AI, and this proportion is steadily increasing. The reason is that AI has greatly expanded the application scenarios of MSIF. Additionally, the growing demand for practical applications in new tasks further propels the development of AI, establishing a mutually beneficial relationship between the two. Therefore, theoretical research based on artificial intelligence has become a crucial direction for the future theoretical development of MSIF. Innovative expressions in painting can leverage AI for assistance. Over the past few decades, the art world has engaged in an in-depth exploration of the role and significance of images in artistic creation. Traditional painting often relies on the artist's subjective imagination and skills to convey their understanding of the world, while modern art tends to utilize ready-made

visual materials such as images and photographs. Through digital technology, these materials are transformed, processed, and recombined to create renewed forms of art. This cross-disciplinary integration of images and painting not only provides artists with diverse expressive possibilities but also offers viewers a fresh aesthetic experience. In today's era, images, as one of the most direct and straightforward means of communication, are widely used across various industries. There are significant differences among traditional painting, photography, and computer-generated images. Traditional paintings, such as oil paintings, Chinese paintings, and watercolors, possess the distinctive marks and brushstrokes of hand-drawn art, reflecting the genuine emotions of the artist, thus most capable of moving and resonating with the audience. For instance, Van Gogh's famous masterpiece "Wheatfield with Crows" reflects the painter's profound loneliness and sorrow. The vigorous brushstrokes and the magical yet frenzied colors represent the genius artist's final confession to the world, serving as his last will and testament. It delivers a powerful emotional impact on the viewer's soul, successfully capturing their admiration with the unique charm of painting. With the advent of the camera, artists explored its artistic significance, transforming captured material into references for artistic creation. Through multi-source information fusion technology, photography offers a superior means of recording life (Chen et al., 2023; Hua & Jing, 2023).

Figure 11: Van Gogh "Wheatfield with Crows" July 1890

Photography, as a primary artistic form of digital imagery, also provides a vast amount of raw data for artificial intelligence. This data encompasses human language constraints and socio-cultural ideological norms, which are incorporated into the digital image generation process. Computer-Generated Imaging (CGI) refers to images created and generated using computer technology. CGI can be used to produce static images, animations, special effects, and more, and is widely applied in the film,

television, advertising, and gaming industries. Unlike real-world images, computer-generated images are synthesized by computers. The process involves modeling with software, rendering, and finally using simulated lighting techniques to composite the image. The information contained in these images does not necessarily exist in reality (Ng & Chang, 2012). Artists have utilized artificial intelligence to generate a vast array of images that adhere to specific artistic rules and computational logic, inspiring them to rethink innovative expressions in painting. Artists must reshape data infrastructure and algorithmic rules to create new generative imagery. Image generation technology encompasses a range of algorithms, including statistical methods, rule-based approaches, and deep learning. Through designing appropriate algorithms, various painting styles such as watercolor, oil painting, and sketches can be generated. However, compared to traditional painting, computer-generated imagery currently lacks distinctively in terms of humanistic and painterly qualities. Consequently, I have attempted to combine traditional painting, photography, and computer-generated imagery in my creative work. The following is an analysis using the piece "Landscape of That Day" as an example.

I have always been enamored with the Populus euphratica tree, appreciating it not only for its bizarre and unique form but also for its remarkable vitality—living for a thousand years without dying, standing for a thousand years after death, and remaining unblemished for a thousand years after falling. The spirit of the Populus euphratica symbolizes not only the biological characteristics of the tree but also profoundly reflects core values in Chinese culture, such as reverence for life, persistent self-improvement, selfless dedication, and patriotism. Communication studies pioneer Paul Lazarsfeld noted that individuals often respond to the content and information conveyed by mass media through selective exposure, understanding, and memory, processes closely tied to their cultural background, life experiences, and social networks. Against this backdrop, the resilience and tenacity displayed by the Populus euphratica have been selectively embraced by the Chinese people as a true reflection of their deep-seated value pursuits. In essence, the spirit of the Populus euphratica is a profound distillation and sublimation of excellent traditional Chinese culture, embodying the nation's high esteem for perseverance and dedication. Through studying this spirit, we can better understand the importance of cultural values in contemporary society and their potential influence on individual and collective psychology (Nunes, 2024). To adapt

to harsh environments, the Populus euphratica grows in a spiral pattern, with branches appearing to twist chaotically. Drawing on this characteristic, I first created a painting using colored pencils, distilling the image into one primarily defined by lines, as shown in Figure 12(a). I then selected a photographic image of a Populus euphratica tree. Figure 12, from left to right, displays the painting, the photograph, the computer-generated image, and the final effect after integrating the three.

a. Painting b. Photograph c. Computer-Generated Image

d. "Landscape of That Day" by Chen Changhuan, July 2004

Figure 12 (a-d): Exploration of the Integration of Painting, Photographic Image, and Computer-Generated Image

The painting in Figure 12(a), with its relaxed brushwork and depth of illusion, surpasses the computer-generated graphic from input keywords in Figure 2(c), which was created using input keywords, while the photographic work provides a tangible sense of scenery and form. The integration of these three elements highlights their strengths and mitigates their weaknesses, resulting in an engaging composition, as evidenced by the combined effect in Figure 12(d). Overall, creating with generative AI is an intriguing process. As Rafaela Nunes (Nunes, 2024) aptly noted, the creative endeavor with generative AI, akin to other artistic activities, continuously redefines and adjusts the boundaries of various entities related to the artwork, reshaping itself through the process of artistic

creation (Andrews & Hawcroft, 2024). It is important to emphasize that although an increasing number of academic papers, art-oriented research, and case studies highlight the close dialogue between art and AI, the author believes that we should also focus on the influence of artistic practice on AI, rather than solely examining the more common theme of AI's impact on art. Artists, as drivers of creative innovation, deserve greater recognition (Becker et al.).

3. TRANSFORMATION STRATEGIES FOR PAINTING IN THE CONTEXT OF MULTI-SOURCE INFORMATION INTEGRATION

With the rapid development of society and the continuous enhancement of people's aesthetic perceptions, the value and collectible potential of the new painting art market are increasingly prominent, becoming a vital part of the art market. New painting creation methods can be presented not only statically but also through video animations. Cross-disciplinary integration, digital transformation, customized development, and market-driven operations are the innovative transformation strategies for painting art. Their application should not be limited to art galleries but should also extend to broader outdoor markets.

3.1 Transformation Strategy One: Cross-Domain Integration

Cross-disciplinary integration affects the art market primarily by expanding the industry's value chain, promoting cultural innovation, fostering socio-economic development, enhancing social cohesion, and advancing global cultural exchange. In the realm of multi-source information integration, painting art no longer presents an isolated form but combines elements such as sculpture, music, video, dance, floral art, and even yoga, creating an operational model rich in creativity and innovation. This model integrates more seamlessly into the market, moving beyond merely expressing the viewer's emotions to emphasize audience engagement and psychological solace. Commercial spaces, through integration with painting art, break traditional business model boundaries, offering consumers multifaceted enjoyment and spiritual satisfaction. This novel form of integration demonstrates the limitless possibilities between commerce and art. Collaborating with financial institutions undoubtedly provides artists with more resources, but it also introduces new challenges, such as maintaining their professionalism and avoiding homogeneity. In recent years, the art market has shown increased interest in works that

incorporate cross-disciplinary integration, capturing the attention of many collectors. There are two main reasons for this. Firstly, art pieces that integrate multiple sources of information captivate audiences and collectors due to their unique artistic appeal. Secondly, cross-disciplinary integration aligns with contemporary art's development trend due to its innovativeness, meeting the art market's demand for avant-garde works. However, innovation alone is insufficient; art pieces should also possess artistic value and high-level craftsmanship. It is only on this foundation that cross-disciplinary integration can gain audience approval and appreciation. There are many successful examples of cross-disciplinary integration in painting art, such as the fusion of painting art and news media in modern Chinese journalism, which has led to the emergence of numerous illustration artists.

In the context of multi-source information integration, painting leverages news dissemination, 3D model construction, and scene CG reproduction to diversify and enrich the forms of news art. The work "The People's Pictures of Rivers and Mountains, Green Hills and Clear Waters Volume," produced by Beijing China News Information Technology Co., Ltd., seamlessly integrates traditional Chinese paintings with the original voice of President Xi Jinping, utilizing multimedia technology to bring these ancient artworks to life with striking visual impact, as shown in the Figure 8.

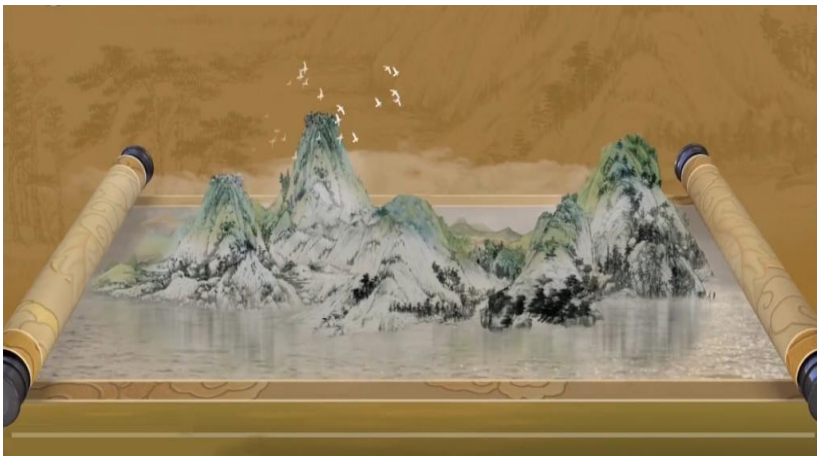

Figure 13: "The People's Rivers and Mountains: Green Waters and Verdant Hills" by China News Service

In the work "Who Changes Whom" by artist Liu Qingyuan, the use of printmaking combined with multimedia technology allows the faces of humans, animals, and robots to continuously flicker and alternate on a large screen, reflecting the artist's "awareness of issues."

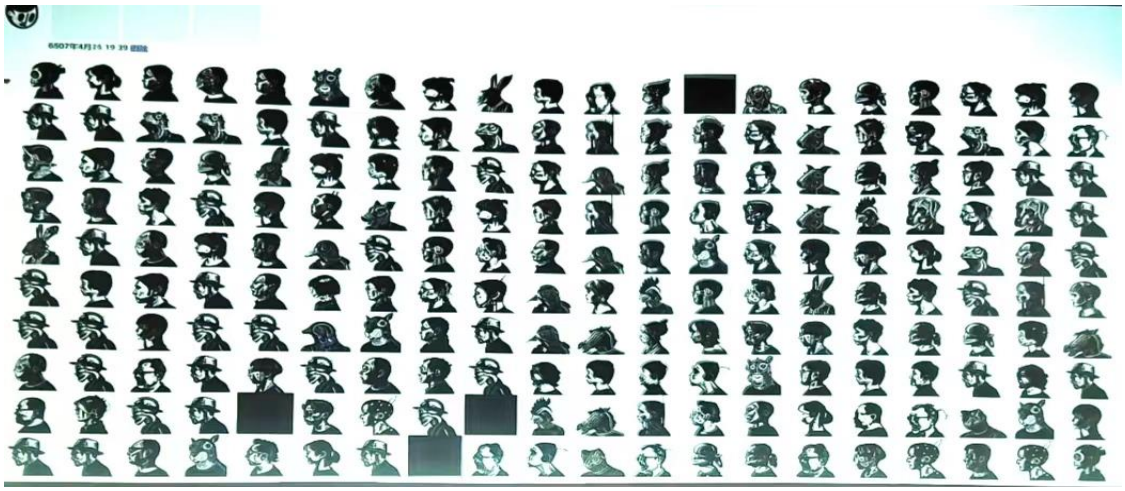

Figure 14: Liu Qingyuan "Who Changes Whom," Video Installation, Dimensions Variable, 2022-2023

3.2 Transformation Strategy Two: Digital Transformation

Jules Janin once remarked: We live in an extraordinary age. Today, we no longer dream of producing anything ourselves; instead, we tirelessly explore ways to replace and produce for humanity (Stallabrass, 2007). As multi-source information merges into the realm of painting art, it gives rise to a new profession: digital art creation. Digital artists use data as their palette and tools like 3D modeling software, artificial intelligence, and 3D engines as their brushes to construct a novel technological aesthetic. The global art market is being reshaped by the incursion of digital technology and the technological revolution, breathing extraordinary allure into the ancient art of painting. The development of "images" is continuously influenced by multi-source information, reflecting the impact of technology in reshaping contemporary art. Traditional art forms such as oil painting, printmaking, and even Chinese painting face the infiltration of digital technology. Domestic large-scale art exhibitions are also adapting to the times, with digital media art exhibitions becoming increasingly prevalent. For instance, the inaugural China Digital Art Exhibition, which opened on April 18, 2024, at the China Academy of Art Museum, created captivating virtual spaces and immersive experiences, attracting a large number of visitors. The computer is one of the most remarkable technological achievements since the dawn of humanity. If painting is seen as a depiction of reality, and photography as its reproduction, then computer graphics technology is the creation of reality. It can outline and present every entity conceivable by the human mind in a digital form (Cabanne & Duchamp, 1971). Artworks created by artificial intelligence are emerging like bamboo shoots after a rain, greatly impacting traditional painting. The "Portrait of Edmond de Belamy," a painting by the French

art collective Obvious using artificial intelligence, was auctioned for $430,000 at Christie's in New York on October 25, 2018. This price far exceeded its initial estimates, marking the entry of AI art into the consumer market and its acceptance by collectors.

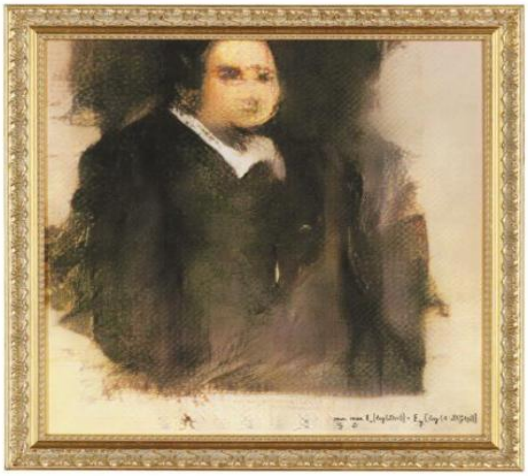

Figure 15: "Portrait of Edmond de Belamy" by Obvious, 2018

Harold Cohen, a pioneer of computer art, algorithmic art, and generative art, invented the renowned drawing system AARON, one of the longest-running and continuously maintained AI systems in history. He utilized computer software and AI tools to generate pictorial images, aiming to produce works on par with those of fine artists. Cohen endeavored to encode the cognitive processes of artists into his algorithms, emulating how artists perceive lines, colors, volumes, space, and forms. Over the years, he employed various programming languages, from FORTRAN to C, and then to Lisp in the 1990s, continually enhancing AARON's drawing capabilities. By 1995, a version of AARON measuring nearly 8 feet in height and 6 feet in width had already been able to draw and color images using a robotic arm.

Figure 16: Harold Cohen, Untitled (Amsterdam Suite), 1977–1978

The traditional painting market primarily relies on conventional avenues such as galleries and auction houses for transactions, with these channels historically dominating the exhibition and trade sector. However, with the rapid advancement of digital technology, the methods of communication and sales in the art market have evolved to become more convenient and efficient. Artists can now use internet platforms and e-commerce channels to sell their works directly to consumers, effectively eliminating intermediaries. This not only significantly reduces costs but also increases profits and market transparency. Additionally, these online channels offer artists abundant opportunities for showcasing and promoting their work, with personal websites, social media, and online galleries providing artists greater exposure and chances to enhance their reputation. In 2009, peasant painter Xiong Qinghua's work made its debut on an online forum. Through spontaneous dissemination rather than promotion or imitation, over the course of a year, this ordinary individual, who had never sold any work, sold his first painting for a price of one thousand yuan. By 2016, he suddenly gained popularity on social media, and the market price of his paintings soared to 70,000 yuan each. He not only held multiple personal exhibitions in Beijing but was also invited to participate in an exclusive interview on Phoenix TV's program "Portraits of Life." Xiong Qinghua is undoubtedly a model of the new media era, attracting attention from academia and the market through public interest, profoundly demonstrating the immense influence of new media. In fact, new media can represent artists and promote exhibitions on these platforms. By leveraging the audience economy characteristic of the internet era, it is possible to build artists and exhibitions into influential online brands, effectively enhancing the impact of painting and opening up a new online market.

3.3 Strategy for Transformation: Personalization and Customization

In the new era, with societal progress and the awakening of individual consciousness, more clients seek uniqueness and self-expression, leading to a trend of personalization and customization in the painting industry. Digitalization has facilitated the realization of personalization. The art market has undergone further segmentation, with creators achieving commercial profitability through the integration of diverse information sources. For instance, designers use AI tools to swiftly generate the visual materials clients require, making art creation efficient and rapid. AI painting technology has led to diversity and interactivity in art, strengthening the personalized and customized development of painting, and propelling the

art industry toward a more intimate and unique direction. The application of personalized content marketing in the high-end art market, through private domain channels delivering high-quality art content, is a precise and efficient strategy aimed at building deep customer relationships, enhancing brand loyalty, and promoting art transactions and collections. Here are the specific steps and key points for implementing this strategy:

3.3.1 Identify the Target Audience

Position high-end clients: Clearly define your target client group, potentially including collectors, artists, art enthusiasts, or high-net-worth individuals with a deep interest in art and considerable spending power.

Understand client needs: Conduct market research and customer interviews to gain in-depth insight into their interests, preferences, and purchasing motivations, providing direction for subsequent content creation.

3.3.2 Develop an Exclusive Content System

Artist interviews: Invite renowned artists for exclusive interviews to share their creative inspirations, artistic philosophies, and stories behind their works, enhancing the uniqueness and appeal of the content.

Artwork analysis: Provide in-depth analysis of the artistic value, historical background, and technical characteristics of artworks, improving customers' art appreciation abilities.

Collection guides: Offer insights on collection trends, investment strategies, art maintenance, and authentication techniques to aid clients in making informed collection decisions.

Industry updates: Share the latest art market dynamics, exhibition information, and auction results promptly to keep clients informed.

3.3.3 Precise Delivery and Interaction

Personalized delivery: Utilize data analytics tools to achieve personalized content delivery based on clients' browsing history and interaction behaviors, increasing reading and engagement rates.

Community management: Organize thematic discussions, Q&A interactions, artist live streams, and other activities in private domain communities, such as WeChat groups or dedicated apps, enhancing user retention and promoting knowledge sharing and emotional exchange within the community.

Feedback loop: Encourage customer feedback and adjust content

strategies according to the response, forming a positive cycle.

3.3.4 Premium Experience and Value-added Services

Exclusive experiences: Offer clients exclusive activities such as offline art exhibitions, artist studio visits, and art appreciation meetings to deepen their understanding and love of art.

Value-added services: Provide one-stop services for art insurance, transportation, authentication, and restoration, addressing clients' concerns and enhancing the service experience.

3.3.5 Strengthen the Art Brand Image

Professional image: Ensure all content reflects professionalism and authority, establishing the brand's leading position in the art field.

Emotional connection: Use narrative and emotive content to build an emotional link between the brand and clients, allowing them to feel the brand's warmth and humanistic care.

3.3.6 Data Analysis and Optimization

Regular assessments: Periodically analyze key metrics such as content readership, engagement rate, and conversion rate to evaluate the effectiveness of content marketing.

Continuous optimization: Adjust content strategies and optimize delivery timing and methods based on data analysis results to achieve optimal marketing results.

Implementing these strategies can create a vibrant and highly interactive art community within private domain channels, attracting and maintaining the interest and loyalty of high-end clients, and boosting the sales of artworks and brand value. Amid the wave of personalization and customization in the art of painting, numerous remarkable success stories have emerged, highlighting the immense potential and innovative vitality in this field. "Digital portrait art," emblematic of personalized custom artworks, has surged in popularity within the art market. Artists conduct in-depth analyses of clients' personality traits, life experiences, and aesthetic preferences, ingeniously combining digital technology with traditional painting techniques to create unique personal portraits. These works capture not only the external appearance of individuals but also delve into their inner spiritual world, earning the admiration of numerous art collectors. Another noteworthy case is the rise of "interactive art installations." Utilizing advanced sensing technology and smart algorithms,

artists create paintings that change in real-time based on viewer behavior. This innovative approach of integrating audience participation into the creative process breaks the traditional boundaries between art and its audience, providing each participant with a unique and memorable artistic experience. The flourishing of "custom wall art" is also notably representative. By thoroughly understanding architectural styles, spatial ambiance, and owner preferences, artists tailor large-scale mural artworks for each project. These paintings, harmoniously aligned with architectural environments, not only enhance the artistic value of spaces but also infuse modern architecture with distinctive cultural depth. Montmartre, a famous arts district in Paris, is renowned for its rich cultural history and artistic ambiance. Here, one can find a plethora of exquisite murals created by street artists, showcasing a variety of styles and themes. Montmartre's murals add vibrancy to the district, reflecting local artistic traditions and contemporary life.

Figure 17: The mural "Untitled" in the Montmartre district

These vibrant examples illustrate the limitless potential of painting in the realm of personalization and customization, indicating that this field will continue to flourish with greater diversity and innovation.

3.4 Transformation Strategy Four: Socialization and Commercialization

In the context of multi-source information integration, the transformation of painting's creative approach should prioritize socialized operations. The rise of social media and digital platforms enables artists to more broadly share and showcase their work, fostering global art exchanges. Strategies for transforming painting methods should include actively participating in social media, establishing online galleries and communities to promote sharing, commenting, and interaction around

their works. This approach aids in expanding the artist's influence and strengthening engagement with the audience, thereby better aligning with the trend of socialized operations. In this era of integrated information, the relationship between artists and audiences has undergone a transformation. While traditional galleries and exhibition formats still exist, digital platforms offer more direct and real-time means of interaction. The transformation of painting methods should focus on how to reconstruct this relationship.

Artists can overcome time and space limitations through digital technologies such as virtual reality exhibitions and online art workshops, deepening their interaction with audiences. This strategy not only enhances the dissemination of artworks but also creates a richer artistic experience. As the painting art market becomes increasingly globalized and digitized, commercial operations have become significant topics in this field. The transformation of painting methods, viewed through the lens of integrated information, must consider market demands and trends comprehensively. Artists can leverage data analytics and artificial intelligence to more accurately understand market needs and adjust their creative directions accordingly. Additionally, digital sales channels and blockchain technology provide a more transparent and efficient way for art transactions. Therefore, transformation strategies should include actively adopting digital sales platforms and participating in blockchain art transactions to enhance market competitiveness. Research into the transformation of painting should also innovate in education and collaboration. Art education can integrate multi-source information, guiding students to master digital painting tools and data analysis skills to meet the diverse demands of contemporary art. Furthermore, collaboration among artists is a key driver of innovation, and transformation strategies should encourage cross-disciplinary collaboration, uniting professionals from fields such as technology and design to explore new possibilities. In the context of integrated information, the socialization and commercialization of painting art have seen remarkable success through the integration of various information channels and technological means. Here are some related success stories:

1) TeamLab: This interdisciplinary group consists of artists, programmers, engineers, and CG animators who use digital technology to create interactive art experiences. By combining multimedia, sensor technology, and artistic creation, their exhibitions have attracted a massive global audience, successfully socializing and commercializing the art experience.

Figure 18: The work by TeamLab "Flowers and People, Cannot be Controlled but Live Together – A Whole Year per Hour"

2) Meural Digital Canvas: Meural is a digital frame that combines technology with art, allowing users to download and display various works of art through a Wi-Fi connection. This product merges digital content with traditional art display, expanding the market for artworks and increasing their accessibility.

3) NFT Art Market: The application of non-fungible tokens (NFTs) in the art market is a prominent example of multi-source information integration. Artists use blockchain technology to authenticate and trade digital artworks, creating a new market. This innovation has not only transformed the way art is sold but also made the ownership and transactions of artworks more transparent.

4) Google Arts & Culture: This platform aggregates resources from museums and art institutions worldwide, providing users with virtual exhibitions and high-resolution online viewing experiences of artworks. Through this approach, Google has successfully socialized art, making it easy for users globally to access and learn about art pieces.

5) Virtual Reality (VR) Art Exhibitions: Artists and galleries are utilizing VR technology to create virtual art exhibitions, enabling audiences to experience artworks within virtual spaces. This method transcends geographical limitations and offers immersive art experiences, enhancing the potential for the socialization and commercialization of art. The exhibition "Virtual Reality: Immersive Worlds in Art," held at the Städel Museum in Frankfurt, Germany, showcased how VR technology can be utilized to create immersive art experiences. Through VR devices, viewers can enter the virtual world of an artwork and interact with it.

These examples demonstrate how the integration of multi-source information combines technology, art, and market needs to achieve the

socialization and commercialization of painting. This integration not only enriches the forms of artistic expression but also broadens the market channels for art.

4. CONCLUSION

As society develops, the blending of multiple information sources will blur the boundaries between various forms of painting. Creators should fully grasp the essence of different painting styles and leverage the combination of diverse forms through technological means to continually explore new tools, materials, software, and more. This pursuit will facilitate the renewal of painting creation methods, achieving innovation. With the relentless progress of technology, painting art is continually innovating, and artworks will be preserved with greater efficacy. The strategy for transforming painting art aims to promote its innovation and transformation in aspects of creation, display, dissemination, and commercialization through the integration of multi-source information. By merging technology, market demands, and social cultural trends, painting art can discover new developmental pathways in the digital age, attracting a broader audience and creating new value. It is essential to emphasize that in the process of innovation and development in painting art, one must avoid wholehearted Westernization. While it is important to embrace and incorporate diverse artistic modalities, one must also discard the dross and maintain cultural integrity. Only in this way can the creation and development of painting art be truly promoted.

Funding

This work was supported by Characteristic Innovation Projects of Ordinary Universities in Guangdong Province in 2023

References

Andrews, H., & Hawcroft, A. (2024). Articulating arts-led AI: artists and technological development in cultural policy. *European Journal of Cultural Management and Policy*, *14*, 12820.

Becker, J., Clare, L., Dietrich, O., Köksal-Schmidt, Ç., Merbach, A., Notroff, J., Pant, S., Peters, J., Pöllath, N., & Schmidt, K. Photo Credits.

Boström, H., Andler, S. F., Brohede, M., Johansson, R., Karlsson, A., Van Laere, J., Niklasson, L., Nilsson, M., Persson, A., & Ziemke, T. (2007). On the definition of information fusion as a field of research. In: Institutionen för kommunikation och information.

Cabanne, P., & Duchamp, M. (1971). Interview: Marcel Duchamp. *The American Scholar*, 273-283.

Chen, Y., Deng, X., Lin, X., Guo, S., Jiang, S., & Zhou, J. (2023). Thermal deformation prediction for spindle system of machining center based on multi-source heterogeneous information fusion. *Journal of Mechanical Science and Technology*, *37*(8), 4227-4238.

Chittenden, T. (2021). A digital distraction? The role of digital tools and distributed intelligence in woodblock printmaking practice. *Digital Creativity*, *32*(3), 165-187.

Dubey, R., Kumar, P., Mishra, S., & Rathore, D. (2014). Traffic Image Feature Extraction based on PHOG Transform and Classification using Cascaded support Vector Machine. *Traffic*.

Hua, Z., & Jing, X. (2023). An improved belief Hellinger divergence for Dempster-Shafer theory and its application in multi-source information fusion. *Applied Intelligence*, *53*(14), 17965-17984.

Klaus, S. (2016). The fourth industrial revolution. In: Moscow: Ekonomika.

Lev, M., Emanuele, A., & Zhuo-Xuan, C. (2023). Lev Manovich: AI Art and Aesthetics *World Film*, *3*(4).

Modood, T. (2014). Multiculturalism and integration. In *Advancing Race and Ethnicity in Education* (pp. 145-161). Springer.

Ng, T.-T., & Chang, S.-F. (2012). Discrimination of computer synthesized or recaptured images from real images. In *Digital Image Forensics: There is More to a Picture than Meets the Eye* (pp. 275-309). Springer.

Nunes, R. (2024). AI, a Tool or an Author? A Posthuman Feminist Perspective on the Agency of Gen-AI in Creative Practices. *Augmented Human Research*, *9*(1), 8.

Osborne, H. (1972). *Aesthetics and art theory: An historical introduction*. EP Dutton.

Qiu, S., Zhao, H., Jiang, N., Wang, Z., Liu, L., An, Y., Zhao, H., Miao, X., Liu, R., & Fortino, G. (2022). Multi-sensor information fusion based on machine learning for real applications in human activity recognition: State-of-the-art and research challenges. *Information Fusion*, *80*, 241-265.

Stallabrass, J. (2007). What's in a face? Blankness and significance in contemporary art photography. *October*, *122*, 71-90.

Xinde, L., Dunkin, F., & Dezert, J. (2024). Multi-source information fusion: Progress and future. *Chinese Journal of Aeronautics*, *37*(7), 24-58.

Zhang, P., Li, T., Wang, G., Luo, C., Chen, H., Zhang, J., Wang, D., & Yu, Z. (2021). Multi-source information fusion based on rough set theory: A review. *Information Fusion*, *68*, 85-117.