Research on Innovative Approaches to Art Curating Based on the Digital Era

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Abstract. Against the backdrop of the digital age, this study delves into innovative models of art curation and future developmental pathways. Firstly, it analyzes the definition of curation and its evolutionary process, examining how digital technologies such as virtual reality (VR), augmented reality (AR), artificial intelligence (AI), and big data have reshaped the concept of curation and contributed to the construction of new theoretical frameworks. By analyzing practical cases of virtual museums and online curation, this study reveals the innovations and effectiveness of digital curation in practice, demonstrating how digital technology can expand the audience reach of artworks and enhance audience immersion and interactivity. Furthermore, this study discusses the challenges faced by digital curation, including high technological costs, technical barriers, and data privacy concerns, all of which significantly impact the development of curation. While digital curation faces numerous challenges, the study suggests that with appropriate strategies and technological integration, these issues can be effectively addressed, ultimately achieving sustainable development in the field of curation. Finally, the paper anticipates future development directions for digital curation, proposing trends such as the popularization of virtual museums, the realization of full-sensory art experiences, the deeper application of AI in artistic creation, and cross-platform integration with multi-channel interaction. These trends will bring new possibilities to future art curation, promoting innovative dissemination of art and fostering global cultural exchange.

Keywords: Digital curation, virtual reality, augmented reality, artificial intelligence, interactive art.

1. Introduction

With the continuous advancement of digital technology, art curation is evolving from traditional static displays to more interactive and interdisciplinary approaches. This study focuses on the transformation and innovation of curation in the digital age, exploring the application of digital technologies in curation and its future development directions. To this end, a literature analysis method was employed to search for and review relevant materials and literature, aiming to analyze the roles of technologies such as virtual reality (VR), augmented reality (AR), artificial intelligence (AI), and big data in curation. The advantage of this method lies in systematically organizing existing research findings and providing an in-depth analysis of the effectiveness of these technologies, thereby enhancing the scientific rigor and accuracy of the study. The goal of this research is to reveal the impact of digital technologies on curation and to anticipate future development directions, providing scientific theoretical guidance and practical recommendations for curators.

Digital technologies, especially emerging ones like VR, AR, and AI, offer new possibilities for art curation, not only enhancing audience experience but also overcoming temporal and spatial limitations, allowing artworks to be presented to global audiences in novel ways. This paper will analyze innovative practices in digital curation and explore their impact on the curation industry, as well as future development trends.

2. Concepts and Theoretical Foundations of Curating in the Digital Age

2.1. Definition and Development History of Curation

As an important part of art display, curation has experienced an evolution from pure artwork display to more academic and interdisciplinary interaction [1]. In the past, graphic paintings were usually displayed in museums and galleries in a static manner, and it was not until the emergence of interactive technology that a revolutionary change was brought about. In the early days, curators were mainly responsible for selecting and presenting works in a static and passive form. Over time, curation has gradually expanded, with curators not only selecting and displaying works of art but also assuming the role of cultural interpreters, actively participating in cultural production and dissemination [2]. By the end of the 20th century, curating gradually formed an independent discipline, not only as a tool for display but also as a carrier for diversity of expression. Curators are no longer just exhibition organisers but active participants in cultural production. The arrival of the digital age has led to a multidimensional expansion of curating. While traditional curation relies on physical space, digital curation breaks through the constraints of time and space, enabling works of art to be presented to a global audience in a new way [3]. Digital communication provides a new path for museums to communicate globally and promotes the formation of a ‘social engagement’ model [4].

2.2. Renewal of Curatorial Concepts in the Context of Digitalisation

With the wide application of digital technology, especially the development of the Internet, virtual reality (VR), augmented reality (AR), artificial intelligence (AI) and big data, the concept of curation has undergone fundamental changes. Curators not only display artworks but also need to use technical means to enhance the audience's experience; VR technology enables the audience to ‘roam’ the exhibition in virtual space, free from the limitations of time and geographic location, and improves the accessibility of the exhibition and the audience's sense of immersion [5]. In his study, Chong, Y. N analysed the application of immersive experiences in museum design, emphasising the role of VR technology [5].

AR technology expands the multiple interpretive dimensions of works by overlaying digital content on reality to provide a rich interactive experience for the audience. Digital museums need to integrate AR technology to enhance the interactivity and educational nature of exhibitions.

The application of artificial intelligence further promotes the development of digital curation. With the help of big data analysis, AI recommends personalised artworks based on audience preferences, thus enhancing the relevance and interactivity of curation. Lu T. explored the mechanism of open-source curation in his doctoral thesis. With the rapid development of computer and Internet technologies, social media has been fully integrated into people's daily lives and become a typical symbol of contemporary lifestyle [6]. The application of big data helps curators to design exhibitions accurately, optimise the way of displaying works and layout, and enhance the audience's sense of participation and satisfaction.

2.3. Theoretical Framework

The practice of digital curation relies not only on technological applications but also on multiple theoretical foundations, particularly digital culture and digital humanities theories. Digital culture theory provides a framework for understanding digital curation, where digital media is not merely a tool but also an emerging form that transforms contemporary cultural contexts and experiences [7]. This theory helps curators understand the potential and impact of digital media in art exhibitions. Graham and Cook, in "*Rethinking Curating: Art after New Media*," explore the impact of new media on curatorial practice in depth and propose new curatorial methodologies [7].

Digital divide theory analyzes the issues of unequal development brought about by the proliferation of digital technology. Arora, in "T*he Next Billion Users: Digital Life Beyond the West*," points out that while digital technology brings new opportunities for art curation, its application is

uneven. Differences in digital literacy and the unequal distribution of digital resources lead to a "digital divide," creating barriers for different social groups in accessing cultural resources [8]. This theory reminds curators to consider the inequalities among different audience groups in digital curation.

Digital humanities theory offers a new perspective for digital curation, implying that curators should possess interdisciplinary knowledge, integrating technological and humanistic perspectives to create new forms of artistic experience and knowledge production.

Participatory culture theory emphasizes that, in the digital age, audiences have shifted from passive consumers to active participants and creators. Harding et al., in "*The Transformation of Digital Participation in Contemporary Art Galleries*," argue that digital interaction changes the way audiences participate, turning them from passive recipients into active participants [9]. This theory highlights the need for curators to design mechanisms that encourage audience engagement in various aspects of the exhibition, allowing them to experience the charm of the exhibition firsthand.

The theoretical framework of digital curation integrates theories such as digital culture, digital divide, digital humanities, and participatory culture. These theories provide a multidimensional perspective for curatorial practice, helping curators understand and address the new challenges and opportunities of art exhibitions in the digital age. Under the guidance of these theories, digital curation not only effectively enhances the display of artworks but also increases audience engagement and interactivity, promoting cultural dissemination and innovation.

Furthermore, this study discusses the challenges faced by digital curation, including high technological costs, technical barriers, and data privacy concerns, all of which significantly impact the development of curation. While digital curation faces numerous challenges, the study suggests that with appropriate strategies and technological integration, these issues can be effectively addressed, ultimately achieving sustainable development in the field of curation.

Finally, the paper anticipates future development directions for digital curation, proposing trends such as the popularization of virtual museums, the realization of full-sensory art experiences, the deeper application of AI in artistic creation, and cross-platform integration with multi-channel interaction. These trends will bring new possibilities to future art curation, promoting innovative dissemination of art and fostering global cultural exchange.

3. Applications of Digital Technologies in Art Curation

3.1. Virtual Reality (VR) and Augmented Reality (AR)

The design, form, and colour of an artwork's environment significantly influence its impact on viewers, especially in the context of digital art exhibitions. The perception of paintings within virtual environments requires careful consideration of both the exhibition setting and the interactions enabled by the application [10]. The integration of Virtual Reality (VR) and Augmented Reality (AR) technologies has introduced new possibilities for art curation, greatly expanding the ways in which artworks can be presented. VR technology, through the creation of virtual environments, allows audiences to experience art exhibitions from an immersive perspective. For instance, Tate Modern's 2016 VR exhibition "Dali's Workshop" enabled a global audience to visit the exhibition online, breaking physical boundaries and allowing viewers to engage with the exhibition anytime, anywhere, thereby expanding its reach [11].

AR technology enriches audience engagement by overlaying digital content in real-world settings, providing a more interactive experience. For example, AR can superimpose background information or animated effects alongside an artwork, helping viewers gain deeper insights into the piece. This interactive experience enhances audience participation and enriches the interpretation of the artwork. By utilizing smartphones, tablets, or AR glasses, digital information can be integrated into real environments, with common platforms including ARKit, ARCore, and others.

3.2. Artificial Intelligence (AI) and Big Data Analytics

The rapid development of artificial intelligence and big data analytics has brought about a wide range of applications for digital curation, significantly improving the precision of exhibition design and the personalisation of audience experience. By analysing audience behavioural data, AI helps curators understand audience preferences and thus optimise curatorial decisions. For example, AI can recommend artworks based on audience browsing history to enhance the relevance and interactivity of the exhibition and use big data to analyse audience feedback to optimise the exhibition layout and content and enhance the overall experience.

Specific applications of AI in curation include artwork classification and retrieval, whereby machine learning algorithms can identify and classify images of artworks, quickly organise and manage collections, and save time. AI can also be involved in art creation, bringing in new content and perspectives. AI-driven chatbots or voice assistants can provide personalised guides for the elderly or children, enhancing interactivity, reducing the burden on volunteers and better serving AI-powered chatbots or voice assistants can provide personalised guides for the elderly or children, enhance interaction, reduce the burden on volunteers and better serve friends with disabilities.

Big data analysis provides a more scientific basis for curatorial decision-making. By analysing a large amount of audience data and the connotation of artwork information, curators can discover new curatorial directions, trends and relevance, and can better improve the academic and innovative nature of curation.

3.3. Digital Platform and Online Curating

The integration of art and technology has been explored as an innovative way to enrich the cultural heritage experience [11]. Digital platforms provide a new display channel for art curation, especially in the context of globalisation, exhibitors can display their works to a global audience through digital platforms, and online curation has become an important way to break through physical and time constraints. Through virtual museums and digital exhibitions, audiences will be able to view artworks from all over the world. For example, the Museum of Contemporary Art in Shanghai has launched a digital curatorial project that expands art exhibitions globally through digital platforms, breaking through the geographical limitations of traditional museums. This globalised curatorial approach broadens the scope of audiences and provides more opportunities for artists to showcase their work.

Digital platforms include official websites, social media and third-party virtual exhibition platforms. Curators can use these platforms to interact with audiences, promote exhibitions, and increase exposure and commercialisation opportunities for their works.

The marketing strategy for online curation involves multi-channel promotion and interactive activities. Curators can produce high-quality digital content, such as exhibition trailers and artist interviews, to attract audience interest and enhance audience engagement through activities such as online live streaming, virtual tours and online workshops.

4. Case Studies of Art Curatorial Innovation in the Digital Age

4.1. Case Studies

In the global practice of digital curation, many museums and art institutions are actively experimenting with emerging technologies to break the limitations of traditional exhibitions and create interactive and immersive art experiences. Notable examples include American artist Kara Walker's large-scale installation art project "Hyundai Commission" at Tate Modern, the digital curation experiments at the Metropolitan Museum of Art in New York, and the digital curation projects at the Power Station of Art in Shanghai. These cases exemplify the widespread application and innovation in digital curation.

Tate Modern is a pioneer in digital curation, using Virtual Reality (VR) and Augmented Reality (AR) technologies to create immersive exhibitions that allow viewers to experience the exhibition

over the internet even when they are far away from home. Wearing VR equipment, visitors can 'enter' the virtual gallery, view the artworks, and interact with them to gain insights into the background and creation process of each piece. This innovation enhances interactivity and participation, breaks through physical space limitations, and makes art communication more global.

The Shanghai Museum of Contemporary Art has created a series of digital curatorial projects through virtual reality technology and digital media to explore new possibilities for art display. The museum has created highly interactive digital exhibitions by applying a variety of technical means such as virtual reality, augmented reality and big data analysis in several projects. For example, the museum's virtual exhibition project allows visitors to enter the virtual exhibition hall through the Internet, where they can not only view the exhibits but also interact with the exhibition content through a digital interface to obtain more background information [12].

In addition, the Museum of Contemporary Art Shanghai has optimised its exhibition design and content by analysing visitors' behavioural data through big data. For example, by analysing data such as the audience's stay time and interaction frequency in the virtual exhibition, the museum adjusts the layout and display order of the exhibition in real-time to ensure that the audience can have the best viewing experience. More interactivity in interactive applications can effectively increase user engagement with the presented content and the application itself [13].

4.2. Case Analysis

The above cases show that digital curation not only enhances the interactivity and engagement of exhibitions but also promotes the globalisation of art communication. Adding more interactivity to interactive applications can lead to increased user engagement with the content presented and the application itself [14].

The application of Virtual Reality (VR) and Augmented Reality (AR) technologies has diversified the forms of art exhibitions and enhanced audience interaction and participation, such as Tate Modern's VR exhibitions and the AR experience at the Museum of Contemporary Art, Shanghai. Digital platforms have broken through the physical limitations of museums, and global audiences can access exhibitions via the Internet, expanding the impact of curation. Curators need to balance digital technology and artistic expression to enhance the interactivity and accessibility of exhibitions while maintaining the originality of the artworks and providing an in-depth artistic experience.

5. Innovative Challenges and Future Trends in Digital Curation

5.1. Challenges of Integrating Technology and Art

Although digital technology brings unprecedented opportunities for curation, it also faces many challenges in the process of practical application [15]. Firstly, the cost issue is one of the main obstacles in digital curation. The high cost of purchasing technical equipment, software development, system maintenance, and training of professionals often makes it difficult for small and medium-sized museums and art organisations to bear. Especially in the early stages, insufficient funding may limit the full application of digital technology, resulting in the scale and quality of curatorial projects being affected.

Secondly, the technical threshold is also a challenge that cannot be ignored. Digital curation requires curators to have certain technical knowledge and skills to effectively integrate and utilise various digital tools [6]. Curators need to be technologically literate to integrate digital tools, but many lack the relevant background, adding to the difficulty of project implementation. In addition, rapid technological updates require curatorial teams to be constantly learning, increasing operational complexity and costs.

Maintaining a balance between artistic expression and technological reliance is also an important issue. While digital technology enhances interactivity and immersion, over-reliance may weaken the expressive power of artworks. Curators should ensure that technology serves artistic expression rather than dominating it, which requires a keen artistic sensibility and the ability to apply technology.

In addition, data privacy and ethical issues cannot be ignored. With the wide application of big data and AI, curators need to pay attention to audience privacy protection and legal use of data. At the same time, the application of AI in art creation raises ethical issues of copyright and creative subjects, and curators need to find a balance between technology and ethics.

5.2. Future Development Directions

In contemplating the future trajectory of digital curation, it is evident that this field is poised for significant breakthroughs and innovations across multiple dimensions, thereby advancing the methodologies of art exhibition and cultural dissemination to unprecedented levels [16].

The proliferation of virtual museums constitutes a pivotal trend within digital curation. As internet technologies continue to evolve and the global digital transformation accelerates, an increasing number of museums and art institutions are expected to establish virtual galleries. These galleries will allow a global audience to access exhibitions irrespective of temporal or spatial constraints. Virtual museums not only expand the potential audience but also offer novel pathways for the presentation and dissemination of artistic works, thereby fostering global cultural exchange and interaction [9].

The integration of immersive technologies, including virtual reality (VR), augmented reality (AR), and haptic feedback, is creating comprehensive, multisensory artistic experiences that enhance audience engagement and enrich the interpretive dimensions of artworks. Such integration enables viewers to experience art in a deeply immersive manner, adding profound depth to their engagement with artistic content. The deployment of artificial intelligence (AI) further catalyzes the evolution of digital curation. AI technologies are not only instrumental in analyzing audience behaviour and providing personalized recommendations but also play an essential role in both artistic creation and curatorial design. AI-generated artworks and intelligent guidance systems facilitate personalized and dynamic exhibition experiences, thereby enhancing the efficiency, precision, and adaptability of curatorial practices.

Moreover, the cross-platform and multi-channel integration of resources emerges as another significant direction for the future development of digital curation. Given the ubiquity of social media and mobile internet, curators are increasingly leveraging these platforms for exhibition promotion and audience interaction [9]. By effectively integrating online and offline resources, curators can amplify cultural dissemination and audience engagement, thereby augmenting the reach and impact of exhibitions [17].

The issue of digital copyright protection is an integral component of digital curation. As digital technologies become increasingly pervasive, curators must prioritize the effective protection of intellectual property to prevent unauthorized access, downloading, and distribution of artworks. Through the application of digital watermarking, encryption, and related technologies, curators can secure intellectual property rights, thereby ensuring the sustainable progression of digital curation.

6. Conclusion

In summary, curation in the digital era is constantly innovating in technical means and theoretical frameworks, opening up a whole new path for art display. In its future development, digital curation will further promote the innovation and development of art display and cultural communication through the popularisation of different virtual museums, the realisation of full-sensory art experiences, the in-depth application of artificial intelligence, the integration of cross-platform and multi-channel measures, and the strengthening of digital copyright protection. Curators need to continuously adapt and respond to these changes, making full use of the advantages of digital technology while addressing the challenges it brings to achieve continuous innovation and optimisation of digital curation.

In the future, the development of digital curation will further promote the innovation and development of art display and cultural communication through the popularisation of virtual museums, the realisation of full-sensory art experiences, the in-depth application of artificial

intelligence, and the integration of cross-platform and multi-channel. Curators need to continuously adapt and respond to these changes, making full use of the advantages of digital technology while addressing the challenges it brings, in order to achieve continuous innovation and optimisation of digital curation.

References

[1] Guynup S. Virtual reality, game design and virtual art galleries. In: Curating the Digital. Springer, 2016, 149-166.

[2] De Vlieghere D. Alfred H. Barr, MoMA, and the entrance and exit of outsider art (1936–1943). Journal of Curatorial Studies, 2021, 10 (1): 2-25.

[3] Art Museum of the Central Academy of Fine Arts. Pioneering and innovation of art museums in the digital age. (n.d.), 2024.

[4] Panina. A study on the innovative path of digital communication in global museums from the perspective of 'social engagement'. Master's thesis, Central China Normal University, 2022, 20-31.

[5] Chong YN. Research on the application of immersive experience in museum space design. Master's thesis, Southeast University, 2021, 32-42.

[6] Lu T. Open source curation: Research on design curatorial mechanisms under the threshold of digital social innovation. Doctoral dissertation, China Academy of Art, 2021, 60-72.

[7] Graham B, Cook S. Rethinking curating: Art after new media. MIT Press, 2015.

[8] Arora P. The next billion users: Digital life beyond the West. Harvard University Press, 2019.

[9] Harding C, Liggett S, Lochrie M. Digital engagement in a contemporary art gallery: Transforming audiences. Arts, 2019, 8 (3): 90.

[10] Maleshkova J, Purver M, McOwan P. Investigating design and evaluation guidelines for interactive presentation of visual art. Springer, 2016, 125-147.

[11] Mantzou P, Bitsikas X. PALIMPSEST project: Reimagining museum experiences. Social Sciences, 2023, 3-7.

[12] Chen Jennifer. Research on content production mechanism of digital museum. Master's thesis, Heilongjiang University, 2024, 44-45.

[13] Webb AM, Kerne A, Linder R. A free-form medium for curating the digital. Springer, 2016, 107-123.

[14] Murchu NO. A designerly way of curating: Reflecting on interaction design methods for curatorial practice. In: Curating the Digital. Springer, 2016, 9-19.

[15] England D, Schiphorst T, Bryan-Kinns N, eds. Curating the digital: Space for art and interaction. Springer, 2016.

[16] Ray J. Digital curation in museums. Library Hi Tech, 2017, 35 (1): 32-39.

[17] Zhao Junxiang. Communication of visual information in museums. Doctoral dissertation, Shandong University, 2019, 51-68.