Imagination in the Computational Era: Power Dynamics Among Algorithms, Curators and the Public

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Abstract. Centered on algorithmic curation, this research adopts a problem-oriented research framework to trace the historical lineage of algorithmic curation to examine how algorithms integrate into curatorial practices, explores the potential of finding practical tools for contemporary design curation from algorithms' underlying operational logics, and exploits the creative capacity of algorithms. Furthermore, it discusses and reflects on the ethical dilemmas of algorithmic curation, aiming to explore approaches and strategies for applying generative algorithms to curatorial work. The research breaks the anthropocentric curatorial paradigm, establishes a new model of knowledge production for exhibitions, and delivers novel insights and perspectives for the digital transformation of curation in China.

Keywords: Algorithmic curation, data bias, AI curator, algorithmic ethics, critical reflection.

1. Introduction

The report to the 20th National Congress of the Communist Party of China clearly outlined plans to build a cyberpower and a digital China, and advance the national strategy for digital cultural development.

In the digital age, the integration of artificial intelligence into art exhibitions has emerged as a prominent research topic in recent years, while also posing challenges to traditional curatorial methodologies and the role of curators. As an interdisciplinary field, curation has evolved chronologically from mere "exhibition production" to "professional curation", and further toward reflective curatoriality and the so-called curatorial turn. [1] Since educational reform in 2015, the Central Academy of Fine Arts has dismantled disciplinary boundaries. Its Experimental Program for Virtual Curation, launched in 2019, leverages interactive systems and virtual reality technologies to create an inclusive platform for museums, art galleries, exhibition practitioners, artists, curators and audiences to engage in dialogs. As President Lin Mao stated, "The influence of art and design is growing increasingly in the new era. We should collectively explore ways to cultivate interdisciplinary art and design talents with combined expertise in art and science, develop talent training systems for the future, promote disciplinary integration, and deepen cultural exchange and mutual learning." This fully demonstrates that the integration of art and technology has become indispensable in the present era.

Qiu Zhijie, a faculty member at the Central Academy of Fine Arts, noted in his keynote speech A Perspective of Technological History: "Tech-based art requires a retrospective vision. We should fully integrate art history, which consists of social history and the history of artworks, with technological history for comprehensive interpretation. From this perspective, art history has long been intertwined with technological progress [2]."

Hence, the interplay between technology and art has persisted throughout history. In the classical era, techniques for refining minerals and oils endowed European oil paintings with vivid tones and rich layered effects. During the Industrial Revolution, machinery transformed conventional production methods, as factories and mechanical production replaced traditional handicraft systems. Walter Gropius, the first director of the Bauhaus, launched groundbreaking educational reforms to pursue an optimal integration of craftsmanship and mechanized production in modern design. In the 19th century, photography revolutionized how artists depicted landscapes. In this digital age, curation has gradually transcended physical boundaries and entered intangible spaces. Meanwhile, big data and algorithms have disrupted established curatorial workflows. The advancement of algorithmic

tools including knowledge graphs, content curation, algorithmic decision-making and image analysis has enabled the implementation of algorithmic curation.

Nevertheless, as stated in Relational Aesthetics: "Technology merely helps artists forge a vision from its effects, instead of making them vehicles for its underlying ideology." [3] If curators blindly follow trends and embrace technological optimism unreservedly, they tend to neglect the core essence of exhibitions and degenerate into mere formalism, while overlooking human labor, human agency and human reflection behind them.

Therefore, how to harness technology to serve curatorial practices and strike a balance between curation and algorithms amid the cultural value crises triggered by algorithmic systems has become a critical issue in this era. This study takes the mechanisms of algorithmic curation as its research subject to elaborate on emerging curatorial models in the digital context.

2. Understanding of Algorithmic Curation

2.1 Development of Algorithmic Curation

As early as the 1950s, Ben Laposky, an American artist and mathematician, captured analog electronic patterns with an oscilloscope named Oscillons, laying the groundwork for early digital art. With the advent of the Web 2.0 era, the internet evolved into a software development platform. It has functioned as a web-based medium for art production and featured a distributed operational structure. In 2006, researcher Joasia Krysa explored the connections between curation and machine learning. [4] In 2016, scholar Magdalena linked curatorial values in the digital turn age to “posthuman curating”. [5] Emerging curatorial practices built upon code, data and information have transformed traditional curatorial frameworks into open models, helping the public better recognize the value of online culture. A typical example is Memories of Passersby I created by German artist Mario Klingemann in 2018. [6] As one of the earliest pilot projects of miniature AI curation, he trained algorithms on a dataset consisting of thousands of portraits from the 17th to 19th centuries, and the algorithm continuously generated new portraits that shared consistent aesthetic traits, marking a major breakthrough for AI art in the field of curation. Later in 2022, an AI curator named Jarvis was presented at the Bucharest Biennale. Adopting generative adversarial networks, this program selected artworks matching designated themes from databases of art academies, galleries and art institutions for exhibition, representing a fully realized practice of AI curation [7].

2.2 Operational Logic of Algorithms

Against the backdrop where new media technologies continue to emerge, curators need to gain an in-depth understanding of the underlying operational logic of algorithms, and they can achieve more effective control over exhibitions by properly integrating algorithms as curatorial production tools into practical work. Artificial neural networks rank among the most widely adopted machine learning methods, and convolutional neural networks are recognized as one of the optimal algorithms for image content analysis. Such algorithms build deep learning frameworks from datasets and mimic the organizational structure of the human visual cortex to realize rational recognition of image data. This approach helps artists and curators break free from individual cognitive limitations and expand their capacity for associative thinking.

Nowadays, big data algorithms are capable of completing nearly all curatorial work for exhibitions independently. As a result, the role of curators is confronted with unprecedented challenges in the digital era, and a core task is to leverage the essence of relevant technologies to strengthen connections between audiences and artworks. This trend also raises a series of new questions: To what extent can algorithms independently curate an exhibition? What are the major advantages and potential drawbacks of algorithm application in curation? How can we apply algorithms to facilitate curatorial practices? This study aims to explore diversified pathways for applying algorithms in curation.

3. Technical Landscape: Mechanisms of Applying Algorithms in Curation

3.1 Approaches to Apply Algorithms in Curation

In practices of applying algorithms in digital curation, curators strive to establish harmonious collaboration with technologies. This section explores applicable pathways by categorizing algorithms into three functional roles: screening tools, imaginative tools and substitutive tools.

3.1.1 Algorithms as Screening Tools

Modern machine vision can extract diverse information from two-dimensional and three-dimensional images, such as color, text and affective cues. Powered by algorithms including convolutional neural networks, machine learning systems can automatically identify and enrich image metadata, and tag images stored in databases with the support of machine vision technology [8].

In the Open Access Initiative launched in 2018 by the Metropolitan Museum of Art in collaboration with Microsoft and the Massachusetts Institute of Technology, [9] a new dataset of thematic keywords was developed. Previously, the public could only search for artworks by name or category. This project makes it possible for audiences to search for works based on visual features and content related to their preferred themes. Within the paradigm of algorithm-assisted digital curation, cultural institutions can disseminate digital resources such as images and videos on a broader scale and provide exhibition data and materials of multiple layers to the public, thus achieving decentralization of the discourse power over knowledge.

3.1.2 Algorithms as Imaginative Tools

In dataset design, machine learning can also uncover latent connections between images across different datasets. Image data is imported into convolutional neural networks to extract model features for clustering, with images with similar traits grouped into one scalable category. Taking Google Art & Culture as an example. [10] When users select a specific research focus, clustering algorithms retrieve and assemble all relevant images from the database to reveal subtle details that are difficult to detect. This process enables rapid, low-cost multi-dimensional knowledge correlation among images in semantic, historical, technical and other dimensions, which eliminates redundant repetitive work, facilitates more accurate and objective knowledge acquisition, and stimulates users' imagination toward social technologies.

3.1.3 Algorithms as Substitutive Tools

At the symposium Refocusing Under New Technologies: Xu Bing Art Forum held by the Pudong Art Museum in December 2023, [11] contemporary artist Xu Bing stated that AI assists us in redefining the true uniqueness of art. Its irreplaceable core resides in humans' integrated physical perceptions, which cannot be emulated by AI. His viewpoint offers a definitive answer to the question of whether algorithms can fully replace human curators.

Furthermore, during the 2023 International Education Forum "Pre-Future" hosted by the School of Design, Central Academy of Fine Arts, Kevin Kelly proposed that artificial intelligence and algorithms can be leveraged as fundamental resources to predict developmental trends. Serving as auxiliary tools and collaborative partners for humans, AI systems cooperate with human agents to capitalize on respective strengths and accomplish tasks. He emphasized that the ultimate goal of AI robots is to empower humans to achieve self-improvement. [12] Emerging new media and technologies provide diverse perspectives and all-round sensory experiences for us. A French poet Charles Baudelaire defined modernity, "Modernity is the transient, the fleeting, the contingent; it is one half of art, and the other is the eternal and the immutable." [13] In the context of this study, the eternal and immutable core of art lies in its inherent spirituality. Curators are required to strike a subtle balance among provoking, engaging, and pleasing audiences, and to rationally utilize technological tools to serve curatorial practices.

In The Ethical Code of Curators by Jean-Paul Martin, [14] the concept of "compliance" is introduced to emphasize the moral norms that curators must abide by. Supported by big data and

algorithms, the gatekeeping mechanism has become a core competency for contemporary curators. Although algorithm application substantially improves the productivity of curatorial practices, the resultant ethical dilemmas induced still necessitate rigorous gatekeeping and balanced regulation from curators.

3.2 Ethical Issues of Algorithmic Curation Mechanisms

In his book Technics and Time, Bernard Stiegler proposes that technology functions as a "pharmakon" with dual attributes. [15] On the one hand, it facilitates social progress and development; on the other hand, it triggers the gradual degradation of individual human knowledge. While algorithmic curation delivers substantial practical conveniences, it simultaneously gives rise to prominent ethical concerns. Generative algorithms produce new images based on training from massive existing visual datasets. If copyrighted data are incorporated into algorithmic training pipelines, the resulting synthetic images may be constrained by the copyright of original sources, thereby triggering disputes over copyright ownership in algorithmic learning processes [16].

On the other hand, a primary flaw of such algorithms lies in their heavy reliance on diverse images and categories used as inputs for neural networks. Due to the diversity and limitations of individual human experience, algorithms generate images with inherent biases, which further evolve into a default system for perceiving and indexing the world. A 2019 study conducted by the Massachusetts Institute of Technology adopted Variational Autoencoders (VAE) to learn latent structures within training data and mitigate biases, but algorithmic prejudice remains unavoidable. [17] In 2016, the team at the Museum of Digital Art (MUDA) in Zurich opened its curatorial workflow and used a web crawler named HAL 101 to screen and select eligible artists for exhibitions. The MUDA team attempted to mitigate inherited algorithmic biases by designing a neutral scoring system that excludes personal preferences and source discrimination, thereby reducing subjective prejudices in human curators' information acquisition and screening processes and improving overall objectivity. Nevertheless, while HAL 101 sought to eliminate curatorial deviations in information retrieval, selection, and evaluation, it inevitably amplified inherent algorithmic biases and generated additional new prejudices [18].

As a double-edged sword, technology inevitably produces negative impacts while bringing convenience to human society. In curatorial practices, human curators and algorithmic systems need to complement each other's deficiencies. Critical reflection on algorithms, curatorial workflows, and latent biases is essential to promote in-depth integration of technology and exhibition practices.

4. Conclusion

Domestic research and practice on algorithmic curation still face a long-term developmental journey. While technological advancements have revolutionized curatorial production paradigms and facilitated curatorial practices, objective and rigorous perspectives are required to examine the dual effects of technology on curation. It is crucial to fully explore the creative potential of algorithms, restructure the relational dynamics among curators, audiences, and the non-human objective world, and break the anthropocentric curatorial paradigm. This study advocates innovative modes of exhibition-based knowledge production, responds to the shifting power dynamics in contemporary tech-enabled curatorial contexts, and embraces the possibilities of future curation with an open and prudent attitude.

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