

**Hertziana Studies**  
in Art History



**BIBLIOTHECA HERTZIANA**  
MAX PLANCK INSTITUTE  
FOR ART HISTORY

# From Hype to Reality

Artificial Intelligence in the Study of Art and Culture

Edited by Eva Cetinić & Darío Negueruela del Castillo



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## **Hertziana Studies in Art History**

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# Abstract

Pepe Ballesteros Zapata

Evolving Methodologies: Computation in Art History

Keywords | *Digital Art history, Visual arts, Computational technologies*



*This essay delves into methodology as the core element to integrate computation within the practice of art history. A cursory examination over time reveals how art history has witnessed various methodological shifts that guide the study of cultural objects. The integration of computation resemblances are yet another iteration echoing past transitions in methodological approaches. Through illustrative research examples inside digital art history, the essay highlights computation as a shift in the point of departure, used to add layers of interpretation which can iteratively contribute to a deeper understanding and interpretation of art. Moreover, the article examines the methodological dichotomy inherent in combining computational and traditional art historical methods. This centaur-like methodological fusion has the opportunity of enhancing the art historical practice by recognizing quantifiable features in traditional non-quantifiable cultural objects.*

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### **Introduction**

Just as art historians may feel uneasy when computer scientists use the term ‘art history’ to refer to paintings, computer scientists and digital humanists also face debates when seeking a suitable term for applying computer-based analysis to art studies. Scholars in the field have attempted to resolve this issue. In the well-known article “Is There a ‘Digital’ Art History?,” Johanna Drucker differentiates between a “digitized” art history and a “digital” art history. The former refers to art historical practices using digitized collections, while the latter refers to “analytic techniques enabled by computational technology.”<sup>1</sup> It seems like the naming relates to the medium, while the definition relates to the methods. Following this line of thought, a tentative name for the field might be ‘Computational art history,’ a term I have strikingly only seen being used by Richard Johnson.<sup>2</sup> The reason for my surprise lies in the fact that other research fields like linguistics, biology, or sociology had already chosen the term ‘computational’ to differentiate between established and computational methods specifically. Just as many other fields of research seamlessly integrate computation into their practice without the need for a separate identity, so too may digital art history follow suit. As discussed by Schich,<sup>3</sup> computation could evolve to become an inseparable part of art history, unifying naturally without the burden of a distinct name. Nuria Rodríguez recognizes Drucker’s terminology distinction but suggests an updated definition. She defines digital art history “as a series of epistemological and methodological transformations.”<sup>4</sup> She says that “there is not an essential distinction between digital art history and other art histories – there is simply

doing art history.” The goal is the same, what changes is the method. This article explores how the choice of a particular method guides and constrains the layers of interpretation given to the object of study. Arguably, that has been the case already in art history, and computation is simply another iteration. Seeking to reduce art history to a limited—and also incomplete—taxonomy of methods carries the risk of yielding banal assumptions and conclusions, and will most likely annoy the cultivated reader. However, amidst these hazards, there is value in contextualizing art historical methods as a preliminary step towards understanding the role of computational thinking in the field.

### **Visual Analysis of Art**

One of the first relevant methodologies to create art history was bibliographical. Painters and art connoisseurs like Vasari, Van Mander, or Bellori, exploited documentary evidence to report the life of artists. The bibliographical approach also sought to differentiate the arts from the crafts, alluding to their role as a liberal art in contrast to a mechanical work. The method is based on a close examination of individuals and their work, imposing their own ideals of artistic quality and influencing the creation of a canon. Emphasis on individual artists and their works as embodiments of intellectual and aesthetic ideals set the stage for the centrality of visual analysis in art historical practice. As the discipline became more established, art historians like Giovanni Morelli or Bernard Berenson<sup>5</sup> used their educated eye to diagnose works of art (e.g., assess authenticity, style, or workshop practices), and assess their artistic significance in relation to the broader artistic landscape.

<sup>1</sup> Drucker 2013.

<sup>2</sup> Doing / Johnson 2015.

<sup>3</sup> Schich 2016.

<sup>4</sup> Rodríguez-Ortega 2019.

<sup>5</sup> For canonical examples of art historical connoisseurship: Morelli 1900. This

technique was further developed by Berenson in Berenson 1948.

Historians and scientists have a long tradition of working together to empower visual analysis techniques, where technology is used as a microscope to date, authenticate, or discover enigmatic clues hidden inside works of art. In multispectral imaging, ultraviolet light is employed to discover extraneous paint marks, potentially from later restorations aiming to repair damages (e.g., cracks on the wood panel). Infrared imaging unveils previously hidden underdrawings, obscured by pigment degradation and varnishing. X-rays provide insights into a painting's genesis and original composition, revealing its initial outlines.<sup>6</sup> The combination of multispectral images with computational software makes it possible to study how colors may have changed over time, bringing the original painting back to life—at least digitally.<sup>7</sup> Not limited by digital restoration, less invasive computational methods like image processing have been used to help historians date books and prints,<sup>8</sup> or to identify watermarks in artworks for authentication.<sup>9</sup>

## Layers of Meaning

Since the late 20th century, the 'new art history' incorporates intellectual thought and ideological movements to further integrate art history within the framework of cultural history. The method I see applied here is the incorporation of theoretical frameworks into their practices, for example, interpreting art history through the lens of historical materialism (like the work of Meyer Schapiro or Arnold Hauser), or feminism (Griselda Pollock or Chris Weedon), among many others.<sup>10</sup> This is strong evidence of the richness of art history, where the entire tapestry of artistic evolution and individual artworks can be perceived and interpreted in a myriad of ways. Like the meaning of words depends on context, artworks embody multiple dimensions of meaning. The act of interpreting an artwork invites a spectrum of possible understandings rather than deterministic conclusions. Meaning

is defined by the space between the artwork and the chosen method of analysis, subject to the particular perspective of an individual or a collective, and their cultural traditions. If meaning is multidimensional, computational methods allow the historian to add another layer to the high-dimensional space of meaning.

Body-pose estimation algorithms can be used to capture gesture in art, a method used to reinterpret Aby Warburg's concept of *Pathosformeln*.<sup>11</sup> Measures could identify distinct figures and their corresponding *Pathosformeln*, and highlight notable contrast between the movements of the upper and lower body parts, reflecting the signature of *Pathos* as a break in the body's unity. Madhu and colleagues used computational methods to study compositional structures in art historical images inspired by Max Imdahl's theories on image composition.<sup>12</sup> They used pose and gaze estimation to extract artwork's structures, tracing focal areas or regions of action to understand narratives in art historical scenes. A distant viewing study of landscape painting reveals dominant dissection ratios that serve as unique signatures across the history of western art.<sup>13</sup> Researches have used computational methods to discuss art historical inquiries in the absence of contextual information. Using image processing and optimization algorithms to calculate the position of the light source in paintings, researchers presented a tentative rebuttal to the Hockney-Falco thesis,<sup>14</sup> claiming that local light sources were insufficiently bright at the time to project virtual images on a canvas.<sup>15</sup> Facial recognition frameworks are also used to enhance art historical discussions when only visual evidence is available. For example, to suggest the possible appearance of Leonardo da Vinci in his old age,<sup>16</sup> or to identify key figures in imperial portraits to trace systems of lineage.<sup>17</sup> Data-driven methods represent yet another possibility to add new layers of meaning. For instance, a distant reading of artwork titles

6 Refer to <https://www.metmuseum.org/articles/vermeer-conservation-for-an-example>.

7 Cotte / Dupraz 2006.

8 Blair Hedges 2006.

9 Johnson 2020.

10 Harris 2002. I see the way intellectual

frameworks guide the study of cultural phenomena as a method. This is evident in recent art historical trends that question the validity of western-based theories as a practice to study cultures outside their geographical borders.

11 Impett / Süssstrunk 2016.

12 Madhu et al. 2020.

13 Lee et al. 2020.

14 The controversial Hockney-Falco thesis argues that old masters used optical aids to project virtual images on the canvas.

15 Kale / Stork 2009.

16 Tyler / Smith / Stork 2012.

17 Zhong 2023.

prompts inquiries into the formation and evolution of artistic canons as reflected in museum collections.<sup>18</sup> Network analysis is used to disambiguate the complex social dynamics of buying, brokering, and selling in the art market.<sup>19</sup> The hidden patterns found across large amounts of data unveil underlying structures that inevitably lead to new questions. For example, what can explain a pattern of synchronization found across different markets at the same time?

## Methodological Dichotomy

Jacob Burckhardt reacted to Hegelian metaphysics when he described philosophy of history as a centaur made up of two incompatible parts, one rational and the other irrational.<sup>20</sup> The metaphor yields skepticism about the blending of history—chronological evidence as occurred—with philosophy—arrangement of events within a theoretical framework to derive meaning. The dichotomy between disciplines echoes Snow's delineation of the division between the scientific and humanistic cultures.<sup>21</sup> This division, often perceived as an incompatibility, might more accurately describe fundamental differences in the method and ultimate goal: The understanding of cultural phenomena as opposed to the understanding of natural phenomena. The examined 'what'—the object of study—naturally affects the 'how'—the methodological approach. But what happens when we maintain the 'what' and change the 'how'? This is what digital art history explores inside the field of art history.

The art historical community can agree on the explanation of a phenomenon, or argumentation can reach a general consensus if the argumentation is convincing enough—that is, contextualizing the problem and supporting the commentary with some sort of evidence. In art history, empirical evidence is often merged with the interpretation of cultural contexts, semiotics, aesthetic experience, and other complex features that are inherently unquantifiable. Digital art history preserves the empirical evidence—the artwork, archival materials, etc.—but transforms the way to

approach it—the method. The application of computational methods—inherited from scientific methods—to art historical evidence suggests that traditional non-quantifiable cultural objects may have quantifiable features. This suggestion carries stereotypes associated with scientific methods, like 'objectivity' or 'techno-positivism.' The study of art as something computable has often been perceived as an opportunistic approach linked to neo-liberalization that aims to produce 'useful' outputs.<sup>22</sup> However, transforming cultural artifacts into metrics can be seen as having the potential to shift the point of departure, to reveal information not immediately apparent, and to add layers of information that iteratively might lead to meaning. The resulting centaur—part computational, part art historical—is not a creature of oversimplification but a hybrid entity capable of synthesizing two different yet compatible realms of understanding.

## Conclusion

Historically, art historians have aligned their approaches with the evolving intellectual and technological landscapes. The research examples showcased in this article are intended to position digital art history not as a fracture but as a continuum in the methodological evolution of art history. The intersection between art historical knowledge and computational methods offers an opportunity to add new layers of meaning by analyzing visual evidence in the absence of contextual information, reinterpreting art historical theories, directly assessing art historical claims, or studying complex cultural dynamics at scale. The methodological dichotomy inherently present in digital art history guides researchers to recognize two situations: The first one recognizes that complex cultural objects may also exhibit attributes amenable to quantification, the second one recognizes that computation serves as an alternative method and cannot solely generate art historical meaning.

<sup>18</sup> Bowman 2023.

<sup>19</sup> Schich et al. 2017.

<sup>20</sup> Fernie 1995.

<sup>21</sup> Snow 1959.

<sup>22</sup> Drucker / Bishop 2019.

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