

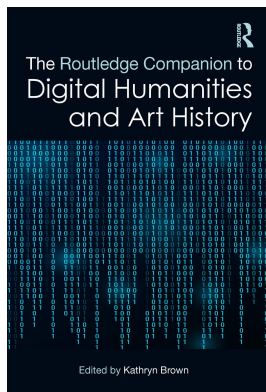
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On: 27 Oct 2021

Access details: *subscription number*

Publisher: *Routledge*

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The Routledge Companion to Digital Humanities and Art History

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The Digital Transformation of Art History

Publication details

<https://www.routledgehandbooks.com/doi/10.4324/9780429505188-5>

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Published online on: 06 May 2020

How to cite :- Harald Klinke. 06 May 2020, *The Digital Transformation of Art History from: The Routledge Companion to Digital Humanities and Art History* Routledge

Accessed on: 27 Oct 2021

<https://www.routledgehandbooks.com/doi/10.4324/9780429505188-5>

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THE DIGITAL TRANSFORMATION OF ART HISTORY

Harald Klinke

The academic discipline of art history is currently in a state of transition owing to the increasing integration of digital methods.¹ Just like the digital humanities in general, art history makes use of databases, data analysis, and visualizations in order to support existing approaches to the history of art as well as to probe new opportunities for the field. Whereas Diane Zorich concluded in her 2012 report for the Kress Foundation that there was ambivalence in the art history community on whether digital methods would change the way research is conducted,² much has advanced since then. To name just a few milestones: In 2014 the *International Journal for Digital Art History* was founded in Munich and published its first volume in the following year. In 2016 the *Art History in Digital Dimensions* symposium at the University of Maryland developed a White Paper recommending future steps that were presented at the subsequent College Art Association conference.³ At the beginning of 2019 the U.S.-based *Digital Art History Society* and the *European Digital Art History Network* announced their existence.

While ambivalence remains in the larger community of art history, it is increasingly swept aside by the growing awareness that digital art history is a growing field that cannot be ignored.⁴ Digital art history has grown from its infancy by building its own infrastructure. The digital art history community organizes itself via social media, publications, summer schools, hackathons, and conferences. A growing number of projects and doctoral theses chart the possibilities of digital applications in art history. With recognition of the field's growing importance, it becomes apparent that digital art history might become more than just an additional method. Rather, it has the potential to transform art history in general. It makes sense, therefore, to look back on what art history is, has been, and what we might want it to be in the future.

A Brief Media History of Art History

The object of art history is the history of art. That means, broadly, that scholars describe the development of human artistic production over time in its societal context and interdependencies with political history, social history, the history of media, etc. As a historical science it focuses on cultural objects as sources of information about the past rather than relying merely on text-based media. As such, visual analytics stand at the core of art-historical methodology.

In order to define art history as a science, Heinrich Wölfflin established a description of images not by their content but by their formal appearance.⁵ "Style" became the central term

in order to tackle the main challenge of dating and attribution. Erwin Panofsky, on the other hand, developed a kind of visual epistemology in order to rediscover the meaning of artworks on several levels in order to embed the object in its cultural-historical context.⁶ “Meaning” seemed to be the goal of that endeavor.

Those methods were developed largely with originals (i.e. individual physical objects) in front of the researcher. But with developments in the visual media capable of representing artworks, art history was increasingly carried out on the basis of reproductions. That opened up many new methodological opportunities. Wölfflin was able to present art history to a larger audience by using slides and established the comparison of two images projected next to each other as a standard method.⁷ Aby Warburg brought more objects into spatial proximity and included works in different media.⁸ He interlinked many images independently of their artistic value (including stamps and postcards). In order to open the field to a global science of the image, André Malraux even highlighted the possibility of comparing works of art only by means of their form in a large-scale vision of global art through images.⁹ Not least, the introduction of slide libraries changed the method and focus of art history and widened the possibilities of access to the works of art created in human history. This, in turn, changed our idea of the object.

Introducing Digital Technology

It should not come as a surprise that the changing technology of our time has a profound impact on the process of “doing art history.” New technology, namely digital technology, has the potential to challenge long held beliefs about art production and its genealogy and to put old questions in new contexts. Art history is often considered to be conservative, maybe because it is a retrospective endeavor. Yet the truth is that art history has consistently evolved and will continue to develop. That we currently cannot estimate the results of digital change should not keep us from taking the advantage of the opportunities that may open up for us. We have to walk the path to understand where it leads. And we need to expect to stumble in order to understand where the pitfalls are. We should also be aware that it is likely that by walking the path, our objectives will change.

The basis of art history is data. The term “data” in Latin means “the given.” It is the basis of any science to start with the given—with what is. Art history starts with the individual object. By describing it, we gather data about what we see. By finding words for what we see, we bring to our conscious mind the contents of the partially unconscious process of seeing, recognizing, and understanding. By writing it down, we make it accessible for our and others’ later use. Our data is visual data that we process in comparison with other images that are present as originals or reproductions or that are located in our mental archive. We describe, compare, and contextualize. We then write in order to communicate the findings to a scholarly community that might verify or falsify statements and build upon generated knowledge. This is how art historians have charted the history of art in depth and detail.

The basis of digital art history is digital data. In order to eliminate the interference of noise in transmissions, Claude Shannon proposed in 1948 to send discrete signals that have one of only two values, a high and a low state.¹⁰ Those digital signals can be computed using calculation rules of binary numbers developed by Gottfried Wilhelm Leibniz in 1697.¹¹ The term “binary” means “on the basis of two.” In contrast to the decimal system, the binary numeral system has only two possible digits, usually “0” and “1.” Information encoded in digital data has the advantage that it can be processed on a machine with speed and precision. In art history we have created digital data in image databases for a long time, but we have just started to probe how that data can serve as a basis for knowledge. That is the difference between what has been called “digitized” and

“digital” art history: using it for more than a substitute for the slide library and, instead, making it fruitful for data analysis in the service of art–historical epistemology.¹² Progress in the latter is the real potential for the field and opens up a number of methodological opportunities.

A Closer Look: Distant Viewing

One such opportunity is “distant viewing.” The term is often used to describe a method for art history to attain a new relationship to visual data. However, the term “distant viewing” is often used without a concise definition. There is not yet a discussion of its history and meaning.

It seems obvious that the term is derived from Franco Moretti’s term “distant reading.” In contrast to reading individual books (close reading), Moretti’s literary method, originally termed “serial reading,”¹³ allows looking at the canon of (in his case) world literature as a whole and discovering lesser known works, recurring patterns, and long term developments that are indistinguishable in close reading. In 2000 he wrote: “Distant reading: where distance, let me repeat it, is a condition of knowledge: it allows you to focus on units that are much smaller or much larger than the text: devices, themes, tropes—or genres and systems.”¹⁴

Empirical literary studies had existed for a long time (e.g. word count done manually)¹⁵ before the term “distant reading” came into being. And distant reading had been discussed before computational methods came about. When Moretti coined the term, he signified a way to de-isolate the single object and embed it into the context of a *longue durée*. Ted Underwood points out the existence of that trend since the 1960s and concludes: “Distant reading has evolved into a name for a more specific approach to literary history, but the approach described significantly predates this particular name for it.”¹⁶ However, computational automation and more advanced statistical methods brought the method to a new level.

Equally, there has also been a form of distant viewing before the use of the term in its newer context and before the use of computers. Moreover, the term existed earlier with a different meaning.¹⁷ In 1897/98, Alois Riegl distinguished in his manuscript *Historische Grammatik der bildenden Künste* between three distances the observer can take to an artwork (“Nahsicht,” “Normalsicht,” and “Fernsicht”) and discusses their respective epistemic advantages.¹⁸ Benjamin Zweig recently pointed out that the translation for “Fernsicht” in the English edition is “distant viewing.”¹⁹ In 2017, Moretti cited the literary critic Northrop Frye and the German poet Johann Wolfgang von Goethe with suggestions similar to those of Riegl: that being close to the canvas allows us to see brushstrokes and if we step back we recognize the organizing design of the picture. And if one arrives in a new town, a person might want to find a higher ground from which to see the city as a whole. Moretti states that close and distant examination are equally valuable approaches: “it all depends on what you are interested in.”²⁰ Distance creates an epistemic viewpoint that differs from close proximity. One sees differently by embedding individual objects in a broader context. And that is probably nothing else than what Malraux had in mind as a globally wide scope of comparison: Distant viewing before the term “distant viewing” and before the use of computers.

Earlier uses of the term can be found on Wikipedia: it relates to “television” since the first idea of what later became TV was described as “distant electric vision” in 1908 by Alan Archibald Campbell-Swinton, who suggested the use of a cathode ray tube for that matter.²¹ Today, the term is also used to applications of visual computing in order to analyze visual culture such as in the *Distant Viewing Lab* at the University of Richmond that devotes one project particularly to cultural analysis within TV studies, i.e. moving images.²²

The shift from “distant reading” to “distant viewing”—the step from literature to art—was perhaps too obvious to mention. It appeared in the context of art history on February 5, 2014,

in a blog entry published by K. Bender in which he juxtaposed quality and quantity in art history:

There is endless discussion in art history about the quality of artworks and how to recognise a masterwork. [. . .] Unfortunately many monographs focus only on works considered as the greatest masterpieces of art. Art history is shallow if lesser artists and their works are forgotten. This also implies that quantity in the arts cannot be dismissed: it is part of the historical complexity of art production.²³

Referring to Moretti, he writes in a later post:

Obviously, “distant viewing” in art history [. . .] should be a method for a much broader objective: the different branches of visual arts (sculpture, painting, etc.), their styles (renaissance, mannerism, baroque, rococo, neo-classicism, etc.) or the many themes in painting—history, portraiture, landscape, marine, genre, still life, etc.—could be analysed quantitatively, provided of course that the appropriate databases are available.²⁴

He subsequently published those thoughts on a broader scope in the first issue of the *International Journal for Digital Art History* in June 2015.²⁵

Accordingly, distant viewing is the presentation of connections between multitudes of images (Big Image Data) in meaningful spatial proximity to each other in order to gain an overview of a corpus that would not be possible without digital means.²⁶ It allows the interactive exploration of that visualization, by browsing swiftly through the images and to find something relevant (e.g. similar objects). The idea behind it is that the computer can process more images than a human can see (and remember in the mental archive) in a lifetime. The *quantity* is expected to be limitless. And that makes the difference.

Sheer quantity requires processing in order to make it usable for the human sensory system. How much such processing can augment connoisseurship is not yet proven. What becomes clear, however, is that now and then, in addition to quantitative analysis, we have to return to a qualitative analysis (i.e. going to a library or gallery). From distant viewing—the overall view of all works—we might want to come back to close viewing, the single inspection of particular works. It cannot be stressed enough that digital methods are no substitute for classical approaches. They are, however, an extension of those approaches. Digital art history works best in a constant exchange with conventional methods.

There are two ways of doing art history: going into depth (and becoming an ever greater expert in an increasingly narrow field) or emphasizing breadth (losing detail and gaining an overview of patterns over longer time periods). Neither is exclusive. What digital art history allows is a macro-analysis, a computerized breadth that would be otherwise impossible.²⁷ The “great unread” of books that have not reached the attention of research, as Margaret Cohen lamented already in 1999,²⁸ turns into the “great unseen” of art. Digital art history now brings them within the purview of scholarly attention.

However, simply applying what information science has to offer is not enough. Art history itself needs to tighten its methods at this point. We need to chart both the possibilities and limits of distant and close viewing. In terms of distant viewing we are not at the point of an established method for our field, but at the beginning of a rocky path. The challenges we face are on multiple levels:

1. It is not yet clear how a meta-image (an image made of a multitude of images) helps to answer particular research questions on the grounds that its “relevance” is not given, but

- depends on the user's interests. For example, someone interested in portraits in general would like to see other portraits in a certain time period. While someone with an interest in paintings in a certain geographic region would like to see more examples from that context.
2. This means that similarity between objects can be defined in many ways. Some of these can be derived from the images via feature extraction, others by making use of metadata. For others, additional data and sources (such as textual) need to be accessed or collected.²⁹
 3. From this it follows that the data we have today are mostly collection data (e.g. from museums) that are not necessarily suitable for the breadth of research questions art history wants to pose. The data might not be (1) sufficient, (2) relevant, and/or (3) valid. With the data we have, we can hardly make universal statements about general art history, but only about our respective basis of data. Thus, talking about the results, we need to be linguistically exact, i.e. we can only talk about the data we have and draw conclusions about the history of the collection, for example.
 4. Visualizations of meaningful similarity measures are not necessarily two- or three-dimensional spaces, but we need to develop new ways of showing meaningful connections between images. That encompasses developing a grammar of visualization for our field. For example, we always have several options to visualize data (bar or pie chart etc.) and many parameters (e.g. the axis limits). Those options can be used to focus on what is essential for the statement we want to make, but it can also serve to manipulate, create false evidence, and hide premises.
 5. Finally, visualizations should not be thought of as static, but as interactive. In the end, visualizations could turn into a graphical user interface of a general research platform for art history via which we access visual data and are supported in gaining knowledge from a large image corpus. What such a platform might look like is far from obvious today.

In order to make good on the promises of distant viewing, we have to ensure its prerequisites: data infrastructure and research infrastructure. We do not yet have the necessary data in abundance. Nor do we have a research platform for digital art history. Such a system will allow an overview of a corpus, find relevant objects, and incorporate objects that are not typically part of the narrative.

Transitioning to a New Art History

In order to develop such a system and to be acquainted with digital technology, a new generation of students has to be taught digital practices. Part of the syllabus of art history should be (and will be) the use of such systems for research on a user level. As such a system does not yet exist, students need training in data analysis, data visualization, and other techniques. As this slowly becomes natural, it may emerge that digital art history is not just an extension of art history, but can spark the transition to a new art history.

First, teaching is changing. Art history is usually taught in lectures and seminars. The goal of such formats is the transfer of knowledge and the organization of discourse. Working with software and data, however, is only in part knowledge or theory. Rather, it is a time-consuming trial and error by playing around with data in order to understand systems, structures, and content. Thus, digital art history requires new formats and new frameworks in which students are allowed to embark on a journey of experience and creativity, reconsidering research questions and approaches. Workshops and collaborative project work seem to be more suitable for this type of learning.

Second, the role of the teacher is changing. In this new environment, the teacher is no longer the encyclopedic mind. Nobody can know the functionalities of every package in the

programming language Python. Nor is that necessary, since manuals and tutorials can be found on the web in abundance. The teacher's role is, instead, to organize a process from an art-historical research question, making use of software tools, data acquisition, and processing. The teacher can give an introduction to core principles, processes, hardware and software, allow and suggest group work and peer-teaching.

Third, the role of the department of art history is changing. Once, the library and the slide library were the center of every department of art history. They were the meeting points for scholars and students. Slides were produced for the slide library and returned to it after use. It grew and became a visual repository for consultation. With the process of digitalization, image databases were established, but in practice, digital reproductions for teaching and research are sought with search machines on the web or are individually scanned from books. Thus, they no longer enter a central repository, but rest on private hard discs. In the absence of a consistent and shared infrastructure, departments lose a central task and relevance as a place of access to knowledge. This is even more so with the declining importance of the rooms in the library as places of knowledge given the increasing availability of e-books and the option to work at home. Both the library and the slide library are in need of a new role.

In the digital age accessing records can take place anywhere where Wi-Fi is available. But still there is a need for rooms in real space for meeting and discourse, exchange and mutual inspiration. Moreover, a world so virtual is in need of hardware. Cutting edge hardware that is especially needed in art history (large calibrated displays, 3D scanners and printers, VR headsets, etc.) is still beyond what the average researcher and student can afford. There needs to be a place in which such equipment can be used. Similar to the former slide library, departments of art history should open laboratories for experience and collaboration, where all equipment is accessible and free to try, where students can develop their own research projects, and seek advice and exchange with other students. Examples of such emerging facilities are the Wired! Lab and the Co-Lab Studio at Duke University.³⁰

In order to manage the lab, organize the infrastructure and consult digital projects, replacing the former head of the slide library, a Chief Technology Officer (CTO) has a key role if departments are serious with their digital strategy. This employee oversees administrators trained in specific functions: maintaining small infrastructure such as Wi-Fi and large infrastructure such as running servers. There is no way around a permanent annual budget for hardware and software and staff.

Enhanced virtual teaching and research environments are also necessary. In order to avoid the need to install software on individual computers with limited specifications and different OS versions, universities need to offer services that give access to cloud storage and cloud computing. With a university login, collaboration in software development and the exchange of data among groups within a teaching or research context becomes possible. An example of such a system is the virtual research platform *DHVLab* developed at the LMU Munich.³¹

As departments are now devoid of slide libraries, on an interdepartmental level, data infrastructures are being built and art-historical data is increasingly stored in science clouds, which researchers can access and to which they can contribute. These systems are not limited to collection data, but can comprise any data that is part of an art-historical project. In addition, virtual research databases are needed that specify a meta-structure (i.e. how digital data can be organized). On the basis of the preceding, a research infrastructure can be built that allows data analysis on a user level (without the need to dig deep into software development) and facilitates collaboration on an international level if necessary.

Fourth, the discipline is changing. All of the preceding cannot be accomplished without a strong focus on interdisciplinary collaboration. Art historians and, in particular, information

scientists (also statisticians, etc.) are already working together in order to develop new solutions for both disciplines: new tools for art history and a better understanding of images for information science. An emerging example is the Focus Program by the German Research Foundation called *The Digital Image* that combines art-historical approaches with solutions from information science in mixed method approaches.³² Another example is the international and interdisciplinary Hackathon for Art History and Information Science *Coding Dürer* that took place in 2017 and brought together art historians and information scientists to work on data.³³ In order to make such collaborations possible and successful, art historians have to understand the fundamental principles of information science. Conversely, information scientists have to understand the core principles, goals, and methods of the visual humanities. This requires joint curricula, projects, summer schools, and collaborative experiences. Only together will we be able to tackle the challenges and opportunities that 3D, augmented and virtual reality, artificial intelligence, and machine learning pose to the discipline. Interdisciplinarity or rather transdisciplinarity will change the discipline more than anything else and, by extension, the impact of the discipline on society.

Fifth, our understanding of the history of art is changing. With Big (Image) Data and the computer as a tool to help get from data to knowledge, the epistemic process of how science produces knowledge is transforming. Distant viewing interfaces in recommender (or filtering) systems that predict user preferences, as just described, are just the beginning. The computer will not replace reading and examining objects, but act as a companion that can store and compute infinite numbers of records, process them (e.g. via visual computing), and compare everything to everything else. It will make it easier to take into account lesser known, lesser described, and lesser-published artists and artworks. It will come closer to the original idea of the “museum without walls”—this time with digital means. Its possibilities make it easier to tell other art histories, take new views, and to include the “long tail” of objects in the narrative.³⁴ This opens up to yet uncharted territories and maybe, thus, a “democratization” of art history (i.e. the total inclusion of every visual artifact).³⁵ Distant viewing, in the end, is not a means in itself but allows finding that single relevant object that could not be found without the help of the computer—and then potentially visit its original for close inspection.

Sixth, the art-historical researcher is changing. With the use of digital technology in the research process, a new skill in demand has to be what could be called “data literacy.” This concerns how to access information and tools as well as how to use them in order to gain the knowledge needed for the research field. But more than that, it needs a critique of sources in a broader understanding:

1. A critique of data concerns how the information was generated, by whom, for what reason, in what context, from which institution, with what bias and gaps.
2. A critique of algorithms is needed in order to evaluate the relevance of results by an understanding of how that result was calculated and under which premises it was generated.
3. A critique of data visualizations allows researcher to understand the seemingly obvious evidence in a context of other possible visualizations.
4. Critical computer literacy is needed in order to stay focused on the goals of a research project among the abundance of data and tools.

Today it seems that the computer is still a new medium, and often the medium seems to be the message. It will probably take a generation until the medium fades into the background as a mostly useful but familiar tool, just like the slide projector in the past.

Still, the question remains, what digital art history really is. There are several options for the future:

1. It is a methodological extension of art history, an addition to the syllabus, the opportunity to new possibilities. And as soon as we are accustomed to it, we drop the prefix “digital” that connotes that it is new and just call it “art history.” One could describe this as an evolution.
2. It is a revolution, and what we call digital art history today will be the art history of the future. Then we also drop the “digital” prefix. Like astronomy (and most other natural sciences) there is no “analogue” astronomy anymore. Astronomers, today, look at computer screens instead of through the telescope.³⁶
3. It is a transdisciplinary field *between* art history and information science (and possibly other subjects). This means it is unlike the digital humanities that struggle to be, on the one hand, the future of the respective disciplines and, on the other hand, do not wish to be distinguished from them.
4. It is something completely new. With its innovative methods, strong focus on interdisciplinarity, and the potential of new views on the cultural history of visual heritage, it could fall under a term such as “cultural analytics” that cuts off all roots to traditional disciplines in order freely to explore new opportunities.

Now is the time to discuss what kind of future we desire for our discipline and to take steps to realize it. That means creating a new, critical understanding of what it means to do art history in the digital era.

Notes

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32. DFG-Schwerpunktprogramm, "Das digitale Bild" (SPP 2172), www.kunstgeschichte.uni-muenchen.de/forschung/digitalekg/digitales-bild1/.
33. Harald Klinke, "A Five Days International and Interdisciplinary Hackathon for Art History and Information Science, March 13–17, 2017, Munich, Germany," <http://codingdurer.de/>.
34. For the meaning of the term, see Chris Anderson, "The End of Theory: The Data Deluge Makes the Scientific Method Obsolete," *Wired Magazine* (July 16, 2008), www.wired.com/2008/06/pb-theory/.
35. Lev Manovich, "Manifesto for Democratic Art History," <http://lab.softwarystudies.com/2016/02/manifesto-for-democratic-art-history.html>.
36. See Roger Malina, "Yes Again to the End of the Digital Humanities! Please!" (August 6, 2015), <http://malina.diatrope.com/2015/08/06/yes-again-to-the-end-of-the-digital-humanities-please/>.

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