

# PHAROS: A digital research space for photo archives

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The PHAROS consortium of fourteen international art historical photo archives is digitizing the over 20 million images (with accompanying documentation) in its combined collections and has begun to construct a common access platform using Linked Open Data and the ResearchSpace software. In addition to resulting in a rich and substantial database of images for art-historical research, the PHAROS initiative supports the development of shared standards for mapping and sharing photo archive metadata, as well as for best practices for working with large digital image collections and conducting computational image analysis. Moreover, alongside their digitization efforts, PHAROS member institutions are considering the kinds of art-historical questions the resulting database of images could be used to research. This article indicates some of the prospective research directions stimulated by modern technologies, with the aim of exploring the epistemological potential of photographic archives and challenging the boundaries between the analogue and the digital.

Photo archives have long been recognised as valuable to art historical research. Photo archives not only provide researchers with otherwise unavailable records of preparatory studies, copies, versions, and conservation treatments, they also preserve reproductions and information about lost works of art. In addition, as historically and art-historically defined corpora, photo archives are authored collections, neither neutral nor broadly representative. As a result, they provide unique insights into the specific historical era(s) in which they were created and, in many cases, provide a perspective on the foundations of the discipline itself.

Capitalizing on the immense potential of photo archives is the central goal of PHAROS, the International Consortium of Photo Archives. This consortium of 14 photo archives is advocating to digitize the collections of its member institutions using shared imaging and technical standards. The goal is to make these collections' contents—over 20 million images with accompanying documentation—available via a free, web-based platform. Transforming and aligning data of this scale and scope brings with it considerable challenges; however, it also represents considerable opportunities to better understand both the current and future research potential of photo archives, in their physical and digital forms, and also how computational tools and methodologies might be used to organise and analyse digital image collections of all kinds. Therefore, while the construction of a joint PHAROS platform will be an outcome of the group's efforts, equally important will be understanding how to build a digital infrastructure for research in support of art history (and perhaps other disciplines) which considers technological solutions alongside research applications of the resulting data and user interfaces. With PHAROS, we would like to demonstrate the added value of an approach that couples a commitment to research with technical decision-making from the very beginning.

PHAROS was formed in 2013 to respond to the accelerating need seen by directors of the Frick Art Reference Library, the Getty Research Institute, the Yale Center for British Art, and the Courtauld Institute of Art to make fully accessible to new generations of scholars the unique materials found in scholarly researched photo archives around the world. To date, no other project has addressed the desire among international researchers for comprehensive consolidated digital



Fig. 1. Different photographers: Reproductions of Johannes Vermeer's *The Lacemaker* (ca. 1669) from the Photo Archive, Study Photographs of Dutch Paintings and Drawings. The Getty Research Institute, 76.P.60

access to the rich historical documentation of these archives, and these institutes' directors realised that technology had advanced far enough that this now would be possible. For this purpose, they convened members of 14 international research institutes to develop a strategic plan to realise the common ambition of the participants: digitising their collections and linking all data for maximum accessibility.

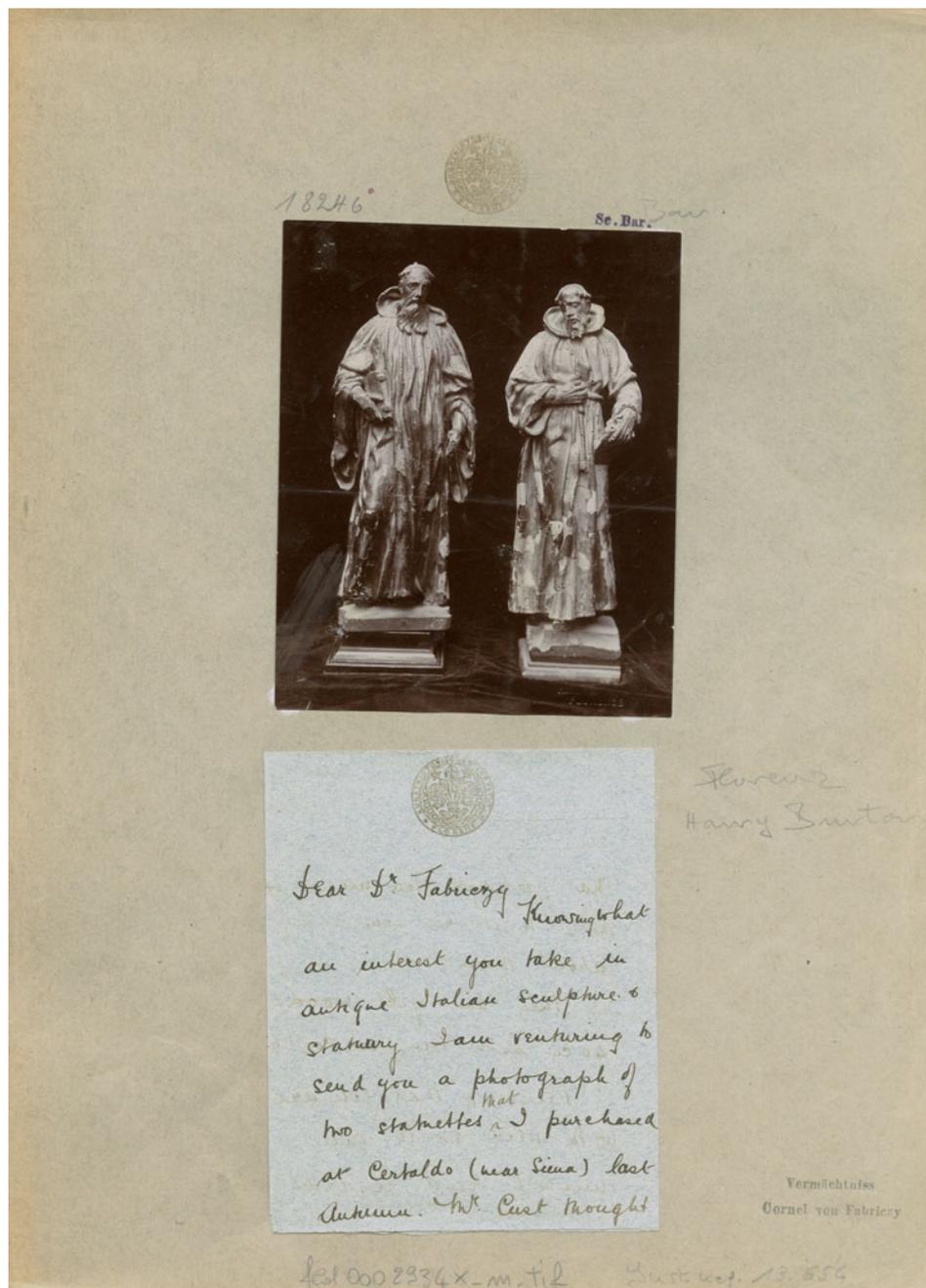
Fairly early on, the group determined that the most promising solution for achieving consolidated access to the documentation on the images of works of art held by PHAROS institutions would be to map the data to the widely adopted CIDOC CRM ontology, a conceptual reference model for cultural heritage information developed by the International Council of Museums. Once transformed into linked open data (LOD), it can be utilized in ResearchSpace, the British Museum project funded by the Andrew W. Mellon Foundation. ResearchSpace is one of the few applications that is able to leverage many of the benefits promised by LOD technology, which helps connect similarly structured data across the web. Specifically built for humanities data, ResearchSpace allows for structured searches between datasets with the ability to visualise the results through a map, timeline, network visualisation, or chart and most importantly, it allows users to continuously enrich this data through annotations and serves as a publishing platform that integrates results and observations into scholarly articles. Thus, non-technical users can author new records, link to other datasets, and visualise these data in ways that can serve as a foundation for further interpretation.

With funding from the Samuel H. Kress Foundation, the consortium investigated computer vision as a useful tool to find and compare images from multiple collections. A subfield of machine learning and artificial intelligence, computer vision refers to the use of algorithms to understand the content of digital images. Computer vision applications such as image similarity software use these algorithms to match or group images based on pixel data rather than metadata, allowing researchers to locate reproductions of a given work across datasets where metadata is lacking or inconsistent.<sup>1</sup>

In September 2016, the consortium launched the PHAROS Visual Search Database designed by computer scientist John Resig. The tool supports immediate comparison of the different attributions and provenance histories recorded by different archives as well as presents a variety of photographs of the work of art taken by different photographers during a period of nearly one hundred years, thus allowing researchers to see at a glance if the work has undergone any physical changes during its history. As of 2019, the database contains nearly 100,000 images of Italian works of art contributed by eight of the member institutions.

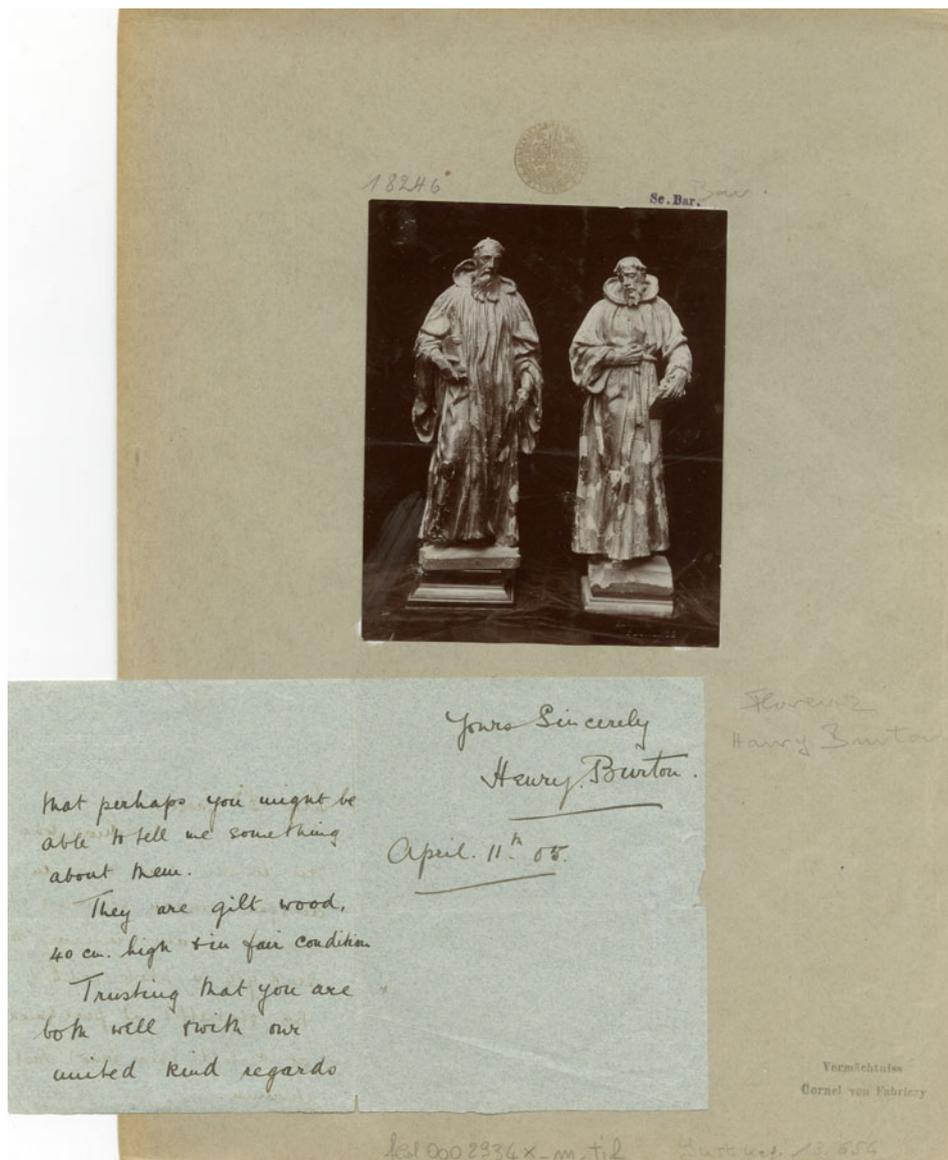
In 2019, the consortium received funding from the Andrew W. Mellon foundation for a thirty-month pilot project to create a research platform using the

1. The concept of visual similarity in the context of computer vision is demonstrated by the visual search function on the PHAROS website, <http://images.pharosartresearch.org/>, and in articles like Shen et al. "Discovering Visual Patterns in Art Collections with Spatially-Consistent Feature Learning." Published in *CVPR 2019*, March 2019.



Figs. 2a-2b. Harry Burton: Two Statues of Saints from his own collection in Florence. Aristotype, 12.9x10.3 cm, with a missive by Harry Burton to Cornel von Fabriczy of 11 April 1905. Kunsthistorisches Institut in Florenz, Max Planck Institute, Inv. No. 18246

ResearchSpace software. The platform will make available nearly 1.5 million images of works of art with accompanying scholarly documentation from five of the 14 PHAROS member institutions: Villa I Tatti, The Harvard University Center for Italian Renaissance Studies, Florence; Biblioteca Hertziana, Max-Planck-Institut für Kunstgeschichte, Rome; Deutsches Dokumentationszentrum für Kunstgeschichte, Bildarchiv Foto Marburg; Fondazione Federico Zeri, Bologna; and the Frick Art Reference Library, New York, all chosen because they hold images and metadata that are ready for immediate contribution to the research platform. The remaining nine institutions of the consortium are: the Yale Center for British Art, New Haven; Getty Research Institute, Los Angeles; Kunsthistorisches Institut in Florenz, Max-Planck-Institut; National Gallery of Art, Washington, D.C.; Courtauld Institute of Art, London;



Figs. 2a-2b. Continued

Warburg Institute, London; Paul Mellon Centre for Studies in British Art, London; Institut National d'Histoire de l'Art, Paris; and RKD – Netherlands Institute for Art History, The Hague.

Particularly given the significant roles of many of its members in establishing the discipline, the PHAROS initiative presents an opportunity for art history to study its own history, a trend increasingly common among a variety of academic disciplines. A historiographic impulse was the context for a series of studies that in recent years have attracted international attention to the epistemological potential of documentary photographic archives, and in particular those accumulated within the institutions of art history: museums, universities, research institutes.<sup>2</sup> This growing interest has been fueled by the introduction of digital technologies, which have allowed scholars to gain a historical distance from analogue photographs. As a result, physical photographs have been transformed from tools to objects of research. Methodologically, a significant contribution to the discourse on photo archives has come from visual anthropology, which since the 1990s has proposed to apply to the photographic collections the principles of material culture studies.<sup>3</sup> Archival studies have made another fundamental contribution,<sup>4</sup> its practitioners arguing that photographs are to be considered material objects, provided with a spatial and temporal dimension, active in social and cultural contexts, including the ecosystem of the photographic archive.<sup>5</sup> In such archives, the photographs and their card mounts, stamps, inscriptions, files,

2. Costanza Caraffa, ed., *Photo Archives and the Photographic Memory of Art History* (Berlin – Munich: Deutscher Kunstverlag, 2011). On art history and photography, not necessarily with an archival focus, see among others Anthony J. Hamber, *A higher branch of the art. Photographing the fine arts in England 1839–1880* (Amsterdam: Gordon and Breach, 1996); Geraldine A. Johnson, *Sculpture and photography: envisioning the third dimension* (Cambridge: Cambridge Univ. Press, 1998); Dorothea Peters, “Auf Spurensuche. Giovanni Morelli und die Fotografie,” in *Zeigen und/oder beweisen? Die Fotografie als Kulturtechnik und Medium des Wissens*, ed. Herta Wolf (Berlin – Boston: De Gruyter, 2016), 15–43; Sarah Hamill and Megan R. Luke, eds., *Photography and Sculpture: The Art Object in Reproduction* (Los Angeles: The Getty Research Institute, 2017).

3. Here the seminal studies are Christopher Pinney, *Camera Indica. The Social Life of Indian Photographs* (London: Reaktion Books, 1997); Elizabeth Edwards, *Raw Histories: Photographs, Anthropology and Museums* (Oxford: Berg, 2001); Elizabeth Edwards and Janice Hart, eds., *Photographs Objects Histories: on the Materiality of Images*, (London: Routledge 2004). For an overview, see Costanza Caraffa, “Photographic Itineraries in Time and Space. Photographs as Material Objects,” in *Handbook of Photography Studies*, ed. Gil Pasternak (London: Bloomsbury Academic, 2019).

4. Joan M. Schwartz, “We Make Our Tools and Our Tools Make Us: Lessons from Photographs for the Practice, Politics and Poetics of Diplomats,” *Archivaria* 40 (Fall 1995): 40–74; Joan M. Schwartz, “‘Records of Simple Truth and Precision:’ Photography, Archives, and the Illusion of Control,” *Archivaria* 50 (Fall 2000): 1–40; Terry Cook and Joan M. Schwartz, eds., “Archives, Records, and Power,” double monographic issue of *Archival Science: International Journal on Recorded Information* 2, no. 1–2 and 3–4 (2002).

5. Costanza Caraffa, “Manzoni in the Phototek, Photographic Archives as Ecosystems,” in *Instant presence. Representing Art in Photography: in Honor of Josef Sudek (1896–1976)*, ed. Hana Buddeus, Katarína Mašterová and Vojtěch Lahoda (Prague:

inventory books, various generations of operators, classification systems, as well as the databases, digitisation procedures, equipment and technologies that archivists choose to carry out their work, act and interact under the pressure of material factors such as the different human resources and budget availability of a given institution or at a given historical moment.

Although the urgency of literally saving from destruction photographic collections neglected and forgotten in the cabinets and storerooms of many institutions has not ceased, for the past decade there has been a growing awareness of the value of these archives.<sup>6</sup> The material approach helps overcome and challenge the traditional hierarchies of value which, especially in the history of art, are linked to the concepts of authorship and uniqueness. The photographs in our collections are not simply reproductions of unique art objects, but multiple originals with their own uniqueness within the archival ecosystem.

Ten years after the Florence Declaration, which proclaimed the need to preserve analogue photographic archives,<sup>7</sup> we can definitively dispense with the apparent dualism or even divide between analogue and digital. The future of photographic archives lies on the one hand in the integration of analogue and digital assets, and on the other in the recognition of their role as research laboratories. The historical depth of many photographic archives allows for surveying the different imaging technologies and their uses over time, stressing the continuities and analysing the differences. It allows, for example, to study the history, mediality and materiality of metadata, from stamps and inscriptions on the cardboards to modern data enrichment and machine learning technologies.

While the PHAROS initiative provides an opportunity to explore the potential photo archives hold with regard to new research questions and methodological approaches, at the same time it will continue to facilitate the kinds of research that photo archives have always been used in the service of, including attribution and connoisseurship, studies of iconography, and the provenance of art works. However, a central focus of PHAROS research activities will be exploring the intersections between what is possible to research once photo archive materials have been digitised and what is interesting and productive for art history and for other disciplines as well. That is, it is not only a matter of what computational tools and methods can enable, but whether and how such tools and methods can help researchers produce unique and valuable scholarly insights.

Critical to the process of determining where the possible and desirable intersect lies will be careful analysis of the metadata that describes these collections. We want to understand how existing metadata might facilitate new or existing approaches to research, as well as how we might enrich datasets or combine photo archive metadata with other kinds of datasets to open up further possibilities. Thus, as we tackle the considerable technical challenges inherent in transforming and publishing linked data, we will seek to balance the priorities of metadata creation and management with those of research and discovery.

Metadata activities we are undertaking as part of the PHAROS project focus at once on maintaining and providing access to the collections, in both their digital and physical forms, *and* on providing ways to research the collections, also in both digital and physical forms. At the Getty Research Institute, for example, much of the metadata for the Photo Archive collection constitutes information about subject and genre, which reflects the physical arrangement of the collection.<sup>8</sup> While there is no doubt that the institutions in PHAROS will retain important information of this kind going forward, we have started to wonder whether, or to what extent, questions of genre are still paramount within the field, as well as what other organizational strategies might make sense for contemporary art historical practice. Could computers 'see' and arrange these archives in ways we could not previously imagine?

One avenue we are considering is how computational methods might be leveraged to analyse what is included within these collections on a macro scale. For example, we might use computer vision to ask which artists are represented within particular collections (or across the corpus), and moreover, by how many images are they represented, relative to other artists. We think taking this kind of macro approach to collections could provide a way of tracing the history of art-historical canon formation, of considering what is included in these collections versus what is excluded. How might the art works included in these archives be mapped against, for example, those depicted in the major art history survey texts of around the same period? Are there differences in the representation of particular artists across different photo archives, or between American versus

Artefactum, Institute of Art History of the Czech Academy of Sciences, 2017), 121-136; Elizabeth Edwards, "Thoughts on the 'Non-Collections' of the Archival Ecosystem," in *Photo-Objects. On the Materiality of Photographs and Photo Archives in the Humanities and Sciences*, ed. Julia Bärnighausen, Costanza Caraffa, Stefanie Klamm, Franka Schneider and Petra Wodtke (Berlin: EOA, 2019), 69-84.

6. Nina Lager Vestberg, "Archival Value. On Photography, Materiality and Indexicality", in: *Photographies* 1(1), 2008, 49-65.

7. "Florence Declaration - Recommendations for the preservation of analogue photo archives" (<https://www.khi.fi.it/en/photothek/florence-declaration.php>). Accessed October 28, 2019.

8. The work at the GRI being undertaken as part of PhotoTech relies on and is informed by the deep knowledge and experience of those in the GRI Library who maintain the Photo Archive, especially Tracey Schuster, Ann Harrison, and Kathleen Salomon.

European photo archives? Digitised photo archives additionally provide an opportunity to examine the collections represented within photo archives, such as those assembled by influential art historians, including Bernard Berenson (Villa I Tatti), Erwin Panofsky (Getty Research Institute), Aby Warburg (Warburg Institute), Cornelius von Fabriczy (Kunsthistorisches Institut in Florenz), and Georg Weise (Deutsches Dokumentationszentrum für Kunstgeschichte in Marburg). What artists are included in these scholars' collections and which are excluded? How might attributions for particular works differ from one collection to another?

Approaching these collections from a macro level may assist researchers in writing more global, more inclusive histories of art and in producing new histories, perhaps of art works that have heretofore been marginalised or excluded from the canon. Asking these kinds of questions of the PHAROS corpus will also be a critical means of avoiding a kind of echo chamber effect, by which our analyses simply reflect back to us the contents of the corpus itself, telling us things we already know. We expect to find, for example, that a considerable percentage of the PHAROS corpus will constitute photographic documentation of Italian Renaissance art; we should not mistake the high proportion of such representations for an objective measure of their art-historical importance, but instead, view it as evidence of a particular phenomenon within the history of the discipline. It would be interesting, for example, to consider the representation within the corpus in relation to other parameters, such as temporality: is the percentage of the photographs documenting Italian Renaissance art in a certain collection constant or changing over time? Moreover, how can we match these data with the sale catalogues of the photographic companies that reacted over time to the market demand but also shaped consumers' needs and behaviours?

Another field of comparative inquiry at a macro scale relates to the classification systems at work in different archives, different countries, and different institutions with their specific agendas. Classification has not only to do with the formation of the art-historical canon and the codification of scientific methods in art history, but also with taxonomy as a category and approach that shapes the modern and contemporary world (think for instance about current human migration phenomena in parallel to the migration of photographs of works of art between different boxes or categories in an archive).<sup>9</sup> What about the position of (photographs of) art works from outside the non-European canon in the hierarchy of the classification systems of our photo archives?

Photographs are also a way to document the migration of works of art between different owners. In particular, our archives hold masses of photographs coming from art dealers and auction houses such as French & Company (Getty Research Institute) or Elia Volpi (Kunsthistorisches Institut in Florenz). Metadata on the provenance of the photographs allow us to reconstruct these funds and to investigate the photographic practices of the art market. The possibility to carry out comparative studies between different collections will give a great boost to investigations on photography and art market, within the emerging field of art market studies.<sup>10</sup>

As we think about the future of image collections and image research, we feel it is incumbent upon us to explore the possibilities and limitations of computer vision tools and techniques. As already mentioned, we are interested in the potential of computer vision tools for processing and providing access to collections through means like similarity analysis to drive visual search or to identify opportunities for inheriting collections data from one repository to another.<sup>11</sup> However, we also want to know whether computer vision could also be used for research. Could it be used to analyse artistic influence by providing a way to trace the circulation of particular visual forms and motifs? Could it be used to explore relationships between artists and followers, the evolution of genres, or the historic definition of genres? Using computer vision, for example, could we analyse the images classified as 'landscape' within the PHAROS collection, considering what proportions of their surfaces are covered with the depiction of the natural world, as compared with those that are NOT classified as landscape? As with all the research activities that are part of PHAROS, we will be asking not only what is possible, but what is art-historically relevant. Although a task like style transfer (e.g., making a photograph look like a painting by Vincent van Gogh) is relatively easy for a computer to perform, the art historical value of this operation is unclear.<sup>12</sup> We will have to consider what it is *useful* to ask a computer to see, with

9. See for example Geoffrey C. Bowker and Susan Leigh Star, *Sorting Things Out: Classification and its Consequences* (Cambridge, MA: MIT Press, 2000); Chiara Franceschini and Katia Mazzucco, eds., "Classifying Content: Photographic Collections and Theories of Thematic Ordering," monographic issue of *Visual resources* 30, no. 3 (2014).

10. See the study days "Il mercato dell'arte in Italia intorno al 1900. Protagonisti, archivi, fotografie", Kunsthistorisches Institut in Florenz/Fondazione Federico Zeri, Florence/Bologna, 14-15 novembre 2017 (publication of selected papers in preparation).

11. The concept of visual similarity in the context of computer vision is demonstrated by the visual search function on the PHAROS website, <http://images.pharosartresearch.org/>, and in articles like Shen et al. "Discovering Visual Patterns in Art Collections with Spatially-Consistent Feature Learning." in *CVPR 2019*, March 2019.

12. Badea et al., "Can We Teach Computers to Understand Art? Domain Adaptation for Enhancing Deep Networks Capacity to De-Abstract Art," *Image and Vision Computing*, Volume 77 (September 2018): 21-32.

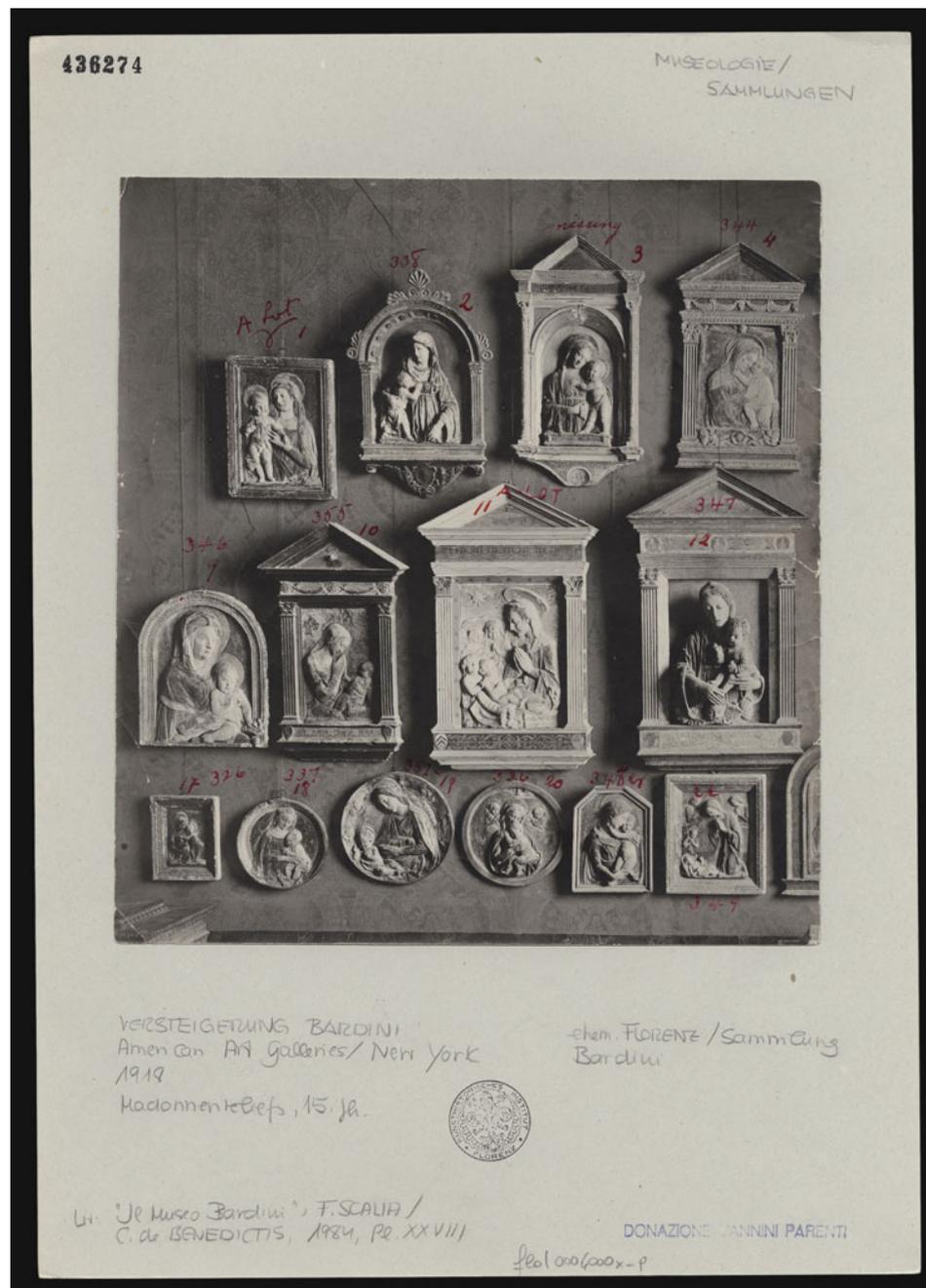


Fig. 3. Unidentified photographer: Terracotta Madonnas in the Bardini collection in Florence, put up for sale by auction in New York 1918. Silver gelatine print, 20.8x19 cm, with handwritten numbers based on the auction catalogue, before 1918. Kunsthistorisches Institut in Florenz, Max Planck Institute, Inv. No. 436274

an acknowledgement of the kinds of tasks computers are good at performing, versus the kinds of tasks and activities for which a human brain is better suited.

Furthermore, our goal in exploring the possibilities of computer vision will be to critically engage with this methodology and with its practitioners. We understand that computer algorithms are deeply informed by the thoughts, goals, and biases of the humans who program them. By examining computer vision as a method, therefore, we will at the same time be examining our own biases, as humans and as art historians. In order to train computers to look for and to 'see' patterns across images of art works, that is, we will have to think carefully through questions like how computers do 'see,' and how this differs from how a human sees and also from how an art historian sees. For example, computers generally look for textures

where humans look for shapes; for this reason, we may see a Dutch still life and a Cézanne tablescape as similar in content, but a computer may not be able to recognise their similarities and instead become thwarted by their distinct painterly surfaces. We will therefore be as interested in exploring where and how the computer fails, as where it succeeds. Moreover, thinking through computer vision will serve as a means of thinking through and analysing human vision, as well as the practices of art historical image analysis, which are often ingrained within us to the extent that we are not consciously aware of the ways we analyse and interpret images. The points of intersection with cognitive studies and artificial intelligence represents a significant field of future research for art history and visual culture studies, and it is in part because of this that we feel it is so important to understand clearly the potential and limitations of such approaches.

In exploring the research potential of digitised photo archives we are not suggesting that engagement with the physical materials is no longer valuable or necessary (indeed we anticipate that by digitising these materials, we will see an increased demand for access to the physical collections); likewise, we are not making the argument that computational forms and methods of art-historical inquiry should replace more traditional or long-standing approaches. Rather, we are proceeding from the premise of a necessary integration of analogue and digital formats. In many cases, computationally-based approaches will contribute to enhance the effectiveness of existing approaches. For example, could we analyse or record the photographic process contained within photo archives, both so that researchers accessing collections virtually might better understand their material forms? Can we provide means by which scholars can search a collection as vast as 20 million images in its entirety as a means of guiding them towards those individual items they might want to consult in person? While we explore and seek to creatively exploit all the potentialities and specificities of a computationally-based approach, we will do so with the understanding that this approach is itself a part of our study, an object of research. Similarly, we are invested not only in the work of the agents and agencies that are connected with the (digital) practices of art-historical photo archives, including the archivists, art historians, documentalists, cataloguers and other individuals who produce and constantly transform the photographic documents, but in exploring and understanding this ecosystem in its entirety. That is, we want to analyze the innumerable daily decisions such experts make, for example about digitization standards, database structures, tagging priorities, and linking strategies, and consider these in relation to the needs and questions of the researchers who use photo archives.

Finally, in addition to providing us with opportunities to explore new ways to analyse and research the rich stores of information and knowledge contained in photo archives, the PHAROS project allows us to reflect on the relationships between imaging technologies and art-historical practice as they have manifest in the discipline's past, its present, and as we look towards its future. In what ways have imaging technologies influenced—and in what ways are they currently influencing—the kinds of art works the field focuses on, the questions we ask, how we ask them, or the forms in which scholarship has been disseminated? For example, Frederick N. Bohrer theorised in 2002 that 'Art history's traditional dependence on photography seems directly linked to its traditional lionization of the art (and especially the painting) of the Italian Renaissance.'<sup>13</sup> More recently, Elizabeth Honig noted a connection between the availability of high-resolution digital imagery, which allows anyone with an Internet connection to see the hyper-realistic, fine detail that characterises Northern Renaissance art, and what she sees as a growth in the popularity of this genre. Moreover, by taking a longer, historical view we are able to consider how the relationship between digital imagery and the popularity of particular genres in a contemporary context may relate, for example, to the nineteenth-century phenomenon, whereby the photographs of Italian Renaissance art that entered the photography market intended for art study, were purchased not only by art historians but also by a growing bourgeois public, which included tourists. Could we use the PHAROS corpus to explore Bohrer's or Honig's theories, along with their historical precedents?

Regardless, it seems clear that how we image works of art, the technologies used by imaging specialists, as well as the ways they manipulate the resulting images, and the means by which the images are shared via the Internet, are having a profound effect on the study of art. In considering the documentation and reproduction of images of art works, the PHAROS project asks not only 'what is the role of the photo archive in the present and future?' but also, 'what is the

13. Frederick N. Bohrer, "Photographic Perspectives: Photography and the Institutional Formation of Art History," in *Art History and Its Institutions: Foundations of a Discipline*, ed. Elizabeth Mansfield (New York: Routledge, 2002), 253.

photo archive of the present and future?’ That is, what resource or resources are being used in place of the historic photo archive, the slide library collection, or even the survey textbook? This question is an urgent one because art history will always require the use and production of images. Moreover, the question about the current role of (analogue and digital) photo archives in our post-digital society is relevant also beyond the boundaries of art history and scholarship.

Publishing the complete photographic archival collections of PHAROS institutions will be of exceptional benefit to not only the field of art history but also the humanities in general. Once the platform is available, an international community of scholars will have free and open access to art historical resources of the highest quality generated during the past century. The images along with the semantically enriched and structured data will in turn contribute to a vibrant culture of open scholarship and collaboration among researchers, disrupting barriers posed by proprietary databases in which information is siloed. The platform could also serve as a pedagogical instrument that could be incorporated into the curriculum of courses around the world, both in-person and in Massive Open Online Course (MOOC) environments. We also hope that the nature of this machine-readable data will lend itself to more playful and serendipitous discovery, making it attractive and engaging to both undergraduates and seasoned scholars alike.

The PHAROS initiative will, however, result in something more than a platform for accessing the digitised photo archive material. The development of shared standards for mapping and sharing metadata, of best practices for working with large digital image collections and for conducting computational analysis of images, the creation of scholarship that demonstrates the kinds of questions the digitise corpus can be used research, these are all outcomes of the PHAROS initiative that are equal in importance to the database of images. Moreover, these are outcomes that are made possible by the collaborative, cross-institutional approach of PHAROS that we hope will itself provide a model for other, similar efforts in the field of art history and cultural heritage. Eventually, we hope to be able to add images and metadata from scholarly photo archives around the globe. Our goal is not only to make millions of images accessible to the world, but to create a framework for doing so that supports and sustains photo archives now and into the future.

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