




Sensitivity and Access: Unlocking the Colonial Visual Archive with Machine Learning

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Abstract

In recent decades, archival institutions have digitized an enormous quantity of material under the rubric of open access, including from colonial archives. However, much of the most sensitive material from these collections remains undigitized or difficult to discover and use. More recently, a critical reconsideration of open digital access has also taken place, particularly when it comes to sensitive material from the colonial archive. Collectively, this has created a situation in which the colonial photography archive risks becoming overly sanitized as well as difficult to navigate and analyze.

In this article, we propose that critical and transparent multimodal artificial intelligence (AI) offers a way to improve access to colonial archives for researchers and the public, without losing sight of the need for ethical approaches to sensitive visual materials. The EyCon (Early Conflict Photography and Visual AI) project assembled a large database of sensitive visual materials from colonial conflicts and developed experimental multi-modal computer vision tools with which to analyze it. Though this tool has not yet been applied at scale or quantitatively compared with other approaches, we are able to propose modes of inquiry for other researchers to explore as they create new research tools. On a more hypothetical or theoretical level, we consider how the use of computational tools to facilitate access to and analysis of sensitive historical materials is compatible with or even beneficial for more ethical approaches to such materials. We conclude with several promising areas for critically integrating AI into the digital colonial archive, while also expanding on some limitations of such techniques.

Introduction

In recent decades, archival institutions have digitized an enormous quantity of material under the rubric of open access, including from colonial archives. However, much of the most sensitive material from these collections — particularly photographs depicting colonial violence — remains undigitized, or difficult to discover and use. More recently, a critical reconsideration of open digital access has also taken place, particularly when it comes to sensitive material from the colonial archive.^[1] Photographic material presents a particularly tense point in the debate over access and sensitivity, largely due to the longstanding notion that it is a “transparent” medium, one that bears an exact trace of the moment in which it is made.^[2] For this reason, photography is commonly perceived or experienced as a more immediate carrier of emotions — including painful or negative emotions — than other kinds of documents or representations. Enormous quantities of photographic material have been digitized without sufficient contextual metadata. What metadata exists was created by colonial institutions themselves, and the metadata thus may not respond to the questions researchers want to ask. At the same time, particularly sensitive material largely remains hidden due in large part to increasing

awareness of ethical concerns. For these reasons, the digitally available colonial photography archive risks becoming overly sanitized as well as difficult to navigate and analyze.

In this article, we ask how machine learning (ML) might redress this problem. Specifically, how might a set of ML-informed tools improve access and navigation for this sensitive digital archive?^[3] We suggest that critical and transparent multimodal ML offers a way to improve access to colonial archives for researchers and the public, without losing sight of the need for ethical approaches to sensitive visual materials. We retrained a visual similarity algorithm using images degraded in order to appear like historical images and “stacked” the algorithm with a way of vectorizing textual metadata. Then, we applied this technique to our database, a very large corpus of colonial conflict photographs collected from various archives in France and the UK. While not tested at scale, the results indicate potential for designing a search interface that would provide better results than non-ML augmented digital databases and currently available off-the-shelf ML tools available from Amazon and Google. While our reflections remain largely hypothetical, they are nonetheless suggestive of a number of paths forward in using ML and computer vision on sensitive visual materials. This article explains the archival problems presented by digitized photographs from the colonial period and then examines ways that ML-augmented computational approaches might make access to such material both more robust and more sensitive to its political and ethical dimensions. We hope that this article opens up modes of inquiry for other researchers to explore further as they create new research tools.

Before moving on, a brief explanation of some of the central technical concepts is in order. Machine learning (ML) is a form of artificial intelligence (AI) that allows machines to learn from data without being programmed directly. In traditional programming, the programmer writes rules in a coding language that the machine follows in order to turn input data into appropriate solutions. In ML, the machine examines input data associated with a set of answers in order to figure out what the corresponding rules should be. An ML system is “trained” rather than programmed — it is presented with many examples relevant to a given task and then finds statistical structures in these examples that allows the system to come up with rules for automating the task, which allows the system to generate solutions to new input data for which the answers have not already been provided. ML has turned out to be much more effective than traditional computer programming at allowing computers to figure out problems involving tasks analogous to human perception, such as image tagging and classification, speech recognition, and natural language translation [Chollet 2021]. Indeed, the advent of a type of ML model called a convolutional neural network (CNN) has made it possible to analyze visual material in digital archives at scale. For example, Thomas Smits and Melvin Wevers have used a CNN to explore visual aspects of a very large digitized archive of Dutch newspapers in order to automatically detect variables such as the changing medium of illustrations over time (engravings vs. halftones), the styles of illustrated advertising, and the most common visual forms in the press [Smits and Wevers 2021]. By “multimodal” ML, we mean the use of an ML model that performs different kinds of operations on different input data, combining or “stacking” these different operations to produce more robust results. Our proposed model’s network architecture includes a CNN to perform operations on “visual” data in pixel values, combined with a network that analyzes textual metadata in associated picture captions.^[4]

The EyCon (Early Conflict Photography and Visual AI) project proposes a number of AI techniques to analyze a database of sensitive visual material from colonial conflicts. Working with a consortium of British and French archives, EyCon scanned non-digitized material and gathered together already-digitized material into a trans-imperial image database that mixes different forms of photograph supports, including albums, the illustrated press, and loose photographs, all related to colonial conflicts between 1880 and 1918.^[5] After treating the image files and annotating associated metadata such as captions, dates, subjects, and photographers, the team trained a layout-parser CNN to extract images and text from the often unusual page layouts of the late nineteenth century press. Using the International Image Interoperability Framework (IIIF) format provides a stable environment in which the image files are permanently linked to their associated textual metadata. After assembling the database, the project worked on potential methods to use multimodal ML to deliver search results for visual similarity, object detection, and other aspects of the images in the database. Though we were unable to assess accuracy at scale, our experimental comparisons suggest that adding natural language processing layers to the network architecture (thereby making it multimodal) might outperform off-the-shelf computer vision tools available from Google and Amazon, whose models are hampered by various forms of bias in

their datasets. Finally, we propose several ways in which the use of computational tools to facilitate analysis of sensitive historical material might also enable more ethical approaches to such materials.

The article's first section introduces issues raised by the digitization of sensitive colonial photography. We outline the history of public archives and the ideal of open access, which we trace to Enlightenment values according to which governmental authority and actions would be subordinated to reason and public debate. This same historical period was also bound up with colonialism, plantation economies, and regimes of forced labor. With digitization campaigns from the 1990s onward, materials from this long colonial period — including images — were diffused online, raising ethical issues. The early consensus in the archival field that digitization would augment access has been increasingly tempered by concerns about sensitive material, particularly depictions of violence, offensive or racist terms in digital metadata, and issues related to privacy and consent. However, we suggest that despite these important ethical issues, choosing *not* to look at these images may lead to overly cautious archival management.

Section Two outlines problems (both ethical and practical) as well as potential benefits associated with ML-assisted approaches to sensitive digital material. It emphasizes that the visual materials in these archives do not simply depict colonialism; rather, colonial perspectives are embedded in their material forms and archival organization, the ways they have circulated, and how their visibility was controlled and limited to certain communities. Though no archive provides direct and unmediated access to the past, choosing to digitize and circulate only more benign material may create a false and sanitized impression of colonial history. The EyCon project is committed to the idea that improving access to these materials is essential to writing new histories of colonialism.

While their use raises both practical and ethical problems, ML approaches can reshape the digital colonial archive in ways that enable new interpretations and engagements with these materials. Digital archives often feature poor metadata shaped by colonial legacies, which insufficiently contextualize the materials being described and replicate the perspectives of their colonial creators. Manual improvement of records and metadata is often impossible due to lack of resources. While AI could assist in this respect, for example by automatically creating or suggesting additional contextualizing metadata, it is far from a panacea. Indeed, the field is rife with a form of technological fetishism that systematically obscures how human labor is essential to training neural networks. Catherine D'Ignazio and Lauren Klein have framed this issue using the feminist concept of “invisible labour”, which can expose the “significant human efforts required by our automated systems” [D'Ignazio and Klein 2020]. This human involvement means that ML models are inevitably shaped by those who have produced the annotated training sets. Following recent calls for a more critical integration of AI into archival practice [Colavizza et al. 2021], we consider ethical issues in the ML field, such as training dataset bias. Humanities scholars, social scientists, archivists, and computer scientists must actively and collaboratively address these issues, given the uncritical ways in which many of these tools and methods have been created [Jo and Gebru 2020] [Crawford and Paglen 2021]. At the same time, we argue against the notion that such tools inevitably do more harm than good.

In the second section, we discuss the limitations of current off-the-shelf computer vision tools for enriching archival metadata and how EyCon points toward possibilities for improving on such products, using limited experiments with our database of colonial images. Done carefully and critically, ML and computer vision tools can help archivists promote access to colonialism's visual records while improving their contextualization at scale, in part by reshaping how researchers can navigate through this archive. EyCon suggests ways that AI projects could be built with sensitivity and equity in mind, improving access while enabling more ethical approaches to potentially sensitive material. This includes involving using “explainable AI techniques” [Bunn 2019], multimodal AI for identification of sensitive material and metadata enrichment, and combining “distant” and “close” readings of archival materials. Finally, we propose ways that ML models might be trained on to operate better on turn-of-the-twentieth-century photographs and publications.

The Critical Turn in Archival Digitization and the Colonial Visual Archive

Public access to archives has its origins in the Enlightenment period and is further rooted in notions of popular sovereignty. The French Revolution opened up national archives to all citizens by instituting a 1794 law that created a “central depository for the national archives”, with free public access [Favier 2004].^[6] To this day, the principle of public

access remains a pillar of the Archives Nationales and other archival institutions. In practice, however, getting access to potentially sensitive information can be extremely complicated. According to the French Heritage Code (*Code du Patrimoine*, article L. 213-2), public records should be made accessible twenty-five years after their creation, or fifty years after their creation for documents related to national defense. However, gaining access to sensitive documents remains complicated when documents have been classified as “secret-defense”. A tension exists between the Heritage Code (which facilitates access to archives after a certain period of time), and the Penal Code (which prevents the diffusion of national defense secrets) (*Code pénal*, article 413-9). Archives that could potentially threaten national security or embarrass governments can remain locked for a very long time. For example, in a 2021 report, the historian Benjamin Stora pointed out that many records related to the Algerian war remain inaccessible. Following this report, a decree passed on 22 December 2021 facilitates access to documents created during the war and its aftermath, between November 1954 and December 1966.^[7]

At the turn of the twenty-first century, large digitization programs offered the possibility of unlocking previously inaccessible archives. In the UK, beginning in the early 2000s, the National Archives began creating digitized records from its microfilm collection [Thompson-Baum 2020]. From 2004 to 2007, the Joint Information Systems Committee (JISC), a UK non-profit organization focusing on digital data and technology, received £22 million from the Higher Education Funding Council for England for large-scale digitization programs. Commenting on the JISC initiative, the librarian Jean Sykes wrote that, “Higher and further education communities are going to benefit from fantastic online resources across a wide range of subjects, gaining access to some of the richest content held in the UK's great national and university libraries” [Sykes 2008]. Google Books, which launched in 2004, started digitizing millions of books.

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It was a period of techno-optimism characterized by a widely-accepted narrative according to which new tools would make knowledge freely available to a wider public. In the early days of mass digitization, few worried about the possible consequences of releasing huge amounts of archival materials to the public. The dominant consensus erred on the side of free and open access. In an influential 2005 article published in *American Archivist*, Mark A. Greene and Dennis Meissner pushed archivists to adopt a new method for processing archival collections. The method of “More Product, Less Process”, or MPLP, would speed up the cataloging process and transfer the materials quickly into the user's hands. Designed primarily to end the cataloging backlogs that plagued paper collections, the MPLP method was soon applied to digital collections.

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Digitization programs also made possible the online diffusion of archives from the colonial period, including visual materials. In the French context, for instance, millions of photographs have been digitized that were originally produced over the course of the colonization of Algeria. According to Benjamin Stora, the Archives Nationales d'Outre Mer (ANOM) has digitized more than 600,000 images from colonial Algeria that can be viewed online [Stora 2021].^[8] Added to this set are images documenting the civil status of Algeria (717,028 images) and images from the military registers (427,945 images). Nearly 1,200,000 images are still being checked, reprocessed, and indexed ahead of their online publication.

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This kind of large-scale digitization program raises important ethical issues, though these issues have sometimes been difficult to define. Greene and Meissner (2005) argue that it was invariably better to release data, even when problematic, than to withhold access. They mention that one processing manual identifies “sensitive subjects as adultery, alcoholism, drug abuse, homosexuality, lesbianism, mental illness, or suicide” [Stark 2001], but “several of those items are not sensitive to every donor or donor's family” [Greene and Meissner 2005]. In light of such uncertainty, the tendency was to release materials, with the option to withhold them if someone complained about sensitivity. The same applied to copyrighted materials. In the case of periodicals, mass digitization made it impossible — or at least extremely challenging — to identify and obtain permissions from all copyright holders. Nevertheless, institutions often chose to put digital copies online. For example, the British Library made accessible selected copies of the feminist magazine *Spare Rib* with the following statement: “We have been unable to locate the copyright holder for these items”. An email address was provided to allow users to share information they might have about the items [British Library 2023]

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In the past few years, this open access approach has been criticized on ethical grounds, with a strong emphasis on

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privacy and consent. Like other countercultural magazines in the 1970s, *Spare Rib* dealt with topics related to sexuality. Contributors who wrote poems or essays to be published in print form expected a small audience rather than the huge readership made possible by digitization. In a 2017 article, Michelle Moravec uses the example of *Spare Rib* to encourage other researchers to ask the following question before using digitized archives: “Have the individuals whose work appears in these materials consented to this?” Making such documents available on the internet has raised the issue of consent as well as the ethics of widely releasing sensitive or private materials intended for other uses.

Similar concerns apply to digital reproduction of representations of enslaved and colonized people. Temi Odumosu (2020) has argued for an “ethics of care” toward sensitive digital colonial collections. As an example, Odumosu uses a photograph depicting a crying child taken by a Danish photographer in St. Croix around 1910. The photograph made its way into albums of Danish colonials and then into the Royal Danish Library, which digitized it in the mid-2010s. Odumosu raises ethical concerns about the decontextualized display of this potentially disturbing image and suggests several avenues toward an ethics of care with regard to colonized subjects captured in visual digital collections. Most interesting for this article is her proposal that additional contextual metadata could help mediate the emotional dimension of confronting documents created in the context of colonial domination, particularly by members of source communities. Odumosu suggests that “digital artefacts of a sensitive and dehumanizing nature are vulnerable without contextualization” and that richer metadata could demonstrate care and sensitivity toward discomfiting images [Odumosu 2020].

Libraries and special collections have started to address concerns surrounding problematic metadata, including racist and antiquated terms used to describe archival materials in previous periods. For instance, Stanford University Libraries has released a statement on “potentially harmful language in cataloging and archival description” [Stanford University Libraries 2023]. While it does not censor existing materials dealing with harmful subjects or using harmful language, Stanford provides additional historical context. Enriching the metadata with contextual information is aligned with the archivist's traditional mission, which excludes censoring or tampering with the historical record.

Other archivists, however, have pushed for a more radical approach, which they characterize as identifying and correcting structural racism embedded in archival metadata. Melissa Adler (2017) recommends “excavating racism in the stacks” to address the impact that racist classification still has today. Adler does not propose removing problematic metadata, but instead suggests that archivists augment “the catalog with local data, create local and subject-specific classifications and subject access tools, encourage participatory and social cataloging, and invent alternative ways to map knowledge in the library” [Adler 2017, 27]. Like Adler, Michelle Caswell (2017) has urged librarians, archivists, and information professionals to address racism in classification systems and metadata. She invites colleagues and students to challenge the multiple ways that archival collections can feel unwelcoming to people of color, from white supremacist language in metadata to suspicion and surveillance of non-white patrons [Caswell 2017, 226].^[9]

Because digitization implies the need for a new archival infrastructure, it opens up political questions around cultural materials that had been somewhat contained by the relatively calcified structure of the analogue archive. By imposing a new order on the material, the digital archive is never a simple retranscription of the original archive. Rather than simply being a way to translate analogue material into a digital medium and preserve it, digitization opens cultural-political conflicts and calls for what Premesh Lalu, discussing problems around early digitization initiatives in South Africa, calls a “politics of digitization” [Lalu 2007]. As Gil Pasternak suggested in the introduction to a recent special issue of *Photography and Culture* on photographic digital heritage, “the marriage of heritage and digital technology” is “a condition that has challenged the traditional, exclusive association of the heritage phenomenon with hegemonic forces” ([Pasternak 2021]. In part, this is because digitization implies choosing what to translate into the new medium and what to make available, thus raising anew old questions about how power relations embedded in archives structure historical debates and research agendas [Zaagsma 2022]. Concerns include the clash between the value of open access and source communities that may want to keep sacred cultural artifacts shielded from public view.

These varied political questions mean that there are many contextual meanings and dimensions to the issue of “sensitivity”. Much of the work on these questions has been done in the context of settler-colonial societies and indigenous data [Guiliano and Heitman 2019] [Lydon 2016]. While most discussions on colonial legacies in museums

have focused on looted objects, the wider archival legacies of colonial oppression deserve more attention. Charles Jeurgens and Michael Karabinos, examining the digitization of the Dutch East India Company records, have drawn a distinction between the “colonial archive” and the “colonized archive” [Jeurgens and Karabinos 2020]. Whereas the former were “created by former colonial institutions in the era of colonization”, the latter refer to “records which were originally created, owned and used by local institutions and people but were collected, looted, bought, or copied and shipped to Europe” [Jeurgens and Karabinos 2020]. Working within Jeurgens and Karabinos's typology, the EyCon project deals with colonial archives, since the photographs and other visual documents in the corpus were created and stored by colonial actors, though they often involve colonized people as subjects. This can imply sensitivity concerns around the depiction of violence against potential ancestors and ancestral communities.

While few within the field would deny that racist language and institutional structures should be challenged, the question of *how* to confront them in light of competing values of archival preservation remains controversial. Faced with these difficulties, it can be tempting for archivists to withhold access to sensitive materials. Digitization projects are no longer unchallenged. For example, funding threats may force Trove, the National Library of Australia's free digital archive, to close [Verhoeven and Jones 2022].^[10] The idea that putting materials freely online will lead to increased and more equal access to information is no longer unquestioned. Rising concerns over privacy, consent, and problematic metadata have caused open access policies to lose some of their luster.

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While criticisms of open access policies are necessary and overdue, in the case of the colonial archive they risk exacerbating a situation in which records tend already to be difficult to find and access. If the visual records of modern organized violence during the two world wars are massively available and searchable, visual material documenting the most unsettling aspects of colonial situations is often less accessible and less digitized. Some of the most challenging visual records were collected outside institutional networks and remain in the hand of private collectors. When sensitive materials are made accessible, poor metadata and descriptions shaped by colonial legacies can provide insufficient contextualization and replicate colonial categories. When it comes to colonial legacies, the existing archive's limitations have rendered clear the need, as Roopika Risam writes, “for digital archives that resist colonial violence in content and method, mediating in the gaps and silences in the digital cultural record that can be filled with extant sources” [Risam 2019].

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In recent years, several digital research projects have focused on more inclusive readings of colonial archives, including photographs. The TRACES (Transmitting Contentious Cultural Heritages with the Arts) project, for example, has explored how to curate exhibitions and events in close partnership with source communities to mediate contested legacies around issues like the collections of human remains held by institutions all over Europe. The *Dead Images* creative co-production, which is part of TRACES, has looked at how to use these collections to open up a dialogue about colonial violence and its legacies [Traces 2023]. The harmful potential of both documents of colonial domination and their historical metadata is at the very core of digital policies of projects such as the *Digital Benin* initiative, which emphasizes how “catalogue transcriptions, book titles, exhibition titles and museum titles may contain harmful terms” [Digital Benin 2023]. Research projects on Australian Aboriginal photographic archives have also worked on careful recirculation of problematic colonial images with descendants of the photographed [Lydon 2016].

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In some cases, inclusive readings can turn into forms of “ethical” erasures and/or restrictions on image circulation. The curators of the *Making African Connections Digital Archive*, for example, have decided to restrict access to the graphic and nude photographs included in their database. They argue that because the web is “a place where images, objects and people can easily be displaced from their context and subject to a gaze which has harmful intent”, their “choice of technology adds further encouragement . . . to act as censors” [Making African Connections 2023a]. Criticisms of the recirculation of images that are ingrained with oppression and violence can sometimes go as far as arguing for a radical expunction of what should be visible and reproduced. Holger Stoecker, writing on very disturbing colonial photographs of human remains in German anthropological collections, even advances the idea that images that reflect extreme oppression and power imbalance could actually be “buried” [Stoecker 2021]. Well-intended approaches to contested visual records are founded on the notion that the supposed replication of colonial dominance entailed by the digital recirculation should be avoided at all costs.

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In fact, such efforts may actually echo the archival violence that has governed management of colonial records since decolonization. In many cases, the rawest colonial photographic records have in effect already been “buried” because they have the power to destabilize established exculpatory narratives. This is exemplified by Jean-Philippe Charbonnier's photographic evidence of torture on Algerians at the hands of the French army in the late 1950s. These disturbing snapshots documenting a focal point of Algerian and French histories suffered a long history of willful burial [Riceputi 2020]. To this day, their recirculation is regulated according to specific guidelines that can become obstacles to their full analysis.

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In part, efforts at creating more inclusive readings revolve around complex questions about who owns colonial photographs and who can legitimately write about the histories they document [Peffer 2020]. This is a particularly salient issue with visual archives that are shaped by imperial power dynamics at their point of origin and by layers of archivation that did little to illuminate them. Colonial oppression is not only depicted in these photographs, but also replicated in how such images were curated, recirculated, and sometimes willfully put aside to protect those who carried out violence [Pringle et al. 2022]. The siloization and fragmentation of archives that document colonial oppression favors the “silencing” of unpalatable pasts [Trouillot 1995], as well as “colonial aphasia” [Stoler 2011].

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Colonial ideologies are thus implicit in the archive's very structure, not just in its graphical or textual content. Zaagsma points out that inherited metadata in colonial archives can “impose a distinct view of the past, in this case, that of the former colonizer” [Zaagsma 2022]. Other projects working with sensitive material produced during colonial periods have raised this issue. For example, the *Making African Connections Digital Archive* refers to the archive as a “technology of colonialism” [Making African Connections 2023b]. While evaluation of such a statement involves many considerations (archives are tools of power, but also potentially of self-determination and liberation for groups that keep their own histories), one cannot dismiss its validity concerning archives created and curated by colonial militaries, which were shaped by colonial ideologies on multiple levels. For instance, while both photographer and the photographed subject play a role in the production of photographs, most of the existing metadata is concerned with authorship rather than documentation of the photographed. To address the invisibilization of colonized people in archives, scholars are now experimenting with a number of digital tools. Toward this end, several scholars have employed Named Entity Recognition in order to identify individuals who are present in the archive but absent in finding aids, enriching archival records with important details about the lives and experiences of marginalized and enslaved people [Luthra et al. 2022].

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Colonial officers and archivists imposed their gazes and their agendas on both the production and organization of these photographs. What they chose to capture and, perhaps more importantly, what they chose to ignore, what they chose to keep in the archives and what they chose to discard, were constrained in different ways. They had material and technical limitations, including that photographic equipment had to be carried long distances, maintained, and sent back to the metropole for development). Their objectives and those of their institutions shaped their picture production; some pictures were taken to terrorize enemies or local populations, some were meant to document the everyday life of colonial soldiers and officials, and still others served as scientific or anthropological data. Many images moved between different uses depending on how they were deployed and contextualized after their production. These objectives had enormous consequences on the pictures' content, but this context is mostly lost on contemporary viewers. For example, pictures of racialized people can be viewed as simple portraits today, while at the time of their creation they served a racist iconographic program meant to show the supposed morphological features of various ethnicities or demonstrate evolutionary theories.

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What these pictures do not show is also of great importance. In general, actions, places, and events that do not easily cohere with the photographers' worldview are excluded. Technical limits rendered other scenes — such as night events, quick movements, or people and actions purposely hidden from the Western troops — difficult to capture [Hayes and Minkley 2019]. Conjured in the colonial archive, the visual past of these conflicts exists only through that archive's selection processes.

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Reshaping the Colonial Archive with Computational and Machine Learning Tools

How might ML-informed approaches to the visual colonial archive help redress this problem by creating research tools that are both sensitive to ethically fraught materials and enable powerful new insights into colonial histories and legacies? Digitization provides an opportunity to restructure archives in ways that exceed the original intentions of their colonial producers as well as institutional archives' political reservations around sharing difficult imperial pasts. Yet the very scale of digitization programs means that improving records manually at scale is a daunting task, if not an impossible one. AI-based augmentation of digital archives could make them navigable in new ways, creating “spaces where counter-narratives or correctives may proliferate” [Risam 2019]. Initiatives such as the *Towards a National Collection (TaNC)* program in the UK, for example, are exploring AI-reliant automation to handle text-based data ingestion in order to make historical big data exploitable. However, while ML tools have proved effective in indexing written material, approaching digital images at scale with computer vision raises additional challenges.

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Before turning to our conclusions and directions for future work developed in the course of the EyCon project, it is necessary to understand some of the risks presented by ML-assisted computer vision. The central risks include the inevitable bias baked into training datasets, exploitation of the labor that produces those datasets, the loss of material context around the image being analyzed by the model, and a techno-optimist ideology around ML that portrays the technology as omnipotent or “intelligent”, thereby obscuring the labor involved in making the system function. After explaining these risks and limitations, this section turns to the potential opportunities presented by ML and computer vision in this field and, finally, to the insights generated by our own efforts to produce an ML model for analyzing the EyCon database.

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First, deep learning — a form of ML used by most computer vision models that relies on many successive “layers” of representations of input data in order to find statistical patterns — relies on data that is contextualized and labeled by human beings. All training datasets are thus inevitably biased [van Miltenburg 2016]. Human-made labels, including those deployed to create the most commonly used training datasets such as CoCo, ImageNet, and Open Images, reflect particular contexts and perspectives. There is no such thing as purely neutral, raw, ground truth data [Drucker 2011]. When the word “sensitivity” is applied to ML and deep learning, it has everything to do with mathematics and little to do with emotions and the senses. A deep learning model's sensitivity is a measure of how well it can detect positive instances, and it is determined by the proportion of actual positive cases to those the model predicts as positive. Beyond numbers, the emotional sensitivity of any computer vision solution merely mimics human textual annotations fed into the datasets from which it learns. Critical approaches to datasets and their constitution by human labor are therefore essential for ethical and effective attempts to create AI for sensitive collections. An “archeology of datasets” that uncovers the processes through which ML models have been trained thus helps address the opacity of their constitution [Crawford and Paglen 2021].

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Secondly, analyses of how “data” has been gathered and constituted should be complemented by a critical perspective on the economics behind large training datasets. When dealing with very sensitive visual and textual content, the AI industry often relies on large-scale annotations from precarious workers [Perrigo 2023]. Neema Iyer has noted that the extractivism that often characterizes digital labor, particularly data annotation, echoes neo-colonial geographies of labor extraction [Iyer 2022]. A lack of reflexivity on how to apply computer vision to photographic archives that document situations of subjugation could therefore result in a doubly colonial perspective, in which both the data itself and the production of the tools used to analyze it would be heavily shaped by power imbalances.

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Additionally, many of the material features of archival pictures or photographs often disappear from the data when computer vision is applied to image files in a database. Preprocessing, a necessary step to apply algorithms to pictures drawn from archives of visual material, tends to create sets of isolated images that extract them from their material environments. Traces of the fixative used to glue a print on cardboard, the wear on an album page that has been turned too many times, the very smell of an old box of calling cards — while all of these embodied stimuli inform spectators about images, sometimes divulging more than their visual content, this information cannot be easily translated into data [Sassoon 2004]. For example, although the popular photo lockets of the 1850s that protected daguerretyped portraits of cherished relatives functioned as a “form of perpetual caress” [Batchen 2004], such images make no sense outside of their relation to the body and the hand that opened the locket to contemplate the face of a loved or lost one. Their meaning cannot be seen by the mechanical eye, and they appear only as prosaic portraits of long-dead people.

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Hyperbolic pronouncements in the early 2020s about the possibilities opened up by advances in deep learning play into the narratives fostered by major industrial actors, which often portray AI as being on the verge of sentience. While the question of intelligence is complex, AI does not think *per se*, and it certainly does not feel. Rather, AI can be trained by feeling and thinking human creators to identify aspects of digital objects and relations between those objects. In this process, the living labor that annotates sensitive material crystallizes into a technical system that is then bestowed with human-like characteristics, making it seem “intelligent”. Both the meaningful materiality of historical photographs — which are cared for by living archivists and experts — and the reality of the work that underlies automated vision can be easily lost in attempts to harness computer vision's potential to augment archival access. 34

Photography, digital imaging, and computer vision are often conceived as radical technological disruptions that burst fully formed onto the historical stage, but none of these technologies can be disconnected from deeper cultural and social histories and institutional formations that helped determine how they were designed and deployed. 35

With these risks and constraints in mind, however, it is possible to use ML and computer vision to substantially improve access to sensitive visual archives. While technologies can come to help determine political, cultural, and social situations, particularly when they become fixed in ossified forms, these determinations are neither immutable nor inevitable [Peters 2017] [Winner 1980]. The assertion that a given technology is an unredeemable instrument of coloniality can paradoxically echo colonial discourses that aligned scientific thought and technical achievement with racial categories [Adas 1989]. Contemporary variations on the racist trope of the colonized subject's supposed over-sensitivity to photographic images should be considered critically [Strother 2013]. 36

With properly trained ML models, we can recognize and annotate aspects of the photographs that were not intended by the colonial institutions that produced them. ML models could fracture the colonial photographic archive's selective recollection and deconstruct the monolithic gaze that dictated its creation. Automated object detection, for example, could help add new metadata that was not intended or even comprehended by the colonial photographer or document producer. For example, colonial troops are often present in a picture but absent from the metadata describing them. Through automatic classification, we can make these troops visible and searchable in the database. ML models could automatically recognize and tag sensitive material, or add additional context by recognizing objects and locations in historical photos and suggesting additional metadata. This would open metadata to contestation, thereby actualizing Risam's call for archives that open a space for counter-narratives [Risam 2019]. 37

At the same time, we believe that understanding how previous archives have situated these documents is crucial to understanding them in their full depth — not only in a positivistic manner, narrowly focused on the moment of their production, but also as dynamic creations that have been interpreted in various ways over time. The key is to historicize and render explicit ways in which documents were previously framed, so that they do not remain unconscious or seemingly neutral. For this reason, the EyCon database retains any original metadata, pointing toward ways that ML might be used to enrich it with additional information that facilitates new interpretations. Using the IIIF format allows more annotation to be added over time. 38

Sensitive images like those represented in EyCon's corpus should be shown within appropriate scholarly and archival contextualizations, using the help of computational and digital tools. This should include but not be limited to the original archival metadata. Jeurgens and Karabinos argue that the coloniality of recordkeeping systems in the colonial archive cannot and should not be removed, yet the archives must be decolonized all the same, a dilemma they refer to as the “paradox of colonial archives” [Jeurgens and Karabinos 2020]. If we choose to delete or suppress some of these pictures or to edit their metadata, we risk losing ways to understand the mechanics of this form of oppression. “Not only would it be hiding the colonial past”, Jeurgens and Karabinos write, but “it would take away the ability to continue to learn from and about the colonial period, it would be a disservice to those who suffered under colonialism and would misrepresent both the past and how information was created, stored and accessed” [Jeurgens and Karabinos 2020]. It should also be noted that most of these documents were meant for very limited circulation: if some of them are propaganda material, the majority were not intended for public display. Choosing to show these pictures, troubling as they can be, is a way to deconstruct the culture of secrecy that shaped their original production and mode of circulation. 39

Scholars addressing these problems often act as though these documents are widely known, easily accessed, and have already been addressed in the public's discussion of the colonial past. In reality, museums have remained hesitant to create public discourse on these issues by displaying such photographs. Referring to visual material representing British colonialism, Elizabeth Edwards and Matt Mead argue that “despite some thirty years of critical museology and a burgeoning theory of photography, these photographs are seldom made to work hard in public culture”. Evidence of the colonial past in British history “is remarkable in its absence. Moreover, given the shape and density of the colonial archive, it is a history all the more remarkable by its photographic invisibility in public space” [Edwards and Mead 2013]. While scholarly and public discussions have advanced considerably since 2013, more work on colonial photography remains to be done. A decision in favor of opacity would only reproduce colonialism's visual paradigm and post-colonial forgetting. 40

Furthermore, some arguments against the digital diffusion of these images do not take a realistic view of the typical scope of dissemination through scientific databases. Even if most research projects claim to have a significant impact on civil society, they exist on an entirely different scale than global image provider corporations or social media platforms. While we should take steps to ensure that unsuspecting audiences do not encounter sensitive pictures in databases without warning or context, the scientific ecosystem in which these tools exist already selects the communities that use them. Such platforms and interfaces are engaged with by users that are proficient with research and interested in historical or scientific inquiry. There is always a risk that malevolent parties could scrape sensitive pictures to redeploy them for other purposes by manipulating their captions or metadata. Precautions should be taken to make these sorts of uses difficult; the database could restrict mass downloads to logged-in users who have answered questions regarding the purpose of their demands, and the database could reiterate its usage policies each time someone downloads a picture. Bad actors could still pervert a database's purpose, but this may be an inherent problem that should be measured against the benefits of the judicious dissemination of such images. Given that there is a virtually inexhaustible supply of freely available material online that could lend itself to racist ends, censoring a forum intended for use by researchers would not significantly alter the situation, but could imperil generations of new insights into the mechanics, contradictions, and legacies of colonial domination. 41

To create a public-facing digital archive that would integrate such tools in a sensitive manner, it is crucial to build an appropriate textual environment for the images. The EyCon project features a sensitive content warning on the database website, which explains the nature of the corpus material and the forms of sensitive content within it. We point out that the material “contains images as well as words, terms, and phrases that are often decontextualizing, inaccurate, derogatory, or potentially harmful to the descendants of colonized people” [EyCon 2023]. We also explain that such images and terms are not neutral, since they were produced by actors with a stake in political domination, economic exploitation, and violence. The statement explains EyCon's argument for reproducing the images with their original metadata in order to facilitate the study of colonialism, in the interests of more just collective futures [EyCon 2023]. Appropriately trained and checked by humans, computer vision could be used to help identify sensitive material and automatically bring up a pop-up advisory for photographs tagged as potentially sensitive. 42

Such ML solutions ought to be specifically developed for historical images, given the shortcomings associated with currently available off-the-shelf computer vision products. The field of AI-driven content moderation is growing as profit-driven enterprises develop content moderation technologies to filter out sensitive pictures or problematic language. Critics have raised concerns over the usefulness of such tools when it comes to difficult limit cases of content moderation, as well as the fact that the creators of these tools may be more motivated by cost-saving imperatives than by actual efficacy [Gillespie 2020]. Developed by companies such as Google or Amazon, these tools do not take historical or ethical specificities into account. They are built mostly to protect brands, to apply local laws, and to reassure advertisers. Audience protection is only important insofar as it fulfills this purpose, as is evident in the description of the Amazon Rekognition program's moderation APIs, which can be used, according to Amazon, “in social media, broadcast media, advertising, and e-commerce situations to create a safer user experience, provide brand safety assurances to advertisers, and comply with local and global regulations” [AWS 2023]. The categories used to classify “inappropriate or offensive content” are clearly based on a legal rather than an ethical perspective, as they include “Explicit Nudity”, “Suggestive”, “Violence”, “Visually Disturbing”, “Drugs”, “Alcohol”, and “Hate Symbols” together with second-level 43

categories that could be of use in a project involving war scenes, for example, in the “Visually Disturbing” category, “Emaciated Bodies, Corpses, Hanging, Air Crash, Explosions And Blasts”.

There are numerous problems with using existing off-the-shelf tools on historical materials. First is the question of audience: most categories are only relevant in certain contexts. For example, a “Suggestive” category would only be appropriate if your target audience includes children, or if there is a strong moral or religious prescription against this kind of content in your target audience. In the case of colonial archives, this category could indeed be problematic, as nudity or sexual situations in a colonial context are often the result of sexual violence or evidence of “primitive” cultures for the authors of the pictures. While AI tools can help augment our capacity to identify such material, careful expert and source community-led reconstruction of contexts would be necessary to ensure that the filters are used appropriately.

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This problem is linked to the issue of implicit content: a seemingly innocuous picture might have violent implications without any explicitly violent content. Examples include pictures of a colonial official or landowner with people engaged in forced labor, people cheering under duress, or a line of prisoners waiting to be executed. One example taken from the EyCon project’s database illustrates the point well. *La Prise de Samory*, or *The Capture of Samory*, is a photographic album created in 1899 by a French officer just after the conclusion of the war against Samory Touré’s Wassoulou Empire, which, at its height in the 1880s, extended across parts of present-day Guinea, Mali, and Côte d’Ivoire. In 1898, the French military captured Touré and exiled him to Gabon.

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Figure 1. Anon., “Samory dans les rues de Saint-Louis”, Silver gelatin baryte print, 17x12.5 cm, in *La Prise de Samory*, photographic album, 1898-99, p. 12. *Service historique de la Défense* (access: 2K194).

The photograph in Figure 1 shows Samory as he was paraded through the streets of Saint-Louis, at that time the capital of the newly formed Afrique-Occidentale française. This photograph therefore documents a form of public humiliation. Its sensitive nature would not be evident to a computer vision model that was not trained by a dataset produced by historically informed human vision. Even when it is explicit, either in the image’s textual metadata or in its visual content,

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off-the-shelf tools often fail to identify violence in historical photographs. Figures 2-4 show that tests of the Google Vision API on pictures in our database showing execution, mass graves, or corpses overwhelmingly return the results “Unlikely” or “Very unlikely” in searches for violent content (Vision AI).

Try the API

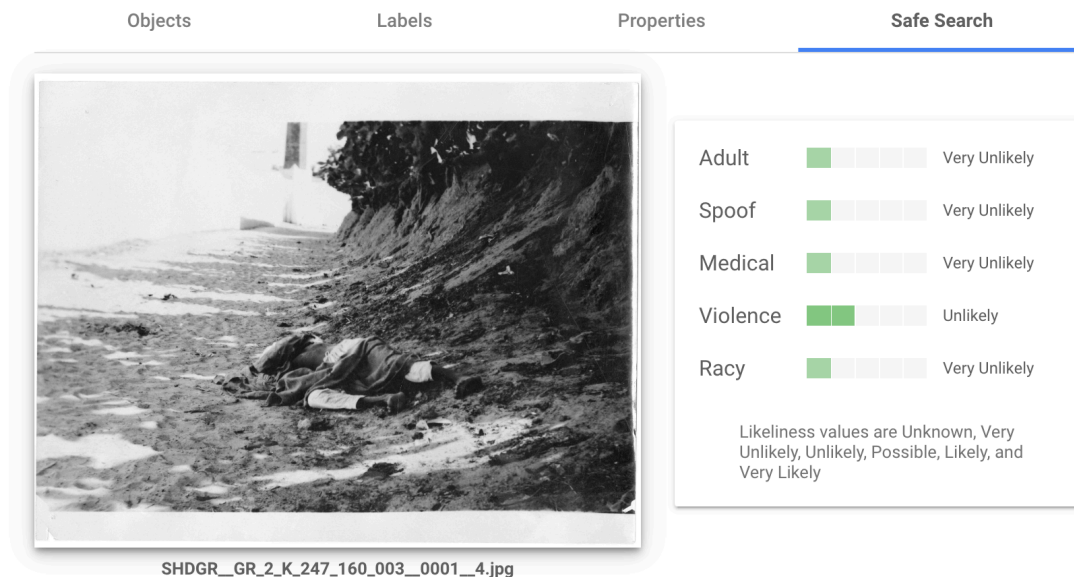


Figure 2. Google Vision API test of SHD 2K247160 003. Lybie, “Tripoli. Arabs who have been slaughtered by the Italians”. *Service historique de la Défense*.

Try the API



Figure 3. Google Vision API test of SHD 2K247160 005. Lybie, “Tripoli Execution of German consuls servant”. *Service historique de la Défense*.

Try the API

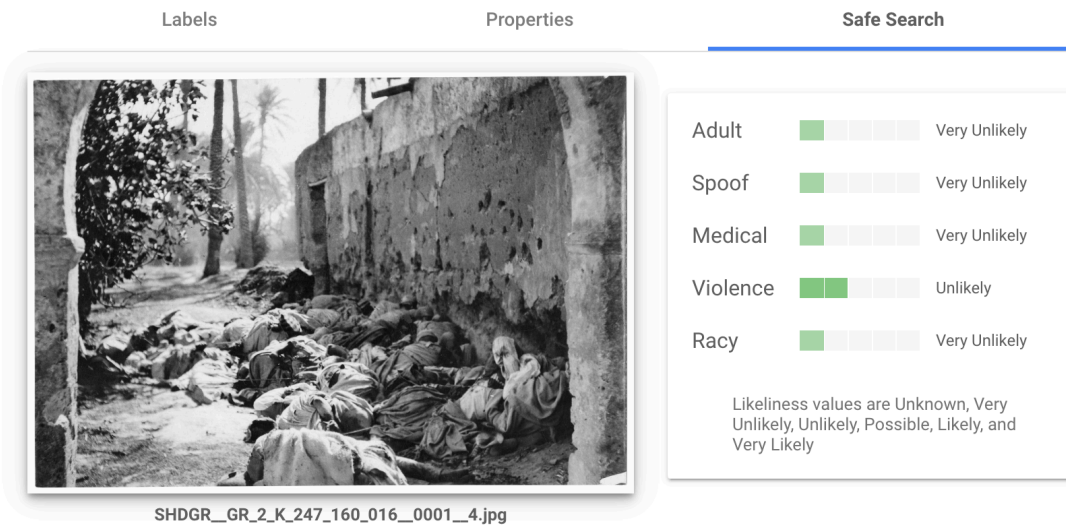


Figure 4. Google Vision API test of SHD 2K247160 016. Lybie, "Tripoli". *Service historique de la Défense*.

Indeed, out of a set of 199 images extracted from the fonds Valois photo albums produced by the *Section Photographique de l'Armée* during World War One which contain the word "cadavre" or "corpse" in their textual metadata, only 12% were recognized by the algorithm as either "possibly" or "likely" containing violence. It found violence to be either "unlikely" or "very unlikely" in 88% of the images. 47

These outcomes are linked to the categories that are built in these tools to classify inappropriate content. In a database of colonial visual materials, the taxonomy would have to be entirely rethought. Human input is crucial here: bias in the database architecture and in the AI models can only be contested through the involvement of informed and diverse communities [McKemmish]. Involving the potential users of a database of this kind is essential. The EyCon project has organized two workshops to discuss how archivists currently define and approach "sensitive" pictures. Professionals from various institutions and backgrounds selected problematic photographs, and the discussions made clear that the restrictive typology used by corporations to classify sensitive content had to be rethought. For this reason, EyCon has been working with team members and paid interns to identify sensitive images. By combining these annotations with already-annotated databases of historical images such as the Valois collection held at La Bibliothèque de Documentation Internationale Contemporaine (BDIC), we suggest it would be possible to train a CNN to identify instances of sensitive images in other online databases with a higher degree of accuracy. 48

Try the API

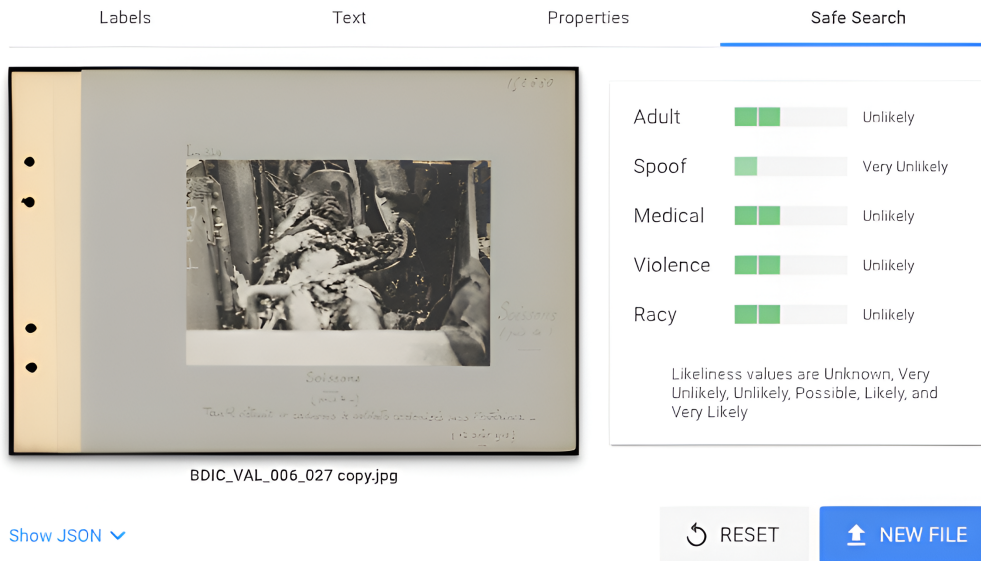


Figure 5. Google Vision API test of VAL 006/027. 17.08.1917. "Fonds des albums Valois - Soissons". *La Contemporaine*.

Better results might also be obtained through multimodal AI, combining natural language recognition and computer vision within the same deep learning model. In another example from the Valois collection, for example, the burned bodies of several German soldiers inside of a destroyed tank are barely recognizable (see Figure 5). Working purely through computer vision, the Google "Safe Search" application cannot recognize them despite information about the corpses in the associated caption. EyCon's experimental approach involved retraining a visual similarity algorithm using contemporary photos that we degraded in order to make them appear more like historical images. EyCon used an "error diffusion" algorithm to produce images that appear similar to black and white halftones, which were in turn used to train a CNN. The team then combined this with vectorization of textual metadata associated with the image. While this method was not attempted at scale and thus not measured quantitatively, when used on a smaller experimental set of images, this approach was able to detect sensitive materials in cases when off-the-shelf tools could not, by including their captions when making a determination.

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The biggest problem for current models is the historical distance between archival pictures and pictures used to train content moderation tools. Even if we test for categories already present in these content filters, formal and technical differences between historical photos and contemporary digital images may prevent these tools from accurately identifying and categorizing the images in the archives. The particular kinds of historical objects in the images are significantly different from the objects in the most common training datasets used to develop contemporary computer vision tools. Additionally, the appearance of halftone reproductions in historical periodicals and the lower lens quality of historical photographs in photo albums make them much less distinct than the digital images used in contemporary training sets. This is why the method of artificially making a set of digital images appear half-toned helped the Eycon model produce better results, by finding similar instances in cases where off-the-shelf tools did not. Once again, this judgment was based on a limited number of examples compared and was not measured quantitatively.

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The EyCon project's experimental efforts suggest ways that a multimodal visual similarity model might address the archival situation that has contributed to "colonial aphasia". The multimodal visual similarity tool can quickly find two instances of the same image in different publications, different formats, and/or different archives. In May 2023, EyCon team members and institutional partners from the Musée Quai Branly-Jacques Chirac, the Service Historique de la Défense (SHD), and the Établissement de Communication et de Production Audiovisuelle de la Défense (ECPAD) met

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at the ECPAD installation at the Fort d'Ivry. We discussed how a multimodal visual similarity approach could be used to find different instances of photographs of atrocities carried out against civilians by the Italian army in Tripoli during the Italo-Turkish War in 1911, tracing these images spread through the press in Italy, France, the Ottoman Empire, Britain, and beyond.

In order to demonstrate some of the possibilities and limitations of these tools, we invited Pierre Schill to share his research on the photographic coverage of the Italo-Turkish war [Schill 2018]. The idea was to show how historians of photography often build their interpretations by tracing image circulation across various formats and publications. This can help establish context by making arguments for probable attributions and by showing how photographs' meanings are inflected by editorial choices such as cropping or captioning. During the workshop, Schill noted that while the war in Tripoli was highly photographed by newspaper correspondents at the time, it is little remembered in Europe today. In part, he argued, this is because of the difficulty in identifying camera operators as well as the diversity of sites and modes of conservation of the photographs. To get a better idea of the conflict and its visual records, it is necessary to draw links between the various archives holding the records in order to make attributions and establish context.

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The key question for this workshop was whether it might be possible to produce visual similarity tools that are capable of capturing this level of nuance, helping to perform tasks such as suggesting probable attributions for photographs. We first constructed a limited image database to test the tools. This set included images of loose photographs documenting the Tripoli atrocities from the Forbin fonds at the SHD, as well as instances of those images reproduced in publications such as *The Daily Mirror* and *Excelsior*. In order to make sure that the tools could pick out similarities among a much larger set of non-similar photos, we also included the roughly 60,000 images from the fonds Valois.

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The Eycon project's experimental multimodal tool would enable a user to query the database using an image and ask for the ten most similar images in the database. Alternatively, the user could enter in a query using textual terms and see what photographs are proposed. Finally, the user could search using an image file and add additional vectors to the search on the basis of text that should be associated with the image. With more work, such a tool could also make suggestions for additional metadata, adding context to images. For example, if the same image or a very similar one is attributed to a photographer in one instance but not in the other, the text-processing part of the process could perceive this attribution and suggest that attribution as a possibility for the other instance of the image. This would make such records more discoverable and address the fact that this conflict is largely forgotten in the West today, despite the fact that it was abundantly covered in the press at the time.

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Computing for visual similarity across large corpuses of images can be both a powerful scholarly tool and a way to show care for sensitive material. Odumosu, for instance, uncovers various archives and publications in which the "crying child" photograph appeared, tracing its recirculation [Odumosu 2020]. With ML, this labor could be semi-automated, allowing scholars to devote precious time and research resources to higher-order mental tasks. In this case, the algorithm's lack of sensitivity might be an asset, as it would relieve arduous visual labor from human affective systems that would otherwise be forced to deal with many troubling images. A visual similarity algorithm can recognize where an image appears in other places in the archive and include a hyperlink to different instances of an image in various national archives. In the case of the seemingly innocuous image of Samory Touré's exile for example, once the context for such a picture is established, a visual similarity algorithm could identify other instances of it and flag them for contextualization or potentially sensitive content warnings.

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Such algorithms could also be invaluable in uncovering trans- or inter-imperial histories of colonial violence. Take, for example, Figure 8, an image held by the ECPAD that documents the execution of a purported adherent of the so-called "Boxer Rebellion" in China in 1900. This was a trans-imperial conflict in which eight nations joined the imperialist coalition that put down the uprising. The background of this image shows a Japanese officer.

56

Try the API

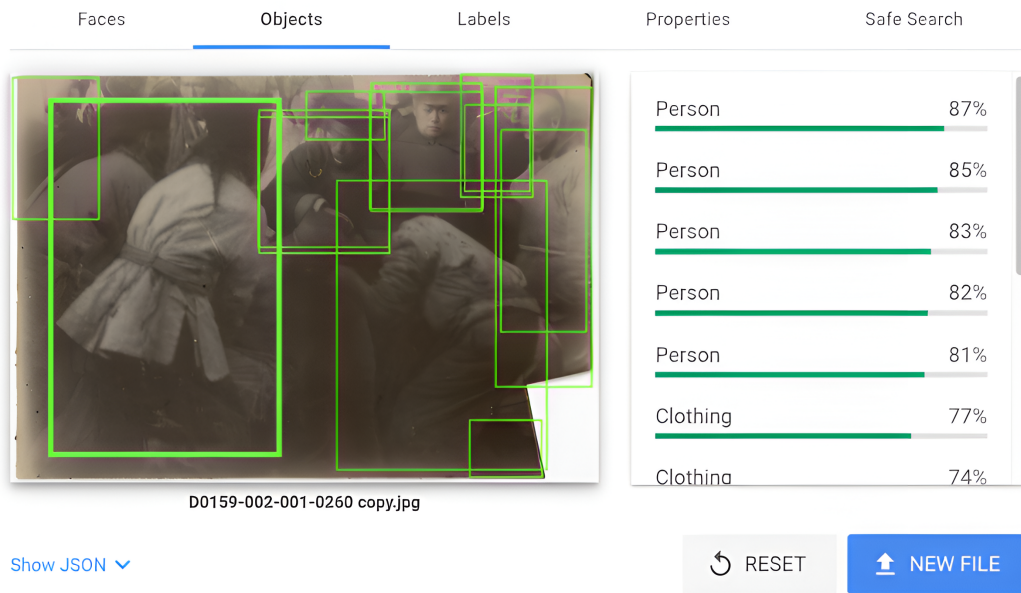


Figure 6. Photo in an album conserved by the ECPAD. Google Vision API does not recognize the body of the individual being put to death as a person. Reference #DO159-002-001-0260.

Such photos were often reproduced and purchased by officers of multiple imperial armies, appearing in albums and collections in different nations. A visual similarity tool combined with internationally linked digital archives could reveal these connections. This would be a way to practice an ethics of care toward sensitive archival material. 57

The simple fact of circumventing archival silos through linked data contributes to the dissolution of the colonial gaze. The same battle, for example, can be viewed from an international or inter-imperial perspective. Various groups described the same events in different terms: what was defined as a skirmish or revolt in Italy or France could be termed a rebellion, war, or revolution by other belligerents, as in the Ottoman Empire, in this case. By using tools of linked data such as wikidata and aligning the metadata around our pictures, we can illustrate such terminological tensions around certain events and create more extensive records. The main issue is educational: how can we ensure that a database's design and interface does not simply spread and reinforce the beliefs and values that created the documents it contains? Machine learning could be a means to deconstruct the colonial archive, to show things that it was not meant to show, to make the conditions of the production of this data visible, and to learn about how colonialism functions through both the display and concealment of violence. By linking data in different silos and statistically analyzing the graphical and textual content of these archives, we can draw new connections and enrich flawed archives. 58

While access to colonial archives is necessary, it should come with critical awareness of database structures and website designs. Many online archival databases are manifestations of a twenty-first century "exhibitionary complex" that favors certain practices of representation and exhibition, specifically when they include AI functionalities [Bennett 1988]. They are performative reflections of early twenty-first century aspirations to ever-increasing searchability, transparency, and access to large quantities of historical data. Given associated ideas about the photographic medium's transparency, the performance is heightened when these online repositories exhibit photographs. Even if the notion that photography possesses a special "eye-witness" power and a distinct potency as a bearer of emotion is a historical and cultural construct with a (mostly) Euro-American genealogy, this idea is now broadly foundational for twenty-first century global spectatorship. Social media platforms, building on these foundations, creates the conditions for massive harm because they reinforce popular notions of their contents' transparency. Pictures on Instagram, for instance, are supposed to be authentic, real, and taken at face value; the platform's simplicity reinforces this perception. 59

Open access online archives harnessing AI-reliant tools should be designed to make sure that users see photography as a *medium* and the documents produced by that medium as social facts that exist in historical time. Such archives should cultivate a sense of distance in order to ensure that the viewing experience does not replicate the visuality of news photographs, for example, which depend on an eye-witnessing power to create distinct forms of feeling and public response to depictions of violence. With visual records of potentially sensitive pasts, users should be constantly reminded that they are looking at a mediation. Ideally, digital archive platforms would mediate the effects of such photographs by reminding users that they are fabricated constructions, as are the tools and structures that make them accessible.

Conclusion

Is it desirable to make all archives openly accessible to the widest possible audience? In the 1990s and 2000s, this question was seldom asked; the notion of open access was largely uncontroversial. While we are now more aware of the dangers of an unchecked open access movement, we are also confronted with the huge practical and ethical challenges posed by AI. ML models cannot be developed without access to data. If AI is to help restructure colonial archives, it is essential that humanists, source communities, experts, and computer engineers cooperate to develop it critically and transparently, with awareness of the risks involved in careless dissemination of sensitive materials.

The goal should not be to show everything indiscriminately, but rather to reshape the colonial archive's visuality in order to facilitate the production of knowledge and the public discussion of contested legacies. Pursuing this objective involves increasing the visibility of this visual heritage, but it is not *reducible* to it. ML might be better thought of as a tool with which to reorder the colonial archive's visuality; it can help articulate and organize the archive in ways that exceed the intentions of its original colonial producers, giving researchers tools with which to build new connections, contexts, and interpretations. Long before digital computer processing, from the days of filing cabinets and paper indexes, archives have always been tools for accessing traces of the past in a structured way. Digital developments and AI-reliant tools will not radically disrupt this basic situation. However, the combination of digitization and machine learning will drastically alter the scale of analysis, the speed at which certain time-consuming archival tasks can be accomplished, and, ideally, the siloization of archives that contributes to patterns of forgetting. The management of sensitive content can never and should never be fully automated. However, semi-automation can help augment our capacity to both produce knowledge of the past using digital visual archives and to approach those archives in ethical ways.

Abbreviation Index

- API: Application Programming Interface
- ANOM: Archives Nationales d'Outre Mer
- BDIC: La Bibliothèque de Documentation International Contemporaine
- CNN: Convolutional neural network
- ECPAD: Établissement de Communication et de Production Audiovisuelle de la Défense
- EyCon: Early Conflict Photography and Visual AI
- GLAM: Galleries, Libraries, Archives, Museums
- IIF: International Image Interoperability Framework
- JISC: Joint Information Systems Committee
- MPLP: "More Product, Less Process"

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Notes

[1] “Sensitive material” can cover a broad range of materials and issues, and it is a major concern within archival science. Material may be considered “sensitive” due to concerns ranging from privacy issues and state secrets to graphic depictions of violence. More recently, in places such as Canada, Australia, and the United States, the category has been used extensively with regard to the legal and ethical implications of archival holdings of indigenous artifacts and remains considered sacred by source communities and nations. In this article, the “sensitive material” to which we refer is largely visual documentation of colonial violence held in state archives, which can be politically explosive and is important for the process of confronting the legacies of colonialism. In our usage, “sensitive material” may also refer to racist or inaccurate metadata dating from the production of these visual materials, which can be disturbing to the contemporary public.

[2] The idea that photography makes meaning by way of an exact trace (also referred to as the medium's “indexical” nature) has been pursued by many scholars, notably the art historian Rosalind Krauss [Krauss 1977]. The concept of the “index” can be traced to the work of the American pragmatist philosopher Charles Sanders Peirce and his semiotic triad of icon, symbol, and index. The “index” establishes meaning by virtue of its physical connection with its referent, as in the way in which footprints are a clue to a pedestrian's passage, for example [Peirce 1960].

[3] Artificial Intelligence (AI) is a large (and potentially poorly named) concept designating the ability of a machine to perform tasks that typically require human intelligence or thought. In practice, the terms “AI” and “ML” are often used interchangeably. This description of AI and ML is informed particularly by François Chollet's lucid discussion in *Deep Learning with Python* [Chollet 2021].

[4] This way of using multimodal ML is still very much a horizon of possibility, since open-source libraries for natural language processing suffer from the same biases as computer vision datasets when applied to historical documents, which we explain in detail in this article. See [Ehrmann et al. 2023].

[5] This network includes the Musée du Quai Branly Jacques Chirac, the Établissement de communication et de production audiovisuelle de la Défense (ECPAD), the Service Historique de la Défense (SHD), the Bibliothèque Nationale de France, the Archives nationales d'outre-mer (ANOM), La Contemporaine, the Imperial War Museum, and the Wellcome Collection.

[6] Archives Nationales, <https://www.archives-nationales.culture.gouv.fr/web/guest/histoire-de-l-institution>.

[7] See [Legifrance 2023].

[8] These images originate from the archives of the Arab offices (“bureaux arabes”) of Algiers, Orania, and Constantinois from 1830 to 1922, as well as from the records of the councils of government in Algeria, from 1832 to 1870.

[9] Caswell draws heavily on the notion of “white supremacy”, citing the work of Anne Bonds and Joshua Inwood in particular: “the concept of white supremacy forcefully calls attention to the brutality and dehumanization of racial exploitation and domination that emerges from settler colonial societies” [Bonds and Inwood 2016].

[10] The National Library's director general, Marie-Louise Ayres, deployed the language of the Enlightenment when she declared, “Free access to information is fundamental to libraries, and it is to us. So, from our perspective, egalitarian access is what drives us” [Burke 2023].

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