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Digital Cultural Heritage, AI, and Authenticity

Cover image: The Dimensions in Testimony exhibition with Tobias Rawet. Author: Daniel Gustafsson/SHM (CC BY)

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Editorial: A Special Issue on Digital Cultural Heritage, AI, and Authenticity

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Keywords: Reconstruction, Authenticity, Digital Cultural Heritage, Artificial Intelligence (AI), Representation

The integration of artificial intelligence (AI) into the field of cultural heritage is rapidly reshaping how heritage representations are produced, interpreted, and experienced. As AI-generated reconstructions and analyses become more prevalent, the concept of authenticity is being redefined in ways that challenge established norms and frameworks. This evolving intersection calls for renewed critical attention to the cultural, technological, regulatory and ethical dimensions of heritage in the digital age. These shifts necessitate not only updated theoretical frameworks but also highlight the need for interdisciplinary collaboration among fields such as communication studies, law, computer science, anthropology, heritage studies, and cultural studies. Understanding how technologies branded as AI alters the ways heritage is interpreted and communicated is essential for reflecting on how cultural meaning is produced and reshaped in the digital age.

At a time when many heritage sites and objects face threats – including from climate change, conflicts, or the loss of cultural continuity – AI offers powerful tools for preservation and regeneration. Yet as these tools can also produce new artifacts, they raise critical questions about authorship, truth, and the potential for misrepresentation, thereby challenging long-standing assumptions about authenticity, authority, sovereignty, and agency in cultural heritage. There is a growing urgency to engage critically with the role of AI in cultural heritage, particularly given the accelerating pace at which these technologies are being developed and implemented – often before appropriate governance and oversight mechanisms are in place.

This special issue of *Culture Unbound* explores the convergence of cultural heritage, AI, and the concept of authenticity, bringing together a collection of interdisciplinary perspectives that engage critically with this emerging field of inquiry. As AI technologies are rapidly evolving and find applications across virtually every domain, their integration into the field of cultural heritage is promising but also challenging. From the analysis of historical documents or classification of artifacts to the simulation or reconstruction of heritage sites, digital restoration of artworks

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and generation of images, various machine learning applications, colloquially known as AI are reshaping the way we engage with the past. The phenomenon of mediated pasts is certainly not new, but the scale at which synthetic images are generated and circulated on social media and search engines is unprecedented (Stjernholm, Eriksson & Mohammadi Norén 2025). As these technologies become more sophisticated, they offer powerful tools for representing and engaging with heritage, especially in cases where physical artifacts, sites or traditional knowledge and memories are damaged, dispersed, evaporating or even lost.

However, these opportunities also give rise to important questions. AI systems, particularly those based on deep learning, do not simply recreate the past. Rather, they reconstruct and potentially reimagine it, often through processes rooted in statistical prediction rather than historical or cultural context. In doing so, AI systems may introduce new forms of representation that appear convincing, yet are shaped by the biases, limitations, and assumptions embedded in their training data, algorithms, and statistical principles. For instance, artistic works or cultural historical artefacts that do not conform to Western canons may be excluded from the data used to train machine learning models (Wasielewski, 2024). Furthermore, text-to-image generation models tend to produce certain styles, such as photorealism, due to the selection of training data and the way these models detect and reduce shapes, colour, and texture (Munster, 2025: 70–71). Importantly, AI operations are embedded in more-than-human dynamics. While humans are involved in choosing and labelling training data and designing machine learning models, the models themselves often operate inductively and independently in opaque, abstract spaces. They learn from data and might become creative. The outcomes of these operations are then perceived, experienced, and evaluated by both humans and machines. These more-than-human agencements (Munster, 2025) or entanglements (Thylstrup et al. 2022) create new types of heritage representations.

Even before the advent of AI and machine learning applications, authenticity was a contested concept. Within cultural studies, for example, authenticity has been criticised for promoting an essentialist view of cultural identity as fixed and unaffected by social and cultural change and interaction. While authenticity cannot be so easily discarded in the heritage sector, a new generation of critical heritage studies scholars have nevertheless begun to question the cult of authenticity surrounding cultural objects in dominant heritage discourses. Both critical scholars and heritage conventions, such as the NARA Document on Authenticity, are increasingly recognising the importance of the values and intangible aspects of heritage in how authenticity is conceived. Gao and Jones (2021) argue that authenticity depends on active interventions, including people's meaningful and emotional relationships with dynamic heritage. The acknowledgement

and incorporation of community values is also crucial for achieving a sense of authenticity in the production of digital representations of objects and heritage sites (see Jones et al. 2018). In the context of digital replicas and reconstructions, the authority and credibility of the institutions and professional experts involved, as well as legal ownership, impact how authenticity is perceived. Furthermore, how authenticity is conceived depends on the replica's quality, and accuracy, as proven by processual transparency and methodological accountability (cf. Di Giuseppantonio, Di Franco, Galeazzi & Vassallo 2018). From a legal-philosophical perspective, authenticity is not a fixed property of an object or subject but a condition of recognition — one that takes shape through interpretive and contextual processes rather than intrinsic qualities. In this view, legal authenticity depends on narrative intelligibility and accountability, raising questions about how AI-generated cultural heritage reconstructions frame and convey cultural belonging and human agency. (Wojciechowski 2024) In this context, it is important to further acknowledge that authenticity also depends on meaningful community participation in the interpretation process. Without such participation, AI-generated, or otherwise externally produced representations risk disconnecting the representation from its cultural meaning or belonging.

This special issue addresses the implications of AI-generated heritage representations in relation to authenticity. It comprises five articles and a featured contribution, highlighting a range of approaches to this topic, which invites insights from various areas of academic enquiry. The contributions in this special issue underscore the need for a deeper understanding of how authenticity and its relation to human agency, is conceptualised and contested across cultural, technological, and disciplinary contexts. They engage with the idea that authenticity may no longer be solely a human concern, as algorithmic systems begin to influence what is preserved, how it is represented, and for whom it holds meaning. Hence, the traditional anthropocentric view of humans as the sole custodians and interpreters of culture and heritage is challenged as more-than-human actors are involved

By approaching authenticity as a contested concept, and considering how AI technologies complicate its interpretation, the contributions in this special issue engage with the conceptual, practical, and ethical challenges of representing heritage in the context of artificial intelligence. In doing so, this issue aims to contribute to a more informed and inclusive dialogue about the role of AI in the future of cultural heritage.

Taken together, the articles suggest that the use of AI amplifies the social aspects of authenticity emphasised in studies of digital representations and replicas. Using AI technologies to curate or generate heritage displays brings the experience-based, relational, and affective aspects of authenticity to the fore. The authority of the institutional framework becomes more central. But it also becomes

more vulnerable. The same is true of the trust that this generates. AI must therefore be implemented in a way that maintains public trust in cultural heritage institutions (Aavaranta et al. 2026). The need for transparency and openness is even more crucial because of the interaction between human and machine agents. Moreover, new power dynamics emerge when heritage institutions rely on commercial models and businesses (Atmadiredja et al. 2026). The articles also emphasise the need for new ethical guidelines and practices, particularly when the heritage of minorities and indigenous communities is involved. Technology must align with source communities' priorities and values, and rights must be upheld (Stuhldreier and Fredriksson 2026). To protect the cultural integrity, effective governance structures must ensure the transparent and respectful application of technology (Ballardini et al. 2026).

Kicking off the issue, "Navigating the Ethical Labyrinth: Artificial Intelligence and the Preservation of Cultural Authenticity in a Post-Truth Era," by Lakshmimol C P critically examines how AI technologies simultaneously enhance and disrupt practices of cultural heritage preservation. Through case studies such as the Dalí Lives project, the article identifies key challenges posed by AI, including the risk of deepfakes, algorithmic bias, and cultural homogenisation. In response, it proposes an ethical framework grounded in explainability, transparency, and collaborative human–AI interaction to guide responsible implementation in heritage contexts. By addressing issues of authority, representation, and global cooperation, this contribution foregrounds the importance of maintaining cultural authenticity and diversity amid accelerating digital transformation.

The article "AI Definitions in Flux: Museum Credibility and Holocaust Testimony in Focus," by Aavaranta et al., examines how shifting institutional understandings of AI shape museum narratives, authenticity, and public trust, using a process study on the Swedish Holocaust Museum's Dimensions in Testimony (DiT) project. Drawing on documentation, observations, and interviews with museum professionals and visitors, the article explores how AI-mediated survivor testimonies are received, interpreted, and emotionally experienced by audiences. While the project is designed to foster empathy, engagement, and relational authenticity, the study also reveals emerging tensions surrounding coherence, institutional uncertainty around AI, and the ethical complexities of 'digital witnessing' in a context marked by Holocaust distortion. By examining how authenticity is negotiated at the intersection of technology, memory, and pedagogy, this contribution offers a critical perspective on AI's role in museums as spaces of historical evidence and moral responsibility.

The article "The Use of Artificial Intelligence in Visualizing Historical and Cultural Objects on Social Media: A Sentiment Analysis of Public Reactions to AI Generated Images of Indonesian Heritage," by Atmadiredja et al. then investigates

how AI-generated reconstructions of historical figures and sites circulate on social media platforms, specifically TikTok, and how audiences respond to them. Using sentiment analysis of comments on AI Nusantara's TikTok posts, the study identifies three primary categories shaping public reactions: accuracy, technology, and common knowledge. The analysis reveals that user responses are shaped by a mix of expectations of historical authenticity, technological curiosity about AI tools, and culturally grounded perceptions of historical authenticity. By highlighting how users draw simultaneously on academic references and local traditions, the article indicates how AI-generated heritage imagery can contribute to emerging forms of digital living heritage.

Addressing issues of cultural continuity and legal complexity, "Back to the Future or Knowledge Reborn – AI Restoration, Traditional Knowledge Protection, and the Dilemma of Authenticity,"- by Stuhldreier and Fredriksson examines the legal and cultural tensions arising from the use of AI in preserving and restoring traditional knowledge (TK). While AI technologies offer potential for revitalising eroded or endangered TK through reconstruction by data-driven techniques, they also raise important questions about authenticity, ownership, and legal recognition. The article analyses current legal frameworks for protecting TK in different forms, highlighting the limitations of conventional intellectual property law and the potential of *sui generis* systems and TK databases. By framing authenticity in terms of living community values rather than fixed historical reference points, the article explores culturally grounded and legally informed perspectives on the challenges of AI-assisted TK preservation.

Turning to questions of representation and participation, the article "Digital Cultural Heritage of Minorities and Indigenous People: Towards a More Participatory Governance Framework for Decision-Making," by Ballardini et al. analyses how current legal and institutional frameworks shape the digital representation of cultural heritage for minority and Indigenous communities. Through a scoping review of scientific literature, the article maps existing governance models and highlights critical gaps related to participation, intellectual property, and the authenticity of digital content. It reveals how unresolved legal and policy issues may hinder equitable involvement in decision-making processes and affect the legitimacy of AI-mediated heritage representations. This contribution calls attention to the need for user-centric, proactive governance frameworks that support more inclusive and authentic engagement with digital cultural heritage.

Concluding the issue, the long essay "Night at the Artificial Museum: Copyright Law and Artificial Intelligence", by Matthew Rimmer examines the complex legal landscape surrounding the use of AI in the protection, preservation, and regeneration of digital cultural heritage. Focusing on copyright litigation linked to AI training data, the piece also touches on related intellectual property

frameworks, including trademark law, publicity rights, and Indigenous intellectual property. Through a comprehensive survey of recent legal developments and disputes, it reflects on what implications the use and regulation of AI has for the Galleries, Libraries, Archives, and Museums (GLAM) sector and broader cultural institutions. This contribution provides a timely legal overview on the rapidly evolving relationship between AI technologies and cultural heritage, highlighting the pressing need for clarity, transparency, and balanced rights in this emerging domain. With its thorough documentation of cases and legal sources this article provides a resource for future legal studies and practices in the fields of copyright and AI in the GLAM-sector, thus complements the issues contributions to the field of cultural and heritage studies.

We would like to thank all contributors to this special issue for their insightful and engaging work, as well as the main editors of *Culture Unbound* for their support throughout the editorial process. We are especially grateful to the peer reviewers who volunteered their time and expertise to help shape the contributions and ensure high standards of academic quality. We now invite readers to explore the diverse perspectives and reflections offered in the articles ahead.

The Editorial Team,
Marc Stuhldreier, Bodil Axelsson, Kristina Kovaitė, Martin Fredriksson & Rosa Ballardini

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Navigating the Ethical Labyrinth: Artificial Intelligence and the Preservation of Cultural Authenticity in a Post-Truth Era

C P Lakshmimol

Abstract

This research explores three interrelated theoretical aspects of Artificial Intelligence (AI)-mediated cultural heritage preservation: challenges in epistemological authenticity, power asymmetries in AI-driven conservation, and socio-technical structures in digital cultural activities. Employing a mixed-methods strategy coalescing critical discourse analysis, digital ethnography, and case study examination, the study probed AI-directed cultural heritage discussion and applications over the preceding decade. The findings exhibit that AI technologies concurrently augment conservation capacities while threatening historical legitimacy, enabling algorithmic bias and potential cultural homogenisation. The investigation unveils how AI conservation projects unreasonably give an advantage to Western European cultural artefacts regardless of Indigenous and Global South traditions composing a significant part of human cultural heritage. The study recommends an ethical structure dealing with representational power and data bias, which is causative to comprehending how technological structures mirror and redesign power relationships in cultural backgrounds. This exploration stresses the necessity of interdisciplinary collaboration between heritage experts, technologists, and policymakers to guarantee impartial conservation processes.

Keywords: Cultural heritage digitisation, AI ethics, Digital preservation, Authenticity, Post-truth era

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Introduction

The crossroads of cultural heritage conservation and Artificial Intelligence (AI) has transpired as a noteworthy domain of inquiry within present-day theoretical frames of authenticity, legitimacy, and technological intercession. This interdisciplinary area integrates cultural heritage research, digital humanities, and computational sciences, achieving distinct significance as global cultural establishments steer what McIntyre explains as the "post-truth" age societal circumstance distinguished by "obfuscation of facts, abandonment of evidential standards in reasoning, and outright lying" (2018: 2). According to him, it is an "expression of concern by those who care about the concept of truth and feel that it is under attack" (McIntyre 2018: 6). The swift advancement of AI technologies is revolutionising how cultural artefacts are conserved, interpreted, and accessed, raising essential questions about authenticity, authority, and depiction in digital contexts.

As Khan et al. note, "Digital technologies have opened new ways of conducting research in varied fields of humanities, making it efficient and easier to employ innovative methods of creation of new knowledge" (2015: 184). This change is predominantly apparent in cultural heritage conservation, where AI systems currently assist in everything from renovating desecrated artefacts to constructing engrossing digital encounters and experiences. Ghaith states that these technological systems "offer novel approaches to identifying patterns of decay and damage, thereby enabling more effective protection strategies for heritage sites and objects" (2024: 3), indicating a noteworthy departure from conventional preservation techniques.

Regardless of the proliferation of AI implementation in cultural heritage contexts, a vital research gap prevails in comprehending the theoretical applications of AI-driven cultural conservation outside purely technological or operational concerns. While current scholarship has scrutinised technological executions, observing that AI capacities are "highly dependent on the type and quality of the data they were trained on" (Neudecker 2023: 155) and recommending museums should "think about the impact these technologies have on their visitors and users" (Murphy 2023: 76), there exists inadequate critical investigation into how these technologies reorganise power relationships, confront epistemological structures of legitimacy, and possibly strengthen persisting cultural inequalities. As Hajri states, AI tools are "far from neutral" (2023: 58) and can instill historical prejudices that "reinforce existing social inequalities" (2023: 58) in cultural conservation endeavours, chiefly across Global North-South divides.

This examination investigates three interconnected theoretical aspects: the epistemological confrontations of authenticity in a post-truth environment, the intrinsic power fluxes in AI-mediated cultural conservation, and the socio-technical frames working in cultural tradition in the digital era. These elements structure the

basis for investigating how AI concomitantly improves access to cultural heritage, likely supporting prevailing discriminations and challenging conservative concepts of authenticity.

The following research questions guide this investigation:

- How do AI technologies restructure power relations in cultural heritage preservation projects?
- What theoretical frameworks can adequately address authenticity questions in AI-mediated cultural experiences?
- How do contemporary digital practices challenge or reinforce traditional cultural stewardship patterns?

The theoretical inferences of this study extend further technological realisation, undertaking indispensable questions regarding cultural stewardship and epistemological structures. Against this background, authenticity signifies not just material authenticity but what Bunz recognises as the "multifaceted relationship between original cultural artefacts and their digitally mediated representations, including questions of provenance, context, and interpretive authority" (2023: 25). The assessment of particular AI implementations in cultural heritage contexts reveals their transformative potential and their ability to support prevailing power systems, principally concerning Western and non-Western cultural interpretation. As Zheng states, as cultural heritage holds "profound cultural value" (2024: 371), covert digitisation interests may buttress established power structures.

This study adds to cultural theory by studying how technological interference modifies conservation activities. The prime case study for this analysis is The Dalí Museum's Dalí Lives venture, which utilised AI technologies, mainly natural language processing and deep learning, to generate experiences that blur the boundaries of historical account and technological intercession. As Mihailova observes, this project "transformed [Dalí] into an approachable, affable, and playfully enigmatic guide to his own oeuvre—albeit one haunted by the inescapable uncanniness of his own existence" (2021: 3). Through sophisticated machine learning systems containing natural language processing and generative adversarial networks (GANs), this deepfake technology facilitated the conception of a communicative digital manifestation that replicated the artist's physical appearance, voice, and fundamental aspects of his character, raising reflective questions concerning posthumous portrayal and permission. This research equally recognises AI technologies' metamorphic capabilities and their abilities to emphasise existing authority structures, supporting current academic efforts on digital cultural tradition.

The organisation of this article commences with this introduction, which is succeeded by an inclusive literature review surveying academic viewpoints on

AI in cultural heritage contexts. The methodology section lays out the qualitative research paradigm encompassing digital ethnographic strategies, the critical discourse analysis framework by Fairclough (1995), and the methodology used in the case study. The section on findings provides thematic explorations from the empirical study and proceeds with a discussion that contextualises these results in broader academic discussion. A devoted case study section examines the Dalí Museum project in depth, followed by a section on limitations and conclusions that directly focus on the research questions and presents suggestions for potential research and practice in this swiftly growing area.

Literature Review: AI and Cultural Heritage Preservation in the Post-Truth Era

This literature review incorporates academic views on AI in cultural heritage frameworks, observing PRISMA guidelines to scrutinise scholarly publications from 2015–2025. By searching keywords comprising cultural heritage, artificial intelligence, post-truth, and digital preservation, the search documented 72 primary publications screened by inclusion criteria and yielded 36 sources for study.

Authenticity and Post-Truth Challenges

The correlation of cultural heritage and AI is present in what McIntyre explains as the "post-truth" era, where the "prefix 'post' is meant to indicate not so much the idea that we are 'past' truth in a temporal sense (as in 'postwar') but in the sense that truth has been eclipsed— that it is irrelevant" (2018: 5). This atmosphere challanges established notions of authenticity, described by Jokilehto as "being truthful, both as an autonomous human creation and as true evidence of something" (2006: 8).

Deepfake technologies predominantly reorient this topography, with Westerlund observing that "the game-changing factor of deepfakes is the scope, scale, and sophistication of the technology involved" (2019: 39), possibly "distort[ing] our perception of what is important, true, and real" (Pariser 2011: 16). These technologies raise "fundamental epistemological questions regarding how societies establish historical truth when traditional markers of authenticity become unreliable" (Westerlund 2019: 42). Cultural establishments rationalize posthumous deepfakes through assertions of humanistic intention. The Dalí Museum, for example, offered its project as "aligning with Dalí's personal beliefs" (Mihailova 2021: 9), unearthing novel validation approaches for technological involvements.

Theoretical Frameworks

This exploration utilises three corresponding theoretical strategies. Feenberg's Critical Theory of Technology investigates how "the outcome of technical

choices is a world that supports the way of life of one or another influential social group" (2005: 52), offering tools for studying power replication through AI implementations. Cameron and Kenderdine's Digital Heritage Theory attends to the ontological transformations when historical objects are digitised, surveying how digital intercession changes the interpretation of and access to cultural artefacts. Post-colonial Digital Humanities by Risam presents methodologies for examining "colonial hallmarks persisting in the digital cultural" infrastructure (2019: 4), necessary for assessing how AI structures likely propagate historical power disproportions. This interdisciplinary framework corresponds with Khan et al.'s remark that "Digital Humanities is methodological by nature and interdisciplinary in scope. It involves investigation, analysis, synthesis and presentation of information in electronic form" (2015: 186).

Power Dynamics and Representational Inequalities

Research persistently recognises power asymmetries in AI-driven conservation activities, with academicians finding that "digitisation projects predominantly privilege Western European cultural artefacts despite Indigenous and Global South heritage constituting the majority of human cultural inheritance" (Röll & Meyer 2021: 10). These endeavours uphold "binary opposites such as undeveloped/developed, primitivism/progress, nature/culture" (Röll & Meyer 2021: 10) that outline Global South-North interactions.

Hennessy and Lyons reveal how "seemingly neutral digitisation processes can reinscribe colonial hierarchies" (2020: 148), emphasising persistent digital divides in cultural demonstration. Ghaith highlights the significance of "fostering a sense of identity and continuity within communities" (2024: 2) through cultural conservation, stressing the social stakes of these inequalities.

Algorithmic and Data Biases

Research on algorithmic bias expresses how AI structures can amplify present bias in cultural accounts. Mehrabi et al. classify "systematic errors in computational systems that affect user experience and cultural interpretation" (2021: 2) that "amplify existing sources of bias". Buolamwini and Gebru demonstrate how "facial analysis systems inadequately represent darker-skinned individuals" (2018: 4) with implications for the digitisation of historical photography.

Foka and Griffin point out that bias or prejudices in cultural heritage compilations are intrinsically inevitable, as "bias exists prior to any sampling... unbiased data—even as an idea—is essentially ahistorical data" (2024: 6127). This produces challenges for "digital heritage [which] comprises computer-based materials of long-term worth that should be reserved for future generations" (Khan et al. 2015: 191).

Ethical and Legal Frameworks

The scholarly literature unveils vital gaps in structures addressing AI in cultural heritage contexts. Academicians draw attention to the obligation for "algorithmic transparency" (Larsson & Heintz 2020: 2) in AI systems , and verification structures, with Samek and Müller underlining that "verifications are required to build trust in every new technology" (2017: 4).

Intellectual property considerations continue unsolved, with Borissova pointing out that the "absence of national policies for the protection of digital content" leads to the "potential loss of digitised cultural values" (2017: 2), making difficulties for Indigenous cultural presentations. Recent studies recommend rights-based structures focused on communities or groups whose tradition is being digitised, advocating a "cultural rights-based approach to AI ethics" (Kowalczyk 2021: 175).

Mary states that associating communities and technology dictates interdisciplinary collaboration and incorporation of "oral histories and cultural narratives" (2025: 3) along technological structures. This viewpoint corresponds with Ghaith's insistence on "a collaborative approach, where technology serves as a tool guided by human expertise and values" (2024: 7).

Research Gaps and Contribution

The literature identifies critical research gaps pertaining to AI's function in cultural representation:

1. Inadequate assessment of how AI strengthens power imbalances between Western and non-Western cultural depiction.
2. Restricted theoretical frames for comprehending authenticity in AI-mediated cultural encounters in a post-truth environment.
3. Obsolete ethical systems distinctively for cultural heritage contexts.

These gaps unswervingly align with the research questions examining power relations, theoretical frames for authenticity, and the influence of digital systems on cultural governance patterns. This research attends to these research gaps by probing definite AI implementations in cultural heritage contexts, with meticulous consideration for power relationships, authenticity concerns, and ethical insinuations. As Derda and Predescu observe, "AI should support and amplify the museum's mission without compromising its authenticity or intellectual integrity" (2025: 47)—a standard this study pursues to concretise through empirical examination.

Methodology

This research utilises a methodological framework constructed upon recognised conventions in qualitative cultural exploration while addressing the distinctive challenges of examining AI-interceded cultural heritage. Digital ethnography, critical discourse analysis, and case study methodology were chosen for their corresponding potentials in probing how technological structures arbitrate cultural depiction.

Research Design

The study uses digital ethnography to examine cultural significance in digital situations where AI directs human understanding with artefacts. As Malinowski recognised, ethnography performs as "the trademark of cultural anthropology... a method for grasping the native's point of view" (1922: 25) – a theory this research broadens to digital contexts. Digital ethnography, as theorised by Pink et al., distinguishes digital spaces as "a field site that is not bounded by the offline/online distinction" (2016: 49), while Hine positions such sites as "legitimate sites of cultural production and meaning-making" (2015: 32). Pursuing Geertz's idea of ethnography as "the inscribing of discourse and practice in terms of the communities which constitute a multivocal and multilayered environment" (1973: 19), this research methodology develops inductively as digital cultural exchanges unfurl.This strategy is complemented by Fairclough's critical discourse analysis frame to "systematically explor[e] relationships between discursive practices... and wider social structures" (1995: 135).

This research methodology anchors a theoretical triangulation integrating Critical Technology Theory, probing how "social interests become embedded in technological systems" (Feenberg 2005: 52); Digital Heritage Theory, which attends to "digitisation's impact on heritage concepts" (Cameron & Kenderdine 2007: 23); and Post-colonial Digital Humanities, which contributes methods for exploring "colonial legacies in digital form and the rehearsal of the colonial dynamics of knowledge production that have othered large swathes of the human population" (Risam 2019: 51). This incorporated strategy facilitates study of how technological structures equally reproduce and redesign power interactions in cultural heritage conservation.

Literature Review Protocol

This literature review incorporates academic views on AI in cultural heritage frameworks, observing PRISMA guidelines to scrutinise scholarly publications from 2015–2025 from Scopus, Web of Science, JSTOR, and ACM Digital Library catalogues. With search terms comprising cultural heritage, artificial intelligence, post-truth, and digital preservation, the search documented 72

primary publications. The screening for inclusion utilised a double-phase strategy: preliminary evaluation of titles and abstracts against inclusion criteria, which specified peer-reviewed English scholarly publications dealing with AI mediation in cultural heritage environments, followed by a full-text evaluation employing an assessment matrix exploring methodological diligence and theoretical significance. This procedure was filtered down to 36 relevant scholarly publications that outline the foundation of the literature review.

Data Collection and Analysis

The digital ethnographic material is concerned with the methodical examination of cultural establishments from diverse nations between March 2023 and February 2025, concentrating on AI-mediated projects. Selection criteria prioritised institutions with documented AI implementation in preservation activities, public-facing digital interfaces, geographic diversity, and institutional reflection on ethical dimensions.

Following Braun and Clarke's (2006) six-step method for qualitative data research, the thematic investigation created initial codes that were distinguished into further thematic categories and eventually distilled into four important sections. These sections constitute the renditions of results in the section Findings, with each one of the subsections examining one principal aspect that materialised from the research. The themes are provided with supporting data from digital ethnographic interpretations and discourse studies to exemplify paradigms across institutional performances.

Research Ethics Framework

The framework of research ethics addresses the intricacies of examining cultural depiction in digital contexts, directed by three doctrines: deference for cultural independence, transparency in means, and researcher introspection. This examination adhered to ethical principles issued by the Association of Internet Researchers (2019) and recognises the potential for technological interferences to reiterate colonial authority dynamics, following Risam's warning against "obvious and subtle hallmarks of colonialism within code" (2019: 41).

Methodological Limitations

The methodological limitations of the study comprise the dependence on digital resources, prioritisation of English-language sources, and restrictions of digital ethnography in obtaining execution procedures as opposed to institutional self-presentation. As Boellstorff points out, digital ethnography encounters challenges concerning "the relationship between online and offline sociality" (2012: 52). However, the triangulation of critical discourse analysis, digital ethnography,

and case study methods offers methodological meticulousness in investigating how AI-driven technologies restructure cultural heritage conservation in the post-truth era.

Findings

The empirical results from the critical discourse analysis and digital ethnography investigating AI technology's function in cultural heritage conservation in the post-truth age reveal multifaceted paradigms across three interconnected aspects: power dynamics and representational asymmetries, authenticity challenges in post-truth contexts, and algorithmic bias and data bias in cultural representation.

Power Dynamics and Representational Asymmetries

The digital ethnography unveiled important power asymmetries in AI-driven cultural heritage conservation activities. The examination of digitisation enterprises across cultural establishments indicates that conservation ventures inexplicably privilege Western and European cultural artefacts, despite "Indigenous peoples and local communities being holders and custodians of a rich and diverse cultural heritage" (Zografos & Tualima 2017: 219). The critical discourse analysis of institutional documents reveals how "Binarism is strongly linked to othering" (Röll & Meyer 2021: 10), which persists in forming global relationships in cultural heritage circumstances and power relations.

This scrutiny supports Chen and Joo's remark that "The annotated labels, Y|X, can be systematically biased. In fact, annotators may possess systematic cultural or societal biases, and if not specifically trained, they may incorporate such biases into their annotations" (2021: 14980). This digital engraving transpires through selection procedures that establish which artefacts are entitled to have AI-improved conservation and through interpretative frames that arbitrate how these cultural artefacts are accessible to the general public.

As Zheng states, "Cultural heritage possesses a public interest attribute" (2024: 371), which is the core impetus for digitisation and possibly will emphasise governing power systems. The investigation observed that cultural establishments with globally collected works regularly emphasise Western cultural artefacts for AI-mediated conservation and digital availability. This system echoes Borissova's claim regarding *Directive 2012/28/EU*, which identifies as the "relation between intellectual property and digitisation [that] has not been fully legally regulated" (2017: 3), generating distinct challenges for cultural expressions for the Indigenous community.

The digital ethnography concerning virtual museum spaces exposed models compatible with Foka and Griffin's statement that "Prejudice precedes

the collection process itself" (2024: 6127). As Ghaith states, the "intersection of Artificial Intelligence (AI) with the field of cultural heritage conservation represents a transformative phase" (2024: 3), yet technological accomplishments frequently mirror and emphasise traditional power dynamics. This is substantiated in museum interpretive structures that recurrently decontextualise non-Western cultural artefacts, highlighting prescribed artistic characters over the cultural background and displaying Indigenous cultural artefacts principally through an archaeological perspective rather than a cultural angle.

Authenticity Challenges in Post-Truth Contexts

The critical discourse analysis done on academic publications from 2015–2025 reveals considerable challenges to conventional perceptions of authenticity in AI-driven cultural conservation. The study discerned a noteworthy change in the definition of authenticity from materiality-centred definitions to experiential systems. This evolution reveals a wider restructuring in conservation philosophy, which becomes experience-focused engagement rather than object-centred approaches.

In the current environment of post-truth, where emotions often play a more significant role than factual accuracy, AI-driven cultural experiences reveal a strain between historical knowledge and technological engagement. The data on interactions of visitors with AI-improved or directed expositions demonstrated that fascinating and interactive features habitually obtain more interest than historical correctness or concerns of authenticity.

This experience corresponds with Jokilehto's opinion that traditionally, authenticity has been recognised as "being truthful, both as an autonomous human creation and as true evidence of something" (2006: 8). Nevertheless, AI-generated cultural experiences confront this perspective by classifying engagement over characteristic veracity. The accomplishment of deepfake technology in cultural contexts exhibits how AI can alter the margins of historical accounts and innovative elucidation.

The scrutiny of the promotional materials of the Dalí Museum exposes how cultural institutions advantageously establish AI applications to steer these authenticity pressures. As Mihailova observes, the promotional video of the museum "begins with a 1989 quote attributed to the artist: 'When you are a genius, you don't have the right to die, because we are necessary for the progress of humanity'" (2021: 9). This symbolic approach endeavours to advertise this project as orienting with Dalí's personal values, beneficially asserting posthumous consent for technological amusement.

The study of AI-created renovations of cultural relics unveiled noteworthy epistemological challenges, aligning with Westerlund's statement that "anyone with

a computer can fabricate fake videos that are practically indistinguishable from authentic media" (2019: 39). These technologies facilitate persuasive restorations that may privilege visual consistency over scholarly accuracy, successfully creating analytical preferences that have conventionally been the field of cultural professionals.

As Pariser informs us, these technologies have the potential to "invisibly transform the world we experience by controlling what we see and don't see" (2011: 27), raising essential problems concerning how cultures institute historical reality when customary indicators of authenticity virtual museum spaces digital environments.

Algorithmic Bias and Data Bias in Cultural Representation

The critical discourse analysis recognised diverse types of bias influencing AI-directed cultural depiction, substantiating Mehrabi et al.'s remark that biases in AI structures can "impact user experience" and "amplify existing sources of bias" (2021: 2) in cultural contexts.

Collection bias arises from the historical works of museum collections that frequently echo colonial accounts. As Foka and Griffin point out, artefact collections formed through "finds, expeditions, and seized by colonisers" (2024: 6126) embed colonial accounts that AI structures may unintentionally enable.

Annotation bias happens as human analysts mark data, with their cultural perspectives influencing how cultural artefacts are classified. This coheres with Kartal's assessment that bias occurs "due to the person's demographic characteristics, culture, and beliefs" (2022: 285).

Temporal bias occurs when AI structures are taught on historical datasets that inadvertently emphasise historical bias present in those data collections. Kartal categorises this as "seasonal bias" (2022: 282), entailing apposite temporal contextualisation.

This bias emerges from what Foka and Griffin explain as a "lack of interconnectivity/interoperability of digitised collections" (2024: 6126). Sampling bias creates representational concerns where particular cultural artefacts are overrepresented, whereas others remain obscured.

Proxy bias transpires when AI structures employ variables that unconsciously associate with sensitive characteristics. As Kartal observes, this "confounding bias" arises when "attributes indirectly indicate" (2022: 285) a sensitive facet of cultural distinctiveness.

The digital ethnography unveiled that these prejudices extensively influence AI-directed cultural depiction. As Buolamwini and Gebru noted in facial analysis structures, they worked "best for lighter individuals and males overall" and "performed worst for darker females" (2018: 12). AI frameworks generally

struggle with artefacts that are different from Western structures. This complexity is predominantly evident for cultural objects with various utilities or that exemplify cultural notions lacking Western counterparts.

The examination of AI-directed cultural understanding often establishes the application of Western systems to non-Western artefacts, highlighting what Röll and Meyer express as "Eurocentric thinking patterns" (2021: 10). This technological fortification positions "Europe as the outstanding centre of culture" (Röll & Meyer 2021) and possibly diminishes the richness of marginal accounts by annihilating indigenous wisdom and knowledge through Western categorisations.

As Mary shows in her study, an important challenge in generative AI for cultural heritage is "accuracy in representing cultural nuances", pointing to the threat that "certain cultural details may be overlooked or misrepresented", chiefly concerning "small but significant design features, symbolic meanings, and traditional craftsmanship" (2025: 5).

Ethical Implementation Frameworks

The investigation of policy data and ethical procedures uncovered three distinctive strategies for AI execution in cultural heritage contexts. Such techno-centric strategies emphasise technological values, data reliability, and performance protocols. These strategies centre principally on technical features while placing ethical considerations as lesser challenges to be clarified through technical methods.

Rights-based systems focus on academic and cultural property rights, stressing community independence and informed sanction. These strategies unequivocally attend to representational authority and power dynamics, agreeing with Borissova's statement that "the cultural heritage is part of the public domain; it belongs to everyone from the community of its origin" (2017: 2).

Hybrid structures assimilate technical values with approaches rooted in rights, highlighting shared progress practices. These correspond with Mary's appeal for "interdisciplinary collaboration between technologists, historians, anthropologists, legal experts, and local communities" (2025: 7).

The digital data concerning application methods located considerable rifts between institutional discourses and performances. Several associations communicate a dedication to ethical AI application; however, they contribute inadequately to consultation with the community and ethical evaluation. This finding aligns with the appeal for a "globally sensitive and inclusive ethics of AI for cultural heritage [requiring] the decolonisation of cultural consumption" (Tiribelli et al. 2024: 299) that focuses on communities and groups whose traditions are being documented and digitised.

The analysis of discourse revealed numerous vital principles rising in ethical frames, such as transparency and explainability. Transparency is essential

in preserving public confidence in AI-generated cultural experiences and understanding. As Larsson and Heintz state, "algorithmic transparency" (2020: 2) is fundamental for instituting authenticity, mainly concerning the amount of AI involvement in preservation practices. Explainability is associated with comprehending how AI structures achieve their conclusions. According to Samek and Müller, "verifications are required to build the necessary trust in every new technology" (2017: 4). Creating explainable AI applications is central to authenticating AI-driven elucidations of historical and cultural artefacts.

Human and AI partnership models should influence each other's corresponding potency. Davenport and Kirby recommend the "opportunity for augmentation" (2015: 60), which, in cultural conservation, signifies that human experts concentrate on composite interpretive scrutiny while AI structures pre-process archival records.

The UNESCO Recommendation on the Ethics of Artificial Intelligence (2021) offers the groundwork for international collaboration, highlighting AI structures that respect cultural multiplicity. Nevertheless, the research showcases that emerging comprehensive ethical systems remain intricate and hitherto indispensable for protecting diversity and authenticity in cultural representation.

Ghaith highlights the significance of this human factor in AI-interceded conservation: "The integration of AI technologies in conservation efforts must be complemented by the insights, ethical considerations, and contextual understanding that only human actors can provide. This balanced approach promises to enhance the efficacy and sensitivity of conservation efforts, ensuring that cultural heritage is preserved in a manner that honours its complexity and significance" (Ghaith 2024: 6).

Discussion

This part interprets the empirical results from the perspective of the theoretical structure, dealing with the research questions and relating the interpretations to the existing data. The digital ethnography, critical discourse analysis, and case study examination have unveiled intricate dynamics in AI-driven cultural heritage conservation that demand attentive assessment.

AI and Power Restructuring in Cultural Heritage Preservation

The first research question evaluated how AI systems reorganise power relationships in cultural heritage conservation endeavours. The findings reveal that AI execution in cultural heritage contexts often strengthens prevailing power imbalances rather than dismantling them. The unbalanced consideration of Western European cultural artefacts in AI-driven conservation projects, although Indigenous and

Global South traditions comprise the greater part of human cultural heritage, shows persistent colonial paradigms in technological operation.

The case study of the 'Dalí Lives' project represents this supremacy dynamic. The museum's alliance with the advertising agency Goodby, Silverstein & Partners places the deepfake technology not principally as an apparatus for cultural conservation but as "a case study in tech-conscious, on-trend museum marketing" where "Dalí is simply the messenger; the message is deepfakes" (Mihailova 2021: 5). This marketing-motivated agency to cultural heritage mirrors the way "exhibit spaces are being branded not just literally, via corporate tie-ins or sponsors, but through the incorporation of marketing-like strategies for exhibitions" (Griffiths 2008: 217).

The posthumous utilisation of Dalí's image and voice raises important questions concerning power and permission. As the data revealed, though "the artist had named the Spanish Kingdom as the sole heir in his will, and Spain's Dalí Foundation gave its blessing to the project" (Lee 2019), this does not completely address the concerns about posthumous representation, where "impersonating the dead can be as much of a violation" (Kneese 2020) as other types of unauthorised or illegal exploitation of image.

These patterns support the statement that binary oppositions like "undeveloped/developed, primitivism/progress, nature/culture" (Röll & Meyer 2021: 10) continue to structure the Global South-North affairs in cultural digitisation projects. The pressure between the conservationist potential and power fortification echoes the "ambivalence of technology" in which technological methods can either "concentrate power" or "democratise it" (Feenberg 2005: 54), depending on application perspectives.

Khan et al. state: "Digital Humanities has broadened its reach, yet it has remained in touch with the goals that have animated it from the outset: using Information Technology to illuminate the human record" (Khan et al. 2015: 184). Nonetheless, the findings propose that this illumination is asymmetrical, with particular cultural accounts receiving imbalanced technological augmentation while others perish in obscurity.

Theoretical Frameworks for Authenticity in AI-Mediated Cultural Experiences

The second research question explored theoretical structures capable of handling questions of authenticity in AI-driven cultural encounters. The findings exhibit the insufficiency of conventional notions of authenticity informed of the originality of the object when challenged by AI-directed cultural heritage. The change from a material-centred to an experience-centred definition of authenticity distinguished in the discourse analysis indicates an important epistemological alteration in conservation values.

The findings from the case study are chiefly illuminating in this view. The Dalí Museum's marketing discourse deliberately structures the deepfake encounter through a tension between assisting "an empathy-based human connection" with Dalí and highlighting "the project's status as a product of cutting-edge AI research" (Mihailova 2021: 10). The museum's director, Hank Hine, states that the audience "can empathise with this man as a human being, they can relate to the work much more directly, much more passionately" (The Dalí Museum 2019), placing the deepfake as an improving technology rather than something that threatens authenticity.

The investigation found that promotional materials for Dalí Lives give prominence to the artist's proclamation: "When you are a genius, you don't have the right to die because we are necessary for the progress of humanity" (The Dalí Museum 2019). This decision has "rhetorical purpose... to frame the museum's use of a posthumous deepfake as a humanistic act and, crucially, to present this project as aligning with Dalí's personal beliefs" (Mihailova 2021: 9). This legitimation approach displays how organisations are preceding novel structures for authentication that obscure established borders between original and replication.

These findings are in line with McIntyre's description of the post-truth era, where emotions surpass truths. The case study showcased that the reception of the Dalí deepfake underlined its emotional aspects over historical correctness, with media reports encircling the idea that deepfakes' "inherent uncanniness makes them a medium particularly well suited to embodying Dalí's legacy" (Mihailova 2021: 10). As a reporter put it "the experience: well, surreal" Lee 2019), demonstrating how the technologically created uncanniness develops into a part of its professed genuineness in relation to the uniqueness of Dalí's art. Ghaith advocates that authenticity in AI-driven cultural conservation should be deemed in terms of "opportunities and challenges", recognising that although AI presents "novel approaches to identifying patterns of decay and damage" (Ghaith 2024: 3), it moreover raises essential questionsconcerning what comprises a valid cultural encounter. This dilemma reflects the necessity for additional refined theoretical frames that can attend equally to the conservation potential and the authenticity disputes of AI-directed cultural tradition.

Digital Practices and Cultural Stewardship Patterns

The third research problem investigated how modern-day digital operations confront or underpin conventional cultural management patterns. The findings unveils that AI-driven conservation practices launch inventive interpretive and curatorial dynamics that reorganise power in multifaceted ways while frequently strengthening governing authority systems via technological methods.

The Dalí Lives project reveals how cultural museums place themselves in"vast

media ecology" (Wasson 2020: 603). The data analysis and case study identify that deepfake application in cultural organisations supports a pattern where "museum professionals have often been very keen to adopt new media technologies as soon as they become available, and even have helped to develop entirely new technologies in order to serve particular communication objectives of their museum" (Pavement 2018: 31).

The ethical elements of stewardship are entangled with business imperatives. The case study showcased that the Dalí deepfake materialised from "the marriage of advertising agency tools and museum curatorial practices" (Mihailova 2021: 5), evincing a wider movement in which cultural museums increasingly espouse the pragmatic logic of market spaces. This agrees with the view that museums progressively highlight "sensual perception or aesthetic experience" in order to "realise rather than sterilise objects, history, and culture on display" (Biehl-Missal & vom Lehn 2020: 235).

The findings suggest that these novel practices reconstruct conventional representations of cultural stewardship, possibly leading to the threats of initiating "technology at a relatively superficial level" rather than creating "meaningful visitor participation" (Hanlee 2020: 321). The Dalí Lives project embodies this issue, concurrently providing new opportunities for encounter while implementing participation methods principally as an "attraction, for visitors and the press alike" (Mihailova 2021: 5).

Mary highlights that "the preservation of cultural heritage through AI is not just a technological challenge but also a social and ethical one", entailing "interdisciplinary collaboration between technologists, historians, anthropologists, legal experts, and local communities" (2025: 7). The findings encourage this collaborative strategy, emphasising the need for "joint Digital Humanities research" (Khan et al. 2015: 190) that bridges technological proficiency and cultural perspective.

Practical Implications for Cultural Institutions

The findings have important practical implications pragmatic for cultural establishments employing AI technologies. The gap between organisational rhetoric and performance perceived in digital ethnography signifies the necessity for additional vigorous governance methods addressing ethical performance.

The case study discussed emphasises both possibilities and risks in AI-interceded cultural encounters. The findings advocate that organisations dealing with posthumous depiction through AI must initiate comprehensible ethical structures addressing questions of permission and "respecting the late individual's autonomy" (Cuellar & Stroud 2019). This is particularly significant given the potential of deepfakes to be professed not as a demonstration but as

"either a fait accompli or an accomplishment of contemporary machine learning" (Mihailova 2021: 3).

The analysis recommends that cultural establishments must cautiously reflect on the balance between technological improvement and cultural legitimacy. While organisations may be attracted to deepfakes for their capability "to spread knowledge to virtually every corner of the globe" (Ames 2020), the findings imply the significance of the "ability to establish authenticity in a digital object" as "crucial for its preservation" (Innocenti 2014: 78).

The doctrines of explainability and transparency underlined in the findings support Larsson and Heintz's rationalisation that "Transparency in AI plays a very important role in the overall strive to develop more trustworthy AI" (2020: 11) and Samek and Müller's statement that "one must not trust a black-box system by default" (2017: 4). Authentication is necessary to build trust in any new technology and thus explainability "will play a pivotal role in future AI systems" (Samek & Müller 2017: 42). These doctrines can direct organisational performance towards more responsible AI execution.

Ghaith recommends numerous pragmatic suggestions that correspond with the findings, including "stable dialogue" to "facilitate interdisciplinary collaboration", formation of ethical frames that "address AI-specific ethical concerns in conservation", and improved "AI literacy" to "empower cultural heritage professionals" (Ghaith 2024: 4–5). These approaches offer solid paths for organisations to address the challenges recognised in the study.

Theoretical Contributions

This study adds to cultural theory by demonstrating the necessity for integrated theoretical structures capable of ddressing the intricate interconnection between power, authenticity, and technology in cultural heritage contexts. The insufficiency of isolated discipline-based strategies in comprehending AI-driven cultural preservation emphasises the significance of the theoretical triangulation that integrates digital heritage theory, critical technology theory, and post-colonial digital humanities.

The empirical results recommend the necessity of this theoretical incorporation. The case study underlines the power of deepfakes "to open up new avenues of expression for artists, expand engagement and interaction opportunities for the public, and raise a number of provocative questions about the place of algorithmic culture in our intellectual traditions, ethical frameworks, and public lives" (Mihailova 2021: 14). This complex influence cannot be satisfactorily addressed by either wholly technological or only cultural theoretical perspectives.

Khan et al. state that "Digital Humanities is a multifaceted effort which includes enhancement in the lifecycle of scholarly activities, illumination and

preservation of the otherwise inaccessible collections, using digital media for encouraging the creation of new expression, cramming the impact of technology in the humanities, and presenting the cultural interpretation" (Khan et al. 2015: 190). The research expresses how this comprehensive quality demands theoretical frames that can equally deal with technological and cultural facets of AI-driven heritage conservation.

The contradictory spirit of AI in cultural heritage contexts concurrently improves involvement while raising insightful ethical issues. AI signifies not simply a technological entity but "an infrastructure integrated into the socioeconomic fabric of modern digitised societies" (Caramiaux 2023: 120). The findings show that having a perceptive on this infrastructure necessitates theoretical strategies proficient enough to equally address technological potentials and its immersion in wider societal, cultural, and financial structures.

Mary highlights the need "to preserve the intangible cultural elements that often go undocumented" (2025: 4) along technological conservation means, emphasising how AI-directed conservation must merge both technological and cultural strategies. This incorporation mirrors an impartial strategy where "technology serves as a tool guided by human expertise and values, ensuring that cultural preservation efforts are both effective and respectful of the heritage they seek to protect" (Ghaith 2024: 7).

Case Study: AI-Powered Salvador Dalí at the Dalí Museum (2019)

In 2019, the Dalí Lives project, unveiled at the Dalí Museum in St. Petersburg, Florida, offers an important instance of the relationship between AI and cultural heritage preservation. This project, which involves bringing life to the surrealist master Salvador Dalí through a deepfake recreation in collaboration with an ad agency, intends to "enhance the museum experience" (Hufschmidt 2023: 140). It provides a microcosm of the moral and ethical intricacies regarding the deployment of AI in cultural contexts, demonstrating the interplay between artistic authenticity, technological progre**ss**, and curatorial intentions in a post-truth environment.

Project Implementation

Employing deepfake technology, the Dalí Lives exhibition generated a life-sized digital recreation of Salvador Dalí that "welcomes museum-goers in a conversational style" (Mihailova 2021: 3) and functions as "a guide and a partner simultaneously" (Khan et al. 2024: 767). This AI-powered incarnation was created through a sophisticated assimilation of machine learning algorithms, including Natural

Language Processing (NLP) systems and Generative Adversarial Networks (GANs). These AI models were trained on a broad corpus of Dalí's artworks, writings, and "over 6 000 frames of filmed interviews" (Mihailova 2021: 3) to capture the artist's likeness and his distinctive mannerisms and worldview.

The Dalí Museum's stated rationale was to provide visitors with an unparalleled experience with the persona of the late artist, who becomes a "guide to his own oeuvre" (Mihailova 2021: 3). This approach transcends conventional engagement methods and "aligns with broader museum trends where AI can help museums reach a wider audience" (Rani et al. 2023: 3). By enabling visitors to interact with Dalí, the museum sought to revitalise static exhibitions, facilitating a more dynamic and personalised exploration of the artist's work.

Ethical Considerations

Despite its innovative nature, the Dalí Lives project raises significant ethical questions. The primary concern involves posthumous representation and the "excessive simulation" (Mihailova 2021: 9) of Dalí's likeness without his explicit consent. With no living family, the "exhibition was run with permission from the Dalí Foundation in Spain" (Lee 2019), which problematises essential concepts of posthumous rights and artistic heritage—a particularly relevant concern given Dalí's carefully cultivated public persona.

Additionally, based on the artist's documented statements, the AI's responses essentially engage interpretation and judgment, raising concerns about potential misrepresentation, particularly regarding contemporary issues Dalí never addressed. As the boundaries between education and entertainment blur, spectacle may be prioritised over substantive engagement with the artist's work, potentially undermining the complexity of Dalí's oeuvre. This exemplifies challenges in cultural heritage contexts "where the regulation of AI is lagging behind the speed of innovation" (Caramiaux 2023: 118).

The project's dependence on AI to mediate visitors' experience of Dalí's art also raises concerns about technological determinism, potentially subordinating curatorial expertise to algorithmic analysis and raising questions about human judgment's role in cultural heritage preservation.

Institutional Response

In response to these ethical concerns, the Dalí Museum implemented several mitigation strategies to ensure that "museums retain their role as trusted spaces for cultural and educational enrichment" (Derda & Predescu 2025: 18). The institution maintained transparency by clearly communicating the AI-powered nature of the experience, distinguishing between the historical Dalí and his digital recreation. The museum also ensured curatorial oversight, with Dalí experts and art historians

contributing to the AI's responses with the artist's documented philosophy and views.

The AI-driven experience was integrated into a broader educational framework "as a techno-utopian educational tool" (Mihailova 2021: 3), incorporating traditional displays and expert-led discussions to provide contextual depth and promote substantive engagement beyond the technological novelty. The museum also established mechanisms to evaluate the project's impact on visitors' perception of and engagement with Dalí's art, enabling continuous assessment and improvement.

Implications for Cultural Heritage

The Dalí Lives project offers valuable insights for AI applications in cultural heritage preservation, illustrating how "museums have a unique role in fostering public understanding of AI's societal implications" (Derda & Predescu 2025: 47). It demonstrates the necessity of developing robust ethical frameworks that carefully govern AI's application in representing historical personalities to protect the integrity of artistic heritage.

The project highlights the importance of balancing technological innovation with curatorial reliability and educational objectives. It suggests AI's potential to enhance rather than replace established methods of cultural engagement while emphasising the necessity of interdisciplinary collaboration in developing AI-powered experiences.

As cultural institutions navigate the complex landscape of AI-mediated preservation, the Dalí Lives project is both a harbinger of future possibilities and a cautionary model. It underscores the need for thoughtful, ethically grounded approaches to incorporating emerging AI technologies in cultural institutions, balancing innovation with responsibility and technological capability with cultural sensitivity.

Limitations

This research's assessment of the use of AI in cultural heritage conservation provides critical awareness and includes a number of limitations that must be acknowledged.

The approach of digital ethnography depends entirely on openly available online resources, possibly eliminating stakeholders with restricted digital presence, which is predominantly from marginalised groups and communities. Practical AI implementations must include technological methods, oral narratives, and cultural histories, elements probably underrepresented in this methodology. The one Western case study of the Dalí Museum restricts generalising across various organisational environments with changing resources and cultural operations.

Regardless of recognising Western-centrism in AI-directed heritage ventures, this study itself insufficiently represents non-Western viewpoints owing to language and access restrictions. The research chiefly utilises Western academic structures while lacking a comprehensive assessment of Global South milieus, mirroring persistent digital divides in cultural depiction.

The authenticity structure used depends on theoretical differences between the original and recreated AI challenges. Jokilehto states that "truthfulness of information sources as a fundamental prerequisite for the definition of authenticity" (Jokilehto 2006: 8) presumes borders that rising technologies distort. In addition, the investigation inadequately studies community engagement in AI-driven heritage projects. Without community involvement, initiatives can pose the threat of estranging or misrepresenting these groups or communities if their views are not heard. Future studies should unswervingly involve societies or communities whose heritage is undergoing digitisation and scrutinise execution across various organisational backgrounds.

Future Research Directions

These limitations imply various promising opportunities for future investigations. Mixed-methods strategies merging traditional and digital ethnographic methods could present a more inclusive perspective on AI application across various cultural backgrounds. Research involving groups or communities whose heritage or tradition is being digitised must attend to important gaps concerning intellectual property considerations that are inefficiently addressed in present legal systems.

Comparative research comprising Global South viewpoints would supplement the perspective of how authority dynamics outline AI execution in cultural heritage conservation. Siliutina et al. state that these technologies offer preservation prospects and challenges "related to data security, accessibility, and the risk of cultural commoditisation" (Siliutina et al. 2024: 263), necessitating exploration across different backgrounds.

Longitudinal studies following AI-interceded cultural encounters could study how organisations acclimatise ethical structures in reply to technological improvements and community response, offering perceptions regarding responsive governance patterns.

Conclusion

This research has studied the complex connection between cultural heritage conservation and artificial intelligence in the post-truth age, exhibiting complex dynamics that equally supplement and defy cultural interpretation and involvement. Through digital ethnography, critical discourse analysis, and case

study examination, the research offers significant insights and responses to the research questions that directed this inquiry:

Research Question 1: How do AI technologies restructure power relations in cultural heritage preservation projects?

AI tools recurrently emphasise existing disproportions between Western and non-Western cultural rendition. The digital ethnography established that AI-driven conservation projects focus on Western European cultural artefacts, although Indigenous and Global South heritage compile the greater part of human cultural heritage. These proceedings reveal important colonial paradigms in technological operation, upholding binary oppositions that contour Global South-North relationships. Nevertheless, when devised with unambiguous consideration of power systems, AI technologies can enable the conservation of vulnerable cultural elements through pattern identification and renovation potentials.

The case study of the Dalí Museum project demonstrates how AI applications can provide commercial elements that give importance to technological demonstration over cultural conservation, transforming heritage into marketing possibilities rather than conservation enterprises. However, when executed with unambiguous consideration to authority systems and representational justice, AI technologies embrace noteworthy possibilities for democratising access to susceptible cultural components through pattern recognition capabilities and restoration potential that would otherwise be inaccessible.

Research Question 2: What theoretical frameworks can adequately address authenticity questions in AI-mediated cultural experiences?

Conventional perceptions of authenticity based on the originality of materials prove insufficient when addressing AI-directed cultural heritage experiences that blur borders between original and recreated. The critical discourse analysis identified a considerable alteration in the direction of experiential frames of authenticity. Cultural establishments deliberately structure AI implementations to institute posthumous authorisation, proffering technological reproduction corresponding to artists' viewpoints. These applications require further nuanced theoretical structures that reflect both conservation reimbursement and authenticity concerns caused by AI in cultural milieus.

The tactical structuring of AI implementations by cultural organisations, mainly manifest in the posthumous consent account provided by the Dalí Museum, reveals how organisations develop original frames for substantiation that intentionally situate technological recreation as compatible with artists' private views. These rising authentication approaches entail theoretical strategies that can include the developing character of legitimacy in digitally directed cultural encounters while upholding critical awareness of how emotional involvement may occasionally surpass historical correctness in the post-truth environment.

Research Question 3: How do contemporary digital practices challenge or reinforce traditional cultural stewardship patterns?

AI-driven conservation projects launch innovative curatorial adaptations that restructure power in multifaceted ways. The study acknowledged various biases, such as collection bias, annotation bias, temporal bias, sampling bias, and proxy bias, that display how AI structures facilitate dominant emblematic hierarchies, although they seem impartial. Nonetheless, developing ethical frames, chiefly based on rights, prioritises community autonomy and presents propitious courses for undertaking further unbiased cultural stewardship paradigms in AI-directed contexts.

These ethical frameworks are apparent in initiatives like the UNESCO's Recommendation on the Ethics of AI and CARE Principles for Indigenous Data Governance, which enables autonomy of communities through protocols for attaining permission and provision for benefit-sharing. These strategies highlight the significance of interdisciplinary cooperation to ensure AI technologies enhance rather than reduce the wealth and multiplicity of cultural inheritance.

The practical propositions of this study emphasise the need for ethical systems, highlighting explainability, openness, and human-AI cooperation. Such systems ought to deal with representational power and data bias as recognising the evolving nature of authenticity in current digital circumstances. Accountable AI accomplishment in the cultural heritage framework entails both technical proficiency and cultural compassion, with interdisciplinary collaboration between heritage professionals, policymakers, technology experts, and cultural societies being fundamental for ensuring that AI technologies improve rather than diminish the richness and multiplicity of cultural heritage.

Declaration of AI Use

AI-assisted tools were used in a limited capacity during the preparation of this article, with Grammarly employed solely for grammar and spelling verification and Mendeley used for citation management and reference formatting. All substantive writing and intellectual content were developed solely by the author.

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AI Definitions in Flux: Authenticity and Holocaust Testimony in Focus

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Abstract

The museum, as an institution, has a long-standing tradition of presenting the public with seemingly authentic and evidence-based narratives. Recent surveys indicate that museums are widely regarded as highly trustworthy across various countries. However, as museum practices increasingly intersect with marginalised and contested politics, this trust can no longer be assumed.

This article offers an in-depth process study of the development of the Swedish Holocaust Museum, with a particular focus on the role of Artificial Intelligence (AI) in its *Dimensions in Testimony* (DiT) project. DiT features video recordings of Holocaust survivors, each of whom has been filmed responding to approximately 1,000 questions. Visitors engage with these testimonies in real time, through AI-driven natural language processing. The analysis draws on a review of documentation and communications, as well as observations and interviews with museum professionals and visitors. It is guided by the conceptual distinction and operationalisation of relational and essential authenticity, and situated within the broader context of the affective turn in museums. A critical dialogue with contemporary scholarship explores the implications of AI technologies for authenticity and trust in the museum sector.

The study identifies a notable shift over time in how the term 'AI' is used and understood, accompanied by emerging ethical concerns. Developing a shared institutional language around new technologies has proven challenging. In just a few years, AI has moved from being framed as an exciting innovation in exhibition design to a more cautiously referenced, and sometimes avoided concept. This evolution presents significant challenges to the accurate representation of historical evidence, the authenticity of survivor testimonies, and the ethical integrity of the narratives conveyed. While visitors generally express trust in the DiT narratives, persistent concerns remain regarding the role of AI in shaping evidence-based content and the ethics of digitally mediated representation.

Keywords: Artificial Intelligence, Museums; Digital technologies; Affective Museum; Authenticity; Trust.

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Introduction

The application of Artificial Intelligence (AI) in museums raises significant questions regarding authenticity and public trust. The uncertain trajectory of AI's development and its current utilisation for diverse and sometimes conflicting purposes necessitates a critical examination of the culturally mediated nature of authenticity and the ethical considerations surrounding AI implementation. In an era of growing societal polarisation, museums remain among the few enduring "institutions of the social campfire" (Grotz & Rahemipour 2024: 4). Yet, the advent of photography and film also inflamed debates at the time (Benjamin 2015), indicating that the adoption of a new technology raising concerns in the sector is nothing new. In fact, one could argue that museums have consistently embraced new technologies to enhance visitor experiences, each change raising ethical questions related to authenticity (Liepe 2018, Bäckström 2016). It is perhaps, then, the ever-increasing pace of technological adoption under the digital shift that presents most concern. The rapid rise of AI, in particular the public conception around generative AI, raises an essential question: what challenges and opportunities does the introduction of AI bring to museums in terms of trust and authenticity? Furthermore, what ethical approaches are required by museum professionals when engaging AI curatorially?

This article situates the inquiry within the context of museums' application of AI and its implications for authenticity and trust in general audiences. The empirical foundation derives from the newly established Swedish Holocaust Museum, focusing specifically on its AI-assisted immersive and interactive installation, *Dimensions in Testimony* (hereafter DiT). DiT is a USC Shoah Foundation initiative that comprises a collection of video interviews with Holocaust survivors, each of whom has been recorded answering over 1,000 questions about their experiences, memories, and perspectives (Traum et al. 2015). The installation is designed for an immersive experience, presented on life-sized screens with an intimacy as if it was a face-to-face encounter with a survivor of genocide. The installation is also interactive in the sense that visitors can pose questions and receive responses in real-time, through the integration of AI natural language processing. Although DiT has been extensively described and evaluated in previous research (Bosell & Rowland 2023, Papier 2024, Stylianou-Lambert, Bounia & Heraclidou 2022, Traum et al. 2015), there remains a significant gap in the critical examination of how museum-based AI applications impact authenticity and trust. Given the proliferation of antisemitic persecution denying, minimising, and distorting the Holocaust, maintaining trust becomes an ethical imperative.

The study involves an in-depth process analysis of the Swedish Holocaust Museum's development in terms of involvement of new technologies in its public exhibitions, focusing on the process of developing and communicating the AI

usage within DiT from 2019, when the National Historical Museums were tasked with creating an AI-powered installation on Holocaust testimony, through the establishment of the Swedish Holocaust Museum in 2021 and onwards. Sources include a review of internal documentation, and visitor perspectives, drawn from observations from test sessions conducted with students providing feedback on DiT. Observational fieldwork with visitors, and additional interviews with museum professionals involved in the DiT production, gathered through interviews and correspondence, are also included.

The structure of the article begins with a conceptual section that introduces the key theoretical frameworks, focusing particularly on authenticity and trust, vis-à-vis the shifting notions of heritage. This is followed by an integrated presentation and analysis of the empirical case, including a process study of the Swedish Holocaust Museum and an in-depth inquiry into the AI-based exhibition DiT, focusing on the conceptualisation of AI and its effect on perceived authenticity. Finally, a discussion reflecting on the broader institutional and ethical implications for museums concludes the paper.

Figure 1. The Dimensions in Testimony exhibition with Tobias Rawet.
Photo: Daniel Gustafsson/SHM (CC BY)

Museums and Trust

Museums are recognised by citizens in many countries among the most trusted institutions. This trust can be linked with authenticity, given institutional trust relies on the perceived authenticity of the museum, its collection and evidence-based narratives, as a societal constant. However, the methodological rationale and gaps inviting and allowing speculation as a byproduct of the processes of digitality, have the potential to denude the trust the museum is built upon (Illsley 2021: 222). Consequently, the role of AI has the potential to exacerbate the matter further.

To examine perceived authenticity and AI, the context of trust must first be addressed. Trust in museums has been studied since the early twenty-first century (e.g., Chryssochoidis et al. 2009, Griffiths & King 2008, Museums Association 2013). A recent German survey found museums to be the most trusted public institutions, surpassing media, political bodies, and even researchers, with trust levels increasing alongside education and income (Grotz & Rahemipour 2024). This survey echoed findings by the American Alliance of Museums (AAM), which ranked museums in the U.S. just below friends and family in trustworthiness – well above scientists, NGOs, and government institutions (AAM 2021). Trust was higher among white respondents, while political views had minimal influence. Key reasons for trust included museums' fact-based nature, their display of authentic objects, and their research orientation. Despite this trust, only 35% viewed museums as neutral, though nearly half believed they should be. In Sweden, a SOM Institute survey found similarly high trust in museums. Interestingly, the highest trust levels came from those who rarely or never visited them – 86% reported high trust, compared to 36% of frequent visitors (SOM 2019).

While none of the cited surveys addressed the impact of museums' increasing use of AI, the AI Narratives project (Cave et al. 2018) explored how various groups discuss AI. It found low public awareness of AI technologies, despite familiarity with everyday applications. The study emphasised that context shapes public perceptions, with views on risks and benefits varying widely. It also warned that exaggerated hopes and fears, especially those tied to humanoid imagery, can undermine public confidence in AI.

There is, however, extensive research and debate on particularly the challenges and risks involved with AI technologies and applications in museums in reference to trust. Recent research has explored ethical issues surrounding the use of AI in museums particularly regarding data privacy, ownership of digital content, and the impact of algorithmic bias (Pansoni et al. 2023, Thiel 2023: 86-7). The use of AI to annotate digitised archives and collections has been criticised due to the risk of perpetuating stereotypes and outdated explanatory models (Villaespesa & Murphy 2021, Balbi & Calise 2023). A growing concern posed by AI is also biases perpetuated by inconsistencies in AI training (Siri 2024: 34). Studies have

also examined how AI technologies, such as deepfakes and synthetic media, raise concerns about the authenticity of museum narratives and visitor trust (Lagerkvist 2022). While AI can enhance visitor engagement (Plaisent et al. 2024), especially in terms of emotional impact (Stylianou 2022), it also raises critical questions about the authenticity of experiences and the ethical representation of subjects, particularly in sensitive contexts such as the Holocaust (Frosh 2018, Papier 2023).

Authenticities and AI in the Affective Museum

If authenticity is a pivotal concept in earning trust, then as a concept it warrants further exploration. In recent decades, museum discourse has begun to shift; now, alongside the enduring importance of evidential and material authenticity, there is growing emphasis on affective engagement, emotional resonance, and experiential learning. This development, often referred to as the *affective turn*, has influenced curatorial practice and visitor expectations alike.

When international cooperation and ethics for cultural heritage and museums emerged in the middle of the last century, authenticity was a consensus concept with the meaning of being true and original, in dichotomy with falsification, anachronism, and copy (Arrhenius 2012). Heritage discourse was grounded in the European context, developing from an understanding of heritage as a tangible phenomenon and exclusive selection that should function as witness to history and tradition. The ontology stipulated that cultural memory was embedded in the material heritage objects and required experts and scientific approaches to interpret. Authenticity, as an index of material essence, was instrumentalised as selection criteria and consequently the concept played a key role in upholding legitimacy of the selection of heritage (Smith 2006: 90). Intangible heritage therefore represents a challenge to the emphasis placed on the idea of material authenticity, and "the preservationist desire to freeze the moment of heritage and to conserve heritage as an unchanging monument to the past". For Smith, the authenticity of heritage lies ultimately in the meanings people construct for it in their daily lives (2006: 6).

The established meaning of authenticity has been instantiated, not least by regional and community traditions where heritage is not bound to material properties, nor divided between culture and nature, or unfamiliar to religion and belief. Criticism has led to the inclusion of both tangible and intangible expression within heritage discourse, and the expansion of authenticity to include situational and immaterial aspects such as location, setting, use, tradition, craftsmanship, spirit, and feeling (ICOMOS 1994; UNESCO 2003). Inclusive and exclusive lists are still maintained (Kirchenblatt-Gimblett 2004: 57), and the essence of traditions and spirit is still negotiated and sustained by expert judgement (Hafstein 2018), but "if nothing else", Smith argues, "the idea of intangible heritage forces a recognition

of the inherent dissonant nature of heritage because of the immediacy of its production and consumption" (Smith 2009: 5).

Research on affect in museums deviates from the concept of authenticity to focus instead on co-creation of experience and learning. Co-creation is determined either by active participation, or interacting with the environment, other visitors, and staff (Popoli & Dera 2021: 389). To achieve this, visitors must be able to develop and shape their own experiences via engagements. This is achieved not just in the staging of the experience but through full cognitive and emotional immersion (Jung et al. 2017: 142). The influence of the affective turn has led to a notable departure from exhibitions primarily structured around textual content, fostering instead a greater emphasis on non-verbal forms of communication (Champion & Foka 2020). Scholarly attention has addressed different concepts, such as affect and emotions (Boyd & Hughes 2020, Smith, Wetherell & Campbell 2018, Smith 2021), empathy (Campbell & Smith 2017), multisensory engagement (Levent & Pascual-Leone 2014), atmosphere (Dorrian 2014), presence (Bencard 2014), and immersive experience (Carrozzino & Bergamasco 2010, Champion & Foka 2020, Cummings & Bailenson 2016). In terms of digitality, it is perhaps then in the overall context where authenticity resides.

The oft-quoted ideas of Bruno Latour and Adam Lowe (2010) suggest that there is an *aura* that can be transcribed from original to reproduction, via the complexity and sophistication of the replica, but also through the context surrounding the original object. The museum itself, having decontextualised and re-assembled artefacts with diverse origins, conjures the aura from original object's essential authenticity and its staged relational authenticity. Digitality as a concept dictates that exhibits can access a mobility and broader reach than ever before, but has yet to fully displace the museum; the museum still 'feels' right in many cases, compared to, say, a tourist information centre (Illsley 2022: 226). As a step further along the process of digitalisation, AI blurs the lines further still between the technological sophistication that lends an *essential authenticity*, and a *relational authenticity* that is resonated through a museum's status as a trusted entity.

Relational Authenticity and Essential Authenticity

Authenticity is an ambiguous concept, yet still a touchstone for debates within museums and cultural heritage activities at large. The ambivalence of authenticity is enmeshed with the notion of heritage, as the concept is instrumental both as a criterion for selection, and a guiding principle for conservation measures (Jokilehto 2017, Folga-Januszewska 2020). As authenticity is semantically coupled with truth, there is a tendency to also equate authenticity with scientific purity and accuracy, lending it a *de facto* role in gatekeeping (Lixinski 2022: 1216). Now

a long-standing tradition of critical research on production and consumption of heritage (Smith 2006), the affective turn in museums (Lemmings & Brooks 2014) and the corroborating new technologies for immersive media to engage with audiences (Varutti 2023) have shifted the connotation of authenticity from a presumed essence embedded in physical materials or truthful statements to a relative and relational concept.

The mutable interconnections between AI, heritage, and authenticity are crucial points of departure when examining the meaning behind statements avowing that the testimonies presented in DiT seem authentic, or that the meeting itself felt authentic. Moreover, what authenticity is it that is being derived from the installation and should it even matter for the museum whether the encounter is perceived as authentic? If so, do all types of authenticity matter as much, and do they all have the potential to affect trust in museums positively or negatively? As a means of classifying authenticity in the context of immersive productions in museums, we have opted to use the terms *essential* and *relational authenticity*, after Grayson and Martinec's (2004) *indexical* and *iconic authenticity*, developed for consumption studies and grounded in semiotics.

Essential authenticity refers to the direct, physical qualities of museum objects, i.e., those considered the 'genuine articles' within the collection. This type of authenticity relies on accurate evidence-based facts, whether they be tangible or intangible heritage, with fact-checked narratives within testimonies. It could also include the museum building itself (Illsley 2022: 226). A filmed testimony of a Holocaust survivor is essentially authentic because it captures a specific person, speaking in a particular time and place. In this view, authenticity resides in the materiality or can be verified through technical means and measurements.

Relational authenticity, by contrast, is grounded in emotional resonance and places emphasis on subjective feeling. This type of authenticity can stay intact even if an object is a reconstruction or a setting is staged as a type of 'relational authenticity' between the object setting and the perceiver. The perceived trustworthiness of the museum as a societal institution is relational, since this relies on a feeling of trust and the elicitation of credibility on the part of the museum. The experience of speaking with a DiT digital surrogate generates a sense of relational authenticity, produced through presence, eye contact, and pauses, that is akin to interacting with a 'real' Holocaust survivor. A digital museum may also attain a relational authenticity, if it aligns with the museum's values and manages to evoke a sense of trust.

Together, these two categories of authenticity provide a useful framework for analysing how audiences perceive truth in immersive museum experiences.

The Swedish Holocaust Museum

Although authenticity and lasting trust are crucial to all museums, the need is amplified for Holocaust and genocide museums, due to the obligation to respect the memories of victims, survivors, and their relatives. According to curators at the new Holocaust museum, when visitors perceive that a museum is honouring victims' stories rather than sensationalising them, they are more likely to trust its narrative. Holocaust denial remains prevalent in certain contexts, with numerous instances showing how historical interpretations can be distorted or manipulated to further contemporary political agendas (Lipstadt 2016, Karlsson & Zander 2020). Establishing and maintaining trust is therefore of paramount importance for the museum. Museums preserve stories and objects for the future, transforming them from individual memories into 'cultural memories' and collective memories. The establishment of a museum makes it clear "that memories of the Holocaust should be regarded as part of Sweden's cultural heritage" (Swedish Government Official Reports 2020: 122-23).

Inaugurated in 2022, as part of the National Historical Museums, the Swedish Holocaust Museum is dedicated to preserving and communicating the memory of the Holocaust. The primary aim of the museum is to deepen public understanding of the historical events leading to the genocides perpetrated by Nazi Germany (Swedish Government Official Reports 2020: 102). A key aspect of the museum's mission is to illuminate the Nazi worldview and the society that the perpetrators sought to construct. Why certain groups were perceived as threats then, and why these attitudes continue to resurface in society, is paramount (Kvist Geverts 2020). The personal stories connected to the Holocaust and the materials donated to the collections also illustrate the deeply personal connection to the Holocaust, and, by extension, to Sweden (Swedish Government Official Reports 2020: 241). Therefore, the museum's role extends to demonstrating how the legacy of the Holocaust continues to affect contemporary society in its totality.

The preparatory work emphasised the need to base the museum on survivor testimonies (Dir. 2019: 36). To bring forward the stories of survivors, the government's investigation concluded that "the museum must establish its own collection of objects, documents, and various types of testimonies" (Swedish Government Official Reports 2020: 107). Another key element of the museum's "legitimacy, credibility, and expertise" (*ibid*. 2020: 124) is research, which should focus on how the Holocaust is connected to Sweden's history, despite not occurring on Swedish soil. The discourse is clear: the museum is the institution best positioned to gain public trust, inherently establishing trust through its collections and research.

In the new museum's official project plan, *Förstudie projekt: Sveriges museum om Förintelsen Tillfällig verksamhet* (shared via email, May 28, 2021), it is stated

that the new museum and its offerings ought to be "accessible to people regardless of where in the world they live or are located, as well as to people with different functional variations. Digital channels and platforms therefore become just as important as a physical location for the museum's programming and public offerings". The Swedish Holocaust Museum also initially launched as a purely digital museum in June 2022 with the opening of its website, museumforintelsen.se, which contained an interactive digital version of DiT and additional material around Swedish testimonies. The physical museum opened a year later, in a temporary museum building, until a permanent premises was to be established. While the implications of digitalisation were not explicitly explored, the preparatory work highlighted the importance of disseminating knowledge digitally through the museum's homepage (Swedish Government Official Reports 2020: 118). While the core offerings and collections remain central, a referral response pointed out that digitisation and AI could offer new opportunities for research and the development of novel forms of knowledge (*ibid* 2020: 221).

Dimensions in Testimony from the Museum's Perspective

Like many other heritage institutions, the museums within the National Historical Museums are increasingly exploring the use of AI, both in order to enrich digital collections with metadata for new research, and perhaps even more so for curatorial potential (Villaespesa et al. 2019). Prior to establishing the Swedish Holocaust Museum, the governmental institution produced, together with the organisation Jewish Culture in Sweden, the exhibition *Speaking Memories – The Last Witnesses of the Holocaust*, which partly merged into the new museum. This exhibition incorporated recordings of two Holocaust survivors, Pinchas Gutter and Eva Schloss, using the DiT technology developed by the University of Southern California (USC) Shoah Foundation. The technology relies on two key forms of artificial intelligence: natural language processing, which enables the system to interpret visitors' spoken questions, and machine learning, which matches these to a large database of pre-recorded answers provided by the survivors. After the *Speaking Memories* exhibition, the National Historical Museums received a government assignment to produce two Swedish-language interactive biographies with Holocaust survivors, using the same technology (Swedish Government Assignment 2020). Tobias Rawet and Elisabeth Citrom were the Holocaust survivors interviewed in Swedish in this format.

DiT's format of affective and inquiry-based pedagogy was outlined by the museum as superior to merely reading facts about the Holocaust, or as the teacher's manual from the museum in 2022 phrases it, "hopefully makes the

work more enjoyable and strengthens their [the students'] desire to learn more" (National Historical Museums 2022). The intent was to inspire students to learn about the Holocaust through "curiosity" (National Historical Museums, personal communication, 3 June 2022). A sense of relational authenticity was central to the pedagogy, with interaction fostering deeper learning through empathy. Yet, an overemphasis on relational authenticity in a museum context can be problematic, as illustrated in an internal email exchange from 2022. In the discussion, a producer and an educator discuss small talk within DiT interactions, suggesting that such small moments are valuable, to help students "gain an increased feeling of meeting a real person". In response, the other person remarks pointedly: "Perhaps it should be clarified that these are in fact real individuals, and not merely the impression of meeting someone real?" (*ibid.*).

In its early years, the promotion during the planning stages of the installation emphasised AI as a buzzword, leveraging its positive connotations as the exhibition was widely marketed as "creative AI installations", "AI experience", or just "AI installation" throughout 2021 (National Historical Museums 2021). At this stage, there was little or no internal critical discussion about the use of the term AI. Beyond the underlying AI infrastructure, the installation requires continuous human curation to ensure conversational coherence. There is also a human decision-making process on how to make these connections. Every question and answer is saved and then reviewed by the curator to guide future AI responses. The producers are also made aware of technical issues in the event of incoherent answers, and the conversational structure is constantly improved.

The curated focal point is the survivors' memories and not historicity, which can prompt a standard response when a user's question falls out of scope, for instance: "That question you should ask a historian" or "Keep in mind that I am a Holocaust survivor and not a historian". Other standardised answers are "This question was not asked during the interview" or "That was an inappropriate question". The standardised answers may disrupt the immersivity in terms of relational authenticity, but they also elicit the methodology behind the installation and create a productive tension on a meta level to the synthetic conversation. A general conception of the DiT installation within the museum is that it is a complementary immersive element offering the visitors another means of understanding.

The concerns around interaction and interpretation became even more pronounced when the DiT installation was adapted for an online audience on the museum's digital platform. However, presenting the biographies online posed significant challenges, particularly in the loss of context and curatorial guidance. The sense of trust created from being situated within a museum environment, with accompanying nomenclature from museum educators, was absent in

the web-only experience. To address these limitations, the museum decided to append an introductory element. This feature involved the two individuals in the interviews, including behind-the-scenes photographs from the recording process. This approach aimed to elucidate the recordings' essential authenticity through transparency in the production process, the need for which emerged from the on-site exhibition testing phase, where visitors occasionally questioned whether the installation involved actors, computer-generated imagery, or even live video calls with the witnesses.

The online presentation also raises broader ethical questions that have come to define the use of AI and immersive technologies in memory institutions. Digital witnessing can involve interactive video testimonies or virtual reality experiences that allow audiences to engage with the past in new affective and immersive ways, enhancing curiosity and deeper learning, but hold a unique set of ethical considerations including obtaining informed consent from survivors or their families, ensuring accurate representation, and maintaining respect for their dignity throughout the process (Wong 2011). It is suggested that there is a scarcity of nuanced narratives, critical source analysis, and discussion on ethics in these novel formats, as well as an ongoing need for museums to respond to the tensions created by new technologies and audiences as AI evolves (Illsley et al. 2024, Aavaranta et al. 2024). When DiT is ethically concerned, the choice has been made for the annotation process to be done by humans, given the potential for AI to alter testimonies or create synthetic representations—raising concerns about authenticity and manipulation (Lagerkvist 2022).

These ethical concerns coincide with broader institutional uncertainties around authenticity, affect, and the role of new technologies and terminologies, often introduced without sufficient contextualisation, within museum storytelling. The conveyance of DiT's AI aspect implies a tension within the museum's role: on one hand, the traditional reliance on essentially authentic elements, while on the other, the increasing requirement for relationally authentic experiences that create an emotional response, an authenticity derived from the intangible and intuitive. These internal tensions became publicly visible when DiT was showcased at large-scale events, exposing varying interpretations and expectations among visitors.

A case in point occurred during the Gothenburg Book Fair in 2023, where the Swedish Holocaust Museum showcased DiT. Museum staff fielded questions from visitors, expressing doubts whether the content was generated footage, a composite of multiple witnesses, or even entirely synthetic. The interviewed communicators and museum educators attributed this heightened scepticism to the growing public awareness of the term AI and its 'sudden synonymy with fabricated content'. The concern was that ascribing the term 'AI-powered' to the testimonies

led members of the public to mistakenly believe that the video content itself was generated, rather than being authentic testimonies of real Holocaust survivors. The guidelines were again revised so that the term AI was no longer to be used in public communications, and the exhibition was to be consistently described as "an interactive survivor biography" (Hansén, personal email communication, May 7, 2024). While the term AI was not to be promoted, it could still appear in background materials that explained the technical foundations of the DiT project. AI became a concept to not overuse, if not completely avoid, mirroring earlier internal advice to avoid or at least contextualise words such as hologram while describing DiT (Hansén, personal email communication, Feb 18, 2021).

In response, the museum undertook a series of revisions in how DiT was described and contextualised. Coupled with the interviews with museum educators, a significant shift in language is revealed both in marketing communications and pedagogical guidance: "they are filmed testimonies" but "through AI technology, your questions are matched with their answers" (Interview Museum Educator SHM 2024). In the 'About the project' section on the museum's online version of the DiT experience (The Swedish Holocaust Museum n.d.), the reference to AI technology was embedded in a text that highlighted the (essential) authenticity of the testimonies as filmed interviews: "In the project, survivors around the world were documented through structured in-depth interviews filmed using advanced video technology". An additional guidance page for teachers posted an exercise in source criticism and discussed the word 'authenticity' as it pertained to the testimonies (Swedish Holocaust Museum n.d.2). When "AI" was used, it was done with more caution and specificity, e.g., "after the documentation, the questions and answers were edited and processed in a system based on AI technology. Using advanced speech recognition, the interactive systems were built over time with the help of semi-automated machine learning" (ibid.). The role of the 'human in the loop,' as well as the expertise and fact-checking by scholars, was highlighted as part of the production process. This addition was seen as an attempt not only to transparently display evidence and sources, but also to highlight the essential authenticity of the production.

All technical descriptors were gradually phased out in favour of simpler terminology, without prominent use of 'AI.' Both written descriptions and verbal introductions by museum educators and communications were revised, and DiT was consistently referred to as "interactive video installations", or more vaguely "a form of documentation", and more vaguely still, "installation" (The Swedish Holocaust Museum 2023). By 2024, references to AI in online nomenclature were minimal and embedded in source critical discussion around the production process, simply referring to "Dimensions in Testimony" (The Swedish Holocaust Museum 2024).

Dimensions in Testimony from a Visitor Perspective

The present study draws on documentation from several smaller studies conducted between 2020 and 2023, including forty semi-structured group interviews and observational notes from interactions with 406 participants who engaged with the DiT installation featuring Tobias Rawet and Elisabeth Citrom at the Swedish History Museum and Malmö Museums, respectively. The majority of participants were upper secondary school students, though some were younger pupils or adults in education programmes, typically accompanied by teachers. In addition, the material includes three days of covert observation of general audience interactions, with brief follow-up questions, as well as nine in-depth interviews with individual adult visitors. The study applied inductive thematic analysis to investigate how participants perceived and interpreted the installation, with a focus on affective engagement, authenticity, trust, as well as perceptions of the technological and testimonial sources. All participants had been informed about the AI component prior to interaction.

Many participants, particularly students, described the opportunity to ask their own questions as enhancing their engagement and deepening their emotional connection to the survivor. This interactivity was frequently characterised as affective rather than factual—for instance, some reported having 'learned about a feeling.' Such responses were interpreted as instances of relational authenticity, which emerged as a dominant theme across the material. Engagement was more often linked to the dynamics of the encounter than to the informational content of the testimonies. Respondents frequently described the survivors as 'honest' and 'real,' referring to body language such as smiles, pauses, and eye contact as contributing to a sense of presence. The narratives were described as 'organic,' 'touching,' and 'personal,' with posture and vocal tone evoking both empathy and trust in the testimony's essential authenticity. Longer responses of several minutes often intensified this emotional resonance, and some participants reportedly adjusted their behaviour to sustain the perceived authenticity of the interaction. Visitors and producers alike framed the installation as a supplement to, rather than a substitute for, more traditional displays of objects, texts, and images.

Relational authenticity often developed gradually. Visitors who interacted with the installation only briefly, asking one or two questions, were more likely to report low emotional involvement and to raise technical issues, particularly when using non-standard dialects, idioms, or slang. As the interaction progressed, many appeared to accommodate the system's limitations, often attributing miscommunication to their own speech. Several adult participants described a 'threshold' or social pressure to formulate questions in ways the system could interpret, including exaggerated articulation or rephrasing. These strategies may have served to maintain the illusion of dialogue but also reveal how social dynamics

within groups shaped the interaction. While technical pauses in the AI processing disrupted the flow of conversation, they also drew attention to the mediated nature of the encounter, sometimes reinforcing rather than undermining trust in the recorded testimony.

The in-depth interviews with adults provided additional insights into how visitors understood the nature and purpose of the installation. Almost all assumed the answers were based on the survivors' own memories. When asked about objectivity and historical accuracy, most indicated that these were not central concerns. As one participant explained, "It's a documentation of his experiences and life", while another noted, "It isn't scientific because it is a subjective narrative, and I don't think the purpose here is to try to be scientific". While some expressed a desire for greater historical context, these comments reflected a general prioritisation of relational over essential authenticity. The testimonies were received as intimate, affective narratives, offering insight into personal memory and experience rather than factual chronology.

Some participants did, however, seek more general historical knowledge, asking questions about timelines or extermination camps. Whereas most visitors were satisfied with an affective, relationally authentic experience, a smaller number preferred essential authenticity, requesting evidence-based orientation. In response to this variation, the Swedish Holocaust Museum has included in its project plans (2024–2025) the development of a "digital interactive timeline" to complement the personal testimonies. This addition is intended to preserve the immersive qualities of the DiT installation while integrating points of reference that support historical orientation and factual grounding.

Understandings of the role of AI in DiT varied widely. During the early years of the project (2021–2022), many visitors expressed uncertainty about the nature of the installation: was the person on screen real? Was the footage synthetic, animated, or live? A frequently asked questions document, distributed in collaboration with a museum in Dallas, addressed these misconceptions directly: "Is he real? Yes, this is a real video of a real person. He is not animated or edited in any way. He was filmed in really high definition, which is why his image is so clear. He is not on Skype and can't hear you; all of the answers you hear are pre-recorded" (USC Shoah Foundation 2021). Similar materials were later incorporated into the Swedish-language installation. Nonetheless, some visitors interpreted Tobias Rawet as a fully AI-generated character based on fictional memories, a composite of testimonies, or a live respondent.

By 2024, visitors generally demonstrated a clearer understanding of the installation's technical underpinnings, particularly when provided with an introductory explanation—something that was inconsistently offered in earlier years. Regardless of assumptions about the AI, most participants expressed trust

in the narratives. This trust appeared grounded both in their emotional connection to the survivor and in the perceived authority of the museum. One visitor stated: "I trust the DiT exhibit because it is the museum that is behind it".

Several interviewees noted that if the same content had been presented on a commercial or independent platform, they would have been more sceptical. As one participant reflected, "The purpose of museums is to spread history, culture, and perspectives for us to think about how it was and to take it with us into the future. I assume that, and then I am perhaps not so critical". Another remarked: "A museum that is supported by the state is something I will automatically trust, and [I] believe in what is presented here". These responses suggest that the museum institution itself plays a key role in facilitating trust in new and unfamiliar technologies, positioning DiT at the intersection of innovation, institutional authority, and affective learning.

Authenticity Matters—A Productive Tension

What, then, was and is at stake in the case of DiT? To what extent did it matter whether the Swedish Holocaust Museum effectively communicated what was meant by AI, or how artificial intelligence was employed within the production? Is it significant whether Elisabeth and Tobias, as presented in DiT, are perceived as real people sharing their lived experiences or as fabricated figures generated based on compilations of Holocaust testimony?

Though a contested and complex concept, authenticity remains central to both heritage discourse and visitor perceptions. Traditionally associated with truth and accuracy, the concept of authenticity within the museum sector has privileged scientific purity and material evidence as criteria for legitimacy (essential authenticity). Recent shifts in museum practice, such as the affective turn (Varutti 2023) and the rapid rise of immersive digital technologies, have broadened this understanding. Authenticity is no longer seen merely as something embedded within artefacts, but also as something subjective, relational, and felt in the encounter as something that is emotionally resonant and experientially credible (relational authenticity). Even reconstructions or virtual representations can thus be felt as authentic and therefore trustworthy. In the affective museum, authenticity resides in the dynamic relationship between the visitor's subjective and affective experience, the framework or setting provided, and the museum as a credible institution. Against this backdrop, the use and communication of AI within the DiT exhibition takes on ethical and interpretive significance that extends beyond being a technical footnote.

In our case study, questions around how AI is defined and communicated become central—not just as superficial matters of terminology, but as issues of

ethical transparency and institutional accountability. The potential confusion over whether Elisabeth and Tobias are real individuals or AI-generated digital constructs directly engages the tension between essential authenticity, anchored in evidentially verifiable sources, and relational authenticity, which depends on emotional resonance, affect, and the feeling of verisimilitude. If visitors confuse algorithmically mediated testimony from real people to be 'AI generated,' the contract between the museum and its audience is strained. Such cases may engender affect, but without clarity and transparency, it risks undermining the trust that allows museums to function as authoritative spaces of learning, and is thus consequential. The stakes are not just about technological choice, but about the conditions under which authenticity is perceived and trust is created and maintained. Misunderstanding the nature of the medium in new technologies, including but not exclusively AI, can erode both the power of the testimony and the trust in the institution that presents it. This concern is amplified by ongoing changes in how museums define their role in contemporary society.

The museum's purpose is constantly negotiated, with many institutions and professionals taking a stronger stance on current social issues, sensitive and contested heritage, democratic values, and rights-based approaches. Jette Sandahl, former director of the Museum of World Culture in Gothenburg, advocates for museums to be "democratising, inclusive and polyphonic spaces for critical dialogue about the pasts and the futures" (Lehmannová 2020: 3). In this transforming role, trust remains a foundational element of museum legitimacy, built through both factual grounding and affective resonance. Trust, according to surveys and research, is primarily established through fact-based, research-oriented communication, and the real objects in the museum's collection, that is, in essential authenticity. Trust in museums is firmly tied to their traditional activities and their role in study and education based on collections as evidence. Alongside this, the affective turn has seen museums turn to more emotionally emphasised practices, where relational authenticity is pushed to the foreground in curating exhibitions and other experiences for general audiences, such as in the digital experience DiT where the visitor is introduced to Holocaust studies through affective means in the 'genuine meeting' with a Holocaust survivor. An affective museum is centred around immersive and interactive experiences that invoke aura and emotional impact. That said, this prioritisation of affective engagement raises pertinent questions about how museums balance emotional experience with evidential clarity.

Does it potentially undermine the museum as an institution if experiences come to be understood solely as subjective stagings, in which evidence-based facts are secondary or conflated with more artistic interpretations? Both aspects can and ought to coexist, but a clear distinction between them is necessary. Museum visitors

need to know that the testimonies of Tobias Rawet and Elisabeth Citrom are indeed testimonies and not AI-generated composites, not only on an ethical level in respect of their lived experiences, but to enable visitors to discern how different types of information should be understood and evaluated. Visitor feedback supports the idea that trust can be preserved when authenticity, both relational and essential, is effectively and transparently communicated.

The process study involving review of museum documents as well as interviews and observations indicates that ethical considerations must be constantly revised and actively discussed. The material suggests that public expectations regarding AI are evolving, but that technology is not the primary factor in building or disrupting trust. AI is a broad concept, and it is essential for museums to clarify the function of AI in their work and under what conditions it is applied. The research corroborates findings from other studies indicating that museums, as institutions, enjoy a high level of trust, and that their exhibitions are largely trusted in and of themselves. Trust is not necessarily contingent on objectivity. Conversations with Holocaust survivors, grounded in subjective memories and personal narratives, can evoke strong affective responses and a heightened sense of relational authenticity, the feeling of 'having met Tobias,' while still maintaining a sense of institutional credibility. Technical imperfections in the DiT experience do not appear to significantly detract from this perception, particularly in interactions that elicit longer responses. This suggests that institutional framing through museum staff, the museum setting, and context plays a vital role in supporting trust, even in technologically mediated experiences.

Whether this tolerance stems from the museum's existing trust capital is a question warranting further investigation. At least, the broader museum context where the DiT is often experienced includes curators and museum educators who help to reinforce relational trust. Their presence, together with the physical museum setting and proximate essentially authentic objects, reinforces the visitor's overall sense of authenticity in the encounter. Yet even immersive and affective experiences like DiT must be anchored in a framework of evidential integrity. If visitors cannot discern whether an experience is AI-generated, as suggested by our case study observations and interviews, this ambiguity may have long-term implications, not only for DiT, but for the museum's broader role as a trusted site for authentic objects and testimony. If authenticity is regarded as a value in itself, and within the heritage sector, then its preservation is essential, as it forms the foundation upon which institutional trust is built.

Ethical and Affective Curatorship in an AI-mediated Future

Looking forward, the museum's evolving engagement with AI reveals shifting strategies and a growing need for transparency. In 2019 through 2021, the National Historical Museums communicated around DiT with the frequent use of the term AI, and was only alerted to this being perceived as equated to 'AI generated' after asking visitors in late 2022. The exhibition began to be communicated without using the term, yet contextualising how AI was used in background information about the project, both in the museum and in the digital exhibition format. DiT manages to bridge both relational and essential authenticity, making it possible to create engaging affective learning experiences within the affective museum framework. Yet, if the AI usage is unclear, due to lack of clear communication on the part of the museum, AI systems might become problematic, not the least on an ethical level, in the long run.

The question remains: can AI bridge or further extend the gap between the museum's discretionary concerns of collecting, conserving, researching, and exhibiting, and its public engagement in education, study, and enjoyment? As AI is becoming increasingly mainstreamed, it becomes pertinent to integrate it into the broader understanding of source criticism. Certain AI applications are becoming more widely known, and scepticism is emerging regarding the particular functions of AI and its training data. Museums that use AI are also serving as agents in public education on critical thinking. Within this evolving landscape, DiT provides a compelling example of how museum communication and pedagogical strategies around AI have adapted over time.

What AI systems will ultimately offer museums remains to be seen. However, it is likely that AI will not only mediate information but also foster new collaborative processes and co-creation in the core activities of collecting, conserving, researching, and curating exhibitions in order to continue to engage new audiences. As 'AI' has changed from an unknown concept for a general audience, to a word thrown around in daily language with a wide range of definitions, museums must clearly communicate what kind of AI is used, how it is applied, and what degree of human oversight is involved. DiT serves as a useful example here, where the museum altered its wording around AI, from highlighting it as an exciting buzzword to create interest and invite audiences to engage with Holocaust testimony, to letting it stand back and be contextualised in transparent explanations on how a production was made, and instead inviting audiences through more traditional seeming museum pedagogical entry points such as 'inquiry,' 'interaction,' and 'dialogue.' The digital format also allows for greater accessibility: at least in theory, 'anyone with an internet connection' can interact with the resource. Also, the platform can serve both a primary school student and a Holocaust scholar within the same system, something traditional museum texts cannot easily achieve.

Despite this pedagogical and accessibility potential, when audiences become unaware of how particular digital experiences function, unsure whether a testimony is video footage, a real-time conversation, or a generated compilation, or even what constitutes a 'real' interaction, this ambiguity may erode confidence in the museum's reliability as a purveyor of truth, particularly in digital-only formats where the curator or educator is not currently present. A final major ethical concern surrounding AI usage in exhibitions and its impact on trust in museums is the systemic bias embedded in current AI technologies. Most AI language models currently underperform in understanding dialects, non-standard speech, and minority languages. This is a limitation that disproportionately affects these non-dominant groups and, if left unaddressed, can unintentionally reinforce majority perspectives and systematically exclude other more marginalised voices.

To conclude, the study shows that the success of AI-mediated installations like DiT depends less on the flawless sophistication of the technology itself and more on institutional framing, transparency, as well as pedagogical and curatorial strategies. Visitors' trust was sustained when they were guided to feel emotionally engaged, but this was grounded in the assumption that these were authentic, filmed testimonies. Miscommunication about the role of AI in the installation risked undermining this trust, as seen in reactions at the 2023 Gothenburg Book Fair, where visitors speculated whether the installation featured deepfake-like composites or simply dismissed them as inauthentic and therefore uninteresting. However, when the museum revised its communication to further clarify that the footage was real and AI was used in the process to match questions with pre-recorded responses, supported by background information on the production process, visitors went on to express confidence in both the content and the institution.

These findings suggest that museums can, and should, navigate both essential and relational authenticity in their digital offerings. Doing so effectively requires a commitment to clarity, ethical transparency, and the acknowledgment of emotional engagement as a legitimate part of learning. In the case of the Swedish Holocaust Museum, trust was not eroded in using AI, but by the lack of clarity surrounding its use. As museums continue to adopt new technologies, they must consider not only what is technically possible, but what is communicable and experientially credible. The challenge is not only to innovate, but to ensure that innovation does not obscure the human stories at the heart of much museum work.

In the end, sustaining the museum's unique capacity to engender trust requires continuously embracing both the evidential and the experiential. Authenticity within a museum's digital offerings cannot rely on one of these alone; it must be grounded in both. So too must be the museums' approach to the use of AI technologies in order to retain affect, personal engagement, and trust among audiences, all the while remaining technically rigorous, emotionally attuned, and ethically transparent.

Declaration of AI Use

AI tools were used in a limited capacity during the preparation of this manuscript, with Claude 3.0 and ChatGPT 5.0 (closed versions) em-ployed solely for proofreading and language correction purposes. All outputs were reviewed and edited by the authors, who take full respon-sibility for the content of the published article.

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The Use of Artificial Intelligence in Visualizing Historical and Cultural Objects on Social Media: A Sentiment Analysis of Public Reactions to AI Generated Images of Indonesian Heritage

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Abstract

Visual reconstructions generated by Artificial Intelligence (AI) are swiftly gaining popularity in both academic circles and entertainment industries. Without credible sources, disseminating AI-generated visual depictions of historical figures and ancient sites on social media may perpetuate misinformation and cognitive bias. AI-generated reconstructions have been developed within the scientific practice of History, Anthropology, and Archaeology. However, there are limited studies regarding the utilisation of AI to visualise historical objects, in terms of public reaction to the AI-generated visual. By conducting sentiment analysis of comments on AI Nusantara's TikTok platform, the study intends to provide an overview of public response to the visual design of historical figures and sites generated by AI technology. The public response to AI is important because many researchers are using social media as a source of data to forecast and explain human behaviour in real life. Related to the use of AI technology that penetrates various fields of life, this research in general can be useful for reading public responses and tastes so that they can project the use of AI in the future. Sentiment analysis methodology was employed to analyse comments posted under uploaded AI-generated images of historical figures and sites. The sentiment classification process uses the Naïve Bayes classifier algorithm in the RapidMiner software. This study finds that public sentiment regarding the utilisation of AI is categorised into three domains: accuracy, technology, and common knowledge. The categorisation is based on scientific opinion and local knowledge opinion. Accuracy relates to the similarity of AI-generated visuals to public expectations. Technology refers to the public's curiosity about the tools that are used to create the visualisation. Common knowledge refers to public perception and custom. This study also illustrates how AI can facilitate the creation of creative characters which are accurate by integrating academic references.

Keywords: Public opinion, AI Visualisation, Social media analysis, Visual reconstruction, AI-Generated.

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Introduction

The rapid growth of Artificial Intelligence (AI) technology has impacted the multidimensionality of human life (Saba and Pretorius 2024). During its continuous evolution, AI raises numerous debates within society. AI technology is increasingly prevalent in economics (Besiroglu et al. 2024), education (Ballantine et al. 2024; He et al. 2024), and healthcare systems (Onno et al. 2023; Schaekermann et al. 2024). AI has made significant contributions to the advancement of research in archaeology, history, and visual culture (Cotella 2023; Murphy et al. 2024). AI helps to categorise archaeological discoveries through visual recognition technology, predicting missing text in ancient manuscripts (Assael et al. 2022a; Zhao and Zhou 2025), presenting illustrations of ancient artifacts and scenes (Magnani and Clindaniel 2023), and correcting the colours and visuals of ancient artifacts (Santos et al. 2024). Nonetheless, the utilisation of AI introduces bias when the data is disproportionately sourced from a single individual, organisation, or region. This discrepancy in data enables specific patterns to emerge, driven by the data inputted into the AI platform. Thus, this phenomenon produces outputs with limited accuracy. Research concerning the utilisation of AI in reconstructing specific scripts or visuals remains primarily within the academic domain. Meanwhile, the public has exploited AI platforms such as Midjourney, OpenAI, DALL-E, and Stable Diffusion to reconstruct scripts or visuals for entertainment purposes with lack of accuracy.

One of the initial applications of computerisation in archaeology involved forecasting site locations and automating the classification of unearthed archaeological discoveries, as demonstrated by Fusco et al. (2022), Barceló (2009), and Gualandi et al. (2021). Lyons et al. (2022) argue that fostering interdisciplinary collaboration between archaeologists and computer scientists serves as a vital strategy for enhancing and broadening digital methodologies within the field of archaeology (Lyons et al. 2022). The use of computerisation for predicting historical artifacts is steadily advancing, with Roueché (2022) utilising an AI platform named Ithaca to demonstrate the capability of deep neural networks in restoring missing letters in an ancient manuscript (Assael et al. 2022a). The Ithaca platform was trained using a dataset consisting of 178,551 manuscripts that were subjected to scientific research assessment. Ithaca's precision holds potential to enrich and improve the endeavours of researchers. Specifically, the utilisation of AI for predictive purposes as demonstrated by Roueché mirrors the work of Assael in predicting the contents of damaged manuscripts (Assael et al. 2022b; Barcelo 2009; Fusco et al. 2022; Gualandi et al. 2021; Lyons et al. 2022; Roueché 2022).

Recently, AI technology has been used to visualise historical figures and sites. A multitude of these reconstructions have been shared on various social media platforms. Nathan Shipley (@nathan_shipley_vfx), a notable motion graphic artist,

recreates paintings of renowned global historical figures into their present-day human likeness with the assistance of AI technology. The designers from @ainusantara also reconstruct figures and sites related to Indonesian historical events using AI technology. In contrast to Nathan, who bases his visual reconstructions on well-known paintings as the primary source (Figure 1), AI Nusantara (@ainusantara) does not necessarily use paintings but also relies on literature and statues to visualise characters and historical sites in Indonesia, such as using the Prajna Paramita statue to predict Ken Dedes's face (Figure 2).

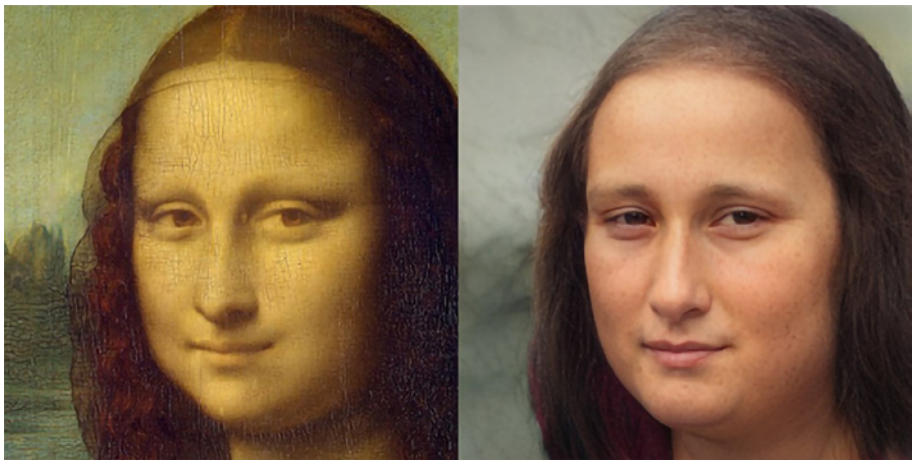


Figure 1. AI visual design based on the Mona Lisa painting (Shipley 2021) used with the creator's explicit permission (granted via email on 12 November 2024).

Figure 2. AI visual design based on the Prajna Paramita statue (@ainusantara 2022) used with the creator's explicit permission (granted via email on 12 November 2024).

At the same time, creators are sharing their work across social media platforms, including Instagram, YouTube, and TikTok. This practice has generated diverse responses from internet users. The public's interest in visual designs based on cultural and historical heritage shapes the responses of internet users, which in turn present several possible outcomes. For instance, the perception of AI-generated visualisations as an unquestionable truth may lead to controversy and more intricate consequences. This scenario is highly probable when a visual representation becomes widely circulated or goes viral on social media, influencing the public's perception of historical or cultural visualisation without validation from relevant scientific experts. Murata (2022) suggests that the utilisation of AI technology without adequate oversight of its accountability could contribute to the emergence of a society where individuals are treated as black boxes whose minds are manipulated and exploited through AI, known as post-truth society (Murata 2022).

In another perspective, the utilisation of AI and machine learning remains a subject worthy of critique. According to Crawford (2021), the classification system implemented by AI is inherently entwined with social and political dimensions, as it fundamentally relies on human subjectivity to assign words (labelling) to the trained data (Crawford and Paglen 2021). From a geographical standpoint, Davis (2020) also observes a disparity in the data accessible for utilisation of AI. Davis notes that the advancement of automated computational methods is hindered by the geographical discrepancy in the development and application of these techniques (Davis 2020). From an artistic standpoint, the utilisation of AI also presents challenges. Artists raise objections to at least two aspects when AI generates an image, namely ethical concerns and issues related to artistic expression. Ethical concerns arise from the alleged unauthorised sourcing of the images, potentially infringing on the artist's portfolio of works. A study also finds that people tend to like artwork less if they know it was made by AI, but they like it more if they know a human was involved; they value the human touch in art (Bellaiche et al. 2023). In relation to visual reconstructions of historical figures and events, it is evident that AI-generated images still rely on datasets sourced from artists' portfolios from around the globe. Thus, there is a need to scrutinise the bias and accuracy of these visualisations (Crawford and Paglen 2021; Davis 2020; Liu 2020; Murphy et al. 2024).

Therefore, this study aims to examine social media users' sentiments towards the visualisation of historical and cultural objects generated by AI through their comments. This study applies mixed methods in analysing social media comments—quantitative and qualitative—by scrutinising the accuracy of AI and cultural authenticity based on local beliefs and scientific evidence. By conducting sentiment analysis on data collected from social media, the study provides an

overview of the public response to the visual design of historical figures and sites generated by AI. Related to the use of AI technology that penetrates various fields of life, this research in general can be useful for reading public responses and tastes so that they can project the use of AI in the future (Abbasi et al. 2012). This study also contributes to the discourse on AI utilisation in the preservation of history and culture, as well as the role of social media in shaping collective memory.

Material and Method

Method

This study uses sentiment analysis of comments on TikTok social media posts about images created by AI based on Indonesian history Sentiment analysis is used to capture responses or opinions in social media comments by assessing the subjectivity of social media users' expressions and then classifying their sentiment as positive, negative, or neutral. Pozzi et al. (2017) explain that sentiment analysis is the process of evaluating the opinions, behaviours, and emotions of certain individuals towards an entity such as products, organisations, events, topics, figures, and others (Pozzi et al. 2017).

The first stage is data collection from comments uploaded on TikTok social media about Gajah Mada, Prabu Siliwangi, Singhasari Kingdom, and the Pyramids in Tanah Sunda from the AI Nusantara account. The four selected visuals were chosen due to their strong cultural significance within Indonesian society and the authenticity of the factual data, which has been interpreted in multiple ways. Comments for analysis were selected by identifying those that discuss the accuracy of AI-generated visuals and their cultural authenticity, considering both local beliefs and scientific evidence. This study focuses specifically on comments written in Indonesian. Although there were no geographical restrictions during data collection, the extracted data revealed that nearly all discourse occurred in Indonesian. This indicates that the primary audience for the AI Nusantara account consists of Indonesians who are engaging with local historical and cultural contexts through AI-generated images.

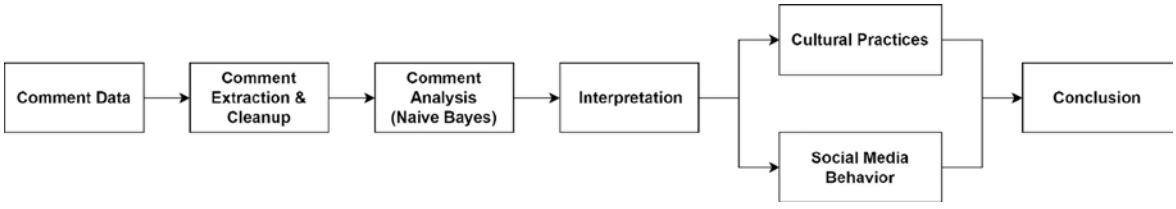


Figure 3. Research workflow. Source: author

These comments represent important public opinion and are used as primary data in sentiment analysis research (Henderi 2024). The data collected totals 2741 comments. Next, data cleaning was carried out to remove duplication, remove emoticons, symbols, hashtags, and irrelevant URL links. This can be seen in Figure 4. This is to guarantee more consistent data. This was followed by filling in 60% of the sentiment that arises from the comment manually to be used as training data for the Rapidminer Studio software to automatically recognise the next comments. At this stage, 60% of the samples are used as training data for algorithm, making the labelling process easier with classification into two categories of negative or positive sentiment. Accuracy in labelling is essential for training effective predictive models (Henderi 2024). Calculation is followed by recognition of patterns and opinion topics that arise to then interpret the results and write conclusions.

Technically our sentiment classification process used the tool in the Rapidminer software as seen in Figure 5. The advantage of using the Naïve Bayes classifier algorithm is that it is enough to use small training data to be used as a reference in the classification process and can function properly. The Naïve Bayes classifier is a simple probability-based technique based on the application of Bayes' theorem with strong independent assumptions. The Bayes prediction is based on Bayes' theorem with the following formula: *Algoritma Naïve Bayes Classifier* (Romli et al. 2021; Yuliarina and Hendry 2022).

$$P(H|X) = \frac{P(H|X)P(H)}{P(X)} = \frac{P(X|H)(H)}{P(X)}$$

X : Sample data that has an unknown class (label)
H : Hypothesis that X is class data (label)
P(H|X) : Hypothesis probability H based on condition
X P(H) : Probability of Hypothesis H
P(X|H) : Probability of sample X data based on the conditions of Hypothesis H
P(X) : Probability of X

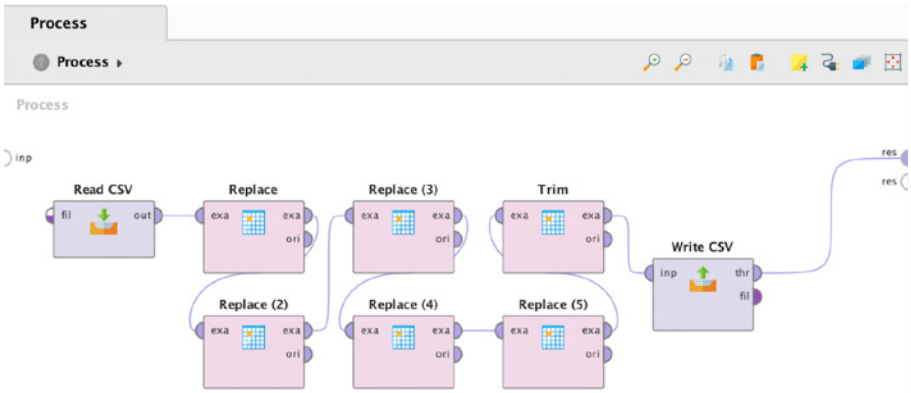


Figure 4. The process of cleaning the dataset from unnecessary elements. Source: author

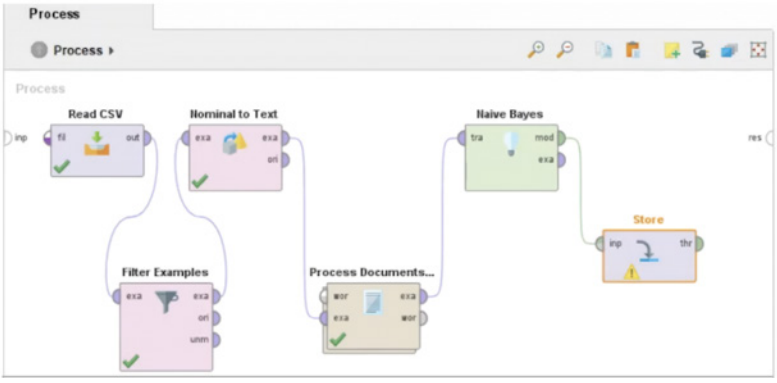


Figure 5. The sentiment classification process uses the Naïve Bayes algorithm. Source: author

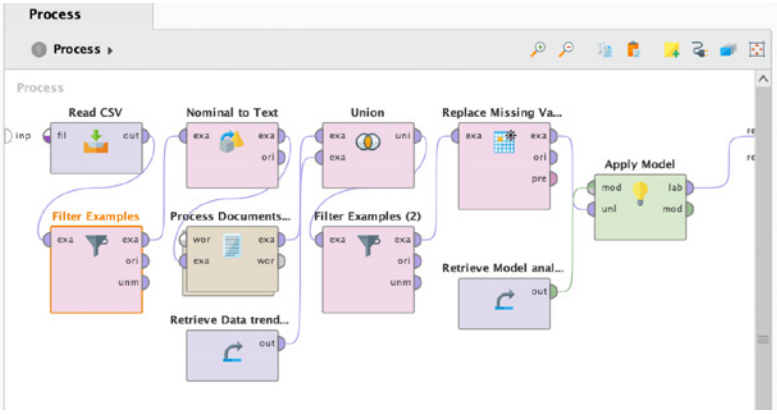


Figure 6. The dataset analysis process (Retrieve data trend, Union, and Replace Missing Variable) uses the Naïve Bayes algorithm. Source: author

This study follows the Internet Research Ethical Guidelines 3.0 from the Association of Internet Researchers (AoIR) by adopting a process-oriented approach (Frankze et al. 2020). Acknowledging the complex privacy expectations within public online venues, specific mitigation strategies were implemented. The data was collected in .csv format, with all user identities permanently removed. Since the comments on this platform are publicly accessible, regarding the AoIR guidelines (2019), obtaining individual consent was not required. Since it is not feasible to obtain consent from every user, strict measures were taken to protect privacy and minimise potential harm. To further safeguard user anonymity, comments were paraphrased rather than directly quoted, ensuring that individual commenters cannot be identified. As for the certain TikTok account ID that we display in this article, AI Nusantara, we have previously asked for consent from the owner. We made sure they were thoroughly informed about this research and allowed us to display the account ID even though it may reveal the account owner's personal information. These procedures ensure that the academic inquiry is balanced with a fundamental ethical responsibility to the online communities being studied.

TikTok and Its Popularity

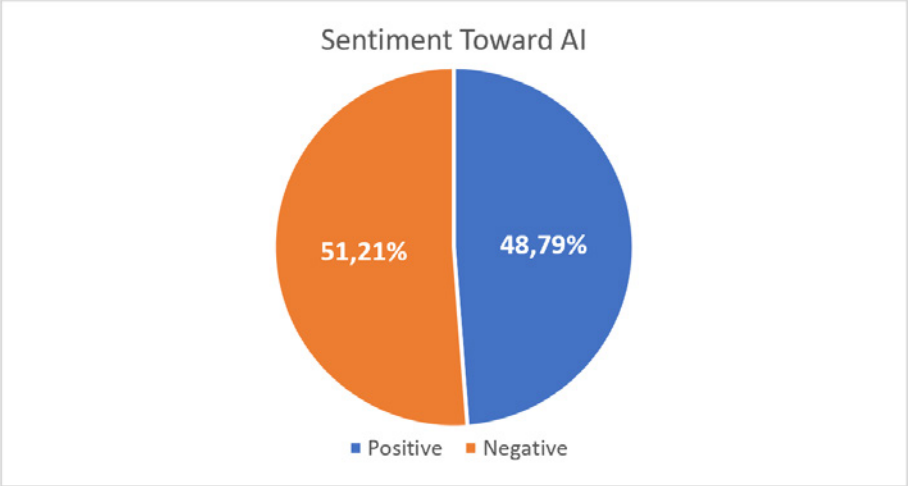
Since its release in 2017, TikTok's popularity has surged, particularly during the pandemic, making it the most popular social media application with over 1.5 billion active users by 2023 (Dixon 2024). Unlike other platforms, TikTok pioneered short video sharing, typically 15-60 seconds, across diverse genres (Southwick et al. 2021). By tailoring videos to user preferences, TikTok attracted a broad user base, especially teenagers (Y. Wang 2022). Indonesian TikTok users increased rapidly during the pandemic, reaching 157.6 million active users by July 2024, the largest user base globally (Ceci 2024).

In the creative realm, content creators foster engagement through the short videos that are the hallmark of this platform. Tutorials on creating works both conventionally and digitally are readily accessible, and products featured in these videos are easily purchasable. TikTok, serving both as a promotional medium and a social media platform, is frequently utilised to seek visual inspiration and keep up with current trends. The platform's user-friendly features for uploading content and integrated marketplaces are among its key advantages. Young people increasingly prefer audiovisual communication, favouring images and short videos over traditional text-based formats (van der Bend et al. 2023; Wang and Wang 2024), a shift facilitated by platforms like TikTok, enabling rapid and engaging visual storytelling (Vogels and Gelles-Watnick 2023).

TikTok's content personalisation ensures relevant content appears on a user's home page. If a user shows an interest in the creative industry and AI, the algorithm

intensifies the presentation of related content. AI-generated images of historical objects have become a trend on TikTok, with Indonesian creators participating by visualising historical figures, gods, and mystical creatures from folklore. The outstanding quality of AI-generated images enhances their realism, making TikTok accounts like AI Nusantara increasingly popular among users interested in historical content, especially Indonesian history.

Visual Works Subjected to Analysis



Graph 1. Sentiment towards using AI for visual design in the past

This study bases its analysis on AI Nusantara's TikTok uploads of four visual design objects, from which 2 741 comments were obtained (per January 2023). In data processing, only 1 654 comments, approximately 60%, were readable for analysis of public sentiment towards the use of AI. Overall, Graph 1 shows that the public sentiment towards AI-generated pictures of historical figures and sites demonstrated a slightly more positive tone with 51.21% against 48.79% of negative comments. This section presents the AI-generated images of the historical reconstruction followed by the description of the visuals. The chosen visuals are very popular among the public, and the public has already formed various interpretations towards the historical figures and sites.

This study also maps and analyses user comments on posts from the AI Nusantara TikTok account that feature visual designs inspired by historical cultures. Because the number of comments per post varies, these quantities are standardised as percentages to ensure appropriate analytical weighting. The comments analysed

in this study pertain to AI-generated visual content of two prominent figures of the Archipelago's monarchy and two historical sites, specifically: (1) Gajah Mada; (2) Prabu Siliwangi; (3) the Singhasari Kingdom; and (4) the Pyramids of Sundaland. These four posts were selected due to their high engagement rates, their representation of both historical figures and sites, and the diverse public discussions they generated, making them rich sources for sentiment analysis.

Gajah Mada was a general of the Majapahit Kingdom. Several studies suggest that Gajah Mada was believed to possess supernatural powers, contributing to his reputation as a mighty general. Additionally, several studies indicate that the Gajah Mada statue, designed by Mohammad Yamin (former minister), is frequently referenced by the public as a visual representation of Gajah Mada. In AI Nusantara's post with the caption "I asked AI to imagine 'Gajah Mada based on his statue'" and the hashtags #artificialintelligence and #gajahmada, several visual designs of Gajah Mada's character were presented. At the end of the video, the process of face rigging (integrating bones to animate characters for movement) is demonstrated on one of Gajah Mada's visuals. This post garnered 1 407 comments, from which 1 001 were analysed in this study.

The next case concerns Prabu Siliwangi, the prominent king of the Padjajaran kingdom who reigned around the 15th century. According to the prevailing myth, Prabu Siliwangi and his followers were transformed into white tigers. The visual design of Prabu Siliwangi was posted with the caption "I asked AI to reimagine 'Prabu Siliwangi based on his portrait painting'". This post, using the hashtags #artificialintelligence, #pajajaran, and #prabusiliwangi, garnered 302 comments, which were selected for analysis.

Singhasari was established around the 1200s. The Singhasari Kingdom is estimated to have been in Malang Regency, East Java, modern-day Indonesia. The AI Nusantara TikTok account shared a visual reenactment of life in the Singhasari Kingdom's capital city, Singosari, using the caption "I asked AI to imagine 'Singhasari capital city'" accompanied by the hashtags that refer to the capital city of Singhasari, featuring images depicting the atmosphere of bathing pools, markets, and areas surrounding temples in a slideshow. In this post, a sample of 133 comments was extracted.

The arrangement of stone structures resembling pyramids in the Gunung Padang area constitutes a megalithic site thought to have been constructed before the Egyptian pyramids. The megalithic site was uncovered by N.J. Krom in 1914, with details of the discovery documented in a report titled *Rapporten Oudheidkundige Dienst*. In 2014, renewed public interest in this site prompted further scholarly investigation by multiple institutions. A post featuring the AI visualisation of the pyramid set in Sundaland, the AI Nusantara TikTok account employs the caption, "I asked AI to imagine 'the ancient pyramids in Sundaland'",

along with the hashtags #artificialintelligence, #nusantara, #sunda, #scifi, and #gunungpadang. Under this shared post, there are 899 comments. The following section presents the detailed findings of the sentiment analysis conducted on these four AI-generated historical and cultural visualisations.

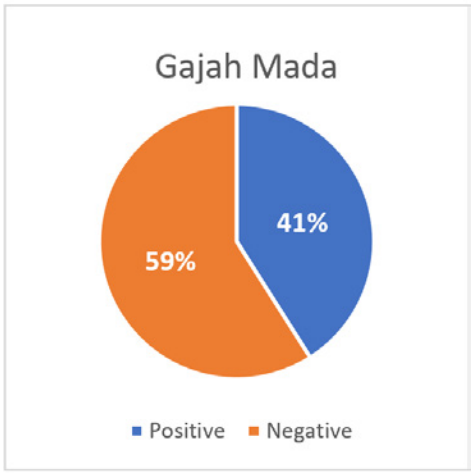
Research Findings

Gajah Mada

The AI-generated visual content of Gajah Mada is presented in a sequence of slideshow videos, beginning with an image of the statue of Gajah Mada located in Bojonegoro Regency, East Java. The initial image reference is the statue, which transitions to a black and white figure rendered in a realist visual style, occasionally displaying the wackiness typical of AI-generated visuals, with arms crossed like the statue. Various visuals show the AI's attempt to replicate the iconic pose and physical traits of Gajah Mada, such as a stocky build, thin moustache, and long hair, maintaining consistency across different images.

However, the AI's interpretation reveals notable inconsistencies, especially in facial features and accessories. While the statue depicts a mature face with a strong jawline, the AI-generated images present a younger, softer face with a different chin shape. Moreover, the AI adds elaborate crowns and luxurious necklaces that are absent in the original statue, indicating that the AI prioritised the general gesture of crossed arms but filled in other details based on broader training data about royal or warrior figures from the era. Further analysis by reviewers highlights differences in hand positioning: the statue shows both hands resting on the folded arms, whereas the AI images depict one hand tucked under the opposite arm. This discrepancy underscores the AI's focus on capturing the overall pose rather than exact details, resulting in a unique but not entirely faithful representation of Gajah Mada. These inconsistencies reflect the nature of AI-generated visuals, which often emphasise major gestures but may overlook finer specifics.

Figure 7. AI visual design based on the statue of Gajah Mada
(Source: TikTok @ainusantara) used with the creator's explicit permission
(granted via email on 12 November 2024).



Graph 2. Gajah Mada sentiment analysis (n=1001). Source: author

Sentiment analysis of comments regarding the AI visualisations of Gajah Mada indicates 409 positive responses and 592 negative responses, with the latter suggesting a general audience perception that the AI-generated visualisation does not align with the initial reference. Some negative comments on the AI results on Gajah Mada address the inaccuracy of the figure of Gajah Mada who is believed to have a lean body instead of fat and bulky. Meanwhile, positive comments show approval and discuss beliefs and historical significance.

The analysis highlights significant public scepticism concerning the historical accuracy of the visualisation, primarily stemming from uncertainty about Gajah Mada's actual appearance and the limited concrete evidence available, which prompted comparisons to other figures and underscores public awareness of these historical gaps. Nevertheless, discussions also encompassed diverse views on Gajah Mada's physical attributes and religious affiliation, demonstrating strong public interest in his history, mythology, and spiritual aspects. These interactions also revealed an appreciation for the AI's technological capabilities, despite underlying doubts regarding the visualisation's historical accuracy.

In the academic realm, there are several versions of Gajah Mada's depiction based on the statue by Muhammad Yamin, which shows Gajah Mada with a stocky, round face, devoid of a moustache and beard. Another notable depiction is presented by Prof. Agus Aris Munandar from the University of Indonesia. He characterises Gajah Mada based on the Brajanata statue, depicting him as a dashing man with a moustache and a mesomorphic physique. The Brajanata representation features curly hair, a large, well-built body, and closely mirrors the historical figure of Gajah Mada due to the similarities in characters and events associated with him. Additionally, a version discussed by Emha Ainun Najib (Cak Nun), an Indonesian

cultural and religious figure, during a Cultural and Environmental Sarasehan in 2013 and in his regular lectures uploaded on YouTube, describes Gajah Mada as a thin man with a moustache but possessing very strong power. This version aligns closely with the Brajanata statue's depiction (Munandar 2010).

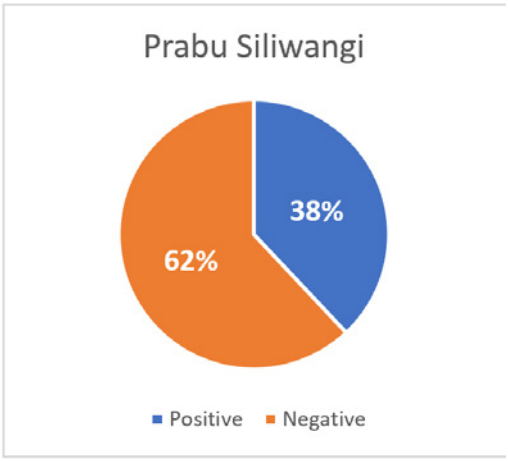
Within the analysed comments, Indonesian netizens predominantly adopt the Muhammad Yamin version of Gajah Mada, a prevalence attributed to its integration into the educational curriculum. Alternative interpretations are primarily debated among academics studying original sources, thus remaining largely unfamiliar to the general public. The creator's prompt, "I asked AI to imagine 'Gajah Mada based on his statue'", granted the AI significant latitude, introducing potential bias. This bias stems from the statue being an artistic interpretation rather than an objective historical depiction. Consequently, the AI may replicate or amplify symbolic elements, potentially incorporating features such as crowns or jewellery derived from training data or stereotypes, which may lack historical accuracy or be absent from the original statue. Ambiguous instructions further allow the AI to prioritise stereotypical over factual elements. Without awareness of these biases, users may misinterpret the speculative AI-generated images as historically accurate representations.

Prabu Siliwangi

The content relating to Prabu Siliwangi uploaded on the AI Nusantara account begins by displaying a painting in the Cirebon Palace. The creator's prompt, "I asked AI to reimagine 'Prabu Siliwangi based on his portrait painting'", directed the AI to reinterpret the leftmost image in Figure 8. This image portrays a male figure widely accepted as Prabu Siliwangi (King Sri Baduga Maharaja), depicted with royal adornments and specific facial features. Due to limited definitive historical sources on his appearance, various myths have developed, notably the Sundanese belief in his *moksa* and transformation into a white tiger. The subsequent AI visualisations, based on this painting, demonstrated significant alterations from the initial reference.

Figure 8. Prabu Siliwangi in AI visual design by AI Nusantara account (Source: TikTok @ainusantara) used with the creator's explicit permission (granted via email on 12 November 2024).

In-depth visual analysis of Figure 8 reveals distinct transformations across three AI-generated images compared to the original portrait painting. These transformations represent the AI's interpretation and 'reimagining' of the original image. The first visualisation primarily enhances realism and textural detail, creating a photorealistic effect. The second shifts to a monochrome palette with sepia tones and a blurred background, altering the mood. The third exhibits the most substantial deviations, with a notably younger and smoother face, altered features, and markedly exaggerated, opulent crown and jewellery details. This suggests an inclination towards an idealised or illustrative digital style, likely influenced by aesthetic biases in the AI's training data. These detailed changes in facial features, regalia, and background are crucial for understanding the AI's interpretive and reconstructive processes based on the initial visual input and prompt, underscoring the AI's emphasis on manipulating features and adornments for aesthetic impressions over purely historical depiction.



Graph 3. Prabu Siliwangi sentiment analysis (n=141). Source: author

Sentiment analysis of comments on the AI visualisation of Prabu Siliwangi revealed 54 positive and 87 negative responses; while quantitatively negative comments predominated, qualitative analysis indicated a complex public discourse engaging directly with the AI's 'reimagining.' Key sentiment categories included Aesthetic Admiration, Historical Scepticism, and Comparison. Comments expressing Aesthetic Admiration praised the visual quality, while Historical Scepticism questioned historical accuracy, highlighting public awareness of uncertainty surrounding Prabu Siliwangi's appearance and mythical narrative. A trend of Comparison emerged, with netizens likening the visualisation to contemporary

figures, demonstrating the audience's attempt to process the representation using existing visual schemas and often implicitly questioning the AI's interpretation. Positive feedback also included expressions of novelty and aesthetic appeal, serving as evidence of public engagement with AI-generated historical depictions presented as 'reimaginings'.

Integrated visual analysis and public reactions revealed correlations between specific AI-generated elements and comments. The AI's tendency to render the face younger and smoother correlated with praise for handsomeness. Comparisons to contemporary figures likely arose from specific facial features rendered by the AI, creating unexpected visual associations. The enhanced crown and jewellery details also prompted varied responses, from admiration to scepticism about historical accuracy. Beyond sentiment, the visualisation stimulated discussions on historical aspects and prompted requests for more AI visualisations of Indonesian figures, indicating public interest. This process tends towards producing idealised or fantastical images that prioritise aesthetic appeal over historical fidelity, a tendency particularly relevant given the scarcity of definitive historical visuals for Prabu Siliwangi.

Muhsin (2011) revealed that Prabu Siliwangi's name can be traced in ancient manuscripts, including the Carita Parahiyangan manuscript (1579), the Sang Hyang Siksa Kandang Karesian manuscript (1518), the Carita Purwaka Caruban Nagari manuscript (1720), and the Bujangga Manik manuscript. It is suggested that Prabu Siliwangi refers to only one King of Pajajaran in the era of 1482-1521, namely Prabu Jayadewata or Sri Baduga Maharaja. In other sources, it is mentioned that Prabu Siliwangi was a handsome figure, and a reliable and trustworthy leader (Muhsin Z. and Falah 2021). The reference uploaded to the AI platform used by the AI Nusantara account uses paintings found in the Cirebon Palace. So far, the painting is considered the most representative because it is in the palace collection. The AI visualisation of Prabu Siliwangi by AI Nusantara, prompted to 'reimagine' a portrait painting, serves as a case study at the intersection of historical representation, AI technology, and digital discourse. The AI's visual outputs, significantly altered from the source, dynamically engage public understanding, shaped by academic views and prevailing myths.

Netizen reactions demonstrate active negotiation of this new representation, blending historical knowledge, aesthetic preferences, and critical awareness of AI's capabilities and limits. This highlights challenges in using AI for myth-rich figures lacking definitive visual sources, particularly in 'reimagining.' Digital platforms become crucial for negotiating cultural meaning, where potentially biased AI images spark debates on authenticity and heritage. The creator's 'reimagine' prompt likely granted creative license, with the public's response reflecting their assessment of its balance between historical reference and artistic interpretation.

Singhasari Kingdom

The AI Nusantara account includes visualisations of the capital city of Singhasari Kingdom, Singosari, displaying areas of the kingdom that have water pools or lakes in front of them and have the form of roof models or house buildings in the form of *limasan*. These visualisations are presented across eight distinct panels, offering varied perspectives of the imagined city. In addition, there are ornaments on the buildings which are very complex, such as those seen on the grand, intricately carved gate depicted in one panel. Then there are also building forms such as parts of the temple complexes that are found in Indonesia or Southeast Asia, including large temple structures with impressive detail and smaller, stupa-like forms situated within garden settings. Some forms of traditional houses are visualised using a roof of thatched leaves or dried coconut leaves. The AI has also added to the visualisation with images of local community activities, such as a figure walking through a garden with statues or another figure carrying a lantern at dusk. Overall, the visualisation of the AI work is interesting, and the objects look beautiful, although for the accuracy of the visualisation a more in-depth study is needed. The panels collectively create an atmosphere that is tranquil, lush, and sometimes dramatic, featuring scenes at different times of day, including mystical night views illuminated by lanterns and majestic gates silhouetted against sunrises or sunsets.

The appearance of water pools (*pertirtaan)* and temple-like buildings in the AI visual design of the Singhasari Kingdom atmosphere refers to the Watugede petirtaan or better known to the community today as *Petirtaan Ken Dedes*. Although according to experts Watugede was built during the Majapahit kingdom, namely the thirteenth to fourteenth centuries AD, many people believe that the *petirtaan* was the place where Ken Dedes and Ken Arok met for the first time. In some of the AI visual designs, there appears to be a woman and a man, allegedly Ken Dedes and Ken Arok. Chutiwongs (2008) explained that *petirtaan*, which is a combination of temples and baths, built during the ancient Javanese kingdom, is a replica of Mahameru (a mountain in Hindu and Buddhist cosmology). Ancient Javanese kings considered mountains as sacred places because the mountains drained water that was used to bless these kings during their reign. During the Singhasari Kingdom, the mountain that was considered sacred was Mount *Penanggungan* because every temple was built facing Mount Penanggungan (Chutiwongs 2008).

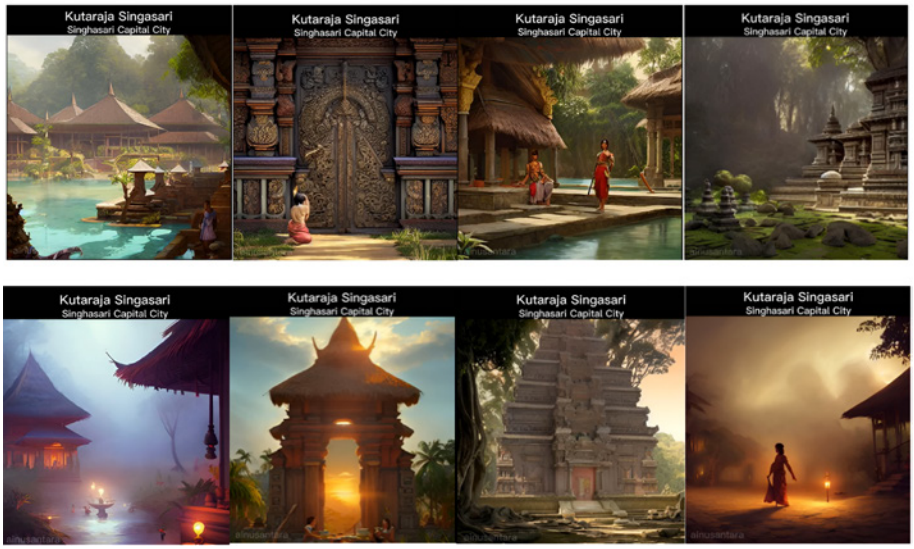
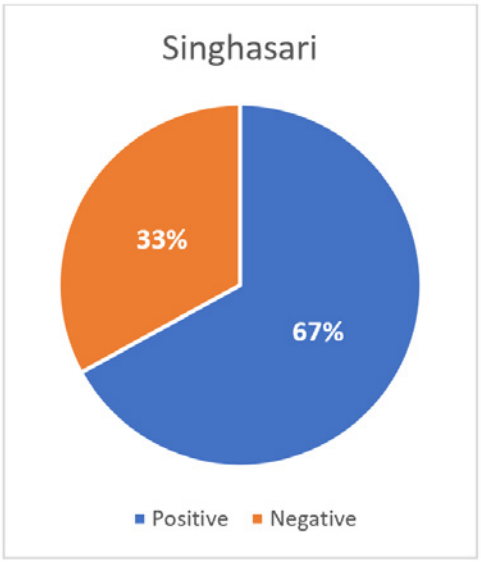


Figure 9. AI visualisations of Singhasari Kingdom by AI Nusantara account (Source: Tiktok @ainusantara) used with the creator's explicit permission (granted via email on 12 November 2024).



Graph 4. Analysis of the sentiment of the Singhasari Kingdom (n = 54). Source: author

The results of the sentiment analysis show that the images of Singhasari Kingdom received 36 positive comments and 18 negative comments. This percentage indicates that the audience was quite impressed with the AI visualisation of the Singhasari Kingdom's capital city. Audience responses appear in the comments on

the AI Nusantara account. Netizens' reactions can be grouped into several main topics. The most dominant reaction expresses admiration or appreciation for the AI visualisation results. Positive comments imply a sense of pride because now there is a famous swimming pool in Malang that was named after Ken Dedes to appreciate her beauty and elegance. Other positive comments express their awe regarding the scenery. Meanwhile, the negative responses related to the inaccuracy of the costumes used for the figures in the image, and the unclear visual quality in some parts, casting doubt on the results of the AI.

Analysis of comments on the AI-generated Singhasari images revealed diverse sentiments beyond simple appreciation or criticism. Netizens expressed nostalgia for the royal era and connection to historical sites in the vicinity of modern Malang. High public interest was evident through requests for visualisations of other Indonesian kingdoms, indicating potential for AI-based historical content. While some critical comments noted visual or historical inaccuracies, the majority sentiment was positive, reflecting interest and pride in Indonesian history and cultural visualisation potential.

An integrated analysis of the visualisations and sentiment suggests potential biases inherent in the prompt or the generative process. Visually, the images idealised Singhasari, often focusing on stereotypical temple architecture. This may reflect a bias towards portraying a 'golden age' rather than a comprehensive historical depiction. The depiction of figures, notably characterised by blurred faces or imprecise clothing details, suggests technical biases or influence from potentially biased or historically inaccurate training data, which may include modern imagery. A strong visual association with *Petirtaan* Ken Dedes/Watugede, despite the differing historical eras of Singhasari and Majapahit, suggests the AI may uncritically incorporate popular narratives prevalent in its training data. These outcomes highlight AI's generative capabilities but also challenges and biases in reconstructing history through this technology.

Pyramids in Sundaland

Based on colonial-era maps purportedly depicting pyramid mapping on Mount Padang, Mount Sadahurip, and Mount Lalakon, the 33-second video titled 'Pyramids in Sundaland' presents AI-generated imagery of alleged pyramids on these mountains. The AI visuals depict monumental, stepped structures with flat levels and precisely cut stone blocks. These forms represent a stark departure from the original landscapes' natural contours, reimagining the mountains as vast, imposing edifices. Each clearly defined level creates an impression of immense scale and deliberate construction, underscoring the AI's transformative interpretation.

These imposing, AI-generated structures incorporate prominent architectural features, such as grand central staircases and textures indicative of ancient

stonework, sometimes partially blended with vegetation. Dramatic lighting, mist, and occasionally a luminous blue light enhances the ancient and mysterious atmosphere. Visually, the AI's design draws heavily upon the complex, stepped pyramid architecture characteristic of ancient Mesoamerican civilisations over the smooth, triangular faces typical of Egyptian pyramids. The video concludes by aligning the three depicted pyramids with the formation of the Giza Pyramids and the Orion constellation.

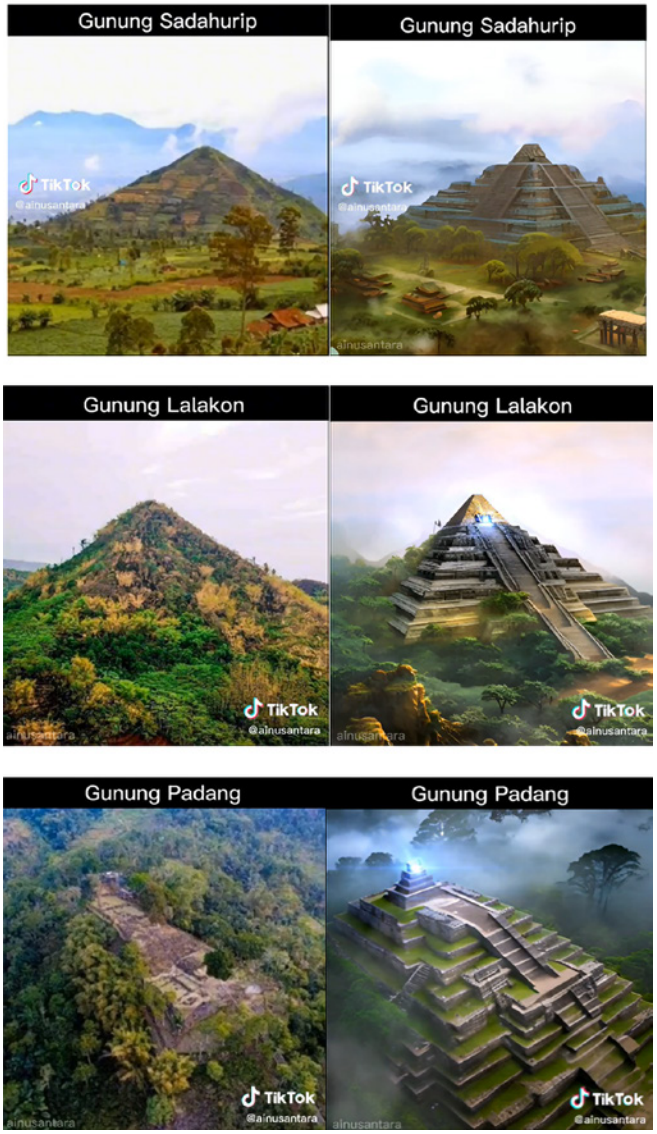
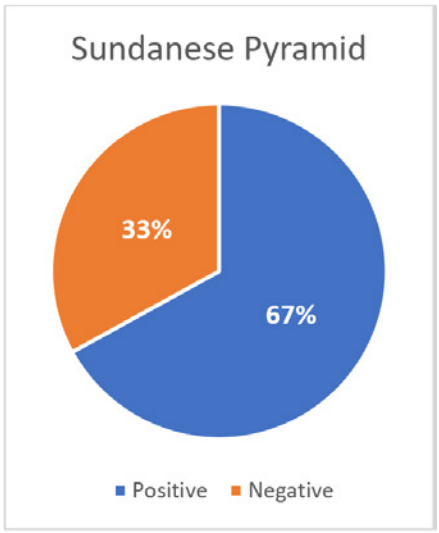


Figure 10. The visual design of the pyramid at the Sunda Level by AI displayed on AI Nusantara's social media (Source: TikTok @ainusantara) used with the creator's explicit permission (granted via email on 12 November 2024).



Graph 5. Analysis of pyramidal sentiment in Sundaland (n = 458). Source: author

Sentiment analysis of comments on the 'Pyramids in Sundaland' visualisation indicates 308 positive responses against 150 negative, revealing a predominantly favourable audience reaction (over 50%) to the AI-generated imagery. The AI's dramatic and monumental depiction significantly contributes to this positive reception, visually corroborating pre-existing beliefs or aspirations among netizens regarding a distinguished ancient civilisation in Indonesia. The striking visuals, particularly the massive, geometrically precise stepped structures resembling large stone blocks, resonate strongly with narratives of hidden history and advanced ancestors. Prominent architectural elements like wide staircases and, in some instances, a mystical blue light from the summit enhance the sense of wonder and ancient power. Instead of commenting on the visual, the public emphasised the existence of pyramid in Sundaland which is a megalithic structure that has similarities to the pyramids in Egypt. Some of the comments even state the belief that the pyramid structure was made by King Solomon, which fuelled speculative narratives. These comments demonstrate how the evocative AI imagery, which visually aligns more with Mesoamerican stepped pyramids than natural formations or Egyptian styles, acts as a powerful catalyst for asserting alternative historical narratives linked to pre-existing beliefs or legends. Conversely, negative responses included expressions of scepticism, rejection, and perceived absurdity, often conveyed through dismissive language. This negative sentiment frequently arises from the visual incongruity between the artificial, geometric AI structures and the known characteristics of the sites, prompting scepticism or outright dismissal from those who perceive the visualisation as misleading or fantastical.

Based on research conducted by the Institute of Sciences (LIPI) in 2018, Danny Hilman Natawidjaja stated that, although the buried structure resembles a pyramid, the structure is different from the Mayan pyramid (Putri 2018). This also confirms that Mount Padang has inside it a man-made structure in the form of a pyramid. In 2024, an article published by Natawidjaja related to Gunung Padang entitled 'Geo-archaeological prospecting of Gunung Padang buried prehistoric pyramid in West Java, Indonesia' was withdrawn by its publisher due to an error in measuring the age of the pyramid (Wuragil 2024). However, this does not rule out the existence of the pyramid structure on Mount Padang.

As for Lalakon and Sadahurip, it has been proven that there are no pyramids there. This has been stated by Bandung Archaeology Center Principal Researcher Lutfi Yondri together with several experts from the Bandung Geological Museum (Muslihah 2012). The same thing has also been revealed by Natawidjaja (2011) in disaster exploration in the area, in fact no pyramid structure was found. He added that the proof of the existence of the pyramids of Mount Lalakon and Sadahurip was obtained from a group of foundations that claimed to get *wangsit*, when in fact it has been empirically proven that there are no pyramids on Mount Lalakon and Sadahurip (Muslihah 2012).

Analysis indicates bias in the AI's interpretation of 'ancient pyramids in Tatar Sunda,' influencing netizen sentiment. The AI model, likely trained on global architectural forms, tended to render structures akin to Mesoamerican stepped pyramids with geometric precision and prominent staircases, rather than incorporating Sundanese cultural elements or the step pyramids (*Punden Berundak)* structure. This suggests a bias favouring global archetypes over regional specifics implied by the prompt. The dramatic visuals became a potent focal point; individuals predisposed to belief in a hidden ancient civilisation felt validated by the AI's compelling, potentially biased, imagery, fuelling positive sentiment and speculation. Conversely, those grounded in archaeological or geological realities reacted negatively, viewing the interpretation as fantastical or inconsistent with documented sites, highlighting visual bias as misinformation. The prompt framing and biased output thus created a feedback loop, shaping sentiments based on pre-existing beliefs rather than objective representation.

Discussion

AI Visual Reconstruction

The visual reconstruction by AI gains mixed responses. As an evolving technology, AI is one of the most promising reconstruction media to date. AI can increase public engagement with historical objects, through visual reconstruction combined with narrative that provides a more immersive experience. This potential requires AI to be based on rigorous research and respect for cultural context. In responding to AI's visual reconstruction, the users of TikTok were able to demonstrate public perception, which in this case is considered to represent a community that has an interest in issues of history, archaeology, and digital culture. Opinions expressed through the comments section show a polarised sentiment towards the accuracy and ethical implications of the visual reconstruction.

Positive Response

In general, TikTok users give a positive response to the visual design results of the two historical sites, Singhasari and the pyramids in Sundaland. Some positive comments in the form of praise are aimed at the visual appearance and the scenery. However, in responding to the existing landscape, the social media public does not really care about the accuracy of AI. On the other hand, the discussion that is built from the visual design of the pyramids in Sundaland is more in the context of the desire to visit the place. There are some commentaries that debate the façade of the visual design of the Sundaland pyramids, equating them either with the pyramids at Machu Picchu, step pyramids (*punden berundak)*, or even the pyramids in Egypt. Many comments expect in-depth research into the existence of pyramids in Sundaland.

On this side, visualisation by AI turned out to be able to trigger public curiosity on social media about the situation and conditions of the pyramids in Sundaland. There are also a few comments that point to a scientific discussion of the situation presented by AI. The AI visualisation manages to provoke public curiosity about existing historical sites. In addition, some comments also relate the visual design to the reality of the condition of these historical sites, such as in the picture of Singhasari Kingdom which shows a bathing pool surrounded by temple stones and many springs originating from Mount Arjuno. This shows that visualisation by AI not only elicits curiosity and scientific discussion but also allows people to compare with the real situation of the historical place. Overall, visualisation by AI has a positive impact on TikTok users in expanding knowledge and understanding of Indonesian history and culture. Although there is some speculation and debate about the accuracy of visual design, visualisation by AI remains one of the effective ways to introduce history and culture to the public.

Negative Response

The negative response to the AI-generated images of the historical figures is higher than the positive response. The results in this regard show that the public has high expectations for the accuracy and quality of visual designs of these historical figures. This is due to the public's expectation that the visual design results match the description and growing knowledge about the figure in Indonesia. As a result, netizens tend to insult or ridicule visual designs that did not meet their expectations. They even compare the faces of historical figures with the present-day public figures or Indonesian athletes. They state that the AI visual of Gajah Mada looks like a comedian or footballer, while some netizens show disappointment since Gajah Mada was a royal commander who was supposed to look dashing and impressive. The public has high standards for the accuracy of visual designs of historical figures, otherwise they will give a negative response if the image does not meet these expectations.

Some negative comments show that there was dissatisfaction among netizens with how the image is presented. Netizens who are caught up in pseudoscience or views that are not based on actual historical facts doubt the validity of the visual design. Some commentaries also contain speculation about the historical background and connect with other historical events, such as the existence of Noah's Ark and the continent of Atlantis. There have even been some negative responses to the visual rendering of historical sites, leading to unfounded conspiracy theories related to the plot of famous fictional manga such as One Piece. However, this kind of view is often driven by fear or discomfort regarding things that are unfamiliar. This shows the importance of better education and understanding of history, so that people can appreciate and understand creative and innovative interpretations of historical figures. In addition, the use of conspiracy theories or unfounded assumptions can undermine public confidence in valid and accurate historical information. Therefore, historians and visual designers should collaborate to ensure the accurate and credible visual representation of historical objects. In developing visual designs of historical figures and at the same time maintaining historical accuracy, it is also necessary to consider creative aspects and aesthetic visual appeals, to attract the attention of the public to learn history in a more interesting and effective way.

In general, there are still negative perceptions towards the use of AI in historical and cultural visual design. Although there is positive sentiment, the difference is not too far from negative sentiment. The negative responses focus on the accuracy problem of AI-generated visuals. This accuracy is related to the data used, so that all data needs to be criticised for its source so that it can be used as an accurate source of knowledge (Haddi et al. 2013). In the comments uploaded, there are two trends in knowledge sources that are referenced in responding to the use of AI in historical

and cultural visual design of the past. The first tendency is to rely on valid academic sources, which emphasises the scientific side and the accuracy of information. The second tendency is the source of opinion that is trusting in a community group, which tends to look at it from the point of view of local beliefs and wisdom.

Several comments draw upon academic perspectives, referencing both scholarly literature and expert opinion. For instance, some mention an article reporting that the government halted the research project for unspecified reasons, while others speculate about the pyramid's origins, suggesting it dates back to the megalithic era around 1500 BC. Comparisons are also made to the discovery of Borobudur Temple, with commenters noting that, much like Mount Padang, Borobudur was once hidden beneath a hill and remained buried under layers of volcanic ash and dense vegetation for over a thousand years. Alongside these academically grounded remarks, there are also opinions rooted in oral tradition. Notably, one comment draws attention to the perspective of so-called 'smart' individuals or shamans, who assert that contemporary depictions of Gajah Mada's face diverge significantly from how he would have appeared in historical reality. Thus, the sources of knowledge are not limited to empirical ones but also include oral information from ancestors/shaman/elders which also contributes to public interpretation of historical objects.

The reference sources used as a starting point for visual design by AI is one of the pivotal factors (X. Wang 2022). In term of Prabu Siliwangi's visual, they used Prabu Siliwangi's painting in Cirebon Palace as the reference. People believe that the painting was made by a talented painter with sixth sense abilities, and his spiritual experiences reflected in his painting of Prabu Siliwangi. The AI-generated image of Prabu Siliwangi closely resembles the painting, and some comments approve, noting that it accurately depicts Prabu Siliwangi. The painting by the capable or talented artist can be used as reference in generating AI images. However, regarding the unusual techniques by which the painting was made, the painting needs further scrutiny in order to assess its cultural significance and its relevance to societal context.

In terms of the relation between beliefs and scientific evidence, Singer and Benassi (1981) explain how knowledge or beliefs can be formed psychologically and sociologically without scientific basis and cognitive bias. The phenomenon is largely driven by the influence of mainstream media. The information that is widely spread on social media is often simply accepted as fact without critical evaluation or verification from reliable sources. This condition is exacerbated by the limited involvement of academics in providing credible information through social media. In contrast, social media users utilise social media platforms largely for entertainment purposes. Therefore, it requires an effort to encourage greater academic participation in social media to disseminate information that can be

critically evaluated and trusted by the public (Mahdiuon et al. 2020; Singer and Benassi 1981).

The limitations of an illustrator or artist in making text-based visualisations can be greatly influenced by the references they have, including their background and life experiences (Wikayanto et al. 2019). With a similar process, AI can adopt the way humans interpret things based on experience and knowledge stored in our brains. The collected data is ready to be interpreted by AI, overcoming the limitations of illustrator or artist. Visualisation can also be limited to the imagination of a creator (Baskinger and Nam 2006; Lohr and Ursyn 2010). For example, famous *wayang* comic creators in Indonesia such as R.A. Kosasih, Teguh Santosa, Jan Mintaraga, and Is Yuniarto use the same references in presenting the character of Pandava and Kurawa from the Mahabarata epoch. The audience demonstrates subjectivity too in interpreting each character depending on their preferences. The AI technology can provide another version of the character from various point of view, as long as the results meet the audience's expectations.

The AI-generated visuals carried out by humans and artificial intelligence should both rely on credible data. The credibility of AI-generated images posted on social media can vary significantly, as they are influenced by the biases, knowledge, and experiences of those who create and interpret them. The interpretations generated by AI models, particularly generative systems like DALL-E, can be significantly influenced by biases embedded within the extensive datasets used for their training. In creative practice, the AI-generated visual is still problematic, too. Creativity is measured by the entire creative process from idea to final form. Using AI to produce work without human creativity often raises the issues of authenticity and credibility of the creator. Therefore, creators who create character figures based on historical figures are required to refer to credible sources and common knowledge by conducting some research before generating the image using AI technology (Crawford and Paglen 2021; Jarrahi et al. 2022).

Hofstede's cultural dimension framework offers deeper insight into how online users respond to AI-generated content. Users are more likely to fully accept AI-designed characters and places when credible, trusted institutions, such as universities or government cultural bodies with recognised authority, produce them. Research findings support this: visualisations of historical sites like the Singhasari Kingdom and the Sundaland Pyramids (both 67% positive sentiment) were met with greater acceptance, likely because the subjects are general, and netizens seem to acknowledge AI's technical image-generation capabilities as a form of authority. Conversely, sharp criticism of AI depictions of historical figures like Gajah Mada (59% negative sentiment) and Prabu Siliwangi (62% negative sentiment) indicates that users often reject AI outputs challenging established narratives or existing knowledge authorities, especially if they differ from widely known versions like

M. Yamin's portrayal of Gajah Mada. This observation underscores a clear user expectation: that depictions of figures with robust, pre-existing narratives should conform to 'official' or widely endorsed interpretations, often reflecting masculine cultural values emphasising strength and impressiveness for heroic characters (Spennemann 2024).

The individualism versus collectivism dimension also explains these dynamics. Although most Indonesian netizens culturally exhibit high collectivism, digital platforms empower strong individual expression, evident in frequent criticisms of AI reconstructions, particularly of historical figures, even from those with collectivist backgrounds. The influence of Uncertainty Avoidance is also significant, as evidenced by widespread doubts among users regarding the accuracy and potential for misinformation in AI reconstructions (Karpouzis 2024). This concern is reflected in negative sentiment towards the Gajah Mada and Prabu Siliwangi visualisations and requests for further clarification on the Sundaland Pyramids. To mitigate the discomfort arising from AI's visual ambiguity, users often seek certainty by consulting sources they deem valid—whether academic or rooted in local wisdom (Beerends and Aydin 2024). For historical sites, this can also involve a greater appreciation for aesthetic qualities over strict factual accuracy, aligning with feminine cultural values that prioritise aspects like visual appeal and atmosphere. This complexity shapes how netizens interact with and evaluate AI-generated historical content, influencing both their engagement and critical responses. While AI reconstruction is currently useful for the entertainment and creative industries, its long-term potential for preserving history and culture heavily depends on improving its accuracy—a dynamic further clarified by Hofstede's framework.

Conclusion

This study reveals that public reception of AI-generated historical imagery is complex and often contradictory, particularly for content posted on social media platforms like TikTok. Some individuals consult academic or credible sources to form their opinions, while others prioritise personal beliefs and folklore. The comments sections on social media posts clearly demonstrate this divergence in perspectives. While empirical evidence and academic research are crucial for understanding these objects, considering the cultural and historical context, including local beliefs and folklore, is equally important. By integrating academic knowledge with cultural traditions, we can gain a more comprehensive understanding of the past and appreciate the diverse perspectives that shape our understanding of history. This study's findings further illuminate the nuances of these interactions in the digital age.

A key finding of this research is that public reception of AI-generated historical

visualisations on social media is notably polarised and contextual, impacting digital heritage. Although overall sentiment is slightly positive, acceptance levels vary significantly. Historical sites (e.g., the Singhasari Kingdom, Sundaland Pyramids) receive positive responses because audiences appreciate their aesthetic appeal and AI's capacity to spark imagination, often overshadowing strict accuracy. Conversely, AI depictions of figures (e.g., Gajah Mada, Prabu Siliwangi) face more criticism due to expectations of accuracy aligned with established narratives (such as M. Yamin's version of Gajah Mada). AI visualisations deviating from these embedded cultural schemas often challenge historical authority, prompting nuanced negotiations of 'visual credibility' based on the object type.

Furthermore, this study identifies the public's reliance on a dualism of reference sources, drawing from both academic knowledge and local traditions. This positions AI not merely as a representational tool but as an active agent shaping 'digital living heritage' and fostering 'neo-mythologies' by amplifying local narratives in the digital sphere. Moreover, the strong 'affective engagement' that AI visuals evoke—ranging from awe to nostalgia—offers a potent, yet sometimes overlooked, pathway to deeper historical learning, even if the visuals lack precision. Social media's 'algorithmic curation' further shapes this interaction. Such curation can inadvertently legitimise or marginalise historical interpretations by promoting engaging AI content, thereby significantly constructing public historical consciousness and memory.

The current widespread adoption of AI technology has highlighted issues of accuracy and artistic innovation. Given contemporary online culture, where social media users are accustomed to rapid technological advancements, people can harness AI for both scientific endeavours and entertainment. Consequently, as user engagement demonstrates, AI-generated content on social media often prioritises entertainment value. This focus potentially sacrifices educational depth and nuanced historical understanding. While AI can support artists in developing fictional content by adapting to their vision, a challenge remains: this creative output must also foster an informed understanding of historical events, rather than solely prioritising aesthetic appeal or novel interpretations.

This study suggests several future steps: (1) Conduct a more comprehensive follow-up study comparing AI's visual results with empirical data to improve accuracy. (2) Future research should explore the ethical implications of AI in historical reconstruction, particularly concerning the creation of 'neo-mythologies' and the impact of 'algorithmic curation' on public historical understanding. This necessitates developing AI ethical guidelines that respect diverse cultures. These guidelines need to address the representation of contested histories or figures with strong cultural preconceptions, as identified in this study's findings on public reception. Additionally, investigating how to ethically harness "affective

engagement" for educational purposes is crucial. (3) We need to increase awareness regarding AI technology's use in cultural preservation efforts. Campaigns could educate the public on critically engaging with AI-generated historical content, especially concerning the biases inherent in both AI models and source data.

The analysis of social media comments in this study has limitations. The voluntary nature of online commentary means that expressed opinions may not represent the full spectrum of public sentiment, whether positive or negative. Furthermore, the flow of comments can obscure original meanings, necessitating human intervention in the analysis process. While these limitations warrant caution in generalising public sentiment, the clearly identified patterns of contextual acceptance and dual referencing offer crucial insights. These insights help assess not only accuracy but, more importantly, the societal impact and interpretation of AI-generated historical visualisations.

Declaration of AI Use

AI was used solely for language editing during manuscript preparation, with Gemini and Microsoft Copilot employed for grammar and clarity improvement. All substantive ideas, analyses, and conclusions were developed exclusively by the authors, who reviewed and edited all out-puts and take full responsibility for the content of the published article.

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Back to the Future or Knowledge Reborn – AI Restoration, Traditional Knowledge Protection, and the Dilemma of Authenticity

Marc Stuhldreier & Martin Fredriksson

Abstract

This article explores the interplay between traditional knowledge (TK), artificial intelligence (AI), and the law, with a focus on challenges and opportunities in protecting TK. TK, often intrinsic to the way of life of Indigenous communities, faces threats of erosion, misappropriation, and neglect due to both modernisation and historical injustices. While digitisation and AI present promising tools for preserving and reconstructing lost TK, these technologies also raise concerns about authenticity and ownership.

AI can support TK preservation through techniques such as deep learning and data mining, which can reconstruct lost elements and provide tools for cultural revitalisation. To ensure cultural authenticity and alignment with communal values, AI-driven restoration necessitates collaboration with traditional communities. This raises complex questions about whether AI-restored TK qualifies as authentic and registrable under existing legal TK protection frameworks.

The article is divided into three sections, providing an overview and analysis of various legal aspects relating to the protection of TK in general and AI reconstructions of TK in particular. To this end, the article highlights the limitations of traditional intellectual property laws and rather focusses on national sui generis laws and the use of TK databases as a tool for protection. These sections are followed by a discussion, reflecting on the legal aspects in a wider cultural context, particularly proposing that authenticity should reflect the living community's values rather than rigid historical fidelity.

Keywords: Traditional Knowledge; AI restoration; Sui generis protection; Authenticity

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Introduction

This article addresses the meeting between old knowledge, new technology, and the law. Traditional knowledge (TK) is usually associated with knowledge from a distant past, orally transmitted between generations of Indigenous peoples and local communities. TK, however, exists in the present and it is subject to the same technological challenges and opportunities that affect other forms of knowledge. The possibilities of digitisation, digital storing, and online dissemination can help safeguard and revitalise TK, but it can also subject it to new forms of exploitation. Over the last decades, the role of TK in a digital media landscape has been discussed by the international community as well as by academics. Several studies have addressed questions such as the consequences of using digital databases to safeguard TK and TK's role in the new digital public domain (WIPO 2020: 10, Bhardwaj & Taparia 2020).

The latest addition to the possibilities offered by digital technology is Artificial Intelligence (AI). Its full impact on society still remains to be seen, but it is already having significant consequences for many social practices and sectors, including TK. The relation between TK and AI is a largely unchartered territory in academic research. This article is an attempt to contribute to this emerging field. As such, it does not present any firsthand empirical research on the practical uses of AI to restore TK, nor does it offer analyses of any legal cases concerning AI restored TK. This is largely due to the scarcity of such examples and cases. This article is rather an attempt to contextualise the relation between AI and TK within the general discussion about protecting TK that has taken place in academia and the international community over the decades. Thus, the aim of this article is to discuss the possibilities and consequences of using AI to reconstruct lost TK in relation to existing legal provisions for safeguarding TK, internationally and nationally.

Finally, the article goes on to address the question of authenticity and discusses if and how such use of AI can affect the authenticity of the TK that is being reconstructed. In doing this, it raises more critical considerations regarding the role and nature of authenticity. In this article, authenticity is to be understood as a sense of connection to a past: a concern that the process of safeguarding or reconstructing TK does not distort its original meaning or distance it from its original context. The question which is addressed in this discussion is how authenticity relates to originality and how this is affected by the realisation that TK also changes with the times and exists in a contemporary cultural context.

The article is divided into three sections, followed by a discussion. Chapters 2, 3, and 4 present an overview and analysis of various legal aspects relating to the protection of TK in general and AI reconstructions of TK in particular, while chapter 5 reflects on the legal aspects in a wider cultural context, paying special attention to the relation between authenticity and originality. The first section, chapter 2,

sets out by describing the problem: how different forms of TK are lost for various reasons, ranging from languages becoming extinct when no one uses them to traditional ecological or medical knowledge being lost in the process of modernity. Fundamentally, this is a threat not only to the global diversity of languages and knowledge systems, but also to the cultures that are constituted by those languages and knowledge systems. Chapter 2 also discusses potential solutions in the form of digitisation, including digital depositories to store and safeguard TK for the future, and the possibility to use AI to reconstruct knowledge that has been lost. While AI and digital technology can certainly contribute to preserving or reconstructing TK, they also present other risks in the sense that digital depositories can subject TK to exploitation and AI reconstructions raise questions regarding the nature and authenticity of the knowledge that is being reconstructed.

The second section, chapter 3, contextualises the question of AI and TK in a bigger discussion regarding the lack of legal tools to protect TK. While TK could be regarded as an immaterial asset, the existing modes of intellectual property (IP) rights are not well adapted to protect TK. This has raised questions regarding the possibility to protect TK under a *sui generis* regime in international law. Chapter 3 gives a brief overview of these, hitherto fruitless, endeavours, and how they relate to a strategy of protecting TK in databases that emerged around 2000.

Despite the failures to create an internationally binding treaty, several countries have taken proactive measures by implementing domestic *sui generis* protection for TK. The last section of this article, chapter 4, provides a brief overview of various national efforts aimed at enhancing protection for TK across different jurisdictions. It also zooms in on the question of how AI-reconstructed TK can be addressed legally in different countries: whether it might warrant protection as TK and if it could be included in different forms of TK registries.

Finally, chapter 5 provides a discussion where these legal considerations are related to the dilemma of authenticity: the question of whether AI-reconstructed TK is authentic in relation to is origin and to the community with which it is associated. This question will be discussed not only in relation to the law but in relation to a wider discussion about authenticity and heritage.

Traditional Knowledge (TK), AI Restoration, and Ownership

TK and Knowledge Loss

TK, also referred to as Indigenous knowledge or local knowledge, refers to knowledge systems embedded in the cultural traditions of regional, Indigenous, or local communities. As such, TK is a living body of knowledge that is not only

rooted in the culture of traditional communities but forms an integral part of their spiritual and cultural identity as well as their value systems, constituting a crucial element of their identity as a people (Chakrabarty & Kaur 2021: 405, Hossain & Ballardini 2021: 51-54, WIPO 2020: 13). TK is generally based on accumulations of empirical observation and on interaction with the environment. In many cases, it is sustained and passed on for generations as an oral tradition (Bhardwaj & Taparia 2020, Wekesa 2006: 2). It includes knowledge about traditional technologies, midwifery, ecological knowledge, traditional medicine, and craft skills and may find expression in stories, legends, folklore, rituals, or songs, transmitted through language, dance, games, design, visual art, and traditional architecture (WIPO 2020: 13, Chakrabarty & Kaur 2021: 405, Hossain & Ballardini 2021: 51, Sand 2003: 188).

Notably, TK lacks a singular, universally agreed-upon definition, reflecting its multifaceted nature and the plurality of perspectives surrounding it (Hossain and Ballardini 2021: 52). Nonetheless, there are many attempts by international organisations, like the International Council for Science (2002), to categorise TK. This engagement by international organisations is indicative of the increased acknowledgement of the importance of TK as a crucial element of the way of life of traditional communities. Today, it is recognised that TK, often enshrined in intangible cultural elements with spiritual essence relating to sanctity and sacredness, is intrinsic to the way of life of traditional communities (Chakrabarty & Kaur 2021: 404 and 417). As such, TK is distinctly connected to self-determination of traditional communities. As a consequence, the misappropriation or misuse of TK can be deeply offensive to the cultural values of communities and may infringe upon their interests, worldviews, and cultural rights (Chakrabarty & Kaur 2021: 404, Sand 2003: 189).

While the importance and cultural value of TK thus is acknowledged today, this certainly was not always the case. This, combined with a variety of complex circumstances, has led to the fact that TK is under constant threat not just of being misappropriated but also of being neglected or even forgotten. In fact, major parts of TK have already been lost over time. On the one hand, this can be attributed to modernisation, as traditional communities developed and adapted to modern lifestyles. Other factors, however, may include that TK, including language, is not consistently used and therefore certain elements, like specific expressions, or whole bodies of knowledge may simply be forgotten. Another, more sinister cause of TK loss is Western colonisation, exemplified by the forced removal of Indigenous children in Canada and the U.S. to boarding schools where their traditional culture was violently suppressed (Pember 2019).

This loss of knowledge cannot be completely avoided, with 90% of the around 6 000 languages currently spoken facing extinction, detrimentally impacting their

associated cultural identities (Chakrabarty & Kaur 2021: 419, Chandran 2017). As TK is commonly transmitted orally through these languages, this will likely lead to a further loss of the knowledge they carry. That the already significantly diminished TK is primarily preserved by the elders of traditional communities further underscores the urgent need for its protection. A potential approach to the preservation of TK is to enhance the understanding of its value among younger generations, thereby fostering incentives for its protection from within the traditional communities themselves (Chakrabarty & Kaur 2021: 422). Such an approach seems to align with the broader objective of 'cultural sustainability,' which emphasises the importance of local adaptation and the community's capacity to maintain and evolve their cultural practices and knowledge systems in response to changing circumstances (Järvelä 2023: 4-5).

AI Restoration of TK

A major challenge in preserving TK lies in the substantial portions that have already been lost, along with the fragmentation of what remains, making holistic preservation difficult as key aspects of its original context and meaning may be irretrievably diminished. Rather than analysing the causes of this loss, the following section assumes its occurrence and focuses on how AI can support TK preservation and potentially aid in restoring lost elements.

According to Rahmatian (2010), restoration of cultural objects can be broadly categorised into six types of restorative efforts. The first category concerns the preservation and protection from (further) decay. The second type focusses on adding missing parts while maintaining the integrity of the existing elements. The third category addresses the reconstruction of the original whole by using existing fragments. The fourth type deviates slightly, focusing on creative restoration that forms a (new) whole in the spirit and style of the lost or fragmented object. The fifth category involves creating a new work inspired by the spirit or style of an artist or era. The sixth type of restoration concerns transformative use of pre-existing works (Rahmatian 2010: 53).

Given the specific challenges of TK, types five and six seem less relevant for restoring lost knowledge. While type four may serve a valid purpose, its creative input risks deviating from the authenticity of the original. By contrast, types one, two, and three prioritise preserving existing knowledge and recovering lost elements in alignment with the essence and spirit of the original object. As such, they appear to represent appropriate approaches for the restoration of lost TK.

If carried out solely by human restorers, restorative efforts require substantial time and human resources. Given that the knowledge necessary for filling gaps in alignment with the original's spirit is often held by the elderly within traditional communities, time becomes a critical and increasingly limited factor.

This is where digitisation and AI can play a transformative role. To address the need for preservation and prevent further loss, endangered TK can be digitised, preventing further decay and thereby preserving it for future generations. This digitised knowledge can then serve a dual purpose. The first is educating younger generations about their cultural heritage and TK, equipping them to assess the authenticity and spirit of restored knowledge. The second purpose lies in training AI systems to support the preservation and restoration of (lost) TK.

A key benefit of AI restoration is its ability to fill gaps by reproducing missing elements, enabling younger generations to better appreciate and connect with their cultural heritage (Li 2022: 368, Georgopoulos 2018: 1). Deep learning (DL) is one of the most effective AI tools for this task, as its algorithms analyse vast amounts of data and generate accurate reconstructions of missing elements. DL uses neural networks to process data and make decisions by identifying patterns and solving complex tasks, mimicking human reasoning to classify information and apply insights in various fields, like image recognition and natural language processing (DeepAI n.d.). Furthermore, DL enables computers to learn and apply hierarchical concepts, making it particularly well-suited for the restoration of cultural objects, including the reconstruction of TK by filling gaps and restoring incomplete elements (Goodfellow et al. 2016: 1). These AI algorithms can be supplemented by Text and Data Mining (TDM), a technique that extracts patterns from large datasets, to enhance the understanding of the restored TK. While DL plays a pivotal role in reconstructing damaged or incomplete elements, TDM can further uncover underlying structures and relationships within the knowledge, offering additional insights that complement AI-driven restoration efforts (Li 2022: 379).

One of the main concerns with AI-restored cultural heritage is whether restored knowledge can be considered authentic. In other words, it can be questioned whether AI can fill gaps in alignment with the original spirit (Li 2022: 374). In this respect, it is essential to recognise that AI restoration cannot function on its own. Instead, effective restoration necessitates AI and human collaboration. This is particularly relevant in the context of restoring TK. The main objective is to ensure that AI-restored knowledge remains authentic. There is a clear distinction between human interpretation and scientific (AI) interpretation, as the latter is entirely shaped by algorithms trained on specific datasets (Li 2022: 370-372, Boffey 2021). Consequently, AI can only generate assumptions derived from the patterns and information present in its training data. Once an AI system is trained, its operations and decision-making processes become largely opaque, so that its response cannot be reliably anticipated by human observers (Li 2022: 372-374, Gaskin 2021, Marcus & Davis 2019: 190).

Thus, while AI can generate multiple outputs, each slightly different, human intervention is required for determining which output is most accurate or in guiding

the AI towards further refinement (Castillo 2021). As such, human intervention is crucial for ensuring that the essence of the original is not lost (Li 2022: 374), or, in the current context, that AI output reflects the spirit of the TK accurately. Effective restoration of TK thus requires active community participation, as the insights of traditional communities are essential for verifying the authenticity of AI-generated reproductions. In this respect, educating younger generations is vital to preserving the remaining knowledge, ensuring its continued availability within traditional communities, both to enrich their cultural heritage and to facilitate restoration efforts in the future.

AI-driven applications should uphold and advance human rights. By aiding in the restoration of TK and lost cultural heritage, AI algorithms can contribute meaningfully to the preservation of the rights of traditional communities (Li 2022: 374). However, this potential can only be realised if AI is applied responsibly and ethically, while respecting the communities' priorities and cultural values. Positive TK protection measures, such as restoration efforts and documentation, can help preserve TK while potentially providing tangible benefits to communities, including compensation or cultural revitalisation (Chakrabarty & Kaur 2021: 419). AI can further improve such efforts, ensuring cultural heritage remains accessible for future generations. Digitisation and using AI to restore TK transforms cultural heritage into digital data, which becomes more accessible and thereby more vulnerable to misuse. This exposes the knowledge to potential appropriation, necessitating protective measures to ensure that sensitive cultural data is not exploited without proper consent or oversight from the originating communities (Chakrabarty & Kaur 2021: 420).

TK Ownership and Protection

Ownership is a critical consideration when it comes to protecting TK. As an intangible asset, TK is often examined through the lens of IP rights. However, TK ownership significantly differs from conventional IP frameworks. Existing IP doctrines would likely classify TK as part of the public domain, a perspective that is contested by traditional communities, who argue that such classification leaves TK vulnerable to unauthorised use and misappropriation (WIPO 2020: 10, Bhardwaj & Taparia 2020).

Furthermore, new challenges emerge in the context of technological development and digitisation, particularly regarding their impact on access to cultural heritage. While these technologies can improve the accessibility and use of TK for the benefit of the traditional communities that hold it, they also significantly increase the risk of misappropriation (Tuominen et al. 2023: 196). As such, information technology has fundamentally altered how TK is exploited. Particularly when digital cultural heritage materials are freely available online, the

communities from which they originate often lose meaningful control over their distribution and use (Tuominen et al. 2023: 200, Chisa & Hoskins 2016: 1-2).

TK ownership, however, should directly benefit the traditional communities that develop, sustain, and culturally identify with this knowledge (WIPO 2020: 20). The purpose should thus encompass goals like conservation and preservation, fostering economic empowerment, ensuring equitable benefit-sharing, safeguarding TK from misappropriation, protecting tradition-based innovation, and promoting respect for traditional communities, including preventing culturally offensive uses (WIPO 2020: 26, Chandran 2017: 2, Wekesa 2006: 7-9). In this respect, the use of TK from traditional communities should only be permissible based on prior, free, and informed consent (Chakrabarty & Kaur 2021: 417).

When comparing Indigenous and Western concepts of rights, terms such as access, public availability, and public domain carry fundamentally different meanings. Even if TK could be prevented from falling into the public domain, Western IP standards are inadequate for its protection, as they fundamentally conflict with Indigenous worldviews (Tuominen et al. 2023: 197-199). Several key differences underscore this incompatibility. Unlike IP, which is limited in duration, TK requires ongoing protection to reflect its generational nature (Hossain & Ballardini 2021: 57, Bhardwaj & Taparia 2020, Kalaskar 2012: 1). Additionally, TK is deeply integrated into cultural heritage, which, for Indigenous communities, cannot be owned by a single individual, and the concept of private property rights over knowledge is not aligned with their cultural values (WIPO 2023: 1, Chisa & Hoskins 2016: 3). Thus, whereas Western IP law rejects community ownership and emphasises individual ownership, TK is inherently collective, demanding a community rights-based approach (Hossain & Ballardini 2021: 58, Chakrabarty & Kaur 2021: 418). Moreover, for Indigenous populations, the focus is not on exclusive rights or restricting access but on achieving self-determination and sustaining the existence and development of TK (Tuominen et al. 2023: 198, Chisa & Hoskins 2016: 3). Most significantly, TK protection should extend beyond legal or economic considerations, encompassing inherently spiritual dimensions (Chisa & Hoskins 2016: 2).

TK lies at the heart of Indigenous cultures, forming an essential part of their way of life. In this sense, TK rights are intrinsically linked to cultural rights, safeguarded within the framework of human rights law, which frequently affirms that traditional communities should maintain control over their TK, particularly when it holds profound cultural significance. These frameworks provide for both moral rights, recognising TK as a cultural commons, and protection for material interests (Hossain & Ballardini 2021: 60). For instance, Article 31 of the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) explicitly recognises the right of Indigenous communities "to maintain, control, protect and develop

cultural heritage, traditional knowledge, and traditional cultural expressions".

Notably, as a mere declaration, UNDRIP is not a legally binding document (Hossain & Ballardini 2021: 61). In the binding bill of rights, TK is neither explicitly addressed in the International Covenant on Economic, Social and Cultural Rights (ICESCR) nor in the International Covenant on Civil and Political Rights (ICCPR), which were developed during a period when human rights were primarily conceptualised as individual rights. However, both acknowledge a collective dimension to certain rights, such as the enjoyment of cultural rights by an individual in community with other members of their group (HRC 1994: para. 6.2, Hossain & Ballardini 2021: 61). In this context, Article 27 ICCPR can be interpreted to implicitly encompass TK as part of the right of minorities to enjoy their culture, religion, and language.

This suggestion aligns with the interpretation of cultural rights by both the Human Rights Committee (HRC) and the Committee on Economic, Social and Cultural Rights (CESCR). For instance, HRC General Comment No. 23 acknowledges that Article 27 encompasses the rights of Indigenous Peoples to their way of life, including engagement in traditional activities (HRC 1994: paras. 3.2 and 7). These traditional activities are often deeply rooted in the TK of these communities (Hossain & Ballardini 2021: 62). CESCR General Comment No. 17 goes even further, explicitly recognising TK in relation to Art. 15(c) ICESCR on the right to benefit from the protection of the moral and material interests resulting from any scientific, literary, or artistic production of which one is the author. The comment highlights that state parties should "ensure the effective protection of the interests of Indigenous peoples relating to their productions, which are often expressions of their cultural heritage and traditional knowledge" (CESCR 2006: para. 32). Reaffirming and expanding upon this, CESCR General Comment No. 25 recommends that, for the effective protection of TK, states should adopt various measures, including establishing specialised IP regimes and ensuring that traditional communities and Indigenous peoples retain ownership and control over their TK (CESCR 2020: para. 39). Notably, despite this increasing recognition of Indigenous cultural rights in soft law and interpretative guidelines, the realisation of such human rights is often undermined by their insufficient transposition into concrete and enforceable national legal frameworks (Mokodompit et al. 2023: 130 and 133-134).

Ultimately, the CESCR returns the issue back to the domain of IP rights, where in fact most TK protection laws are established in the form of *sui generis* IP rights. *Sui generis* IP rights, derived from the Latin meaning 'of a special kind,' refer to a special legal protection system, designed to address issues that do not fall into either of the traditional IP categories. For the unique characteristics of TK, this offers a system that can address its specific needs and protection requirements,

while still remaining within the broader scope of the IP framework (WIPO 2020: 36, Kalaskar 2012: 2, Wekesa 2006: 3).

Sui generis TK protection laws typically offer one or both of two types of protection: defensive protection and positive protection. Defensive protection does not grant TK holders specific rights over their knowledge; rather, it safeguards against misappropriation (Ganesan 2016: 50). This is achieved by preventing individuals outside traditional communities from obtaining IP rights over TK (WIPO 2023: 2). For instance, the inclusion of knowledge in databases can help identify TK as prior art, thus preventing patents based on TK from being granted to non-traditional inventors (Ganesan 2016: 52). Another notable benefit is that undisclosed TK stored in private databases may be eligible for trade secret protection (Hossain & Ballardini 2021: 57). Positive protection, in contrast, involves the granting of rights that enable communities to promote, control, and benefit from the commercial exploitation of their TK (WIPO 2023: 2). This can be facilitated, for example, through licensing agreements and benefit-sharing mechanisms (Ganesan 2016: 53).

If TK is effectively protected against misappropriation and may potentially even offer tangible benefits to traditional communities, these communities may be more inclined to share their knowledge, such as medical insights, which can, in turn, benefit the global community (Wekesa 2006: 9). In this regard, proper TK protection can create a mutually beneficial situation for both local communities and broader society. However, the question is whether a *sui generis* system can in fact provide effective protection for TK. In a global economy driven by IP rights, it remains to be seen whether *sui generis* TK protection can effectively challenge this dominance, particularly given the disparity between weaker national TK laws and the overwhelming strength of the international IP regime (GRAIN 1998). Furthermore, since *sui generis* TK protection is based on IP rights, it may suffer from similar shortcomings inherent in the traditional IP system (Chisa & Hoskins 2016: 6). In fact, critics argue that *sui generis* rights are incapable of offering a sufficient solution (Hossain & Ballardini 2021: 53).

Protecting TK in International Law, from *Sui Generis* Rights to TK Databases

Sui Generis Rights

The first initiative to protect TK in international law was developed within the field of copyright. The 1967 Stockholm conference of the parties to the *Berne Convention for the Protection of Literary and Artistic Works* wanted to adapt international copyright to a new postcolonial landscape by addressing issues of particular

importance for the global south. One such issue was the protection of folklore and TK, which had hitherto been ignored by a copyright regime based on the idea of the author as an individual creator rooted in European history and influenced by liberal ideology and romantic aesthetics (Boyle 1996). In an attempt to embrace non-Western forms of creativity, the 1967 revision of the Berne Convention came to include Article 15(4)a, allowing member states to protect unpublished works by anonymous authors – although without explicit references to folklore or TK (Blake 2015, Hemmungs Wirtén 2010). This, however, had limited impact since it was only an optional provision and thus not an internationally binding legislation.

Nine years later, UNESCO presented its 1976 Tunis Model Law on Copyright for Developing countries: a template for copyright legislation that developing countries could utilise to help them adopt national copyright acts that meet the requirements in the 1952 Universal Copyright Convention. Article 6 of this model law provided protection for folklore in a more explicit manner than the Berne Convention. Nevertheless, since a model law is a voluntary and flexible tool that states can apply in the form and to the extent they see fit, the Tunis Model Law also failed to provide for any significant harmonisation of TK protection in international law (Sand 2003).

In the 1970s, UNESCO and WIPO began exploring the possibility of protecting TK and folklore without relying on existing IP legislation. This resulted in the passing of another model law: the Model Provisions for National Laws on the Protections for Expressions of Folklore against Illicit and Other Prejudicial Actions in 1982. This was a template for a *sui generis* protection of folklore and TK that individual states could adopt at their own discretion. Similar model laws have also been promoted regionally, for instance by the African Union and the Pacific Community (Sand 2003, Clark et al. 2004). Two years later, UNESCO and WIPO presented a draft for an international Treaty for the Protection of the Expressions of Folklore Against the Illicit Exploitation and Other Prejudicial Actions. Such a treaty would have been the first international, legally obliging *sui generis* protection for TK, but it was rejected, primarily by the industrialised member states (Blake 2015: 247).

Following this setback, UNESCO and WIPO came to address the issue on separate fronts. UNESCO continued the work on its own, leading up to the UNESCO Recommendation on the Safeguarding of Traditional Culture and Folklore of 1989. This was, again, not a legally binding treaty but merely a document that outlined a model for a *sui generis* protection for TK that the member countries were encouraged to adopt (Perlman 2011, Blake 2015). This would, as Blake puts it, be a system where "the creators and interpreters of folklore would be treated in a manner equivalent to that of copyright-holders", but without utilising existing IP legislation (Blake 2015: 248).

In 2001, WIPO appointed a special committee to address the issue, the Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC). One of the ultimate goals of the IGC was to develop an international treaty to protect genetic resources, TK and folklore (Blake 2015: 259). By 2015, the IGC had produced two draft provisions for a future legislation: the WIPO Revised Provision for Protecting Traditional Cultural Expressions and the WIPO Draft Articles of the Protection of Traditional Knowledge (Blake 2015). The latter of these documents included provisions to prevent the granting of illegitimate patents on TK and associated genetic resources (Blake 2015: 267). In 2024, WIPO adopted the Treaty on Intellectual Property, Genetic Resources and Associated Traditional Knowledge. The treaty aims to prevent illicit patenting of Indigenous knowledge by requiring patent applications to disclose their sources of knowledge and get the consent of the source communities before patenting and commercialising their knowledge (WIPO 2024). At the time of writing, the treaty has not yet entered into force but will do so if and when it is ratified by 15 signatories.

The illicit patenting of genetic resources and associated TK has also been addressed by the Convention of Biological Diversity (CBD) and the Nagoya Protocol, which provides provisions similar to the 2024 WIPO treaty. While the overarching goal of the CBD is to prevent the erosion of biological diversity, Article 1 in the CBD also calls for a "fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies" (CBD Article 1). This is further elaborated in the 2014 Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity. The Nagoya Protocol introduces instruments that can be employed to ensure that Indigenous Local Communities (ILCs) are involved in and benefit from the exploitation of resources emanating from their TK about local genetic resources (although without explicitly mentioning patents as a specific form of exploitation). The CBD and the Nagoya Protocol take a narrower approach to the issue of TK than WIPO and UNESCO as they only address TK associated with genetic resources. The Nagoya Protocol is nevertheless one of the few international agreements that oblige the member states to acknowledge traditional and local communities' rights to TK (Fredriksson 2020, Daly 2015).

Apparently, the attempts to establish protection for TK have, so far, resulted in few legally binding instruments but a number of recommendations to member countries to protect TK in national legislation. It is hardly surprising that it is mostly countries of the Global South that have adopted different forms of TK protection in their domestic legislation. The work of WIPO has instead come to focus more upon the possibility of database protection for TK.

TK Databases

In parallel to the negotiations over a *sui generis* protection for TK, WIPO and the IGC have addressed the possibilities to construct TK databases as a means to protect that knowledge from misappropriation. As mentioned before, there are, broadly speaking, two kinds of protective databases: 'defensive' protection and 'positive' protection (Varadarajan 2011). This chapter will primarily deal with defensive databases, as these have come to dominate the discussions at WIPO. During the first session of the IGC in May 2001, the member states articulated a need for a defensive protection in the form of documentation of TK that can prevent the illegitimate patenting of such knowledge (WIPO/GRTKF/IC/2/6, §1). Since the IGC was formed, it has regularly discussed different approaches, based on various forms of defensive databases for protecting TK.

Two databases that are often evoked as successful examples by the IGC are India's *Traditional Knowledge Digital Library* (TKDL) and the American Tulalip Tribe's TK database *StoryBase*. The TKDL is a state-run digital archive that collects and catalogues information on practices and pharmaceutical formulas originating from the four main branches of traditional Indian medicine – Ayurveda, Yoga, Unani, and Siddha. The library was launched in 2001 in response to cases where TK from India had been patented by companies in America or Europe, much to the outrage of Indian authorities and of the original holders of that knowledge. The idea behind the TKDL is to collect and classify a vast amount of TK in a format that is accessible and easily searchable for foreign patent examiners to make that information visible as prior art and thereby prevent its future patenting. Thus, the TKDL is only accessible to patent examiners at patent offices that have signed a non-disclosure agreement with India's Council of Scientific and Industrial Research (CSIR), the government institute that owns the database (Reddy & Chandrashekaran 2017, Gupta 2000, 2001, Fredriksson 2021).

StoryBase, on the other hand, is constructed and managed by the Tulalip Tribes, a First Nations community in Washington state. StoryBase was founded around the same time as the TKDL but stores traditional ecological knowledge: knowledge on how to manage and interact with the local environment that has been produced and reproduced within the Tulalip community for generations. StoryBase is an initiative by a small local community to register and store their own TK, primarily intended for internal use by the community. Such databases are sometimes described as internal databases, in contrast to external databases like the TKDL where authorities or other non-Indigenous actors take it upon themselves to collect and safeguard knowledge from local communities (UNEP/CBD/WG8J/4/INF/9).

To manage the disclosure of information, StoryBase makes a distinction between 'Type A knowledge' that is only available to members of the community, and 'Type B knowledge' which is made available to people outside the community,

such as patent examiners. In that way, information that is not already public can be documented for preservation for future generations without being disclosed, while information that has been made public can be documented for the purpose of preventing misappropriation (WIPO/GRTKF/IC/7/7, WIPO/GRTKF/IC/8/7). In that regard, StoryBase is both a positive and a defensive protection (WIPO/GRTKF/IC//3/6), compared to the TKDL which is a predominantly defensive database.

The question of whether to disclose information depends on what kind of material is documented. In the case of the TKDL, the database mostly contains so-called *codified TK* which is already documented and publicly available. StoryBase, on the other hand, mostly contains *uncodified TK* that has been passed on orally from generation to generation. A representative of the Tulalip Tribes at the WIPO proceedings also highlighted the diversity of different forms of knowledge including well-established and state-supported traditional medical practices such as Ayurveda and more local and marginalised forms of TK "which have not had schools to teach these things for thousands of years" (WIPO/GRTKF/IC/12/9, § 201).

Even though StoryBase is often highlighted as a good example in the WIPO debates, neither the Tulalip Tribes nor representatives of Indigenous communities in general uncritically embrace the idea of databases. While they acknowledge that databases can provide some protection against exploitation and preserve knowledge for future generations, they also feel that misused or badly managed databases can subject TK to public exposure and potential exploitation. The efficiency of defensive databases is sometimes questioned. Bagley (2019), for instance, argues that a database does not provide "any additional protection from misuse that the traditional knowledge does not already have, it is simply making the knowledge more easily accessible". He goes on to argue that "the database is not even providing that dubious level of 'protection' to secret traditional knowledge, as it cannot be used in a rejection without voiding its secret status" (Bagley 2019: 340). Furthermore, there are concerns that an exclusive focus on databases for protection can divert attention from other more effective, but also more controversial, strategies such as a *sui generis* protection of TK (WIPO/GRTKF/IC/29/8, Biswajit 2017: 257, Fredriksson 2022).

National TK laws: Registration and AI-Restored Knowledge

National Sui Generis TK laws

Despite ongoing efforts and debates surrounding the *sui generis* protection of TK, no internationally binding treaty has yet been established to address this issue comprehensively. However, a growing number of countries have taken steps towards

protecting TK by implementing domestic *sui generis* laws, reflecting a growing recognition of the need to safeguard cultural heritage through tailored national legislation. These countries include Costa Rica, Brazil, India, Kenya, Malaysia, Panama, Peru, South Africa, the Philippines, Thailand, and Venezuela (Chakrabarty & Kaur 2021: 410, Tong 2019: 935, Ganesan 2016: 53, Wekesa 2006: 10, Clark et al. 2004: 763-766). Some of the essential elements of *sui generis* TK protection laws include provisions for benefit-sharing, prior informed consent (PIC), and the disclosure of the country of origin. Further crucial elements concern co-ownership of patents, the disclosure of the use of TK, and regulations for contractual agreements that acknowledge the role of customary law (Kalaskar 2012: 4).

Peru was among the first countries to formally integrate domestic TK protection through its enactment of Law 27811 (UNCTAD 2016, Clark et al. 2004: 758 and 773). This law "introduces a notion of guardianship that emphasizes the responsibility of current Indigenous generations to preserve, develop, and administer their knowledge for their own benefit and for the benefit of future generations" (Clark et al. 2004: 778). Law 27811 provides targeted protection for the collective TK of Indigenous peoples, specifically in relation to biological resources, rather than offering a general TK protection framework (Clark et al. 2004: 775). It establishes that TK cannot be individually owned but must be collectively exercised by Indigenous communities, who are, however, entitled to determine their own priorities (Ganesan 2016: 53). The law envisions royalty payments for the use of TK and utilises existing legal instruments such as registers, licenses, trade secret protection, and competition law to enforce these rights (Chakrabarty & Kaur 2021: 412, Ganesan 2016: 54, Clark et al. 2004: 773).

In this context, registers offer defensive protection by preventing misappropriation, while licenses can provide positive protection that can benefit traditional communities by offering fair compensation (Clark et al. 2004: 782). However, the Peruvian system has also been criticised for not fully realising its potential benefits (UNCTAD 2016). As noted by Hossain and Ballardini, traditional communities may not view registration as the most effective method for protecting their TK, as this may conflict with their cultural values and practices (2021: 59).

Costa Rica enshrines the protection of TK in its Biodiversity Law, Law 7788, where Article 82 establishes TK as a *sui generis* form of IP. A distinctive feature of this provision is that it does not require prior declaration, explicit recognition, or official registration, allowing for the inclusion of practices that may acquire TK status in the future (Wekesa 2006: 10, Clark et al. 2004: 764). The law further determines that traditional IP rights cannot conflict with TK protection, seemingly prioritising TK. While the exact scope of these rights is to be defined through secondary legislation, a participatory process is envisioned to determine who can hold and invoke these rights (Clark et al. 2004: 764). The Costa Rican government

often relies on prospecting agreements to enforce TK rights against international corporations. However, these agreements have also included TK held by Indigenous communities without involving them in the negotiation process, raising concerns about inclusivity and representation (Ganesan 2016: 53).

In contrast to this, Brazil's approach to TK protection, like Peru's, mandates the registration of TK as a prerequisite for legal recognition. Unlike Costa Rica, however, Brazil's law, Medida Provisória No. 2. 186-16 of 2001, specifies that TK protection does not affect conflicting IP rights established prior to the TK registration (Clark et al. 2004: 763). On a positive note, the Brazilian law explicitly identifies and guarantees TK holder rights with a specific chapter dedicated to benefit sharing and licensing agreements (Ganesan 2016: 53). This approach offers a form of positive protection, ensuring that TK holders are actively involved in the utilisation and economic benefit derived from their knowledge. Similarly, Malaysia, Kenya, and Panama offer positive protection for TK, with at least Panama requiring the registration of TK as a condition for such protection (Chakrabarty & Kaur 2021: 410, Clark et al. 2004: 766). India, by contrast, also mandates the registration of TK as a prerequisite but provides only defensive protection, as outlined above (Chakrabarty & Kaur 2021: 410).

One of the most recent examples of domestic TK protection is found in South Africa's Protection, Promotion, Development and Management of Indigenous Knowledge Act of 2019 (PPDMIKA), adopted at the brink of the Fourth Industrial Revolution, which is defined by rapid digitisation and data flows. The Act's objectives address a variety of aspects inherent to TK, including protection from "unauthorized use, misappropriation, and misuse", promoting its wider application and development, and ensuring equitable benefit-sharing, while at the same time encouraging the commercial utilisation of TK including for new products, services, and processes. To prevent misappropriation, TK shall also be recognised as prior art in the context of IP rights (PPDMIKA: Section 3). Indigenous communities are then granted exclusive rights to: (a) any benefits derived from the commercial use of their TK, (b) recognition as the origin of the TK, and (c) restrict unauthorised use of their knowledge (PPDMIKA: Section 13(1)). In this respect, individuals outside the community intending to use TK commercially must negotiate a licensing agreement with a trustee representing the Indigenous community (PPDMIKA: Section 13(2), Tong 2019: 935).

To be protected under the PPDMIKA, TK must be registered and documented in accordance with Section 3(f), Section 9, and Chapter 6 of the Act. For this purpose, a suitably skilled and qualified person shall be appointed as curator of such knowledge. The curator may then delegate their powers to a trustee of Indigenous communities (PPDMIKA: Section 18). Section 19 further details the specifics of the register, its contents, and a stipulation regarding the security of the register. Regarding security, it is noteworthy that the register is generally public, allowing

public access for inspection subject to payment of a fee (PPDMIKA: Section 21(1)). However, for certain additional documents related to the registration of TK, access may require the requesting party to enter into a non-disclosure agreement (PPDMIKA: Section 21(2)). Section 20 of the PPDMIKA then outlines the conditions for registration, notably referring the registrability of TK to certain specific criteria outlined in Section 11 of the Act (PPDMIKA: Section 20(2)).

In this context, Section 11 prescribes that the protection of TK only applies to such knowledge that "(a) has been passed on from generation to generation within an Indigenous community; (b) has been developed within an Indigenous community; and (c) is associated with the cultural and social identity of that Indigenous community" (PPDMIKA: Section 11). Notably, Section 10 explicitly states that TK is protected only as long as it meets these eligibility criteria. Once knowledge no longer satisfies these criteria, it falls into the public domain (PPDMIKA: Section 10). Thus, for South Africa, TK refers only to knowledge that has been developed within an Indigenous community, is deeply connected to its cultural and social identity, and is passed down through generations. While this generational aspect aligns with Indigenous worldviews, it also raises questions about what constitutes TK, both in relation to the objective of developing TK as outlined in PPDMIKA Section 3(b) and whether lost knowledge and cultural heritage restored through AI can qualify as TK.

At this point, it is important to highlight that national TK protection laws are significantly limited, primarily because they only provide protection within the confines of specific national jurisdictions (Clark et al. 2004: 775). This fragmented protection, however, is insufficient in addressing the globalised nature of knowledge exchange, as it fails to ensure comprehensive custodianship and equitable benefit-sharing on a broader scale (Intepat 2020). The misappropriation of TK is a global problem (Chakrabarty & Kaur 2021: 407). This holds especially true in relation to other IP rights that benefit from robust international protection. While national laws can help prevent misuse of TK nationally, they are inherently constrained by those jurisdictional boundaries, requiring the establishment of internationally agreed-upon rules to provide global recognition and enforcement of TK protection (Kalaskar 2012: 1, Clark et al. 2004: 795).

The Registration Requirement and AI-Restored TK

According to Clark et al. (2004: 782-784), TK registers are designed to protect the rights of Indigenous communities by helping preserve their knowledge, ensuring control over its use, and preventing unauthorised use and misappropriation. There are three main types of registers: Public National Registers, Confidential National Registers, and Local Registers. Public National Registers compile publicly available TK, for example, to assist patent offices in evaluating patent applications

involving Indigenous knowledge. Confidential National Registers safeguard TK that Indigenous communities seek to keep secret. Access to these registers is therefore restricted. Local Registers support community-level initiatives to manage and control access to TK based on local customs or laws.

A key issue with documenting TK in official registers is that it results in wide disclosure, making such knowledge more accessible to the public, especially when made available online. This raises further concerns regarding misappropriation, particularly when only national protection exists. On the other hand, documentation, at least under current *sui generis* regimes, is essential for the protection of TK, as it helps define what knowledge is protected while also preserving it for future generations (WIPO 2023: 2, Bhardwaj & Taparia 2020, Chisa & Hoskins 2016: 4). A potential solution, applied both by the TKDL and *StoryBase*, could be to store documented TK in private registers, limiting access on a need-to-know basis (Kalaskar 2012: 2). At least with regard to defensive protection, this seems to be an adequate approach (Ganesan 2016: 50). Even for positive protection, this approach may still be suitable, allowing traditional communities to exercise self-determination in deciding when, with whom, and for what purposes their knowledge is shared (Kalaskar 2012: 2-3). In this context, a significant challenge with TK databases is that they are, like the TKDL, often governed by the state rather than being under the primary authority of traditional communities (Tuominen et al. 2023: 205).

When it comes to registering TK, a distinction can be suggested between registers used for defensive protection and those for positive protection of TK. In the context of defensive protection, particularly with regard to patents, an unequivocal identification of knowledge as TK is less critical. As long as the knowledge exists anywhere in the world, irrespective of whether it belongs to any particular community, it constitutes prior art. While companies may still use such knowledge for research purposes, they are precluded from obtaining patent protection over such knowledge. Conversely, as positive protection seeks to prevent appropriation and may impose licensing fees, it places greater emphasis on the need for protected TK to be demonstrably held by traditional communities. Nonetheless, this requirement should not impose unreasonable conditions on its protectability.

This raises the overarching question of whether AI-restored TK can and should be regarded as registrable TK eligible for *sui generis* protection. As indicated in 4.1, some jurisdictions, like Section 9 of South Africa's PPDMIKA, provide protection only for registered TK, whereas the registration of knowledge as TK is subject to specified requirements. Under the PPDMIKA, for example, TK must be transgenerational, developed within a traditional community, and tied to that community's cultural and social identity. It is therefore important to consider whether AI-restored TK can fulfil these requirements.

In this context, acknowledging that *sui generis* TK protection is grounded in IP systems, parallels can potentially be drawn to modest and controversial debates about the applicability of copyright protection to (AI-)restored cultural works, such as historical artworks. The central question here is whether (AI-) restored artworks can qualify for copyright protection. The main argument supporting such protection is that it provides an incentive for conservators to undertake the restoration of culturally significant objects (Li 2022: 375, Mandel 1981). A comparable rationale could apply to the restoration of TK. Adequate protection could encourage traditional communities to share their knowledge for restorative purposes. In contrast, the lack of such protection might dissuade them, as they may fear the appropriation of both their digitised existing TK as well as of the newly restored heritage by others. Nonetheless, the suitability of copyright as a mechanism for protecting AI-restored TK remains questionable. Firstly, the argument for granting copyright protection to restored artworks is not widely supported in prevailing legal commentary. In particular, it seems that the restoration of artworks, especially when AI-assisted, typically lacks the originality and creative autonomy required for copyright eligibility (for eligibility criteria see e.g. *Painer*, C-145/10, 2011, Bridgeman Art Library v. Corel Corp., 1999).

Secondly, copyright fails to account for the collective and cultural dimensions inherent to TK. In particular, if copyright law would provide for the protection of restoration efforts, a copyright could potentially be granted to the restorer, who may not be a member of the traditional community. This could present an improper solution within the context of TK restoration. Furthermore, debates around copyright in the context of restoration efforts often involve historical works that are already in the public domain – where questions concern whether the act of restoration can create a new, protectable work. In contrast, TK should specifically not be regarded part of the public domain in the first place. A deeper analysis of whether AI-restored works can or should receive copyright protection lies beyond the scope of this article. Nonetheless, in light of this potential jeopardy arising from such copyright considerations, a different solution is required to counterbalance this risk in relation to TK. In this context, recognising AI-restored TK as eligible for *sui generis* protection seems paramount. However, this can only be realised if AI-restored TK satisfies the criteria to be encompassed by the definition of TK.

This, however, is complicated by the circumstance that, even without AI involvement, it may often be challenging to prove that certain knowledge constitutes TK and is owned by a specific community (Hossain & Ballardini 2021: 64, Sand 2003: 198). Looking back at South Africa's interpretation of TK as knowledge that has been developed within an Indigenous community, is deeply connected to its cultural and social identity, and is passed down through generations, it appears that the first two criteria can be met by AI-restored heritage. The restoration of TK

requires that efforts are grounded in knowledge that originates from traditional communities and was likely developed by them. The desire of these communities to restore lost elements of this knowledge further underscores its cultural significance, linking it to their identity.

The key issue in relation to the utilisation of AI is thus the question of whether AI-restored TK satisfies the transgenerational aspect typically associated with TK. The transgenerational aspect concerns the principle that the authenticity of TK is ensured by the fact that it has been passed on from generation to generation. The interpretation of this transgenerational principle, which is inherently tied to the essence of what defines TK as 'traditional' (Clark et al. 2004: 778), is thus of paramount concern. The challenge posed by AI involvement is that AI-restored knowledge may be considered a new creation, not having been passed down through generations. The fact that the knowledge got lost indicates that it was not transmitted across generations. Additionally, the communities that hold this knowledge are often viewed more as guardians than as owners in the Western sense (Clark et al. 2004: 778). However, this guardianship entails an active engagement with this knowledge. This aligns with Section 3(b) of South Africa's PPDMIKA, which emphasises that one of its objectives lies in a broader application and development of TK. Or, as Clark suggests, TK "refers to knowledge systems that […] are constantly evolving in response to a changing environment" (Clark et al. 2004: 778). This perspective implies that TK can evolve into something that has not yet been passed down from generation to generation but could be in the future. Moreover, AI itself can be seen as part of the evolving environment in which traditional communities find themselves in the modern era.

In conclusion, there is currently a lack of legal certainty regarding whether AI-restored knowledge can qualify as TK. Nevertheless, there is a pressing need for appropriate protection to support the preservation and restoration of TK. To this end, a broad understanding of the TK concept is essential, and the transgenerational aspect should not be applied too restrictively. Only through adequate protection can traditional communities be encouraged to actively engage in preservation and restoration efforts. The determining factor for protection should thus ultimately be based on the authenticity of the AI-restored content, in consideration of the cultural context from which it originates.

Discussion: Reflections on Authenticity and the Transgenerational Principle

This article has accounted for various legal aspects that can apply when using digital technologies, like AI, to safeguard or restore TK. Before concluding, we want to reflect briefly on how these legal aspects relate to a wider discourse on heritage,

indigeneity, and authenticity. As Li (2022) points out, authenticity is a complex term without a universal definition. This is true in a legal context, but it is even more the case from a heritage studies perspective where authenticity is a somewhat problematic concept. When applied to culture in an anthropological sense – i.e. culture as a system of expressions, practices, and beliefs – authenticity is burdened by essentialist connotations dating back to the age of nationalism and infused with romantic beliefs that nations and people have inherent identities expressed through folk culture. With regards to Western cultures, such essentialist ideas have been relegated to the past (although recurringly resuscitated by nationalists). However, they sometimes linger in discourses on Indigenous cultures where Indigenous people are expected to display a certain form of cultural authenticity in order to be acknowledged as Indigenous and enjoy the privileges or compensations they are lawfully entitled to. Here, ideas of authenticity on the one hand aim to empower Indigenous communities and safeguard their cultural rights, while they on the other hand tend to deny them the fruits of modernity and expect them to maintain a romanticised lifestyle from a distant past (Sissons 2005).

This article addresses a more specific definition of authenticity, related to the discussion on AI-restored TK. Here, authenticity may simply refer how well the restoration resembles the form and shape of what is perceived as the 'original' work. This is, however, not a simple definition either and it is not unrelated to the larger discourse about cultural authenticity. The 'original' work is in many cases an imagined entity since the form and shape of the initial work often tend to be partly or entirely lost – hence the need to restore it. In such cases, the restorations are merely filling in the missing pieces with new content that replicates certain characteristics of the work that is being reconstructed. The goal for restoration of older works, whether done with AI or not, would thus be to "produce output that is 'authentic' in style and content, but not 'original'" (Li 2022). It is necessary to ensure that the restoration does not become a new work in itself in order to respect the authenticity of the work that is being restored: from a copyright perspective, originality needs to remain with the original work otherwise the reconstruction risks becoming a derivative work.

This, however, raises the question of where originality begins. Zondi for instance discusses whether the traditional costumes of the Indigenous Sotho community in South Africa can still be considered authentic to Sotho culture even though the glass beads that now adorn the costumes were introduced by European colonisers in the 15th century, replacing the shells that were initially used (Zondi 2019). Such a definition of authenticity tends to presume that authenticity resides in a precolonial place and time and that everything introduced after that, as a result of colonialism, corrupts that authenticity. This might make sense if the goal is to amend the damages that colonialism inflicted upon Indigenous people by erasing

the traces it left in traditional cultures. However, that is not only an impossible task, it also leads down the rabbit hole of primordialism.

The discourse on restoration of heritage tends to focus on the restoration of cultural objects: paintings, costumes, and other artifacts. This is complex enough in itself, as the example of the Sotho beads show. Discussing authenticity in relation to intangible cultural heritage and TK is even more challenging. As many have pointed out (Clark et al. 2004), TK continuously evolves, and it should not be subjected to a concept of authenticity that freezes Indigenous cultures in a distant state of origin. Embracing the fact that TK changes over time implies that the best way to preserve it might not be to restore it to an original state but rather allow it to transform in harmony with the social and cultural development of the group that holds it.

This however actualises the transgenerational principle discussed above: the connection between the past and the present where the authenticity of TK relies on an unbroken rendering of knowledge from generation to generation. When that chain is broken and knowledge is partially lost, AI can certainly be a useful tool to restore it. This, however, raises the question of whether the authenticity of that knowledge is corrupted when it is reinvented rather than repeated over generations. There is of course no universal answer to that query. The crucial question might be who performs the reconstruction. As discussed in chapter 4.2, copyright could indeed be granted to a restoration conducted by someone outside of the community. If that is done without the consent of the traditional owners of that knowledge, that would obviously violate the rights and the integrity of that community. It could potentially also be in breach of the CBD and the Nagoya Protocol if the knowledge concerns genetic resources. This would however also apply if the reconstruction is made without the use of AI. This touches upon the same dilemma that appears in the discussion about TK databases, where databases maintained by public authorities or other actors outside of the Indigenous community are more likely to suffer a lack of legitimacy.

If an Indigenous community on the other hand utilises AI to reconstruct TK that has been lost but was once held by that community, the question becomes more complicated. The reconstructed knowledge might still be discarded as inauthentic with reference to the transgenerational principle if it turns out that the knowledge has not been handed down by the ancestors and there is no way of knowing if it even reflects their understanding of it. This, however, leads back to primordialism. A more relevant question would be if and how the TK relates to the culture of the living community. If it aligns with the values and perspectives of the community, it implies that the knowledge is indeed embedded in an unbroken cultural tradition, i.e. the link between the past and the present still exists.

It thus seems counterproductive to categorically discard the use of AI to

restore TK on the grounds of authenticity. AI-restored TK could well enjoy the same protection as other TK, for instance through databases and depositories, as long as they are endorsed by the community to which they are attributed. In that sense, authenticity would be based on the restoration's capacity to represent the living community rather than on its seemingly truthful replication of an unknown origin.

Conclusion

TK is central to the cultural identity of Indigenous communities, reflecting their spiritual, environmental, and practical wisdom handed down through generations. However, the spiritual and cultural value of TK is threatened by ongoing abuse and misappropriation, which undermine the sovereignty and dignity of the communities that hold this heritage. TK further faces ongoing erosion, with much of this knowledge being lost due to modernisation, colonisation, or neglect. As highlighted in this article, AI can offer a solution to this problem by offering tools for the reconstruction of fragmented or lost TK, thereby aiding in preserving cultural heritage for future generations. For this to be effective, however, TK further requires adequate legal protection from misuse and misappropriation.

Despite decades of international dialogue, efforts to protect TK within the framework of international law remain largely fragmented and inconsistent. In particular, the reliance on Western IP considerations fails to address the spiritual, generational, and collective dimensions of TK. While national *sui generis* frameworks may offer at least some protection for TK, their limited jurisdictional scope underlines the necessity for a cohesive global strategy.

Furthermore, the registration of TK in databases, which is often required under domestic TK protection laws, is a double-edged sword. While defensive protection mechanisms can prevent misappropriation of registered TK, the registration requirement raises questions about what qualifies as registrable TK. There may exist a perceived conflict between the multigenerational aspect of TK and facilitating the adaptive development of cultural knowledge. To provide effective protection, however, the aspect of generational continuity as a registration requirement should not be interpreted too narrowly, as the purpose of TK protection is not only preservation but also its continued development by traditional communities. In this context, the registrability of AI-restored TK should rather be determined by its authenticity which should reflect the living cultural values of traditional communities rather than static historical fidelity.

To this end, active participation of traditional communities in AI-driven TK restoration projects is essential to ensure that technological interventions align with their cultural values and priorities. When appropriately fostering collaboration,

transparency, and equitable protection, digitisation and AI restoration can create mutually beneficial outcomes: traditional communities gain access to new approaches for preserving their heritage, while the broader global community can benefit from access to knowledge that contributes to the collective cultural and intellectual wealth of humanity. To incentivise traditional communities to share and digitise their valuable TK, robust protection is required to prevent artificial barriers from impeding the rightful recognition and custodianship of AI-restored knowledge.

Declaration of AI Use

AI, in the form of Microsoft 365 Copilot, was used for language editing in the preparation of this manuscript. The amended content was re-viewed and further edited by the authors to ensure the accuracy and quality of the final output.

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Digital Cultural Heritage Of Minorities And Indigenous Peoples: Towards A More Participatory Governance Framework For Decision-Making

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Abstract

Cultural heritage (CH) is a core element of the identity and self-determination of minorities and Indigenous peoples. Digital technologies, especially artificial intelligence (AI), offer new ways to preserve, revitalise, and share CH. However, issues related to intellectual property, human rights, and data governance often limit fair participation and hinder authentic representation of these communities.

This article examines these issues and explores governance models, proposing more inclusive frameworks for digital CH. Protecting, preserving, and revitalising the CH of minorities and Indigenous peoples has been prioritised by current regulatory frameworks, e.g. in the European Union. Nevertheless, there is a lack of comprehensive mapping of the current models of governance employed by CH institutions. Such mapping would enable scholars and stakeholders to better understand the challenges and opportunities posed by digitisation and AI, particularly regarding the authenticity of content representation in minority and Indigenous CH.

This article offers a new holistic overview of governance models in the digitisation of Indigenous and minority CH. The findings are based on a scoping review undertaken to identify scientific publications dealing with the role of law and policies governing the participation of minorities in decision-making processes. This review sheds light on overlooked, unresolved, or controversial legal and policy issues implicit in the existing governance models. Such issues can hinder the participation of minorities in CH digitisation decision-making processes. Consequently, this can affect the authenticity of the contents of the digitised material.

We conclude by proposing ways of leveraging user-centricity and proactiveness. This will promote more effective engagement and participatory practices to better support the existing governance frameworks for digitisation and the use of AI in relation to minority and Indigenous heritage.

Keywords: Digital cultural heritage, Artificial Intelligence (AI), Law, Policies, Governance, Decision-making, Minorities, Indigenous peoples, Participation, Representation.

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Introduction

Cultural heritage (CH) is a crucial element in the process of identity definition, representation and self-determination of minorities and Indigenous peoples. In turn, digital technologies, particularly artificial intelligence (AI), are an increasingly important part of documenting, preserving, accessing, and renewing such CH. The digitisation of the CH of Indigenous and minority groups can enhance their cultural resilience, foster community empowerment, and promote mutual understanding and cooperation between different stakeholders at the local level (Arthur et al. 2023). However, the digitisation of CH can also pose challenges. This is particularly true when technologies such as AI are used. Among other concerns, the integration of such technologies into the CH of minorities raises issues of intellectual property, human rights, and data governance (Tuominen et al. 2023). This poses challenges regarding concepts of ownership and property, rights of use, and the appropriate representation of Indigenous and minority cultural expressions. Overall, this could reduce the participation and inclusion of these groups, hinder the equitable representation of diverse values in digitisation, and increase the risk of misuse of digital CH.

Recognising these challenges, the European Union (EU) has developed various legal and policy frameworks to promote inclusivity and diversity in the digitisation of minority heritage. At the same time, it is seeking to strike a balance between information protection and access. In this respect, the European Commission has consistently emphasised that public sector information should remain in the public domain once digitised. For example, the Open Data Directive (2019/1024), which regulates the opening and reuse of digital datasets published by EU public sector bodies, stipulates that documents from libraries, museums, and archives should be 'reusable'. It also promotes their availability in open, machine-readable formats accompanied by metadata and the use of open standards. Article 14 of the Digital Single Market Directive (2019/790) requires the reproduction of public domain material to remain in the public domain. The Commission's recommendation of 10 November 2021 on a common European data space for CH also reiterates the positive impact that the dissemination and reuse of digital CH can have. Moreover, the Data Act (COM/2022/68 final), which complements the Data Governance Act (2022/868), establishes minimum standards for the opening, reuse, preservation, and fair exploitation of digital CH resources, while ensuring equitable stewardship.

However, if observed from the perspective of minorities and Indigenous peoples, such a mandate focused on the use and reuse of CH poses important challenges, both in terms of open data policies and intellectual property rights (Ballardini et al. 2021, Hossain & Ballardini 2021). Although the EU has declared that the rights of members of minorities should be respected by the EU (Article 3(3) of the EU Treaty and Article 21 of the EU Charter of Fundamental Rights), the protection of minority digital CH thus far falls short of some of the emerging

international human rights standards on CH. An example of this is the right to self-determination (Olsén 2019). Such policies in favour of 'openness' can clash with other EU laws (e.g. copyright), limiting the possibility of opening digital CH in the first place. The policies are also particularly problematic when it comes to the digital CH of minorities, as the open policy can be perceived as incompatible with the principles and shared values of the minorities themselves. Consequently, such policies provoke fears of digital objects being misused or taken out of context, as well as concerns over the exploitation of public domain material for commercial gain. This mistrust can, in turn, lead to a reluctance on the part of these communities to share their own CH, thus reducing the availability of this material and subsequent opportunities for reuse. Furthermore, there is a clear and pressing need for greater legal clarity around IPR, ethical considerations, and the digital reproduction of minority CH (Wallace & Euler 2020).

Overall, there is a lack of a broader, holistic understanding and knowledge of participatory governance models that could enable CH institutions, scholars, and stakeholders to better address these challenges. Such models are essential for harnessing the opportunities that digitisation and AI present in terms of authenticity of content, value, and appropriate representation of minority and Indigenous CH. To that effect, this article addresses this gap by providing a fresh, holistic overview of the governance models currently in use in the field of Indigenous and minority CH digitisation. The research is based on a scoping review conducted to identify scholarly publications addressing the role of law and policies for minority participation in decision-making processes related to digital CH. This includes decision-making processes related to the initiation and management of new digitisation efforts, and to the governance of access to previously digitised materials. This allows us to highlight currently unresolved or controversial legal and policy issues implicit in these existing governance models that may hinder minority participation in CH digitisation decision-making processes and, as a consequence, affect the authenticity of the content. We conclude with a set of proposals on how user-centric approaches and related practices can support governance models that promote more effective engagement and participation, ultimately enabling more respectful and inclusive digitisation of minority and Indigenous heritage. In the context of this article, user-centricity refers to how certain design processes are carried out and how people connect to and interact with different systems in a general sense. User-centricity, in this vein, is a manner of making a certain system easier and better suited to its users and also improving or changing the system at a deeper level (Hagan n.d.; see also Luchs et al. 2015). Therefore, the 'users' in this context are not a clearly defined group (as might be the case with designing a product for certain types of customers), but rather anyone who relates to the existing governance and policy models in a certain position or role.

DIGITISATION and MINORITY Cultural Heritage: Shield or Sword?

Developments in digital technologies have brought both opportunities and challenges to many sectors – memory institutions (such as archives and museums) and CH organisations being no exception. In this context, both advanced digitisation techniques and increased opportunities to open collections online are significant factors to consider, as institutions are now able to digitise new categories of materials, in greater quantities and at higher levels of quality. Advanced digital technologies such as AI, machine learning, cloud computing, 3D modelling, and virtual and augmented reality have significantly expanded the opportunities for digitisation, online accessibility, and digital CH preservation. These opportunities affect both the initiation and management of new digitisation processes, as well as the governance of access to previously digitised material. Indeed, these technologies enable ground-breaking forms of artistic creation, provide new opportunities for the promotion of Indigenous culture, and thus reinforce pluralism and tolerance. The technologies also introduce new ways of engaging with digital CH content through co-curation, co-design, and crowdsourced contributions, thereby enhancing participation (Commission Recommendation (EU) 2021/1970 of 10 November 2021 on a common European data space for CH).

The online dissemination of materials provides previously inaccessible information and value to associated communities due to the fact that earlier, the materials were kept exclusively in physical form within institutional premises (Mäkikalli et al. 2021). However, the more material that is available online, the greater the risk of misuse and appropriation (Linkola et al. 2025). As Jon Bing has commented, in the field of digital CH it is important to develop 'a project' to make a greater amount of CH content available in digital form and to establish criteria and principles for computerisation, and coordinate this (project) on a national and EU level. According to Bing, "this involves libraries, but also archives and museums – illustrating the converging force of information technology". Bing maintains that "this poses new issues on several fronts" (Bing 2005). For instance, the application of AI, particularly generative AI (Gen-AI), to the digital CH environment poses significant risks related to authenticity, provenance, and bias of the newly generated digital datasets. Gen-AI can create realistic but synthetic artefacts, making it difficult to distinguish authentic heritage from AI-generated content. This can potentially undermine the trustworthiness and the authenticity of digital archives or digital museums. In addition, Gen-AI can reinforce prejudices regarding minorities and Indigenous culture and communities, as algorithmic biases risk distorting cultural representation, marginalising diverse cultural narratives and reinforcing existing inequalities. While Jon Bing did not specifically address Gen-AI, his work provides a useful lens through which to examine today's AI-related legal

and ethical challenges. The fundamental issues he identified, however, remain at the core of AI governance. Examples of these are automation, digital rights, legal access, ethical considerations, and accountability. His insights underline the fact that, as technology evolves, many of the underlying legal and ethical issues remain strikingly persistent.

To our knowledge, legal proceedings have not yet emerged in relation to modern types of digital tools such as AI and their use in digitising minority heritage. However, there have been several legal cases in regard to CH digitisation in general. For instance, the risks materialised as early as 2020, when the British Museum made nearly 1.9 million images of archival and museum material available online. Some of the images were related to Indigenous communities and included images of human remains, which are often considered highly sensitive and can hold particular spiritual significance for Indigenous communities. These materials were made freely available under a Creative Commons 4.0 licence (Open Culture 2020). Similarly, in the same year, the Finnish Heritage Agency released over 200,000 images online under a CC BY licence (Finnish Heritage Agency 2020). Archival photographs of Indigenous peoples have been used on mobile phone covers or clothing without the consent or permission of the communities or individuals concerned (Tammela 2021). It is clear that the dissemination of materials in this way leaves little to no control over the materials for the Indigenous communities involved.

In this context, the so-called 'Sinaida case' is especially illustrative. In 2021, YLE radio Oy, the Finnish Broadcasting Company, reported a case involving an image of a Skolt Sámi woman, Sinaida (Tammela 2021)[1]. Her granddaughter, Laura Feodoroff, had become aware that the picture of her late grandmother was being used in commercial products, such as phone covers and pillowcases, in an American online store. A Brazilian artist had downloaded the image of Sinaida from the account of the Finnish Museum of Photography on Flickr, added colours to it, and sold it online as an art product. Indeed, in line with many other institutions, in 2016 the Finnish Museum of Photography opened part of its collections online to be freely used under the Creative Commons licence CC0 – No Rights Reserved (Creative Commons 2009). According to the licence: "In contrast to CC licenses that allow copyright holders to choose from a range of permissions while retaining their copyright, CC0 empowers yet another choice altogether – the choice to opt out of copyright and database protection, and the exclusive rights automatically granted to creators – the 'no rights reserved' alternative to our licenses". Such a licence also allows use of the work for commercial purposes. According to the

1 Skolt Sámi are a small group of Sámi people who speak the Skolt Sámi language. In Finland, there are three main Sámi languages spoken: Inari Sámi, Northern Sámi, and Skolt Sámi.

museum's chief curator Anni Wallenius, the thinking behind the decision was that the museum would intervene as little as possible in how the public can use the images within the limits of the legislation and copyright (Tammela 2021). However, as Wallenius noted, the museum did not foresee the potential ethical and moral ramifications of making the pictures available online under the CC0 licence. The passage was translated by Iiris Tuominen, and parts of the interview were previously published in Tuominen et al. (2023). As soon as the museum became aware of the incident, it removed the photos from Flickr. Laura Feodoroff and her relatives also contacted the Brazilian artist, who was sympathetic to their concerns and removed the picture. However, as Feodoroff told YLE, it took several steps to remove the picture from the online store, as the image had ended up in other products in the online store. It was only after Feodoroff filed an official complaint with the American online store that the image was ultimately removed from sale. Wallenius told YLE that based on this case, the Finnish Museum of Photography decided to update its practices by liaising with the Sámi Museum Siida as well as Sámi researchers and activists to ensure the materials are made available online in a more thoughtful manner in the future (Tammela 2021).

As the Sinaida incident illustrates, one problem that can be identified in the context of online collections is the uncontrollable commercial use by the majority population, which often marginalises the voice of Indigenous groups and provides little benefit to Indigenous communities. This risks the exoticisation and stereotyping of Indigenous peoples. Similarly, the historical background of many cultural institutions poses important challenges in terms of the colonial legacy of representations of Indigenous cultures in Western cultural institutions. This legacy can also influence CH digitisation initiatives. However, this history has rarely been addressed in the context of memory institutions, many of which have several colonial collections (e.g. the National Museum of World Cultures in the Netherlands, the Museum Europäischer Kulturen in Germany, the British Museum in England, and the Smithsonian Institution in the US). Through digitisation, the field is taking a step forward that bears an acute risk of continuing colonial practices rather than reconciling them.

In this respect, collections containing human remains seem particularly important. For example, Swedish, Finnish, and Norwegian museums have long held collections of Sámi bones and skulls. Many of these remains have been exploited for scientific purposes in the study of racial differences. A notorious institution in this regard was the Unit in Uppsala, a government-funded research institute that studied eugenics and forcibly sterilised thousands of Sámi women (The Guardian 2019). In Finland, the University of Helsinki donated its bone collection to the Sámi Museum Siida in 2001 (YLE 2019). However, many other institutions have not yet returned their bone collections to the communities. While the issue of human remains is an

extreme example, it highlights that care is needed and the past to be addressed before opening collections online to ensure that the same mistakes are not repeated.

In certain cases, technological developments make it possible to advance processes of reconciliation and restitution (Hennessy 2009). For example, the repatriation of objects regulated by international and EU law is a complicated legal and political process, while digital repatriation is much less effort- and resource-intensive. Digitising and providing access to museum collections and archival materials allows these items to be repatriated quickly. However, digital repatriation should be used as a temporary solution rather than a quick fix for institutions (Stahn 2022). At the same time, this example highlights the broader issue of broken governance models in CH management. The lack of inclusive and ethical frameworks has allowed past practices to perpetuate harm, such as the mishandling of sensitive materials and the exclusion of Indigenous perspectives. Governance models that prioritise transparency, inclusivity, participation, and respect for cultural contexts are critical to ensure that digitisation processes are conducted in a manner that is respectful of indigenous perspectives (Christen 2009).

By ensuring that Indigenous communities are actively involved in defining how their heritage is digitised, represented, and accessed, digital technologies can foster meaningful and critical exchanges that are grounded in informed consent and cultural knowledge (Sarantou et al. 2024). Such participatory and ethically grounded governance models are essential for fostering trust, addressing historical imbalances, and promoting collaboration that aligns with the values of Indigenous communities while preserving the integrity of their CH (Qureshi et al. 2005).

Some of these issues stem from the inherent challenges in regulating intellectual property, which limit the rights that Indigenous communities can exercise regarding the digitisation of their CH. More generally, many challenges arise from the decision-making process that surrounds the digitisation of Indigenous CH. Specifically, decisions regarding digitisation should open spaces for the participation of Indigenous communities, their worldviews, and cultural values. It is by opening such meaningful spaces for participation that ensures communities have a voice in shaping how their heritage is preserved and represented.

This lack of representation in decision-making processes is indicative of deeper governance deficiencies. Without inclusive frameworks, digitisation risks perpetuating historical inequities and marginalising the very communities it seeks to empower. Effective governance models must not only provide legal and procedural clarity but also prioritise the active involvement of Indigenous voices.

To address these past deficiencies, this study highlights that the governance models must prioritise the active involvement of Indigenous communities, ensuring their voices are central in shaping how their CH is preserved, digitised, and represented. This requires adopting frameworks that respect minority and

Indigenous knowledge systems, cultural practices, and governance structures, ensuring that digitisation efforts align with their values and aspirations. Only by opening spaces for such participation can digitisation serve as a tool for empowerment, reconciliation, and the preservation of CH in a way that truly benefits minorities and Indigenous peoples.

Governance Models for minority Participation: A SCOPING REVIEW

Governance of the digital CH of minorities and Indigenous peoples poses challenging questions for democracies that strive to be inclusive of diverse cosmologies, and where the forceful imposition of Western or majoritarian ways of being is legally and ethically unacceptable (Anaya 2004). In this context, policymakers and scholars have developed an increasingly robust regulatory toolkit to tackle the challenges of the interaction of divergent worldviews and their distributive implications (Engle 2010). Regulatory strategies have mostly focused on creating formal participation procedures and on opening more informal spaces for giving a voice to minorities and Indigenous peoples in settings of experimental governance. The most comprehensive international system of participation to date was established by the amalgamation of the UN Declaration on the Rights of Indigenous Peoples and the ILO Convention 169. At its most protective, the UN Convention requires, as a matter of self-determination, free, prior, and informed consent (FPIC) for projects affecting resources customarily used by Indigenous peoples. Less demanding, but of wider application, ILO Convention 169 creates a duty of consultation with the objective of achieving agreement or consent (Rombouts 2017). Other regional instruments establish a more ambitious system of Indigenous participation in governance (Clérico & Aldao 2011).

Outside such formal and legalised spaces of participation, other forms of participation can be undertaken. This is the case of the decision-making processes regarding the digitisation of CH, where more informal practices of governance have been observed. To map such models of governance in minority and Indigenous CH digitisation, we conducted a scoping review during 2024 in the context of the project "Digitisation of cultural heritage of minority communities for equity and renewed engagement in the EU (DIGICHer)". See also Ballardini et al. 2025 (submitted and forthcoming), Deliverable 2.1, "Map of best practices of governance models for minority participations". This review explored decision-making processes in minority and Indigenous CH digitisation, focusing on governance models discussed in the literature and their incorporation of minority and Indigenous perspectives.

The scoping review process began with a comprehensive search across relevant academic databases to identify articles exploring the intersection of digital CH,

minority and Indigenous participation, and governance models. This included an extensive content search conducted through LUC-Finna (LUC Library Guides n.d.), providing access to over 887 databases. From this collection, six databases were selected as the most relevant to the research topic, namely: Scopus, Web of Science, Westlaw UK, Westlaw, HeinOnline, and Kluwer Law Online. These were chosen for their focus, especially on governance, law, and policy. Boolean search techniques (New York Public Library 2012) were employed to explore five thematic fields: 'digitisation,' 'cultural heritage,' 'minorities,' 'Indigenous,' 'legal and governance aspects,' and 'participation and inclusion.' Notably, Scopus, Web of Science, Westlaw UK, Westlaw, and Kluwer Law Online produced fewer than ten results, and sometimes no results, for the selected fields. However, HeinOnline emerged as the most significant source, providing 2,762 articles. After filtering for full-text availability and relevance, 981 articles remained. Following the removal of duplicates and further refinement, 662 articles were retained for analysis.

Due to HeinOnline's prominence, the research team – comprising five members, including four legal experts in various relevant fields and one specialist in visual data analysis – distributed the 662 articles relevant to minorities, Indigenous groups, and digital CH, assigning approximately 132 articles to each member. Three key characteristics of the scope in the first screening process should be noted. First, the screening phase focused on abstracts (or introductions, where abstracts were unavailable). Second, following the research team's language skills, abstracts in English, Finnish, French, Italian, Portuguese, Spanish, and Urdu were selected. Finally, the scoping review was performed in the context of a project with a European geographical focus. Consequently, articles were selected on the basis of whether they were potentially relevant to providing understanding in the European context. Thus, abstracts of studies on Europe were selected, as were international and comparative studies potentially applicable to Europe.

A second screening round further refined the selection, focusing on articles explicitly addressing minorities and/or Indigenous peoples, their involvement in digital CH, and alignment with the European geographical scope. This process resulted in 110 articles for full review.

To guide the in-depth analysis, the team established the following two core research questions:

1. What decision-making processes and models have been used in Europe in the digitisation of the cultural heritage of minorities and Indigenous peoples?
2. What models or approaches have been used for the participation of minorities and Indigenous peoples in the digitisation of cultural heritage?

The full-text review of the 110 articles was conducted exclusively by the team of four legal experts. The findings were systematically categorised using a shared spreadsheet, facilitating collaborative data extraction and organisation. This process led to the identification of 27 articles that met all predefined criteria, forming the final dataset for in-depth analysis. To categorise governance models for decision-making in the digitisation of Indigenous and minority CH, the research team employed the AI tool Notebook LM to support the synthesis of the information from the papers and the extraction of key patterns and themes. From the team, three researchers – two with legal expertise and one specialising in visual data analysis – collaborated to refine the analysis through iterative discussions. By utilising precisely crafted prompts with the AI tool, diligently refined and checked by the team of three researchers both individually and as a group, the team identified four distinct clusters of governance models, reflecting a variety of approaches and practices found in the literature (a comprehensive and detailed description of the process followed in the scoping review can be found in the Deliverable 2.1., "Map of best practices of governance models for minority participations", submitted and forthcoming in 2025).

This comprehensive review not only mapped governance frameworks for minority and Indigenous CH digitisation but also underscored the importance of inclusive decision-making processes that amplify minority and Indigenous voices. Thus, the following four essential clusters of governance models were identified:

1. Collaborative and participatory models
2. Third Space approaches
3. Access and benefit sharing
4. Embedded cultural practices and values.

In what remains of this section, we will discuss these clusters and explore their potential and limitations.

Collaborative and Participatory Models

In this first style of governance, the goal is to create spaces to involve communities in the decision-making process, so that the digitisation of Indigenous and minority community CH is conducted in an ethical, responsible, and beneficial manner for these communities, as well as for local communities. It is necessary to include source communities as equal partners to prevent the perpetuation of colonial power imbalances and ensure the ethical and culturally sensitive treatment of heritage. This necessitates a shift in power dynamics, recognising the expertise and agency of those communities and creating spaces for genuine collaboration and shared decision-making. This includes mechanisms for community-centric access models

based on legal pluralism and empowerment of communities to govern their CH (Perla 2020).

A central topic of discussion regarding collaborative and participatory models of governance is the proposal put forth by the Sarr-Savoy Report. This report, in its commentary on the restitution of African CH, underscores the necessity for "a radical change in the practice of sharing" digitised content (Lixinski 2020). Nonetheless, critics of this report, such as Pavis and Wallace (2019), posit that establishing digitisation as a prerequisite for restitution could serve to perpetuate colonial power dynamics, for example, by conferring control over digital representations of African heritage upon French institutions (Lixinski 2020). Alternatively, they propose that a more effective approach would involve granting African communities and institutions comprehensive authority over the digitisation process, allowing them to decide whether, how, and to what extent their heritage is digitised and shared. This practice underscores the significance of transferring control over digitisation processes and ownership of digital surrogates to the source communities. The Pavis and Wallace (2019) critique of the Sarr-Savoy Report also outlines the potential risks associated with digitisation projects that prioritise open access and sharing without sufficiently accounting for the perspectives and needs of source communities. Involving source communities and individuals in the development of metadata, indexing, cataloguing, and defining target audiences for digital archives has the potential to transform digitisation from a mere translation of existing material into a dynamic process of knowledge production and meaning making (Tureby & Wagrell 2020). This approach, which is rooted in participatory archiving principles, has the capacity to empower marginalised communities and contribute to a more inclusive and democratic representation of history.

Equally important is the implementation of co-design and co-production models of digitisation, aimed at creating new value for heritage and reducing the digital divide. These proposed practices shift the focus from the physical objects themselves to the social and cultural practices that imbue them with meaning (Polymenopoulou 2021). The experience of Australian museums in digitising Pacific collections demonstrates the significance of such co-design and consultation processes, even in instances where the physical objects are not returned. Furthermore, the aforementioned sources illustrate the value of co-design and co-production models for generating new value for heritage and fostering more equitable relationships between source communities and institutions (Lixinski 2020).

Third Space Approaches

The second cluster of governance models is the so-called 'Third Space' approach, which denotes a digital environment that extends beyond the mere presentation of the object in question. The objective is to mitigate the potential for neo-colonialism

in digitisation efforts by empowering communities to shape the narrative around their CH. Rather than merely serving as passive subjects of digital documentation, communities can engage actively in the curation and interpretation of their heritage in the digital domain (Stahn 2022). This approach acknowledges the potential of digital technologies to democratise access to heritage while recognising the risks of perpetuating colonial power dynamics and misappropriation. This shift in power dynamics allows those communities to determine whether, how, and to what extent their heritage is digitised and shared.

This model of governance is different from, and potentially complementary to, the previously described models of collaboration and participation. The 'Third Space' fosters collaborative partnerships where source communities and institutions work together as equal partners in co-designing and co-producing digital heritage projects; however, it does not require prior formal participation in the decision-making process. Instead, 'Third Space' approaches focus on the modes of deployment of digitised CH and the inclusion of minority and Indigenous voices in that process, thereby complementing existing frameworks for participation. Thus, this approach emphasises reciprocal relationships, recognising the expertise and agency of source communities and valuing their knowledge systems. Moreover, the 'Third Space' concept advocates the utilisation of digital technologies to transform CH, transcending mere replication to facilitate novel forms of engagement, interpretation, and meaning-making (Stahn 2022). By engaging source communities in the development of metadata, indexing, and curation, digital archives can evolve into dynamic platforms for reclaiming narratives, fostering cultural understanding, and challenging dominant historical perspectives (Perla 2020).

Access and Benefit Sharing (ABS)

The third cluster of governance models relates to Access and Benefit Sharing (ABS). As we have seen, the potential for digitisation to exacerbate the misappropriation of Indigenous CH is a significant concern (Prazmowska 2020). This is because digitisation makes CH easily accessible without providing cultural context or facilitating contact with source communities. Consequently, there is a pressing need for robust legal frameworks to address these challenges. While recognising the potential of digitisation to enhance transparency, renew memory, and facilitate reconnection with objects, concerns are raised about appropriation and alienation. This highlights the necessity for community control over access and use.

ABS is different from, and complements, both the participation and 'Third Space' models of governance discussed above. ABS reflects a distributive idea, in the sense that it seeks to establish rights and entitlements in favour of minority and Indigenous groups in the context of CH digitisation. One potential

avenue for establishing robust legal frameworks is the incorporation of ABS principles into the domain of CH digitisation, which might become more likely if spaces of participation exist. However, one does not imply the other, as ABS can potentially be adopted as a matter of top-down decision-making, without requiring the participation of minority and Indigenous groups. Similarly, ABS can arguably exist in parallel to 'Third Space' initiatives, as reciprocal relations may be established outside of ABS. In this context, a more effective approach might involve complementing ABS with both participatory and 'Third Space' approaches, thereby offering multiple layers of voice and rights to minority and Indigenous groups in the digitisation of CH.

Thus, a review of relevant literature indicates that ABS principles, as developed in contexts such as those pertaining to genetic resources and traditional knowledge, can be applied to CH digitisation with a view to ensuring that source communities derive benefit from the use of their heritage. The fundamental elements of ABS can include Prior Informed Consent (PIC), whereby communities have the right to grant or deny consent for the digitisation of their heritage (Xiaodong & Xiurong 2017); Mutually Agreed Terms (MAT), through which communities negotiate terms of access and use of their digitised heritage; Benefit Sharing Agreements, whereby benefits arising from the use of digitised heritage are shared fairly and equitably with source communities (Phillips 2016); and Disclosure Requirements (DRs), which apply in accordance with certain patent application regulations, requiring the disclosure of the source or origin of genetic resources. This concept could be adapted to CH digitisation, requiring institutions to disclose the origin of digitised heritage and demonstrate compliance with ABS agreements (Arezzo 2007, Oguamanam 2008).

Embedded Cultural Practices and Values

The final cluster of governance models identified in our scoping review is what we term Embedded Cultural Practices and Values (Farley 1997, Arezzo 2007, Recht 2008, Oguamanam 2008a, Oguamanam 2008b, Varadarajan 2011, Reddix-Smalls 2014, Blakely 2015, Phillips 2016, Karanja 2016, Karjala & Paterson 2017, Katyal 2017, Prazmowska 2020). This model is grounded in the understanding that CH is not merely a collection of objects, but rather a complex tapestry interwoven with cultural practices, values, and beliefs. It is imperative that digitisation initiatives recognise and respect these embedded elements to prevent misappropriation, ensure ethical representation, and empower source communities.

Unlike the previous models, the idea of embedded cultural practices focuses on the materiality of CH, as it undergoes a transition towards digitisation. Indeed, embeddedness implies an awareness of the interconnectedness of tangible and intangible heritage, recognising that objects often embody cultural stories,

traditional knowledge, and spiritual significance. In this sense, governance models highlighting embeddedness focus on the continuity of the material existence of CH and its digitisation, thereby presenting distinct challenges in terms of representation and voice for minority and Indigenous groups.

It is thus crucial that decision-making processes acknowledge the comprehensive nature of CH, as it frequently encompasses cultural narratives, knowledge, and spiritual significance. For instance, Indigenous communities frequently regard knowledge as an intrinsic part of their cultural identity, and traditional designs and artefacts are not merely commodities, but expressions of deep meaning and social value. Consequently, digitisation should not only prioritise the replication of objects but also consider the cultural contexts and practices that imbue them with significance.

Interim Conclusion

As illustrated by the four clusters identified in our scoping review, when implemented ethically and responsibly, digitisation holds significant potential for supporting the CH of Indigenous and minority communities. To that end, decision-making processes concerning the digitisation of Indigenous and minority CH should involve interested communities as early and extensively as possible. However, as our review has shown, although numerous policy options exist to support inclusive approaches, they are often implemented on an ad-hoc basis and remain at a relatively abstract level. Admittedly, such calls for participation implicitly confer a privileged role on cultural institutions, as the governance models described generally assume institutional control over the cultural artefact to be digitised – a premise that is increasingly being challenged amid growing pressure on these institutions to 'decolonise' their practices and collections (Onciul 2015). While clearly vital for the overall debate on digital CH, this question goes beyond the scope of this article, as it implies a process of redefining the ownership policy applicable to all cultural institution holdings of Indigenous or minority origin, and not only to CH relevant for digitisation. With this scope in mind, we argue that more must be done to put the voice of Indigenous peoples and minorities at the centre of the CH digitisation wave.

In the next section, we suggest that a possible step towards this goal is to adopt a user-centric approach, building on the different models of governance identified above. This can fulfil the potential of digitalisation to empower communities to revitalise their cultural practices and reclaim their narratives.

Honour Authenticity, Promote Trust, and Ensure Benefit-Sharing through ProActive Engagement

The discussion presented in this article, especially the examples of conflicts outlined above in Section 2, highlights a fundamental issue: the lack of engagement and participation of minority and Indigenous communities in the digitisation of their heritage. At the same time, the clusters of best practices of governance identified through the scoping review indicate that involving Indigenous and minority members and other expert representatives of the culture early in the digitisation process is not only central to fostering participation and engagement, but it is also a key tool in ensuring authenticity of digital CH. To increase such proactive engagement and participation of minority and Indigenous communities, whether in relation to the use of AI, 3D printing, or other digital technologies, and thereby honour the authenticity of content, promote trust, and ensure benefit-sharing, proactive user-centred approaches in decision-making, including in the laws and policies that govern them, should be emphasised.

In this regard, user-centric approaches such as legal design (LD) have significant potential to mitigate tensions, for example, between state laws and Indigenous worldviews (Ballardini & Cadillo-Chandler 2025). LD aims to reform law through user-centred design to make the legal system more human-centred, usable, and satisfying (Ballardini et al. 2021). When applied to law and technology, for example, LD recognises the importance of new technologies but does not privilege technology-driven solutions over people's needs and experiences. As such, LD is particularly well suited to initiating "new policy reforms, technology interventions, and service and visual designs that can improve the legal system, through a commitment to a wider participatory public involvement" (Ballardini et al. 2021). In practice, this means involving a wider range of experts specialised in legal and governance processes, i.e. not merely lawyers or policymakers. After thorough research aimed at uncovering the pros and cons of users' experiences during the design process, the testing phase involves running pilots and/or workshops with a large group of stakeholders. The results are then scaled and replicated to become the new standard for how the legal system should work (Ballardini et al. 2021). As Margaret Hagan notes, design thinking allows us to 'put the focus of law on innovating, testing and building systems that serve the agency of the people involved in them' (Hagan n.d.). For example, LD could be particularly useful in supporting the aforementioned governance models with practices that ensure the engagement of minority groups. At its core, LD enables inclusive groups to develop and test new improvements to the system, as well as offering flexible exploratory methods for piloting. This could help address some of the existing gaps in current governance models identified above. However, the question remains: what does LD mean in practice for the governance of minority and Indigenous

digital heritage? Indeed, acknowledging the importance of this approach is only a first step towards building truly participatory, diverse governance models and practices in this context. As such, the approach is as relevant – or as naïve – as its concrete applications.

Examples of uses of LD techniques in governing digital CH of minorities and Indigenous peoples have already emerged. For instance, in the context of the Sámi people, the use of ethical guidelines, co-created closely with Sámi communities, was developed in the Nuohtti service. Nuohtti was developed in the project Digital Access to Sámi Heritage Archives (2018-2021), a multidisciplinary research project integrating user-centred design principles throughout the development process. The purpose of the initiative was to improve accessibility to the digitised Sámi CH. The Nuohtti portal provides an easy and simultaneous way to access information and materials related to Sámi CH from different archives and collections (Nuohtti 2024). Although archive materials were not digitised within the project, Nuohtti facilitates access to already digitised materials. While this type of improved access was considered to mainly offer benefits from the perspective of the Sámi, it also entailed several risks. Indeed, Häkkilä et al (2022: 137) note that "digital access exposes the culturally sensitive material for a wider audience, creating the potential risk of offensive or disrespectful usage, related, for example, to commercial exploitation". To tackle and proactively prevent these possible challenges, the project decided to develop ethical guidelines for the use of the Nuohtti service. The ethical guidelines were drafted by one of the authors, Iiris Tuominen, as part of the project Digital Access to Sámi Heritages Archives (see Tuominen 2025). Although the guidelines were developed in the 'traditional' manner of legal research, based on existing legislation and international examples of ethical guidelines for Indigenous CH, participatory design methods and the review of the guidelines with Sámi community representatives in the project steering group also played a central role (Häkkilä et al 2022: 138). For example, with the first draft of the guidelines, several workshops with the community identified that a majority of users perceived them to be an extensive wall of text. The guidelines were considered unapproachable and, as a result, users did not read them. The guidelines were also seen as resembling privacy notices that users would mainly click through without reading them. Based on these observations, the design goal was that when entering the search service for the first time, the user interface (UI) would guide the user to consider ethical aspects. Through multidisciplinary workshops combining expertise from graphic design, user interface design, technical development, law, and archival studies, the UI was integrated with elements designed to introduce ethical issues in a user-friendly manner. For example, when entering the search service for the first time, the UI would guide the user to consider ethical aspects. A pop-up window with a visualisation would interrupt the first-time search activity

and draw the user's attention to an ethical guideline quiz or towards reading the ethical guidelines at length (Häkkilä et al. 2022: 139).

Another example of user-centric practices, which we argue employs LD techniques, is data stewardship. This is generally understood and described as the collection, digitisation, maintenance, curation, storage, analysis, sharing, use, and reuse of datasets (Open Data Institute 2023). In the specific context of Indigenous data governance, both the stewardship and the processes necessary to implement Indigenous control over Indigenous data are being created (Carroll et al. 2020). In September 2019, the Global Indigenous Data Alliance (GIDA) released the CARE (Collective benefit, Authority to control, Responsibility, Ethics) principles, shaped to guide the involvement of Indigenous peoples in data governance within the current data landscapes (GIDA n.d.). These principles introduce a focus on people and purpose to data governance, complementing the data-centric nature of the FAIR (Findability, Accountability, Interoperability, Reusability) principles (Wilkinson et al. 2016). The objective is for data stewards and researchers to embody both FAIR and CARE principles in their collection, processing, reuse, deployment, and dissemination of Indigenous data. Indeed, the CARE principles support ethical stewardship of Indigenous data. According to the CARE principles *Authority to Control* paragraph A3: "*Indigenous Peoples have the right to develop cultural governance protocols for Indigenous data and be active leaders in the stewardship of, and access to, Indigenous data especially in the context of Indigenous Knowledge*" (Research Data Alliance International Indigenous Data Sovereignty Interest Group 2019). In this context, the role of the data steward is crucial, as they are responsible for ensuring that data remains accurate, accessible, and is used appropriately throughout its lifecycle. The role also includes maintaining and cleaning the data regularly. Data stewards work to establish policies, procedures, and best practices for data management, collaborate with data users and stakeholders, and address any issues or concerns related to data governance, while implementing both FAIR and CARE principles.

In the context of Indigenous digital CH, the secondary use of data, particularly when CH datasets are made available in open formats allowing for their free use, reuse, and exploitation of the datasets for commercial and non-commercial purposes, has proved challenging in many instances. Indeed, data sovereignty and governance of Indigenous CH datasets raise various issues from an ethical perspective. For instance, in the EU context, the current open data movement and the related legislation (e.g. the Open Data Directive) do not fully consider Indigenous peoples' rights and interests in terms of data sovereignty and control over the secondary use of data. As previously mentioned, this approach can conflict with Indigenous perspectives, where certain types of data, such as sacred cultural knowledge, environmental resources, or historical narratives, are not intended for unrestricted public use.

The CARE principles address these challenges by ensuring that open data initiatives integrate Indigenous values and governance models. In the specific context of Sámi datasets related to their CH, the GIDA-Sápmi network (which is connected to the above-mentioned global GIDA network and is composed of Sámi representatives, universities, memory institutions, and archives from Norway, Sweden, and Finland) has further developed the CARE principles to better adapt them to the Nordic Sámi context. The ultimate goal is to make the Nordic research community, and memory and archival institutions, aware of the CARE principles and to "strengthen Sámi data governance and Sámi research data for the needs of contemporary Sámi society" (UiT n.d.).

Moreover, in the context of the Māori group, the Indigenous people of Aotearoa, the Māori Data Sovereignty (MDS) Network (Te Mana Raraunga n.d., Homepage) was established in response to the need to affirm and protect Māori data rights and interests in this rapidly evolving digital and data-driven society. To the Māori, data is not a neutral resource, but a *living taonga* (treasure) that carries *whakapapa* (genealogy), cultural identity, and collective memory. With the global push for open data, *Te Mana Raraunga* calls for a Māori-led data governance model that reflects *tino rangatiratanga* (self-determination), *tikanga* (Māori customary practices, laws, and/or behaviours), and collective well-being.

Specifically, the MDS Network emphasises that data owned, preserved, and maintained by Māori should be under Māori governance, supporting tribal sovereignty and the realisation of Māori aspirations. Te Mana Raraunga seeks to safeguard and protect data for and about the Māori, uphold the quality and integrity of its collection, advocate for Māori involvement in the governance of data repositories and leadership in data stewardship, support the development of secure data infrastructures, and foster the growth of sustainable Māori digital businesses and innovations. Thus, to provide an alternative to the dominant FAIR principles, the MDS Network incorporates and develops the CARE principles, which, as mentioned, emphasise the requirement to prioritise Indigenous peoples' rights and interests in data practices. Accordingly, the MDS Network calls for reconciling open data policies with Indigenous rights, proposing a model of conditional or responsible openness, where data is only made open with Māori consent. In this way, ethical and cultural protocols are respected, the collective benefit is clearly demonstrated, and the Māori retain the right to appropriately govern and restrict data.

Building on these principles, Te Mana Raraunga has developed tools and models to guide institutions and communities (Te Mana Raraunga n.d., Ngā Rauemi). Of these, we highlight two that are most relevant to our research. First, the Māori Data Governance Model was developed in partnership with the New Zealand State in 2021 (Data.govt.nz 2025). The co-design of a Māori Data

Governance Model places strong emphasis on data stewardship, offering a unique opportunity for the New Zealand government to develop a governance approach that genuinely reflects Māori needs, values, and authority over data. Second, the Māori Data Audit Tool helps organisations to assess their readiness to handle Māori data ethically. It includes criteria to evaluate cultural alignment, community involvement, data-sharing agreements, as well as risk mitigation strategies (Māori Data Audit Tool 2017). This approach redefines openness, not as an absolute, but rather as contextual, negotiable, and relational. It invites governments, researchers, and technologists to reconsider their assumptions and engage in genuine partnership with Indigenous peoples.

In a sense, the Nuhotti ethical guidelines and the role of (Indigenous) data stewardship in the GIDA-Sápmi network and the Māori Data Sovereignty Network exemplify contemporary applications of design thinking and user-centricity techniques – such as LD – in governance models. These approaches can contribute to building trust in the use of AI and digitisation more broadly, particularly in relation to the digital CH of minorities and Indigenous peoples. To be sure, the Sámi example reflects a particular context in which an Indigenous group enjoys constitutional protection of their identity, representation, and political participation (Niemivuo 2015). In this sense, decision-making processes related to CH digitisation are embedded within a broader framework of human rights protection, shaping the conditions under which minority and Indigenous groups can meaningfully participate. Notwithstanding this limitation, these types of practices illustrate how the existing governance models highlighted in our scoping review could be enhanced through a more deliberate integration of user-centric approaches such as LD. For instance, it could be argued that had one of the governance models outlined above been integrated with LD techniques in the Sinaida case, the incident in question would have been prevented. Indeed, given the complexity of the issue highlighted in this article, it would be unrealistic to expect a bulletproof solution. Yet, it is clear that engagement and cooperation are not only important in this context but are also key elements in enabling a peaceful reconciliation between legal rules, such as IPR and human rights, and ethical principles, such as those rooted in minority and Indigenous worldviews. This is essential for securing more respectful and participatory digitisation practices in governance models.

Conclusion

The digitisation of CH for minorities and Indigenous peoples presents both profound opportunities and significant challenges. It offers a platform for preserving and promoting cultural resilience, ensuring that traditions and identities are documented and accessible to future generations. Digital tools such

as AI, 3D printing, and other technologies expand the possibilities for engagement and co-creation, empowering marginalised communities to renew their cultural practices. These technologies also facilitate greater understanding among diverse stakeholders at local and global levels, advancing cultural inclusion and mutual respect. However, this promise is accompanied by substantial risks. The integration of advanced technologies into CH projects often raises ethical concerns, particularly around IPR, equitable representation, and authenticity. The historical imbalance of power, rooted in colonial practices, continues to influence how CH is digitised and controlled. As demonstrated by cases such as the unauthorised use of Sámi cultural imagery in commercial products, digitisation without community involvement can lead to exploitation and alienation rather than empowerment. The ethical application of AI and other digital tools in CH digitisation is critical to addressing issues of bias, misuse, and authenticity.

Such dynamics of CH digitisation become particularly relevant in the context of generative AI. Indeed, generative AI might be trained on data that includes digitised Indigenous and minority CH. Moreover, it could generate synthetic content that may be perceived as representing Indigenous CH, thereby creating a process of distorted cultural narratives (Ghosh et al. 2024, Worrell & Johns 2024). Thus, CH digitisation governance models are crucially important in understanding certain risks and promises of generative AI with regard to Indigenous and minority rights. Effective governance frameworks must ensure that such technologies are applied transparently and respectfully, safeguarding the cultural integrity of minority and Indigenous groups.

To address these challenges, this article has identified four key governance models based on scoping review results for improving minority participation in CH digitisation. Each model underscores the need for participatory frameworks that honour authenticity, foster trust, and ensure benefit-sharing. Together, they form a cohesive approach to overcoming the risks posed by digitisation while maximising its potential for empowerment. Yet, these existing models lack a coherent and holistic perspective and concrete practices to achieve the goal. In this regard, this article argues that practices based on proactive, user-centric approaches provide a pathway for addressing these complex challenges. LD, for instance, offers a framework for integrating user-centred principles into governance, legislative, and policy processes. By involving diverse stakeholders – legal experts, technologists, and community representatives – LD fosters inclusive solutions. Ethical guidelines, such as those developed for the Sámi Nuohtti project, along with the role of (Indigenous) data stewardship in the GIDA-Sápmi network and the Māori Data Sovereignty Network, exemplify how collaborative processes in the digitisation of minority and Indigenous heritage can anticipate and mitigate risks while enhancing trust and engagement. Ultimately, the success of digitisation lies in prioritising the voices of minority and

Indigenous communities. This requires moving beyond fragmented policy measures to establish comprehensive participatory governance frameworks supported by user-centric practices. By ensuring that communities are involved from the earliest stages of decision-making, digitisation can become a tool for empowerment, allowing communities to reclaim their narratives and revitalise their cultural practices. Moreover, as institutions adopt more ethical, inclusive, and transparent practices, digitisation has the potential to transform CH into a bridge between diverse histories, fostering understanding and reconciliation across societies.

Declaration of AI Use

The AI tool NotebookLM was used to support the synthesis of literature and the identification of patterns during the scoping review. All outputs were critically reviewed, refined, and validated by the research team/authors.

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Night at the Artificial Museum: Copyright Law and Artificial Intelligence

Matthew Rimmer

Abstract

This essay explores the legal challenges and risks posed by tools associated with artificial intelligence (AI) for the protection, preservation, promotion, and regeneration of digital cultural heritage. In particular, it focuses on copyright litigation over AI training projects. However, it also touches upon other forms of intellectual property protection, such as passing off, trademark law, publicity rights, patent law, and trade secrets. This article considers the implications of copyright litigation in respect of AI projects for galleries, libraries, archives, and museums (composing the GLAM sector). It surveys the host of copyright action over AI projects – looking at literary works, journalism, databases, artistic works, musical works, performances, and cinematographic films. It explores the relationship between copyright law, the Creative Commons, and cultural heritage. It also considers how Indigenous intellectual property will be impacted by AI. The work investigates law reform options in respect of copyright law and AI in the GLAM sector. It also considers comparative perspectives on the regulation of AI – with a particular focus on copyright law, transparency, and AI training materials.

Keywords: Copyright Subsistence, Defence of Fair Use, Artificial Intelligence, Creative Commons, Cultural Heritage, Indigenous intellectual property

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Introduction

This essay explores the legal challenges and risks posed by tools associated with artificial intelligence (AI) for the protection, preservation, promotion, and regeneration of digital cultural heritage.

Los Angeles has announced the establishment of Dataland, a museum of AI Arts (Dataland 2024; see also Gelt 2024). Dataland will use millions of photographs and other records from partners including the Smithsonian and London's Natural History Museum to create its installations. Refik Anadol and Efsun Erkilic will be the guiding artists and curators behind Dataland. The project explains: "In pursuit of its mission, Dataland combines online access and learning platforms, acts as a public repository for large-scale, nature-focused data sets, and will build a comprehensive collection of AI art" (Dataland 2024). The project maintains that "Dataland is committed to ethical data-gathering and AI practices" (Dataland 2024). The project observes: "Aspiring to set the global standard for the presentation, curation, and exploration of AI-driven art, Dataland operates at the intersection of human imagination and the creative potential of machines, establishing a new model for cultural institutions in the digital age" (Dataland 2024).

There has been enthusiasm amongst curators about how AI could enhance the work of existing galleries, libraries, archives, and museums. Lauren Styx (2024) suggests: "From interactive virtual guides and personalized tours to predictive maintenance and sentiment analysis, AI is transforming how museums engage with audiences and manage their collections, ensuring a more dynamic and efficient future for the industry". She contends: "By leveraging AI responsibly, museums can enhance visitor experiences, streamline operations, and remain relevant in an increasingly digital world" (Styx 2024). Styx (2024) observes: "The future of AI in museums is bright, but it requires careful navigation to ensure ethical and effective implementation".

However, it may be difficult to claim copyright ownership in such works because of the lack of a human author. Copyright law – with its notions of authorship, material form, and originality – requires human authorship for copyright subsistence. Moreover, there could be dangers of copyright infringement in respect of AI projects, particularly if they draw upon third-party data and source material for training models. There has been a flood of copyright litigation relating to the unauthorised use of copyright materials for machine learning and AI training.

In the United States, a number of jurists and legal theorists have considered ways and means by which robotics and artificial intelligence could be accommodated within copyright law. Pamela Samuelson (1985), Annemarie Bridy (2012), James Grimmelmann (2016), and Andres Guadamuz (2017) have explored the possibilities in respect of copyright law and artificial intelligence.

There is a growing literature on the topic of intellectual property and AI. Carys Craig (2022) has written about the AI-copyright challenge to technology neutrality, authorship, and the public interest. Giancarlo Frosio (2022) has considered how the advent of AI has required a reconsideration of theories of authorship, creativity, and aesthetics. Enrico Bonadio, Plamen Dinev, and Luke McDonagh (2022) have considered whether AI can infringe copyright. Some academics have argued that copyright law needs to be updated, reformed, and modernised to take AI into account (see for instance Lemley & Casey 2021). Other scholars have maintained that copyright law should remain true to its original founding principles in the face of AI (Lee & Woo 2020). The United States Copyright Office (2023a) issued a notice of inquiry, seeking public responses to questions about the intersection of copyright law and AI. The United States Copyright Office (2023b) received over 10,000 submissions. Given the competing interests of stakeholders, it has often been difficult to achieve consensus on copyright law reform – such as in Australia (Attorney-General's Department 2023). As Dennis Crouch (2024) has observed, there are also limitations as to the role of copyright law as a regulator of AI.

There have also been studies of the impact of AI upon other fields of intellectual property. There has been investigation of the implications of AI for design law, trademark law, and consumer protection law. There has been particular concern about AI and deepfakes, raising questions in respect of personality rights, publicity rights, and passing off. James Boyle (2024) has highlighted the impact of AI on personhood. More generally, Toby Walsh (2023) has explored the rise of AI-related fakes in a study of authenticity. In the field of patent law, there has been litigation as to whether AI can be the inventor of a patented invention (Osha 2023, Noto La Diega, Cifrodelli & Dermawan 2024). There has also been consideration of how trade secrets law and the protection of confidential information will be affected by AI (Crouch 2024). Beyond intellectual property, there is larger work concerning the regulation of AI and robotics (Guihot & Bennett Moses 2020, Chesterman 2021, Allegre 2024, Santow & Nellor 2024). There is a considerable literature on the ethics of AI (Dubber, Pasquale & Das 2020). There has also been a broader discussion of the impact of AI on politics, society, and the environment (Crawford 2022).

Given the expanding universe of scholarship on intellectual property and AI, this paper seeks to limit the scope of its study in a variety of ways. This work is focused largely on the intellectual property domain of copyright law. Given the concern with digital cultural heritage, this paper looks at relevant subject matter – including literary works, databases, artistic works, musical works, cinematographic films, and Indigenous intellectual property. This work is particularly interested in case law and litigation in respect of copyright law and AI training materials. There is however a discussion of the larger political debate in respect of copyright law and AI – particularly given the deep divisions between stakeholders in the field.

Given the preponderance of activity in the United States at present in respect of copyright law and AI, this essay mainly looks at United States copyright law and policy. While there is a brief comparative survey at the end, there is not really the space to do a full comparative study of copyright law and AI, especially as such an endeavour would require a full monograph.

This article explores the ramifications of copyright law for AI projects in the GLAM sector (galleries, libraries, archives, and museums). There has been a wave of copyright litigation over AI projects, especially in the United States (Lee 2024a, 2025a). There are currently 59 copyright lawsuits before the United States courts relating to AI projects, as at November 2025 (Lee 2025c). This article will evaluate such copyright litigation over AI, according to the copyright subject matter involved. Part 1 focuses on copyright law, literary works, and AI – particularly highlighting the outcomes of early disputes in this field. Part 2 examines copyright lawsuits by news companies and media organisations against AI companies. Part 3 focuses upon legal action for copyright infringement by database developers against AI companies. Part 4 examines the relationship between copyright law, artistic works, and AI. Part 5 focuses upon copyright law, musical works, and AI. Part 6 deals with the complaints of performers about the use of their voices by AI companies, particularly under publicity rights. Part 7 focuses upon cinematographic films, audio-visual works, copyright law, and AI. Part 8 examines disputes over copyright law, computer programs, and AI. Part 9 looks at the work of the Creative Commons movement in dealing with open licensing, cultural heritage, and AI. Part 10 focuses on copyright law, Indigenous intellectual property, and AI. Part 11 focuses upon law reform options for copyright law and AI in the GLAM sector. Part 12 explores alternative comparative perspectives in terms of dealing with copyright law and AI training materials.

Copyright Law, Literary Works, and AI

The copyright litigation over literary works and AI builds upon previous precedents dealing with copyright law and digital libraries involving Google, Hathi Trust, and the Internet Archive. Google sought to raise the defence of fair use in the litigation over Google Books – ultimately, a settlement was reached by Google with the publishing industry.[1] Hathi Trust raised the defence of fair use after conflict with authors and publishers.[2] The copyright litigation by authors and publishers against the Internet Archive perhaps suggests that the courts are shifting their approach to fair use (Rimmer 2024/2025).[3] The preliminary decisions over copyright law,

1 Authors Guild Inc., et al. v. Google, Inc. 804 F.3d 202 (2nd Cir., 2015).
2 Authors Guild Inc. v. HathiTrust 775 F.3d 87 (2nd Cir., 2014).
3 Hachette Book Group, Inc. v. Internet Archive 115 F. 4th 163 (2nd Cir., 2024).

fair use, literary works, and AI handed down in mid-2025 have been mixed. In June 2025, Meta largely prevailed in a dispute over copyright and fair use against Kadrey at first instance.[4] However, the decision in *Bartz* v. *Anthropic* in June 2025 was much more complicated.[5] While Anthropic won summary judgment on the use of literary works as training materials against Bartz, Anthropic failed to obtain summary judgment in respect of the creation of a library of pirated books. There has been a proposed settlement in this dispute. Copyright litigation by literary authors and publishers against OpenAI is ongoing. Given the divergence of opinion thus far, superior courts, such as the Court of Appeals for the Federal Circuit and the Supreme Court of the United States, may need to intervene to resolve the diversity of opinion in the district courts.

Kadrey v. Meta

There have been a series of lawsuits by writers and authors against Meta Platforms Inc.[6] Pulitzer Prize winner Michael Chabon has led a group of authors in filing a class action against Meta, accusing the tech giant of misusing their copyrighted works to train its Llama AI software (Brittain & Paul 2023).

In May 2025, Justice Vince Chhabria considered oral argument over summary judgment in a dispute between Meta and another group of authors. There has also been an array of amicus curiae briefs involving other interested parties. The judge responded to the arguments of Meta that Llama AI training is a transformative use, which poses no threat to authors. The judge commented: "You have companies using copyright-protected material to create a product that is capable of producing an infinite number of competing products" (Belanger 2025a). Chhabria said: "You are dramatically changing, you might even say obliterating, the market for that person's work, and you're saying that you don't even have to pay a license to that person" (Belanger 2025a). He questioned the defence of fair use raised by Meta: "I just don't understand how that can be fair use" (Belanger 2025a). The judge reflected: "It seems like you're asking me to speculate that the market for Sarah Silverman's memoir will be affected by the billions of things that Llama will ultimately be capable of producing" (Belanger 2025a). Nonetheless, some commentators – such as Lee (2025b) – predicted that Meta could still prevail on the fair use defence.

4 *Kadrey* v. *Meta Platforms, Inc.* 788 F.Supp.3d 1026 (United States District Court, N.D. California, 25 June 2025).

5 Bartz v. Anthropic PBC 787 F.Supp.3d 1007 (United States District Court, N.D. California, 23 June 2025).

6 *Kadrey* v. *Meta Platforms, Inc.*, the U.S. District Court for the Northern District of California, No. 3:23-cv-03417 (filed July 7, 2023) (proposed class action); *Chabon* v. *Meta Platforms, Inc.*, the U.S. District Court for the Northern District of California, 3:23-cv-04663 (filed Sept. 12, 2023) (proposed class action); and *Huckabee* v. *Meta Platforms, Inc.*, the U.S. District Court for the Northern District of California, 3:2023cv06663 (filed Sept. 12, 2023; revived and consolidated on July 5, 2024) (proposed class action).

In June 2025, the judge largely found in favour of Meta at first instance. Chhabria discussed the conflict in these terms:

> Companies are presently racing to develop generative artificial intelligence models—software products that are capable of generating text, images, videos, or sound based on materials they've previously been 'trained' on. Because the performance of a generative AI model depends on the amount and quality of data it absorbs as part of its training, companies have been unable to resist the temptation to feed copyright-protected materials into their models—without getting permission from the copyright holders or paying them for the right to use their works for this purpose. This case presents the question whether such conduct is illegal.[7]

The judge commented: "Although the devil is in the details, in most cases the answer will likely be yes".[8] The judge observed: "What copyright law cares about, above all else, is preserving the incentive for human beings to create artistic and scientific works".[9] The judge feared: "Generative AI has the potential to flood the market with endless amounts of images, songs, articles, books, and more".[10] The judge lamented: "People can prompt generative AI models to produce these outputs using a tiny fraction of the time and creativity that would otherwise be required".[11] The judge observed: "So by training generative AI models with copyrighted works, companies are creating something that often will dramatically undermine the market for those works, and thus dramatically undermine the incentive for human beings to create things the old-fashioned way".[12]

The judge discussed the application of the defence of fair use to the topic of AI training:

> Fair use is a fact-specific doctrine that requires case-by-case analysis that is sensitive to new technologies and their potential consequences. No previous case has involved a use that is both as transformative and as capable of diluting the market for the original works as LLM training is. So no previous case answers the question whether Meta's copying was fair use. That question must be answered by flexibly applying the

7 Kadrey v. Meta Platforms, Inc. 788 F.Supp.3d 1026 at 1034 (United States District Court, N.D. California, 25 June 2025).
8 Ibid., 1034.
9 Ibid., 1034.
10 Ibid., 1034.
11 Ibid., 1034-1035.
12 Ibid., 1035.

> fair use factors and considering Meta's copying in light of the purpose of copyright and fair use: protecting the incentive to create by preventing copiers from creating works that substitute for the originals in the marketplace.[13]

The judge commented: "In cases involving uses like Meta's, it seems like the plaintiffs will often win, at least where those cases have better-developed records on the market effects of the defendant's use".[14] The judge also observed: "No matter how transformative LLM training may be, it's hard to imagine that it can be fair use to use copyrighted books to develop a tool to make billions or trillions of dollars while enabling the creation of a potentially endless stream of competing works that could significantly harm the market for those books".[15] Nonetheless, on the facts of this case, the judge commented that "because Meta's use of the works of these thirteen authors is highly transformative, the plaintiffs needed to win decisively on the fourth factor to win on fair use".[16]

The judge also noted that the decision was qualified and limited: "But in the grand scheme of things, the consequences of this ruling are limited".[17] The judge noted: "This is not a class action, so the ruling only affects the rights of these thirteen authors—not the countless others whose works Meta used to train its models".[18] The judge observed: "And, as should now be clear, this ruling does not stand for the proposition that Meta's use of copyrighted materials to train its language models is lawful".[19] The judge commented of the ruling: "It stands only for the proposition that these plaintiffs made the wrong arguments and failed to develop a record in support of the right one".[20]

An appeal has been launched against this decision by copyright owners who have complained that the decision of the judge is self-contradictory.

Bartz v. Anthropic

A group of authors – including Andrea Bartz, Charles Graeber, and Kirk Wallace Johnson – have sued the Amazon.com-backed Anthropic for copyright infringement over using their books to train the AI Claude.[21] The complaint calls

13 Ibid., 1059.
14 Ibid., 1059.
15 Ibid., 1059.
16 Ibid., 1060.
17 Ibid., 1036.
18 Ibid., 1036.
19 Ibid., 1036-1037.
20 Ibid., 1037.
21 *Bartz* v. *Anthropic*, the U.S. District Court for the Northern District of California, 3:24-cv-05417 (filed Aug. 19, 2024). For discussion, see Soni 2024a.

Anthropic a "modern-day Napster".[22] The complaint maintains: "It is not consistent with core human values or the public benefit to download hundreds of thousands of books from a known illegal source".[23] The complaint suggests: "Anthropic has attempted to steal the fire of Prometheus".[24]

In his June 2025 decision on fair use, Alsup J portrayed the dispute in these terms:

> An artificial intelligence firm downloaded for free millions of copyrighted books in digital form from pirate sites on the internet. The firm also purchased copyrighted books (some overlapping with those acquired from the pirate sites), tore off the bindings, scanned every page, and stored them in digitized, searchable files. All the foregoing was done to amass a central library of 'all the books in the world' to retain 'forever.' From this central library, the AI firm selected various sets and subsets of digitized books to train various large language models under development to power its AI services. Some of these books were written by plaintiff authors, who now sue for copyright infringement.[25]

His decision on the conflict was a mixed one. Alsup J granted summary judgment for Anthropic that the training use was a fair use. Alsup J also granted that the print-to-digital format change was a fair use, albeit for a different reason. However, Alsup J denied summary judgment for Anthropic that the pirated library copies must be treated as training copies.

First, Alsup J held: "The copies used to train specific LLMs were justified as a fair use".[26] In his view, "Every factor but the nature of the copyrighted work favors this result".[27] His Honour concluded: "The technology at issue was among the most transformative many of us will see in our lifetimes".[28]

Second, Alsup J held: "The copies used to convert purchased print library copies into digital library copies were justified, too, though for a different fair use".[29] The judge ruled: "On balance, as the purchased print copy was destroyed and its digital replacement not redistributed, this was a fair use".[30] Alsup J held that it was "a fair use because all Anthropic did was replace the print copies it had purchased

22 Ibid.
23 Ibid.
24 Ibid.
25 Bartz v. Anthropic PBC 787 F.Supp.3d 1007 at 1014 (United States District Court, N.D. California, 23 June 2025).
26 Ibid., 1033.
27 Ibid., 1033.
28 Ibid., 1033.
29 Ibid., 1033.
30 Ibid., 1033.

for its central library with more convenient space-saving and searchable digital copies for its central library — without adding new copies, creating new works, or redistributing existing copies".[31]

Third, Alsup J held: "The downloaded pirated copies used to build a central library were not justified by a fair use".[32] The judge noted: "Every factor points against fair use".[33] Alsup J noted: "Anthropic employees said copies of works (pirated ones, too) would be retained 'forever' for 'general purpose' even after Anthropic determined they would never be used for training LLMs".[34] Alsup J maintained: "A separate justification was required for each use".[35] The judge observed: "None is even offered here except for Anthropic's pocketbook and convenience".[36] Alsup insisted that "Anthropic had no entitlement to use pirated copies for its central library".[37] In his view, "Creating a permanent, general-purpose library was not itself a fair use excusing Anthropic's piracy".[38]

Finally, Alsup J commented: "As for any copies made from central library copies but not used for training, this order does not grant summary judgment for Anthropic".[39] The judge observed: "Anthropic is not entitled to an order blessing all copying 'that Anthropic has ever made after obtaining the data,' to use its words".[40]

There has been a proposed settlement of the dispute in *Bartz* v. *Anthropic*. Alsup J has expressed his concern about certain aspects of the settlement. In September 2025, the judge quipped: "We'll see if I can hold my nose and approve it" (Liedtke & O'Brien 2025). The $US1.5 billion settlement is "the largest copyright settlement in U.S. history" (Hansen 2025b). The success of this lawsuit has led to many other Shadow Library lawsuits being filed against AI developers.

Authors Guild v OpenAI

In September 2023, the Authors Guild and 17 authors filed a class-action suit against OpenAI in the Southern District of New York for copyright infringement of their works of fiction.[41] The named plaintiffs included David Baldacci, Mary Bly, Michael Connelly, Sylvia Day, Jonathan Franzen, John Grisham, Elin Hilderbrand, Christina Baker Kline, Maya Shanbhag Lang, Victor LaValle, George R.R. Martin,

31 Ibid., 1019.
32 Ibid., 1033.
33 Ibid., 1033.
34 Ibid., 1033.
35 Ibid., 1033.
36 Ibid., 1033.
37 Ibid., 1019.
38 Ibid., 1019.
39 Ibid., 1033.
40 Ibid., 1034.
41 *Authors Guild* v. *OpenAI*, in the U.S. District Court for the Southern District of New York, 1:23-cv-8292 (filed Sept. 19, 2023) (proposed class action).

Jodi Picoult, Douglas Preston, Roxana Robinson, George Saunders, Scott Turow, and Rachel Vail.

Rachel Geman, a partner with Lieff Cabraser and co-counsel for Plaintiffs and the Proposed Class, commented: "Without Plaintiffs' and the proposed class' copyrighted works, Defendants would have a vastly different commercial product" (The Authors Guild 2023). She stated that the "Defendants' decision to copy authors' works, done without offering any choices or providing any compensation, threatens the role and livelihood of writers as a whole" (The Authors Guild 2023).

Scott Sholder, a partner with Cowan, DeBaets, Abrahams & Sheppard and co-counsel for Plaintiffs and the Proposed Class, added: "Plaintiffs don't object to the development of generative AI, but Defendants had no right to develop their AI technologies with unpermitted use of the authors' copyrighted works" (The Authors Guild 2023). He commented: "Defendants could have 'trained' their large language models on works in the public domain or paid a reasonable licensing fee to use copyrighted works" (The Authors Guild 2023). Authors Guild CEO Mary Rasenberger commented: "It is imperative that we stop this theft in its tracks or we will destroy our incredible literary culture, which feeds many other creative industries in the U.S." (The Authors Guild 2023). She observed: "To preserve our literature, authors must have the ability to control if and how their works are used by generative AI" (The Authors Guild 2023).

In December 2024, the Authors Guild filed an amended complaint, naming Microsoft as a defendant.[42] The complaint observed:

> Plaintiffs seek to represent a class of professional fiction writers whose works spring from their own minds and their creative literary expression. These authors' livelihoods derive from the works they create. But OpenAI's LLMs endanger fiction writers' ability to make a living, in that the LLMs allow anyone to generate—automatically and freely (or very cheaply)—texts that they would otherwise pay writers to create. Moreover, OpenAI's LLMs can spit out derivative works: material that is based on, mimics, summarizes, or paraphrases Plaintiffs' works, and harms the market for them.[43]

The complaint alleged: "Unfairly, and perversely, without Plaintiffs' copyrighted works on which to 'train' their LLMs, Defendants would have no commercial product with which to damage—if not usurp—the market for these professional authors' works".[44] The complaint maintained: "OpenAI's willful copying thus makes

42 Amended complaint.
43 Amended complaint.
44 Amended complaint.

Plaintiffs' works into engines of their own destruction".[45] The claims to relief include direct copyright infringement, vicarious copyright infringement, and contributory copyright infringement.

In April 2024, Judge Sidney Stein of the U.S. District Court for the Southern District of New York denied a motion by plaintiffs in a California case to intervene in litigation pending against OpenAI in a New York federal court.[46]

The Authors Alliance (2024) – which promotes a progressive approach to copyright law – has argued: "We believe AI training can rely on transformative fair use, but it is also possible for courts to take a very restrictive reading of fair use (especially in the wake of the Supreme Court's recent *Warhol* decision) and decide that AI training is not acceptable as a fair use for a variety of reasons".

There has been a lawsuit lodged by Jonathan Alter against OpenAI and Microsoft in New York.[47] This action has been consolidated with other authors' lawsuits (BakerHostetler 2024).

In California, a number of legal actions have been consolidated in the matter of *In Re: OpenAI ChatGPT Litigation*.[48] The authors alleged six causes of action: direct copyright infringement, vicarious copyright infringement, violation of the *Digital Millennium Copyright Act* (DMCA), unfair competition, negligence, and unjust enrichment. OpenAI sought dismissal of all causes of action except direct copyright infringement. In February 2024, a federal judge in California, Araceli Martínez-Olguín, granted the bulk of OpenAI's motion to dismiss many of the writers' claims.[49] Martínez-Olguín dismissed a claim of vicarious copyright infringement on the grounds that the authors had not shown that there was "substantial similarity" between their books and ChatGPT's output.[50] The judge was of the view that the authors' claim that all ChatGPT outputs are "infringing derivative work" is "insufficient".[51] Her Honour also dismissed allegations of negligence, unjust enrichment, and violations of the *Digital Millennium Copyright Act* 1998.

45 Amended complaint.
46 Authors Guild v. OpenAI (1 April 2024) https://caselaw.findlaw.com/court/us-dis-crt-sd-new-yor/116009536.html
47 *Alter* v. *OpenAI, Microsoft (formerly Julian Sancton v. OpenAI, Microsoft)*, in the U.S. District Court for the Southern District of New York, 1:23-cv-10211 (filed Nov. 21, 2023).
48 *Tremblay* v. *OpenAI, Inc*., the U.S. District Court for the Northern District of California, No. 3:23-cv-03223 (filed June 28, 2023) (proposed class action); *Silverman* v. *OpenAI, Inc*., the U.S. District Court for the Northern District of California, No. 3:23-cv-03223 (filed July 7, 2023) (proposed class action); and *Chabon* v. *OpenAI Inc*., the U.S. District Court for the Northern District of California, 3:23-cv-04625-PHK (filed Sept. 8, 2023) (proposed class action).
49 Tremblay v. OpenAI, Inc., the U.S. District Court for the Northern District of California, 12 February 2024. See Creamer 2024.
50 Ibid.
51 Ibid.

Other Literary Copyright Litigation v. AI Developers

In July 2023, a lawsuit was filed by authors against Alphabet Inc. over the scraping of data for the AI program Bard.[52] One of the plaintiffs, J.L., a Texan author and investigative journalist, said Google also copied her book in full to train Bard. The lawsuit requested the court to order Google to let internet users opt out of Google's "illicit data collection" and to delete the existing data or pay its owners "fair compensation" (Brittain 2023). Google general counsel Halimah DeLaine Prado responded that the company has been "clear for years that we use data from public sources — like information published to the open web and public datasets – to train the AI models behind services like Google Translate, responsibly and in line with our AI Principles" (Brittain 2023).

Novelist Andre Dubus III and journalist and nonfiction writer Susan Orlean have lodged a copyright complaint in respect of Nvidia's NeMo Megatron models.[53] The complaint alleges: "NVIDIA made multiple copies of the Infringed Works during the training of the NeMo Megatron models without Plaintiffs' or Class members' permission and in violation of their exclusive rights under the Copyright Act".[54] There has also been a proposed class action launched by Abdi Nazemian against the NVIDIA Corporation.[55]

Fiction writers Rebecca Makai and Jason Reynolds have filed a lawsuit for copyright infringement against Databricks Inc. over its Mosaic ML model in the U.S. District Court for the Northern District of California.[56] There has been another action launched against Databricks Inc. by Stewart O'Nan.[57]

Copyright Law, Journalism, News, and AI

There have been significant intellectual property disputes over news and journalism in the past, raising issues about copyright law, confidential information, and "hot news" (Slauter 2019). A range of news, media, and journalistic organisations have brought action against technology developers for copyright infringement in respect of AI programs.

52 J.L. v. Alphabet Inc., the U.S. District Court for the Northern District of California, 3:23-cv-03440-LB (filed Jul. 11, 2023)
53 *Dubus* v. *NVIDIA Corp.*, the U.S. District Court for the Northern District of California, 4:24-cv-02655 (filed May 2, 2024) (proposed class action). For commentary, see Jahner 2024.
54 Dubus v. NVIDIA Corp., in the U.S. District Court for the Northern District of California, 4:24-cv-02655 (filed May 2, 2024) (proposed class action).
55 *Nazemian* v. *NVIDIA Corp.*, the U.S. District Court for the Northern District of California, No. 3:23-cv-01454 (filed Mar. 8, 2024) (proposed class action).
56 *Makkai* v. *Databricks, Inc.,* the U.S. District Court for the Northern District of California, 3:24-cv-02653 (filed Aug. 27, 2024). For commentary, see Jahner 2024.
57 *O'Nan* v. *Databricks, Inc.,* Mosaic ML in the U.S. District Court for the Northern District of California, No. 3:23-cv-01451 (filed Mar. 8, 2024).

In February 2024, Intercept Media brought a legal action against OpenAI and Microsoft in the U.S. District Court for the Southern District of New York.[58] Intercept Media alleged that OpenAI and Microsoft removed electronic rights management information in respect of its copyright: "Defendants… trained ChatGPT and Copilot not to acknowledge or respect copyright, not to notify ChatGPT and Copilot users when the responses they received were protected by journalists' copyright, and not to provide attribution when using the works of human journalists".[59] In June 2024, The Intercept Media Inc. amended its complaint to include over 600 pages of exhibits (Gilbert 2024a). It detailed how algorithms stripped articles of the author's name and title. In response, the technology companies argued that the lawsuit should be dismissed, because of a lack of injury. Rakoff J responded: "The injury is that you removed that information knowing or having reason to know it would lead to copyright infringement" (Soni 2024b).

In February 2024, Raw Story Media Inc. and Alternet brought an action against OpenAI, claiming that it was in breach of the *Digital Millennium Copyright Act* 1998 (US) by scraping news articles from its site, and removing the electronic management rights information.[60] In November 2024, McMahon J dismissed the copyright lawsuit by Raw Story Media Inc. and Alternet Media. Inc. on the grounds that they lacked concrete injury to bring the lawsuit (Gilbert 2024b).

Investigative journalist Nicholas Gage and author Nicholas Basbanes have also filed a copyright lawsuit against OpenAI and Microsoft, alleging that their books and articles were used to train ChatGPT.[61] The lawsuit from Gage and Basbanes said that "until recently, ChatGPT provided verbatim quotes of copyrighted text" (Poritz 2024). The complaint observed: "Currently, it instead readily offers to produce summaries of such text".[62] The lawsuit noted: "These summaries themselves are derivative works, the creation of which is inherently based on the original unlawfully copied work".[63]

The New York Times has also brought a copyright infringement against Microsoft and OpenAI over the use of its journalism for training materials.[64] *The New York Times* noted: "Publicly, Defendants insist that their conduct is

58 *Intercept Media Inc.* v. *OpenAI*, the U.S. District Court for the Southern District of New York, 1:24-cv-01515 (filed Feb. 28, 2024).
59 Intercept Media Inc. v. OpenAI, the U.S. District Court for the Southern District of New York, 1:24-cv-01515 (filed Feb. 28, 2024), complaint, 2.
60 *Raw Story Media, Inc.* v. *OpenAI*, in the U.S. District Court for the Southern District of New York, 1:24-cv-01514 (filed Feb. 28, 2024).
61 *Basbanes* v. *Microsoft Corp.*, *OpenAI*, the U.S. District Court for the Southern District of New York, 1:24-cv-00084 (filed Jan. 5, 2024) (proposed class action).
62 Ibid.
63 Ibid.
64 *The New York Times Co.* v. *Microsoft Corp.*, *OpenAI*, the U.S. District Court for the Southern District of New York, 1:23-cv-11195 (filed Dec. 27, 2023).

protected as 'fair use' because their unlicensed use of copyrighted content to train GenAI models serves a new 'transformative' purpose".[65] However, in the view of *The New York Times*, "there is nothing 'transformative' about using The Times's content without payment to create products that substitute for The Times and steal audiences away from it".[66] *The New York Times* argued: "Because the outputs of Defendants' GenAI models compete with and closely mimic the inputs used to train them, copying Times works for that purpose is not fair use".[67] *The New York Times* commented: "This action seeks to hold them responsible for the billions of dollars in statutory and actual damages that they owe for the unlawful copying and use of The Times's uniquely valuable works".[68] There has been some scholarly discussion as to whether the position of *The New York Times* is consistent with its past approach to copyright law and fair use (Pope 2024).

A group of United States newspapers – including the *New York Daily News* and *Chicago Tribune* – have sued Microsoft and OpenAI for copyright infringement.[69] The complaint observes: "This lawsuit arises from Defendants purloining millions of the Publishers' copyrighted articles without permission and without payment to fuel the commercialization of their generative artificial intelligence ('GenAI') products, including ChatGPT and Copilot".[70] The complaint observes: "Microsoft and OpenAI simply take the work product of reporters, journalists, editorial writers, editors and others who contribute to the work of local newspapers—all without any regard for the efforts, much less the legal rights, of those who create and publish the news on which local communities rely".[71] The complaint also worries about the distortion of its journalism: "As if plagiarizing the Publishers' work were not enough, Defendants' products are often subject to 'hallucinations' where those products malign the Publishers' credibility by falsely attributing inaccurate reporting to the Publishers' newspapers".[72] The lawsuit fears: "Beyond just profiting from the theft of the Publishers' content, Defendants are actively tarnishing the newspapers' reputations and spreading dangerous disinformation".[73] An OpenAI spokesperson responded that the company takes "great care in our products and design process to support news organizations" (Brittain 2024d).

The Center for Investigative Reporting Inc. has also brought action against

65 Complaint, [8].
66 Ibid., [8].
67 Ibid., [8].
68 Ibid., [9].
69 *Daily News* v. *Microsoft*, in the U.S. District Court for the Southern District of New York, 1:24-cv-03285 (filed Aug. 27, 2024).
70 Ibid., Complaint, 1.
71 Ibid., Complaint, 6.
72 Ibid., Complaint, 7.
73 Ibid., Complaint, 7.

OpenAI and Microsoft for copyright infringement.[74] The complaint alleged: "Defendants copied, used, abridged, and displayed CIR's valuable content without CIR's permission or authorization, and without any compensation to CIR".[75] The complaint maintained that "Defendants greatly benefit from CIR's distinct voice in the marketplace, as CIR provides a unique perspective, especially regarding investigative topics impacting diverse communities".[76] Monika Bauerlein, CEO of the Center for Investigative Reporting, commented: "OpenAI and Microsoft started vacuuming up our stories to make their product more powerful, but they never asked for permission or offered compensation, unlike other organizations that license our material" (Reveal Staff 2024). She added: "This free rider behavior is not only unfair, it is a violation of copyright" (Reveal Staff 2024). Bauerlein argues: "The work of journalists, at CIR and everywhere, is valuable, and OpenAI and Microsoft know it" (Reveal Staff 2024).

In October 2024, Rupert Murdoch's Dow Jones and New York Post sued the AI firm Perplexity AI for copyright infringement (Reuters 2024). The lawsuit read: "This suit is brought by news publishers who seek redress for Perplexity's brazen scheme to compete for readers while simultaneously freeriding on the valuable content the publishers produce" (Reuters 2024). The News Corp CEO, Robert Thomson, said in a statement: "Perplexity perpetrates an abuse of intellectual property that harms journalists, writers, publishers and News Corp" (Reuters 2024).

There has also been litigation by news organisations against AI developers in neighbouring Canada.[77] In November 2025, the Ontario Superior Court of Justice ruled that a copyright action by Canadian news publishers – including Postmedia, CBC/Radio-Canada, the Canadian Press, the *Toronto Star*, and the *Globe and Mail* – against OpenAI could proceed to trial (Lau, 2025). The Ontario court held that "a good, arguable case has been made that the *Copyright Act* breaches are sufficiently connected to Ontario". The court additionally awarded the Canadian news media companies $260,000 in preliminary costs.

Such litigation over copyright law, journalism, and AI is relevant and pertinent to museums, archives, libraries, and galleries, given that they often rely on news reporting in the creation of exhibition content.

74 *The Center for Investigative Reporting, Inc.* v. *OpenAI*, in the U.S. District Court for the Southern District of New York, 1:24-cv-04872 (filed Aug. 12, 2024).
75 Ibid., Complaint, [6].
76 Ibid., Complaint, [7].
77 Toronto Star Newspapers Limited v. OpenAI Inc., 2025 ONSC 4685 (CanLII). Court File Number: CV-24-00732231-00CL.

Copyright Law, Databases, and AI

There has been significant copyright litigation over the use of databases in AI projects. There has also been broader concern about data, AI, and algorithmic surveillance (Sinnreich & Gilbert 2024).

A leading early case is *Thomson Reuters Enterprise Centre GMBH* v. *Ross Intelligence Inc.,* which was filed in the U.S. District Court for the District of Delaware in 2020.[78]

In 2023, Justice Bibas rejected summary judgment and the analysis of fair use, in light of *Andy Warhol Foundation* v. *Goldsmith*[79] and *Google* v. *Oracle*[80] decisions in *Thomson Reuters* v. *Ross*.[81] The judge observed: "Facts can be messy even when parties wish they were not".[82] The judge noted: "But summary judgment is proper only if factual messes have been tidied".[83] The judge observed: "Courts cannot clean them up".[84] The judge commented that because "many of the critical facts in this case remain genuinely disputed", it was necessary to deny Thomson Reuters's and Ross's motions for summary judgment.[85]

The judge noted that the parties still dispute the breadth and validity of Westlaw's copyright. The judge observed that questions of substantial similarity needed to go to a jury.

The judge also highlighted how contested the question of fair use would be between the parties: "Deciding whether the public's interest is better served by protecting a creator or a copier is perilous, and an uncomfortable position for a court".[86] The judge observed: "Here, we run into a hotly debated question: Is it in the public benefit to allow AI to be trained with copyrighted material?".[87] The judge commented that "an independent evaluation of the benefits of AI is unlikely to be useful yet, even though both the potential benefits and risks are huge".[88] The judge observed: "Suffice it to say, each side presents a plausible and powerful account of the public benefit that would result from ruling for it".[89]

In 2024, Justice Bibas invited the parties to renew their motions for summary judgment: "I invite Thomson Reuters to renew its motions for summary judgment

78 Thomson Reuters Enterprise Centre GMBH v. Ross Intelligence Inc., in the U.S. District Court for the District of Delaware, No. 1:20-cv-613-SB (filed May 6, 2020).
79 Andy Warhol Foundation for the Visual Arts, Inc. v. Goldsmith, 598 U.S. 508 (2023).
80 Google LLC v. Oracle America, Inc., 593 U.S. 1 (2021).
81 Thomson Reuters Enterprise Centre GmbH v. Ross Intelligence Inc., United States District Court, D. Delaware, 694 F.Supp.3d 467 (2023).
82 Ibid.
83 Ibid.
84 Ibid.
85 Ibid.
86 Ibid.
87 Ibid.
88 Ibid.
89 Ibid.

on those issues and Ross to renew its cross-motion for summary judgment on fair use".[90] The judge noted: "Thus, the parties may submit two sets of additional briefing on (1) copyrightability, validity, and infringement, and (2) the defense of fair use. In the briefing, the parties may also choose to address merger, scenes a faire, copyright misuse, and innocent infringement, as I instructed this morning".[91]

In 2025, Bibas J engaged in a substantial revision of his position.[92] His Honour noted: "A smart man knows when he is right; a wise man knows when he is wrong".[93] The judge noted: "Wisdom does not always find me, so I try to embrace it when it does––even if it comes late, as it did here".[94] The judge granted most of Thomson Reuters' motion for partial summary judgment on direct copyright infringement and related defences. The judge granted Thomson Reuters' motion for partial summary judgment on fair use. The judge denied Ross' motion for summary judgment on fair use, and on Thomson Reuter's copyright claims.

Bibas J suggested that, since "Ross took the headnotes to make it easier to develop a competing legal research tool", "Ross's use is not transformative".[95] His Honour also observed: "Because the AI landscape is changing rapidly, I note for readers that only non-generative AI is before me today".[96] Balancing the fair use factors, Bibas J now held: "Factors one and four favor Thomson Reuters. Factors two and three favor Ross".[97] Bibas J ruled: "Factor two matters less than the others, and factor four matters more".[98]

Ross Intelligence has appealed against the ruling of Bibas J on originality and fair use – saying, amongst other things, that there was conflict between his own decisions (Brachmann 2025). The Authors Alliance has been critical of the district court ruling for blurring the line between fact and expression; expanding copyright infringement to intermediate copies; and imagining a robust market for AI training material (Xu 2025).

Another database case is *Huckabee* v. *Bloomberg*.[99] Mike Huckabee (former governor of Arkansas) and others filed a putative class-action complaint against Meta, Bloomberg, Microsoft, and EleutherAI Institute, claiming that Meta, Bloomberg, and Microsoft trained their LLMs on EleutherAI's datasets. The

90 Ibid.
91 Ibid.
92 Thomson Reuters Enterprise Centre GMBH v. Ross Intelligence Inc. 2025 WL 458520 (US District Court for the District of Delaware, 11 February 2025).
93 Ibid.
94 Ibid.
95 Ibid.
96 Ibid.
97 Ibid.
98 Ibid.
99 *Huckabee* v. *Bloomberg*, in the U.S. District Court for the Southern District of New York, 1:23-cv-11195 (filed Dec. 27, 2023) proposed class action).

plaintiffs have amended their complaint to only name the Bloomberg entities as defendants. Bloomberg has asked the case to be dismissed (Brittain 2024b).

Given that GLAM entities often rely on databases, such copyright litigation over databases and AI will have a bearing on their activities.

Copyright Law, Artistic Works, and AI

There has been consideration of the protection of AI-generated pictures such as photographs and paintings under copyright law. Yaniv Benhamou and Ana Andrijevic (2022) have considered the complexities of copyright law and AI art.

Stephen Thaler has sought to test whether copyright protection extends to AI-generated artistic works in a dispute with the United States Copyright Office.[100] (In parallel action, Thaler has also been involved in testing whether AI can be named as an inventor in patent applications.) The United States Copyright Office denied an application by Thaler on the grounds that an artistic work generated by the "Creativity Machine" lacked human authorship, a prerequisite for a valid copyright. Beryl A. Howell J of the United States District Court for the District of Columbia held that the "defendants are correct that human authorship is an essential part of a valid copyright claim".[101] The judge noted: "Copyright has never stretched so far, however, as to protect works generated by new forms of technology operating absent any guiding human hand, as plaintiff urges here".[102] Her Honour insisted: "Human authorship is a bedrock requirement of copyright".[103] The judge recognised:

> Undoubtedly, we are approaching new frontiers in copyright as artists put AI in their toolbox to be used in the generation of new visual and other artistic works. The increased attenuation of human creativity from the actual generation of the final work will prompt challenging questions regarding how much human input is necessary to qualify the user of an AI system as an 'author' of a generated work, the scope of the protection obtained over the resultant image, how to assess the originality of AI-generated works where the systems may have been trained on unknown pre-existing works, how copyright might best be used to incentivize creative works involving AI, and more.[104]

100 *Thaler* v. *Perlmutter* 687 F. Supp. 3d 140 (US District Court for the District of Columbia, 2023).
101 Ibid., 142.
102 Ibid., 146.
103 Ibid., 146.
104 Ibid., 149.

Howell J observed: "On the record designed by plaintiff from the outset of his application for copyright registration, this case presents only the question of whether a work generated autonomously by a computer system is eligible for copyright".[105] The judge ruled: "In the absence of any human involvement in the creation of the work, the clear and straightforward answer is the one given by the Register: No.".[106] The judge concluded that "the image autonomously generated by plaintiff's computer system was never eligible for copyright, so none of the doctrines invoked by plaintiff conjure up a copyright over which ownership may be claimed".[107]

In March 2025, the United States Court of Appeals for the District of Columbia Circuit upheld the initial ruling against an appeal by Stephen Thaler.[108] In the opinion for the court, Patricia Ann Millett J found:

> As a matter of statutory law, the *Copyright Act* requires all work to be authored in the first instance by a human being. Dr. Thaler's copyright registration application listed the Creativity Machine as the work's sole author, even though the Creativity Machine is not a human being. As a result, the Copyright Office appropriately denied Dr. Thaler's application.[109]

The judge commented: "Numerous *Copyright Act* provisions both identify authors as human beings and define 'machines' as tools used by humans in the creative process rather than as creators themselves".[110] The judge ruled: "Because many of the *Copyright Act's* provisions make sense only if an author is a human being, the best reading of the *Copyright Act* is that human authorship is required for registration".[111]

The judge held: "The Creativity Machine cannot be the recognized author of a copyrighted work because the *Copyright Act* of 1976 requires all eligible work to be authored in the first instance by a human being".[112] The judge also noted that it was unnecessary to consider constitutional law questions in the matter: "Because the *Copyright Act* itself requires human authorship, we need not and do not address the Copyright Office's argument that the Constitution's Intellectual Property Clause

105 Ibid., 149-150.
106 Ibid., 150.
107 Ibid., 150.
108 Thaler v. Perlmutter 130 F.4th 1039 (United States Court of Appeals, District of Columbia Circuit, 18 March 2025).
109 Ibid., 1044-1045.
110 Ibid., 1045.
111 Ibid., 1045.
112 Ibid., 1041.

requires human authorship".[113] The judge also found: "Nor do we reach Dr. Thaler's argument that he is the work's author by virtue of making and using the Creativity Machine because that argument was waived before the agency".[114]

Millett J noted that "even if the human authorship requirement were at some point to stymy the creation of original work, that would be a policy argument for Congress to address".[115] Millett J emphasized that it was the role of Congress to accommodate new technologies: "In that regard, it bears noting that the Political Branches have been grappling with how copyright law should adapt to new technology".[116]

As well as raising questions in respect of authorship of artistic works, AI has also posed questions about copyright infringement, and the nature and scope of copyright exceptions, such as the defence of fair use.

The Supreme Court of the United States recently considered copyright law and the defence of fair use in the context of artistic works. The court found against the Andy Warhol Estate in a dispute over a pop art rendition of a photograph of Prince.[117] The case has raised concerns about a shift in the approach of the United States judiciary towards the defence of fair use. There has been concern that the Roberts Court has neglected the importance of freedom of speech in some of the Supreme Court intellectual property cases (Lemley & Tushnet 2023).

In 2023, Getty Images launched a copyright infringement and trademark infringement lawsuit against Stability AI Ltd, the developer of the open source image generator Stable Diffusion, in the U.S. District Court for the District of Delaware.[118] The complaint alleged:

> This case arises from Stability AI's brazen infringement of Getty Images' intellectual property on a staggering scale. Upon information and belief, Stability AI has copied more than 12 million photographs from Getty Images' collection, along with the associated captions and metadata, without permission from or compensation to Getty Images, as part of its efforts to build a competing business. As part of its unlawful scheme, Stability AI has removed or altered Getty Images' copyright management information, provided false copyright management information, and infringed Getty Images' famous trademarks.[119]

113 Ibid., 1051
114 Ibid., 1041.
115 Ibid., 1050
116 Ibid., 1051.
117 Andy Warhol Foundation for the Visual Arts, Inc. v. Goldsmith, 598 U.S. 508 (2023).
118 *Getty Images (US), Inc.* v. *Stability AI Ltd*, in the U.S. District Court for the District of Delaware, No. 1:23-cv-00135-UNA (filed 2/03/23) (proposed class action).
119 Complaint, [1].

The complaint sought relief from the court: "Getty Images brings this action to recover damages that it has suffered and is continuing to suffer, and to prevent the irreparable harm caused by Stability AI's intentional and willful acts".[120]

The lawsuit argues that Stability AI has not sought permission for its use of the images: "Rather than attempt to negotiate a license with Getty Images for the use of its content, and even though the terms of use of Getty Images' websites expressly prohibit unauthorized reproduction of content for commercial purposes such as those undertaken by Stability AI, Stability AI has copied at least 12 million copyrighted images from Getty Images' websites, along with associated text and metadata, in order to train its Stable Diffusion model".[121] The lawsuit contends: "Stability AI now competes directly with Getty Images by marketing Stable Diffusion and its DreamStudio interface to those seeking creative imagery, and its infringement of Getty Images' content on a massive scale has been instrumental to its success to date".[122]

In addition to the copyright complaint, Getty Images also argued that Stability AI Ltd was also engaged in trademark dilution. Stable Diffusion is well known for recreating the company's watermark in some of its images, and Getty argues that the appearance of this watermark on the model's "bizarre or grotesque images, dilutes the quality of the Getty Images Marks by blurring or tarnishment".[123]

Writing for *The Verge*, James Vincent (2023) commented: "The lawsuit is the latest volley in the ongoing legal struggle between the creators of AI art generators and rights-holders". He observed: "AI art tools require illustrations, artwork, and photographs to use as training data, and often scrape it from the web without the creator's consent" (Vincent 2023).

Getty Images has also filed legal action in the United Kingdom against Stability AI.[124] Stability AI has mounted a defence against this lawsuit (GT Law 2024). Reflecting upon the United Kingdom litigation by Getty Images, Cerys Wyn Davies and Gill Dennis commented: "There is quite a lot for the High Court to consider in this case, and quite a lot at stake beyond how this individual dispute between Getty and Stability AI is resolved" (Davies & Dennis 2024). Davies and Dennis (2024) observed: "The case is therefore likely to be followed closely by AI developers, the copyright lobby, and policymakers alike given its potential to precipitate the evolution of licensing and the law".

In November 2025, Justice Joanna Smith of the High Court of Justice (Chancery

120 Complaint, [2].
121 Ibid., [8].
122 Ibid., [9].
123 Ibid., [11].
124 *Getty Images (US), Inc.* v. *Stability AI Ltd.*, the High Court of Justice in London (Chancery Division), (filed 1/16/23), No. IL-2023-000007.

Division) handed down a decision in *Getty Images (US) Inc. and others* v. *Stability AI Ltd* (2025).[125] The judge held: "An AI model such as Stable Diffusion which does not store or reproduce any copyright works (and has never done so) is not an 'infringing copy'". However, her Honour declined to rule on the passing off claim. The judge ruled in favour of some of Getty's claims about trademark infringement related to watermarks. The decision has been seen in the media as a qualified victory for the AI developer (Booth 2025). In a statement, Getty Images said: "We remain deeply concerned that even well-resourced companies such as Getty Images face significant challenges in protecting their creative works given the lack of transparency requirements" (Booth 2025). Christian Dowell, the general counsel for Stability AI, said: "The decision to voluntarily dismiss most of its copyright claims at the conclusion of trial testimony left only a subset of claims before the court, and this final ruling ultimately resolves the copyright concerns that were the core issue" (Booth 2025).

In December 2025, Justice Joanna Smith DBE granted permission to Getty to appeal her finding of no secondary copyright infringement in her judgment of 4 November (Montagnon 2025). However, the judge refused leave to Stability AI to appeal her finding of trade mark infringement (Montagnon 2025).

Getty Images itself has faced lawsuits for copyright infringement from photographers and artists whose work has been put on its database without its consent (Graphic Artists Guild 2016). The action was dismissed by the judge.

In 2023, visual artists Sarah Andersen, Kelly McKernan, and Karla Ortiz filed a class-action lawsuit against Stability AI, Midjourney, and DeviantArt in the Northern District of California.[126] The legal action alleged copyright infringement, right of publicity violations, and other claims related to the use of the plaintiffs' works in training data sets for the AI image-generating platforms Stable Diffusion, the Midjourney Product, DreamStudio, and DreamUp. In August 2024, the court issued an order granting defendants' motions to dismiss the copyright management information claims under the *Digital Millennium Copyright Act* 1998 (US) with prejudice (Madigan 2024). However, the court denied the motions to dismiss trademark, direct copyright infringement, and inducement claims.

In 2024, photographer Jingna Zhang and cartoonists Sarah Andersen, Hope Larson, and Jessica Fink brought a legal action against Google and its parent company for copyright infringement in respect of the misuse of copyrighted images to teach Imagen.[127] The artists' attorneys Joseph Saveri and Matthew Butterick said in a statement that the case was "another instance of a multi-trillion-dollar tech

125 Getty Images (US) Inc & Ors v. Stability AI Ltd [2025] EWHC 2863 (Ch) (04 November 2025).
126 *Andersen* v. *Stability AI Ltd*, the U.S. District Court for the Northern District of California, No. 3:23-cv-00201 (filed 1/13/23) (proposed class action).
127 *Zhang* v. *Google, Alphabet*, the U.S. District Court for the Northern District of California, No. 3:23-cv-02531 (filed Apr. 26, 2024) (proposed class action).

company choosing to train a commercial AI product on the copyrighted works of others without consent, credit, or compensation" (Brittain 2024c). In response, Google spokesperson Jose Castaneda maintained: "Our AI models are trained primarily on publicly available information on the internet" (Brittain 2024c). He commented: "American law has long supported using public information in new and beneficial ways, and we will refute these claims in court" (Brittain 2024c).

Copyright Law, Musical Works, and AI

The music industry has a vast experience of copyright litigation in respect of new technologies, having previously weathered the introduction of new modes of distribution, including cassette tape recording, CDs, DVDs, peer-to-peer networks, and streaming. As Lee (2024b: 235) observes: "AI raises profound challenges for musicians and the copyright system at a time when the music industry is still reeling from the major disruptions wrought by the streaming of music". Key companies in the music industry – including Universal, Sony, and Warner Brothers – have launched legal action for copyright infringement against a number of AI companies.

A leading complaint is the 2024 matter of *UMG Recordings* v. *Suno Inc.*, in the U.S. District Court for Massachusetts.[128] The complaint notes: "From the invention of the phonograph record, through the eras of vinyl, cassette tapes, CDs, and now streaming and social media, the recorded music industry has been at the forefront of technological advancement".[129] The complaint observes: "Artificial intelligence ('AI') and machine learning are the next frontier of technological development, poised to push boundaries and expand commercial opportunity".[130] The complaint notes: "But with AI's enormous capabilities comes an equally enormous potential for abuse, making it critical that AI technology be implemented responsibly, ethically, and legally".[131] The complaint maintains: "Most fundamentally, AI companies, like all other enterprises, must abide by the laws that protect human creativity and ingenuity".[132] The complaint argues: "There is nothing that exempts AI technology from copyright law or that excuses AI companies from playing by the rules".[133]

The lawsuit contends: "Suno is not exempt from the copyright laws that

128 UMG Recordings v. Suno Inc., the U.S. District Court for Massachusetts, 1:24-cv-11611 (filed Jun. 24, 2024).
129 Complaint in UMG Recordings v. Suno Inc., the U.S. District Court for Massachusetts, 1:24-cv-11611 (filed Jun. 24, 2024), [1].
130 Ibid., [1].
131 Ibid., [1].
132 Ibid., [2].
133 Ibid., [2].

protect human authorship".[134] The complaint observes: "Like any other market participant, Suno cannot reproduce copyrighted works for a commercial purpose without permission".[135] The lawsuit argues: "Heedless of this basic principle, Suno's unauthorized copying erodes the value and integrity of Plaintiffs' copyrighted sound recordings with rapid and devastating impact".[136] The lawsuit alleges that "Suno also profits substantially from its infringement of Plaintiffs' copyrighted sound recordings".[137]

The lawsuit further argues: "Suno cannot avoid liability for its willful copyright infringement by claiming fair use".[138] The lawsuit maintains: "The doctrine of fair use promotes human expression by permitting the unlicensed use of copyrighted works in certain, limited circumstances, but Suno offers imitative machine-generated music—not human creativity or expression".[139]

The lawsuit maintains: "Suno's wholesale theft of the Copyrighted Recordings threatens the entire music ecosystem and the numerous people it employs".[140] The complaint also alleges that Suno "also degrades the rights of artists to control their works, determine whether future uses of their works align with their aesthetic and personal values, and decide the products or services with which they wish to be associated".[141]

The lawsuit argues: "There is room for AI and human creators to forge a sustainable, complementary relationship that promotes human creativity and facilitates the human creations that shape culture, excite the public, and resonate with consumers".[142] The complaint maintains: "This can and should be achieved through the well established mechanism of free-market licensing that ensures proper respect for copyright owners".[143]

The lawsuit laments: "Since the day it launched, Suno has flouted the rights of copyright owners in the music industry as part of a mad dash to become the dominant AI music generation service".[144] The lawsuit contends: "Neither Suno, nor any other generative AI company, can be allowed to advance toward this goal by trampling the rights of copyright owners".[145]

The lawsuit pleads that there is a direct copyright infringement of post-1972

134 Ibid., [12].
135 Ibid., [12].
136 Ibid., [12].
137 Ibid., [13].
138 Ibid., [14].
139 Ibid., [14].
140 Ibid., [80].
141 Ibid., [80].
142 Ibid., [81].
143 Ibid., [81].
144 Ibid., [82].
145 Ibid., [82].

copyright recordings. The lawsuit also pleads that there is a direct copyright infringement of pre-1972 copyright recordings. The lawsuit seeks as a relief a declaration of willful copyright infringement; equitable relief; statutory damages; costs; interest; and any further relief.

There has been a similar action launched by UMG Recordings against Uncharted Labs in respect of Udio.[146] The lawsuit noted: "If developed with the permission and participation of copyright owners, generative AI tools will be able to assist humans in creating and producing new and innovative music".[147] The lawsuit observed: "But if developed irresponsibly, without regard for fundamental copyright protections, those same tools threaten enduring and irreparable harm to recording artists, record labels, and the music industry, inevitably reducing the quality of new music available to consumers and diminishing our shared culture".[148]

In October 2025, the Universal Music Group announced that a settlement had been reached with Udio (UMG 2025). The press release noted: "In addition to the compensatory legal settlement, the new license agreements for recorded music and publishing will provide further revenue opportunities for UMG artists and songwriters" (UMG 2025). Sir Lucian Grainge, Chairman and CEO of UMG, said: "These new agreements with Udio demonstrate our commitment to do what's right by our artists and songwriters, whether that means embracing new technologies, developing new business models, diversifying revenue streams or beyond" (UMG 2025). Andrew Sanchez, Co-Founder and CEO of Udio, commented: "This moment brings to life everything we've been building toward – uniting AI and the music industry in a way that truly champions artists" (UMG 2025). Oliver Brown (2025) questioned the arrangement: "The idea that copyright provides an incentive for creators to produce original work is faltering with AI–recording industry licensing deals".

In October 2024, Universal, Concord, and ABKCO sued the AI company Anthropic for copyright violations.[149] The complaint alleged:

> Publishers bring this action to address the systematic and widespread infringement of their copyrighted song lyrics by the artificial intelligence ('AI') company Anthropic. In the process of building and operating AI models, Anthropic unlawfully copies and disseminates vast amounts of copyrighted works — including the lyrics to myriad musical compositions owned or controlled by Publishers. Publishers embrace innovation and

146 *UMG Recordings* v. *Uncharted Labs d/b/a/ Udio*, the U.S. District Court for the Southern District of New York, 1:24-cv-04777 (filed Jun. 24, 2024).
147 Ibid., complaint [3].
148 Ibid., complaint [3].
149 *Concord Music Group, Inc.* v. *Anthropic PBC*, transferred to the U.S. District Court for the Northern District of California, 5:24-cv-03811 (filed Oct. 18, 2023). For discussion, see Aswad 2023.

> recognize the great promise of AI when used ethically and responsibly. But Anthropic violates these principles on a systematic and widespread basis. Anthropic must abide by well-established copyright laws, just as countless other technology companies regularly do.[150]

The music publishers maintained that Anthropic misused lyrics to train the chatbot Claude (Brittain, 2024a). In August 2024, Anthropic filed a motion, asking to have a large part of the copyright infringement case against it dismissed (Tencer 2024).

In March 2025, in the case of *Concord Music Group, Inc*. v. *Anthropic PBC*, Eumi K. Lee J distinguished the case from the ruling of Bibas J in February 2025: "The Court reviewed the subject opinion and notes that it is distinguishable because (1) it addressed the merits of the parties' respective infringement claims and defenses at the summary judgment stage; (2) it did not concern a generative AI model; and (3) the parties in that case were direct competitors".[151] The judge held that the music "Publishers are not entitled to the extraordinary remedy of a preliminary injunction".[152] The judge noted: "In reaching this conclusion, the Court does not address whether Publishers could plausibly state either direct or secondary infringement claims against Anthropic, as those questions are appropriately reserved for Anthropic's motion to dismiss the complaint and subsequent proceedings on the merits".[153]

Musicians have had reservations about the use of AI to create musical works. Australian musician Nick Cave (2023) doubted that AI music would be convincing: "ChatGPT may be able to write a speech or an essay or a sermon or an obituary but it cannot create a genuine song". He observed: "It could perhaps in time create a song that is, on the surface, indistinguishable from an original, but it will always be a replication, a kind of burlesque" (Cave 2023). He predicted: "ChatGPT's melancholy role is that it is destined to imitate and can never have an authentic human experience, no matter how devalued and inconsequential the human experience may in time become" (Cave 2023).

However, there have also been some productive uses of AI in the restoration of lost musical works. The Beatles were able to recover the musical work 'Now and Then' with the help of technology developed by Peter Jackson for the Get Back documentary, which enabled the splitting of music into separate tracks based on machine learning (Welch 2023). The resulting work has been nominated for a Grammy (Roth 2024).

There remains debate as to whether copyright law reform is necessary to

150 Ibid.
151 Concord Music Group, Inc. v. Anthropic PBC, 2025 WL 904333 (N.D. Cal., 25 March 2025).
152 Ibid.
153 Ibid.

deal with musical works and sound recordings in the age of AI. As Lee (2024b: 236) comments: "Congress and the courts both have important roles to play in periodically rebalancing the scope of copyright, and in considering the need for measures beyond copyright to address problems posed by AI".

Copyright Law, Dramatic Works, Performances, and AI

United States copyright law has not embraced performers' rights like other jurisdictions, particularly in the European Union. Richard Arnold (2022) has considered the problems in respect of the protection and enforcement of performers' rights in an age of AI.

As a result, performers have often relied upon publicity rights and other secondary forms of intellectual property protection to protect their identity. Jane Gaines (1991) has written about the origins and evolution of publicity rights in the United States. There have been numerous precedents relating to publicity rights and sound-alike voices. Better Midler won a lawsuit against the Ford Motor Company over an advertisement featuring what sounded like her voice.[154] Tom Waits won litigation against Frito-Lay over a Doritos ad that featured an imitation of his singing voice.[155] Such precedents are relevant and pertinent to litigation over AI and voices.

In 2024, the actor Scarlett Johansson objected to a sound-alike version of her voice being used by OpenAI (Fung, Duffy & Maruf 2024). She hired legal counsel to request that OpenAI take down the 'Sky Voice'. Johansson commented: "I was shocked, angered and in disbelief that Mr. Altman would pursue a voice that sounded so eerily similar to mine that my closest friends and news outlets could not tell the difference" (Weprin 2023). Johansson noted: "In a time when we are all grappling with deepfakes and the protection of our own likeness, our own work, our own identities, I believe these are questions that deserve absolute clarity" (Weprin 2023). She observed: "I look forward to resolution in the form of transparency and the passage of appropriate legislation to help ensure that individual rights are protected" (Weprin 2023).

OpenAI (2024) denied that the company had misappropriated the publicity rights of Scarlett Johansson. Sam Altman maintained: "The voice of Sky is not Scarlett Johansson's, and it was never intended to resemble hers" (OpenAI 2024). He emphasised: "We cast the voice actor behind Sky's voice before any outreach to Ms. Johansson" (OpenAI 2024). Sam Altman noted: "Out of respect for Ms. Johansson, we have paused using Sky's voice in our products" (OpenAI 2024).

154 Midler v. Ford Motor Co. 849 F.2d 460 (9th Cir., 1988).
155 Waits v. Frito Lay, Inc. 978 F.2d 1093 (9th Cir., 1992).

He observed: "We are sorry to Ms. Johansson that we didn't communicate better" (OpenAI 2024).

This dispute could have certainly raised questions around the operation of publicity rights (Fung 2024). Professor Tiffany Li observed: "It doesn't matter if OpenAI used any of Scarlett Johansson's actual voice samples" (Fung 2024). She noted: "[Johansson] still has a viable right of publicity case here" (Fung 2024). Professor James Grimmelmann commented: "OpenAI might have had a plausible case if they hadn't spent the last two weeks hinting to everyone that they had just created Samantha from 'Her'". (Fung 2024). He highlighted: "There was widespread public recognition that Sky was Samantha, and intentionally so" (Fung 2024).

There have been further disputes over AI and publicity rights. In *Vacker* v. *ElevenLabs Inc*, the audiobook voice actors Karissa Vacker and Mark Boyett have accused ElevenLabs of creating an AI voice-over generator which mimics their distinctive voices.[156] They alleged that there had been a misappropriation of their likenesses and publicity rights – as well as violations of the *Digital Millennium Copyright Act* 1998 (US) through the circumvention of technological protection measures, and the removal of electronic management information. After mediation, this dispute was settled and closed in August 2025 (Lee 2025d).

There has been another action by voice actors Paul Sky Lehrman and Linnea Sage against Lovo over the cloning of voice recordings.[157] The complaint observes: "This is a class action brought on behalf of Plaintiffs and similarly situated persons whose voices and/or identities were stolen and used by LOVO – to create millions of voice-over productions – without permission or proper compensation, in violation of numerous state right of privacy laws, and the federal *Lanham Act*".[158] The complaint alleges: "To be clear, the product that customers purchase from LOVO is stolen property".[159] The complaint maintains: "They are voices stolen by LOVO and marketed by LOVO under false pretenses: LOVO represents that it has the legal right to market these voices, but it does not".[160]

There has been further controversy over Amazon's plans to use AI voices to narrate audiobooks on Audible (Knight 2025). Stephen Briggs, who voiced a number of the audiobooks of Terry Pratchett's Discworld novels, said: "The use of AI to replace human creativity is in itself a dangerous path" (Knight 2025). Actor and audiobook narrator Deepti Gupta lamented: "We need to create more, not less, space for Bipoc narrators, and these AI tools are a new way to marginalise and

156 *Vacker* v. *ElevenLabs, Inc*., the U.S. District Court for the District of Delaware, No. 1:20-cv-00987 (filed Aug. 30, 2024). For commentary, see Soni 2024c.
157 *Lehrman* v. *Lovo*, the U.S. District Court for the Southern District of New York, 1:24-cv-03770 (filed May 16, 2024) (proposed class action). For news reportage, see Derico 2024.
158 Ibid., [1].
159 Ibid., [1].
160 Ibid., [1].

colonise the voices that need to be heard" (Knight 2025).

There will no doubt be further disputes involving AI over copyright law, dramatic works, and performances, as well as associated fields of publicity rights. Such matters will raise important questions around authenticity as well as ownership.

Copyright Law, Cinematographic Films, Audio-Visual Works, and AI

In the 2000s and 2010s, there was mega-litigation over copyright law and YouTube videos. Google/Alphabet – the owner of YouTube – sought protection behind the safe harbours regime of the *Digital Millennium Copyright Act* 1998 (US).[161] In the end, there was a settlement of the dispute (Stempel 2014). There was complex litigation as well in respect of take down notices under the *Digital Millennium Copyright Act* 1998 (US), most notably in respect of the Dancing Baby case.[162] There have been proposals for a reformation of the *Digital Millennium Copyright Act* 1998 (US), but there has not been agreement or consensus as to the nature of any shift to that regime (United States Copyright Office 2020).

As documented by Stuart Cunningham and David Craig (2019, 2021), a new creative class of YouTube video performers and makers has emerged. In the 2020s, there has been litigation by YouTube creators against AI projects, which have used YouTube videos for AI training. In 2024, David Millette brought a class action against OpenAI on behalf of YouTube creators and users: "This case addresses the surreptitious, non-consensual transcription of millions of YouTube users' videos by Defendants to train Defendants' AI software products".[163] The lawsuit alleged: "By collecting and using this data without consent, Defendants have profited significantly from the use of Plaintiff's and Class members' materials, violated California's Unfair Competition Law ('UCL'), and been unjustly enriched at Plaintiff and Class members' expense".[164] Similar lawsuits were launched by Millett against Google[165] and Nvidia.[166] The companies have sought to dismiss the lawsuits (Gilbert 2024c).

In October 2024, the producer of 'Blade Runner 2049' sued Elon Musk's Tesla and Warner Bros Discovery over AI-generated promotional materials for Tesla's

161 Viacom International Inc. v. YouTube, Inc. 676 F.3d 19 (2nd Cir., 2012).
162 Lenz v. Universal Music Corp. 801 F. 3d 1126 (2015); for discussion, see Rimmer 2017.
163 *Millette* v. *OpenAI*, in the U.S. District Court for the Northern District of California, 3:24-cv-04710 (filed Aug. 2, 2024) (proposed class action). For a news report of the action, see Skolnik 2024.
164 Ibid.
165 *Millette* v. *Google*, in the U.S. District Court for the Northern District of California, 5:24-cv-04708 (filed Aug. 2, 2024) (proposed class action).
166 *Millette* v. *Nvidia*, in the U.S. District Court for the Northern District of California, 5:24-cv-04708 (filed Aug. 14, 2024) (proposed class action).

cybercab robotaxi (Cho 2024). The complaint alleged direct copyright infringement, vicarious copyright infringement, contributory copyright infringement, and false endorsement.[167] The complaint summarises the dispute in these terms:

> Defendants requested permission to use an iconic still image (Exhibit A) from Alcon's 'Blade Runner 2049' motion picture ('BR2049' or the 'Picture') to promote Tesla's new fully autonomous cybercab in an October 10, 2024 event that was livestreamed worldwide from WBDI's Burbank, California studio lot. Alcon refused all permissions and adamantly objected to Defendants suggesting any affiliation between BR2049 and Tesla, Musk or any Musk-owned company. Defendants then used an apparently AI-generated faked image to do it all anyway.[168]

The complaint observed: "Any prudent brand considering any Tesla partnership has to take Musk's massively amplified, highly politicized, capricious and arbitrary behavior, which sometimes veers into hate speech, into account".[169] The complaint noted: "If, as here, a company or its principals do not actually agree with Musk's extreme political and social views, then a potential brand affiliation with Tesla is even more issue fraught".[170]

The producers contend that the false affiliation is "highly offensive to Alcon's right to commercial and cultural self-determination" and "a massive economic theft".[171] The producers contended: "Beyond Alcon's lost fees for the unauthorized association, Defendants muddied the waters for Alcon's in-progress exploration of automotive brand partnerships for the upcoming BR2049-based Blade Runner 2099 television series".[172] The producers lamented: "The theft infringed Alcon's copyright in the Picture, and created actual confusion or a likelihood of it in the relevant marketplaces about BR2049 branding, including Alcon's current marketing efforts with potential auto brand partners on the Blade Runner 2099 television series, among other marketplace confusion and brand damage".[173]

In June 2025, Disney and Universal launched copyright litigation against Midjourney (Riga 2025).[174] The film studios insisted: "For more than 100 years, Disney and Universal have delighted audiences around the world by investing in

167 Alcon Entertainment LLC v. Tesla Inc., Elon Musk, and Warner Bros. Discovery Inc. (2024), United States District Court for the Central District of California, Western Division, Case 2:24-cv-09033.
168 Ibid., [2].
169 Ibid., [7].
170 Ibid., [7].
171 Ibid., [9].
172 Ibid., [9].
173 Ibid., [70].
174 Complaint in Disney Enterprises Inc. et al. v. Midjourney Inc. United States District Court for the Central District of California, Case 2:25-cv-05275, 11 June 2025.

and fostering American creative innovation and producing some of the greatest motion pictures and fictional characters of all time".[175] The film studios alleged: "Midjourney, however, seeks to reap the rewards of Plaintiffs' creative investment by selling an artificial intelligence ('AI') image-generating service ('Image Service') that functions as a virtual vending machine, generating endless unauthorized copies of Disney's and Universal's copyrighted works".[176] The film studios argued Midjourney used the studios' works to train its image service and generate high-quality reproductions, appropriating the companies' cinematic characters. The lawsuit alleged: "By helping itself to Plaintiffs' copyrighted works, and then distributing images (and soon videos) that blatantly incorporate and copy Disney's and Universal's famous characters — without investing a penny in their creation — Midjourney is the quintessential copyright free-rider and a bottomless pit of plagiarism".[177] The complaint maintained: "Midjourney's conduct misappropriates Disney's and Universal's intellectual property and threatens to upend the bedrock incentives of U.S. copyright law that drive American leadership in movies, television, and other creative arts".[178]

In response, Midjourney complained that the film studios were seeking to censor creative expression: "Plaintiffs seek to stifle them all… [They] made sweeping allegations about Midjourney writ large, commenced this litigation, and are pursuing a path that chills lawful expression" (Kinsella 2025).

In September 2025, Warner Brothers also sued Midjourney for copyright infringement (Stempel 2025).[179] The complaint alleged: "Midjourney has made a calculated and profit-driven decision to offer zero protection for copyright owners even though Midjourney knows about the breathtaking scope of its piracy and copyright infringement".[180] In terms of remedies, the lawsuit sought unspecified damages and disgorgement of profits, and a halt to further infringements. No doubt there will be further copyright litigation over audio-visual works and AI.

It should be noted that not all the film industry are opposed to the use of AI. George Miller – the film-maker behind the Mad Max franchise – has commented: "AI is arguably the most dynamically evolving tool in making moving image" (Burke 2025). Miller maintained: "As a film-maker, I've always been driven by the tools. AI is here to stay and change things" (Burke 2025). He observed: "It's the balance between human creativity and machine capability, that's what the debate and the anxiety is about" (Burke 2025). Burke commented: "It strikes me how this

175 Ibid.
176 Ibid.
177 Ibid.
178 Ibid.
179 Warner Bros Entertainment Inc et al. v Midjourney Inc. (2025) U.S. District Court for the Central District of California, No. 25-08376.
180 Ibid.

debate echoes earlier moments in art history" (Burke 2025).

There could be clashes within the film industry over the use of AI. Professional guilds in the film industry have campaigned in labour disputes over the misuse of AI to replace creative contributions (see Anguiano & Beckett 2023, Maddaus 2024).

Copyright Law, Computer Programs, and AI

There has also been conflict over copyright law, computer programs, and AI.

In the 2021 case of *Google LLC.* v. *Oracle America Inc.,* the Supreme Court of the United States considered the operation of the defence of fair use in respect of computer programs.[181] The majority of the court held that Google's copying of the Java SE API, which included only those lines of code that were needed to allow programmers to put their accrued talents to work in a new and transformative program, was a fair use of that material as a matter of law. Breyer J delivered the majority opinion, which was joined by Sotomayor, Kagan, Gorsuch, and Kavanaugh JJ. Breyer J commented:

> The fact that computer programs are primarily functional makes it difficult to apply traditional copyright concepts in that technological world. In doing so here, we have not changed the nature of those concepts. We do not overturn or modify our earlier cases involving fair use—cases, for example, that involve 'knockoff' products, journalistic writings, and parodies. Rather, we here recognize that application of a copyright doctrine such as fair use has long proved a cooperative effort of Legislatures and courts, and that Congress, in our view, intended that it so continue. As such, we have looked to the principles set forth in the fair use statute, §107, and set forth in our earlier cases, and applied them to this different kind of copyrighted work.[182]

Thomas J filed a dissenting opinion, which was joined by Alito J. Barrett J took no part in the consideration or decision of the case. Thomas J maintained: "Properly considering that statutory text, Oracle's code at issue here is copyrightable, and Google's use of that copyrighted code was anything but fair".[183]

In the context of AI, there has been a proposed class action by authors of computer programs against Github Inc and Microsoft.[184] The amended complaint alleges:

181 Google LLC v. Oracle America, Inc., 593 U.S. 1 (2021).
182 Google LLC v. Oracle America, Inc., 593 U.S. 1 (2021).
183 Google LLC v. Oracle America, Inc., 593 U.S. 1 (2021).
184 *Doe 1* v. *Github, Inc.*, in the U.S. District Court for the Northern District of California, No 4:2022cv06823 (filed 11/03/22) (proposed class action).

> Defendants have made no attempt to comply with the open-source licenses that are attached to much of their training data. Instead, they have pretended those licenses do not exist, and trained Codex and Copilot to do the same. By simultaneously violating the open-source licenses of tens-of-thousands—possibly millions—of software developers, Defendants have accomplished software piracy on an unprecedented scale. As Microsoft's Co-Founder Bill Gates once said regarding software piracy: "the thing you do is theft".[185]

The complaint has various grounds of action – including for a (1) DMCA s. 1202 claim for removal of electronic management information, (2) breach of contract open-source license violations, (3) breach of contract by Github, (4) intentional interference with prospective economic relations Cal. common law, (5) negligent interference with prospective economic relations Cal. common law, (6) unjust enrichment, (7) unfair competition Cal. law, and (8) negligence.

In January 2024, Judge Jon Steven Tigar made an order dismissing most of the claims. In June 2024, the judge made an order granting in part and denying in part motions to dismiss the First Amended Complaint.

Creative Commons, Cultural Heritage, and AI

The Creative Commons movement has used standardised template contracts to make copyright works more widely available, subject to conditions in respect of attribution, commercial use, derivative use, and so forth.[186] The Creative Commons has been grappling with the implications of AI for copyright law and contract law.

Kat Walsh (2023) has written a policy note on what role Creative Commons licences could and should play in the future of generative AI. Walsh (2023) noted: "Generative AI presents an amazing opportunity to be a transformative tool that supports creators — both individuals and organizations — provides new avenues for creation, facilitates better sharing, enables more people to become creators, and benefits the commons of knowledge, information, and creativity for all". Walsh (2023) also recognised: "But there are serious concerns, such as issues around author recognition and fair compensation for creators (and the labor market for artistic work in general), the potential flood of AI-generated works on the commons making it difficult to find relevant and trustworthy information, and the disempowering effect of the privatization and enclosure of AI services and outputs, to name a few". Walsh (2023) maintained: "CC wants AI to augment and support

185 Amended Complaint, [181].
186 Creative Commons, https://creativecommons.org/

commons, not detract from it, and we want to see solutions to these concerns to avoid AI turning creators away from contributing to the commons altogether".

Stephen Wolfson (2023) has contemplated the question of whether generative AI would be protected by the defence of fair use under copyright law. He contended that the public purposes of copyright law should facilitate AI training: "Since the purpose of copyright law is to encourage the new creative works, to promote learning, and to benefit the public interest, fair use should permit using copyrighted works as training data for generative AI models like Stable Diffusion and Midjourney" (Wolfson 2023). He observed: "The law should support and foster the development of new technologies that can provide benefits to the public, and fair use provides a safeguard against the cudgel of copyright being used to impede these technologies" (Wolfson 2023).

The Creative Commons movement has been grappling with copyright law and AI in the cultural heritage sector. In 2021, Policy Director Brigitte Vezina (2021) discussed the position of the Creative Commons organisation in respect of the use of GLAM collections as input for AI training:

> CC fully supports GLAMs in using the massive amounts of data in their digital collections for AI-training purposes (including machine-learning) in order to fulfil their public interest missions. Legally, there remains significant uncertainty as to whether copyright limitations and exceptions allow the use of copyright content for AI training. This uncertainty is likely to have a chilling effect on GLAMs wishing to take advantage of AI technologies. This is one reason why, at CC, we argue that the use of copyright works to train AI should be considered non-infringing by default. As concerns CC-licensed content, where copyright permission is required to train AI systems, the licenses grant that permission under different terms and conditions depending on the particular CC license.

The Creative Commons movement is of the view that there should be no copyright in AI "creative" content. Brigitte Vezina (2021) commented: "While the copyright status of such content is unclear under existing law, CC is of the firm view that there should be no copyright on AI-generated content and that it should be in the public domain". She also added: "Beyond copyright, several obstacles to sharing and using GLAM collections related to ethics, privacy and data protection need to be assessed to bring clarity to the rapidly evolving role that AI is playing in the GLAM sector" (Vezina 2021).

Indigenous Intellectual Property, Cultural Heritage, and AI

There has been a long wretched history of misappropriation of Indigenous intellectual property and cultural heritage, including in the GLAM sector (Janke 2021). As a result, Indigenous communities have been forced to engage in intellectual property litigation in respect of misuse and misappropriation of Indigenous culture. Moreover, there has been an effort by Indigenous communities to get national governments to engage in law reform to better protect Indigenous intellectual property – whether through amendments of existing legislation, or the development of sui generis, standalone legislation. At an international level, there has been an ongoing dialogue and discussion about the need for the protection of Indigenous intellectual property in various international treaties, agreements, and declarations, such as the *United Nations Declaration on the Rights of Indigenous Peoples* 2007.[187]

In this context, Indigenous advocates and lawyers have been worried and concerned about whether Indigenous culture will be misused in AI projects. Emma Fitch, Clare McKenzie, Terri Janke, and Adam Shul (2023) have written a discussion paper on the topic looking at "The New Frontier: Artificial Intelligence, Copyright, and Indigenous Culture". The lawyers observed: "Generative AI can create further issues with inauthentic art because anyone can create 'Aboriginal style art'" (Fitch, McKenzie, Janke & Shul 2023). The lawyers call into question "the inability for AI to understand and respect the important and meaningful connection that a person creating the artwork has to culture and Country, informing what the artwork is about and how it is created" (Fitch, McKenzie, Janke & Shul 2023). The lawyers contend: "Reinserting Indigenous sovereignty and self-determination practices within the AI space can alleviate this concern" (Fitch, McKenzie, Janke & Shul 2023). The lawyers maintained: "The users of AI should consider ICIP rights as well recognising Indigenous Data Sovereignty Principles as they relate to AI, and ensuring there is appropriate use of AI that respects ICIP rights" (Fitch, McKenzie, Janke & Shul 2023). The lawyers contend: "To protect misuse of ICIP, it is important that First Nations people are involved in the development of AI, that creators of the AI system can recognise where ICIP may be used inappropriately, and limiting the information used for machine learning to avoid negative impacts on ICIP rights and copyright" (Fitch, McKenzie, Janke & Shul 2023). They observed: "These strategies could help prevent the misuse of ICIP and other expressions of cultural heritage, such as artwork, songs, and stories" (Fitch, McKenzie, Janke & Shul 2023).

More broadly, Tamika Worrell (2024) has worried that "the AI industry and governments have largely ignored Indigenous people in the development

187 United Nations Declaration on the Rights of Indigenous Peoples 2007 resolution / adopted by the General Assembly, A/RES/61/295, 2 October 2007.

and regulation of AI technologies". She has commented: "AI developers and governments need to urgently fix this if they are serious about ensuring everybody shares the benefits of AI" (Worrell 2024). Worrell (2024) noted: "A first step is for industry to involve Indigenous people in creating, maintaining and evaluating the technologies – rather than asking them retrospectively to approve work already done". She also stressed: "Governments need to also do more than highlight the importance of Indigenous data sovereignty in policy documents" (Worrell 2024).

The Indigenous Data Sovereignty movement has sought to boost the rights of Indigenous peoples to govern the collection, ownership, and application of data about Indigenous peoples (Bodkin-Andrews, Walter, Lee, Kukutai & Lovett 2019). The Australian Government published a Framework for Governance of Indigenous Data in 2024 to provide practical guidance for the Australian public service (Commonwealth of Australia 2024). The Indigenous Data Sovereignty has been demanding ethical AI in business, as well as government (Rana 2024).

United States Copyright Law Reform

This survey has been quite focused on United States copyright law and AI. It is worth providing a sense of the political discussion swirling around the topic, above and beyond the litigation itself.

The United States Copyright Office has been engaged in ongoing consultations over copyright law and AI.

In July 2024, the United States Copyright Office (2024) released a report on *Copyright and Artificial Intelligence*, focusing on digital replicas. This report argued that existing laws do not provide sufficient legal redress for those harmed by unauthorised digital replicas and proposed the adoption of a new federal law. The United States Copyright Office (2024) proposed a new law in respect of digital replicas. In its view, "The statute should target those digital replicas, whether generated by AI or otherwise, that are so realistic that they are difficult to distinguish from authentic depictions" (United States Copyright Office 2024). The United States Copyright Office recommended (2024): "Protection should be narrower than, and distinct from, the broader 'name, image, and likeness' protections offered by many states".

In January 2025, the United States Copyright Office (2025a) published the second part of its report on *Copyright and Artificial Intelligence*, focusing on copyrightability. The United States Copyright Office (2025a) concluded that "Questions of copyrightability and AI can be resolved pursuant to existing law, without the need for legislative change". The United States Copyright Office (2025a) maintained: "The use of AI tools to assist rather than stand in for human

creativity does not affect the availability of copyright protection for the output". The United States Copyright Office (2025a) advised: "Copyright protects the original expression in a work created by a human author, even if the work also includes AI-generated material". The United States Copyright Office (2025a) added: "Copyright does not extend to purely AI-generated material, or material where there is insufficient human control over the expressive elements". The United States Copyright Office (2025a) reflected: "Whether human contributions to AI-generated outputs are sufficient to constitute authorship must be analyzed on a case-by-case basis". The United States Copyright Office (2025a) commented: "Based on the functioning of current generally available technology, prompts do not alone provide sufficient control". The United States Copyright Office (2025a) found: "Human authors are entitled to copyright in their works of authorship that are perceptible in AI-generated outputs, as well as the creative selection, coordination, or arrangement of material in the outputs, or creative modifications of the outputs". The United States Copyright Office (2025a) concluded: "The case has not been made for additional copyright or sui generis protection for AI-generated content".

In May 2025, the United States Copyright Office (2025b) released a pre-publication report on *Copyright and Artificial Intelligence*. This was the third part of its report and was focused upon generative AI training. The report recognised: "These issues are the subject of intense debate" (United States Copyright Office 2025b: 1). The report also recognised that there was significant litigation underway in respect of copyright and AI training materials: "Dozens of lawsuits are pending in the United States, focusing on the application of copyright's fair use doctrine" (United States Copyright Office 2025b: 1). The report also acknowledged that there was significant public policy debate on the topic of copyright law and AI training: "Legislators around the world have proposed or enacted laws regarding the use of copyrighted works in AI training, whether to remove barriers or impose restrictions" (United States Copyright Office 2025b: 1).

In particular, the United States Copyright Office (2025b: 32) considered the operation of the defence of fair use in relation to claims of copyright infringement by generative AI. The report considered the various indicia involved in a fair use determination:

> We observe, however, that the first and fourth factors can be expected to assume considerable weight in the analysis. Different uses of copyrighted works in AI training will be more transformative than others. And given the volume, speed and sophistication with which AI systems can generate outputs, and the vast number of works that may be used in training, the impact on the markets for copyrighted works could be of unprecedented scale (United States Copyright Office 2025b: 74).

The report recognised the difficulties of pre-judging litigation outcomes: "As generative AI involves a spectrum of uses and impacts, it is not possible to prejudge litigation outcomes" (United States Copyright Office 2025b: 74). The report suggested that there would be missed outcomes to the litigation over copyright law and AI: "The Office expects that some uses of copyrighted works for generative AI training will qualify as fair use, and some will not" (United States Copyright Office 2025b: 74). The report observed: "On one end of the spectrum, uses for purposes of noncommercial research or analysis that do not enable portions of the works to be reproduced in the outputs are likely to be fair" (United States Copyright Office 2025b: 74). The report also commented: "On the other end, the copying of expressive works from pirate sources in order to generate unrestricted content that competes in the marketplace, when licensing is reasonably available, is unlikely to qualify as fair use" (United States Copyright Office 2025b: 74).

The report recognised: "Various uses of copyrighted works in AI training are likely to be transformative" (United States Copyright Office 2025b: 107). The report observed: "The extent to which they are fair, however, will depend on what works were used, from what source, for what purpose, and with what controls on the outputs—all of which can affect the market" (United States Copyright Office 2025b: 107). The report commented: "When a model is deployed for purposes such as analysis or research—the types of uses that are critical to international competitiveness—the outputs are unlikely to substitute for expressive works used in training" (United States Copyright Office 2025b: 107). The reported warned: "But making commercial use of vast troves of copyrighted works to produce expressive content that competes with them in existing markets, especially where this is accomplished through illegal access, goes beyond established fair use boundaries" (United States Copyright Office 2025b: 107). The report suggested: "For those uses that may not qualify as fair, practical solutions are critical to support ongoing innovation" (United States Copyright Office 2025b: 107). The report also explores the feasibility of voluntary licensing; the ability to provide meaningful compensation; and possible legal obstacles to collective licensing.

The report attracted critical commentary from technology associations and representatives. The president and CEO of the Computer & Communications Industry Association, Matt Schruers, expressed concerns that the report advocated "an expansive theory of market harm for fair use purposes that would allow rightsholders to block any use that might have a general effect on the market for copyrighted works, even if it doesn't impact the rightsholder themself" (Belanger 2025b). Likewise, the Chamber of Progress feared that "the report does not go far enough to support innovation and unnecessarily muddies the waters on what should be clear cases of transformative use with copyrighted works" (Belanger 2025b).

The Authors Alliance wondered about the timing of the publication: "Whatever the motivation for the timing of the release, we think it's unfortunate for this reason: there are two cases currently pending in the courts, *Kadrey* v. *Meta* and *Bartz* v *Anthropic*, where the issues being litigated are directly related to the contents of this report" (Hansen 2025a). The Authors Alliance reflected: "While it's certainly fair for the Copyright Office to make its views known, even on controversial issues, the timing of this report is problematic because it could put a thumb on the scale for how the courts will resolve these cases" (Hansen 2025a).

Just after the release of this draft report, the Trump Administration removed the Register of Copyrights and Director of the United States Copyright Office, Shira Perlmutter. The Office reported that Perlmutter had received an email from the White House with the notification that "your position as the Register of Copyrights and Director at the U.S. Copyright Office is terminated effective immediately" (O'Brien 2025). The decision follows on from the White House firing the Librarian of Congress, Carla Hayden (O'Brien 2025). Jose Olivares suggested: "Perlmutter's firing evidently signals another step by the Trump administration to reshape the federal government by ousting officials who he believes may resist his agenda". There was discussion as to how the removal of Perlmutter would affect the entertainment industry's leverage against AI companies (Zeitchick and Millman 2025).

Democrat Representative Joe Morelle responded that the removal of Perlmutter was politically motivated: "Donald Trump's termination of Register of Copyrights, Shira Perlmutter, is a brazen, unprecedented power grab with no legal basis" (Nolan 2025). He argued that the public policy report on copyright law and AI was a factor in her removal: "It is surely no coincidence he acted less than a day after she refused to rubber-stamp Elon Musk's efforts to mine troves of copyrighted works to train AI models" (Nolan 2025). He commented: "Register Perlmutter is a patriot, and her tenure has propelled the Copyright Office into the 21st century by comprehensively modernizing its operations and setting global standards on the intersection of AI and intellectual property" (Nolan 2025).

Courtney Radsch, the Director of the Center for Journalism & Liberty at the Open Markets Institute, commented that the removal of Perlmutter "appears directly linked to her office's new AI report questioning unlimited harvesting of copyrighted materials" (Belanger 2025b). She commented: "This unprecedented executive intrusion into the Library of Congress comes directly after Perlmutter released a copyright report challenging the tech elite's fundamental claim: unlimited access to creators' work without permission or compensation" (Belanger 2025b). Radsch alleged that the move came "after months of lobbying by the corporate billionaires" who have pursued "AI dominance" (Belanger 2025b).

Comparative Perspectives

From a comparative perspective, it should be noted that other jurisdictions have been pursuing alternative approaches in terms of the regulation of AI, and the reform of copyright law to take into account developments in AI. Given the scope of this paper, it is not possible to exhaustively examine such alternative approaches. Nonetheless, a quick comparative analysis of how other regimes deal with disputes over copyright law and AI is helpful and useful.

In the European Union, the 2019 Directive on Copyright in the Digital Single Market provided that members could provide for exceptions for "reproductions and extractions" of copyrighted material for use in text and data mining.[188] Article 3 allows for text and data mining for the purposes of scientific research by "research organisations and cultural heritage institutions". Article 4 provides for an exception or limitation in text and data mining. Article 5 deals with use of works and other subject matter in digital and cross-border teaching activities. Of particular interest for cultural institutions, Article 6 enables "cultural heritage institutions to make copies of any works or other subject matter that are permanently in their collections, in any format or medium, for purposes of preservation of such works or other subject matter and to the extent necessary for such preservation".

In 2024, the European Union adopted the *Artificial Intelligence Act* (*EU AI Act*).[189] The EU AI Act provides for transparency obligations for providers and developers of AI systems. The EU AI Act also provides for obligations for the providers of general-purpose AI models, as well as for AI Models with systemic risk. Recital 105 explains: "Any use of copyright protected content requires the authorisation of the rightsholder concerned unless relevant copyright exceptions and limitations apply". Recital 105 emphasises: "Directive (EU) 2019/790 introduced exceptions and limitations allowing reproductions and extractions of works or other subject matter, for the purpose of text and data mining, under certain conditions". Recital 105 notes: "Under these rules, rightsholders may choose to reserve their rights over their works or other subject matter to prevent text and data mining, unless this is done for the purposes of scientific research". Recital 105 provides: "Where the right to opt out has been expressly reserved in an appropriate manner, providers of general-purpose AI models need to obtain an authorisation from rightsholders if they want to carry out text and data mining over such works".

Axel Voss, a German centre-right member of the European parliament,

188 Directive EU 2019/790 of the European Parliament and of the Council of 17 Apr. 2019 on Copyright and Related Rights in the Digital Single Market and Amending Council Directives 96/9/EC and 2001/29/EC, 2019 O.J. (L. 130/92).

189 Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act).

has been critical of the EU AI Act (Rankin 2025). He observed: "What I do not understand is that we are supporting big tech instead of protecting European creative ideas and content" (Rankin 2025). He argued that the absence of strong provisions on copyright was "irresponsible" and that it was "unbelievable" that the legal gap remained (Rankin 2025).

There are other jurisdictions with text and data mining copyright exceptions. Japan has established a broad, all-encompassing "non-enjoyment"-based text and data mining exception (Dermawan 2023). Singapore has also established a broad copyright exception for text and data mining (Oh 2021). There has been discussion of a potential expansion of Singapore's text and data mining exception (Oh 2024). Hong Kong's government has proposed a copyright exception for text and data mining activities to encourage the development of generative AI (Ho 2024).

In other jurisdictions, there has been unresolved debate over copyright law and AI training materials. In Australia, the Senate Select Committee on Adopting Artificial Intelligence (2024) favoured submissions from creative industries and copyright collecting societies. The report recommended: "The Government should continue consulting with creative workers, rights holders, and their representative organisations, including through the Copyright and AI Reference Group (CAIRG)" (Senate Select Committee on Adopting Artificial Intelligence 2024). The report labelled the use of copyright materials for AI training as "theft", even though the Australian courts have not settled such a contention: "This consultation is essential to address the unprecedented theft of creative works by multinational tech companies operating in Australia" (Senate Select Committee on Adopting Artificial Intelligence 2024). The report called for greater transparency in respect of the use of copyrighted materials: "Developers of AI products must be transparent about the use of copyrighted works in their training datasets. Further, these works should be appropriately licensed and remunerated" (Senate Select Committee on Adopting Artificial Intelligence 2024). The report also favoured establishment of a licensing regime: "The Government should urgently consult the creative industry to establish mechanisms that ensure fair remuneration for creators when AI systems generate commercial outputs based on copyrighted material" (Senate Select Committee on Adopting Artificial Intelligence 2024).

In 2025, the Attorney General's Department (2025) released a summary of responses to a discussion paper on copyright law and AI transparency. Creative artists and copyright industries have been pressing the Australian Government to engage in copyright law reform in the field of AI (Taylor 2025). Meanwhile, the Productivity Commission (2025) recommended consideration of new copyright exceptions for the age of AI.

The Australian Attorney-General Michelle Rowland (2025) has ruled out the creation of a specific copyright exception for text and data mining: "The Albanese

Government is consulting on possible updates to Australia's copyright laws – while reiterating that this will not include a Text and Data Mining Exception." Rowland (2025) noted: "Some in the technology sector called for the introduction of a broad Text and Data Mining Exception in Australian copyright law." Rowland (2025) observed: "Under such a proposal, Artificial Intelligence (AI) developers would be able to use the works of Australian creators for free and without permission to train AI systems." Rowland (2025) concluded: "The Government stands behind Australia's creative industries and, by ruling out a Text and Data Mining Exception, is providing certainty to Australian creators." Rowland (2025) maintained that "work is underway to ensure that Australia is prepared for future copyright challenges emerging from AI – so that Australian creators are protected and supported while unlocking new uses of copyright material."

The Government of Canada (2021) launched a consultation on the modern copyright framework for AI and the Internet of Things. Subsequently, the Government of Canada (2025) held a further consultation focused on the impacts of recent developments in AI on the creative industries and the creative economy. The new Carney Government will have to consider its responses to such inquiries. In the context of Canadian copyright law, Carys Craig (2021) contends that there is a need for "much more careful consideration of the extent to which the copyright system can and should play a role in encouraging, facilitating, restricting, and/or regulating the ongoing evolution of AI". Craig (2021) contends: "A robust, substantive principle of technological neutrality should guide any efforts to 'update' copyright law in response to AI technologies: changes to the allocation of rights and responsibilities within the copyright system must be made with a view to maintaining the appropriate balance between protection and access, in furtherance of copyright's public policy goals and the social values it seeks to foster". Copyright litigation of AI is currently emerging in the Canadian courts as well (Lau 2025).

In the United Kingdom, there has been activity in the courts over intellectual property and AI, with the ongoing dispute between Getty Images and StabilityAI. At a policy level, there has been conflict in the Parliament over copyright law, AI, and transparency. The United Kingdom Government has blocked an amendment by the House of Lords which would have required technology companies to reveal which copyrighted material was used in their models (Hall 2025).

Conclusion

The deployment of AI for the protection, preservation, promotion, and regeneration of digital cultural heritage will raise larger questions around copyright law, policy, and practice. Setting up AI museums like Dataland and adopting AI practices in existing cultural institutions will pose complex questions in respect of copyright

law and cultural heritage.

This survey of copyright litigation in relation to AI should provide a cautionary tale. Creative guilds and legacy copyright industries have initiated a wave of copyright litigation against AI companies using copyright materials for machine learning and AI training without permission. In response, AI companies have maintained that they have not violated or infringed copyright law, and, in any case, are protected by the defence of fair use. It will take the American courts some time to process the fifty-nine cases currently on foot over copyright law and AI (as at November 2025). It will take some time to resolve procedural and substantive issues in respect of these copyright disputes over AI. This survey of copyright litigation in respect of AI is certainly provisional and incomplete. There have been some early decisions in the United States over copyright law, fair use, and AI, with a diverse set of outcomes. Many of the legal actions are in a formative stage. No doubt there are further lawsuits being prepared in respect of copyright law and AI. Given the considerable resources of the warring industries, such disputes will no doubt be appealed from the District Courts to the Federal Circuit appellate courts, and even up to the Supreme Court of the United States.

There is great uncertainty as to how courts will resolve key matters in respect of copyright law and AI. For some subject matter, there may be questions about copyright subsistence. To establish copyright infringement, there will be a need for copyright owners to demonstrate that a substantial part of their work has been reproduced. There will be larger questions as to whether AI developers can rely upon the defence of fair use in such copyright litigation. The Authors Guild, professional creators, and copyright industries have maintained that AI developers should not be shielded by the defence of fair use. In response, AI developers and information technology companies have argued that AI training is transformative fair learning and deserving of protection under the defence of fair use. There is a division of opinion in the judicial sphere as to whether AI developers will be able to satisfy the various indicia required for a fair use determination. Indeed, there have been conflicting early precedents in *Kadrey* v. *Meta*, *Bartz* v. *Anthropic*, and *Thomson Reuters Enterprise Centre GMBH* v. *Ross Intelligence Inc*. The profusion and diversity of opinions may require further resolution by superior courts, and intervention by the United States Congress. The specific copyright exceptions for libraries, archives, galleries, and museums are narrow and limited, and have not been properly updated for the digital age, let alone the era of AI. It is doubtful that such copyright exceptions for cultural institutions will offer much protection for AI projects engaged in the protection, preservation, promotion, and regeneration of digital cultural heritage. There is a debate as to whether new copyright exceptions should be developed and designed for the AI era, such as data-mining exceptions (Authors Alliance 2023).

The copyright litigation over AI has also raised questions about the efficacy of special new remedies introduced by the *Digital Millennium Copyright Act* 1998 (US), including technological protection measures and electronic rights management information. It will also be important to consider what remedies courts will grant to copyright owners who are successful in their legal action.

There is an array of public policy activity in respect of copyright law and AI. As highlighted by the ructions over the United States Copyright Office report on copyright law and AI, there are great political divisions over an appropriate course of action. It remains to be seen what the Trump administration will do in respect of copyright law and AI – especially given that the Republicans control the House of Representatives and the Senate. The removal of Register of Copyrights and Director of the United States Copyright Office Shira Perlmutter perhaps indicates that the Trump administration will favour a more permissive regime for the use of AI training materials under copyright law.

While United States copyright law is a hegemonic force in comparative law and international law, it should be recognised that there are other alternative approaches to dealing with copyright law and AI. The European Union and a number of other regimes have exceptions for text and data mining – which can be extended potentially to AI training. In other jurisdictions outside the United States (which is heavily focused on economic rights), there may also be considerations in respect of the protection of moral rights (Matulionyte 2022) and performers' rights (Bouvard, Cooper & Thomas 2024). Moreover, certain AI projects will raise additional considerations in respect of the protection of Indigenous intellectual property and Indigenous Data Sovereignty.

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