



Original research

Artificial Intelligence in Art Historical Research and Cultural Heritage Preservation: Opportunities, Limitations and Ethical Challenges

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Abstract:

This paper examines the application of artificial intelligence (AI) in art historical research and cultural heritage preservation, focusing on visual analysis, stylistic classification, material analysis, authentication, and conservation. It explores the extent to which AI-based methods enhance established art historical practices and generate new methodological and ethical challenges. The study employs a qualitative exploratory approach based on a critical review of scholarly literature, museum reports, conservation studies, and digital heritage policy documents. The findings indicate that AI can improve the speed, consistency, and scalability of selected analytical and conservation processes. However, its emphasis on quantifiable visual features may overlook cultural context, symbolism, historical meaning, and interpretive complexity. The study also identifies concerns relating to algorithmic bias, unequal representation, data ownership, and the digitisation of cultural heritage. It argues that AI should be understood as a transformative analytical tool rather than a substitute for human expertise. Responsible integration therefore requires critical human oversight, contextual awareness, and ethical consideration of the cultural and social dimensions of art and heritage.

Keywords: Artificial Intelligence, Art history, Heritage safeguarding, Algorithmic analysis, Digital humanities.

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1. Introduction

1.1 Background of the research

Art history research has long depended on various factors, including “connoisseurship, contextual interpretation, and material awareness”. However, in recent years, a particular shift towards “data-driven heritage work” has been accelerated and shaped by “mass digitisation” and “computational analysis”. Similarly, major initiatives have been recorded as digitised heritage, with a proper analysis of historical infrastructures; for example, in the case of the “Common European Data Space for Cultural Heritage”, under the EU service contract, it has been recorded to reflect a large scale of organising research on heritage and artefacts while allocating a significant budget of around 7.5 million Euro within the fiscal year 2023 (Europeana, 2024). On the other hand, another digitisation progress has been recorded in the case of the “National Museum of Australia”, as it has shown a massive digital data record-keeping of around 86% while using modern-day technologies like machine learning and Artificial Intelligence (AI) within the fiscal year 2023-24 (National Museum of Australia, 2024). As the digital landscape has expanded significantly, the integration of “pattern recognition, stylistic classification, authentication support, and conservation planning” has been documented in the analysis of art history and related artefacts.

1.2 Problem statement

Although certain enhancements have been recorded in the field of speed and scalability, with better visual and analytical preferences, interpretive limitations related to usage can also be observed in this particular case. Algorithmic approaches, whether favouring measurable features, often undermine “cultural symbolism, historical contingencies, and layered meaning”, the key pillars of “art historical explanation”. Similarly, overreliance on computational outputs can be considered the prior reason for unsettling “conventional interpretive norms and repositions”, while providing uncertainty in terms of validating “context-thin” facts in the case of machinery inferences of persuasive appearances of expert judgment.

1.3 Research Rationale

In researching the practical use of AI in safeguarding art history, the intensification of machine learning and algorithmic preference can be observed in the present day. For example, a certain rise in governance frameworks can be observed in the context of emphasising accountability, as UNESCO’s AI ethical standard has been recorded to be upgraded by 26 September 2024, while reinforcing various global expectations to maintain “human-centred oversight” related to analysing art history and cultural symbolism (UNESCO, 2024). Therefore, a certain evaluation of transformative analytical presence can be recorded as a supportive instrument, as AI can help become a safeguarding tool to maintain scholarly integrity along with cultural response.

1.4 Aim

To evaluate the analytical contribution of AI, its interpretive constraints, and the ethical implications of researching Art History and Cultural Heritage, while emphasising “context-aware integration”.

1.5 Research Objectives

- To analyse the application of AI in recognising historical artworks and cultural heritages

- To examine the extent of AI and its strengths in terms of narrowing the interpretation of Art History
- To evaluate the way AI assessment is reshaping conventional research ways
- To determine various ethical risks and representational imbalance related to “digitized cultural materials”.

1.6 Research Questions

- How can AI tools be used in the case of analysing historical artwork and cultural heritage?
- In what ways can the strengths of AI be used to enhance the interpretive depth related to art history?
- How can computer analysis be useful in establishing important interpretive norms with the expert roles?
- What are the ethical and representational risks that can arise in adopting AI to safeguard “digitised cultural materials”?

1.7 Significance of the research

The research can help contribute a critical lens in clarifying the meaningful enhancement of AI by amalgamating “scholars, museums, and heritage policymakers” while showing its analytical capacity related to “authentication, comparative visual study, and preventive conservation”.

2. Literature Review

In the context of analysing the importance of AI in art history, visual pattern recognition through Evolutionary computation (EC) has been noted in recent years, highlighting the role of machine learning in identifying “similarities, compositional structures, and repetitive motifs”. According to Bi et al. (2022), when applying EC, evolutionary algorithms and swarm intelligence have been observed, particularly in pattern recognition, and can skillfully handle tasks such as “dealing with edge detection, image segmentation, image feature analysis, image classification, object detection, and other tasks” without introducing major errors.

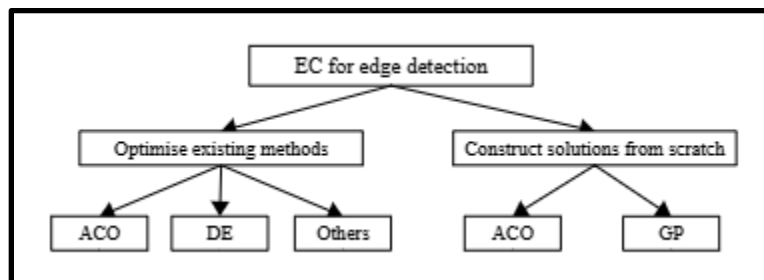


Figure 1: EC technique on edge detection

(Source: Bi *et al.*, 2022)

This particular feature of AI can be helpful in the edge detection process by applying both ACO and GP modelling, which can make edge detectors more effective at identifying edges or non-

edges in historical images or artefacts while analysing their real age and timing. However, caution is warranted, as the algorithmic pattern can create inherent reduction, since the process mainly depends on “quantifiable visual features” including “color distribution, brushstroke texture, and spatial geometry”, potentially defaming cultural heritage and symbolic ideas, respectively.

Implementation of AI with neural networks and “spectral analysis” tools can be used to analyse historical images and artefacts, identifying anomalies such as “pigments, canvas fibres, and surface deterioration”, while supporting their provenance verification in cultural studies. Based on the observation of Gîrbacia (2024), the implementation of the “Neural Radiance Fields (NeRFs)” can be beneficial for creating effective 3D models of Cultural Heritage (CH) Assets, providing an easier solution to the critical traditional photographic challenges and significantly enhancing “image-restoration methods” in recent days.

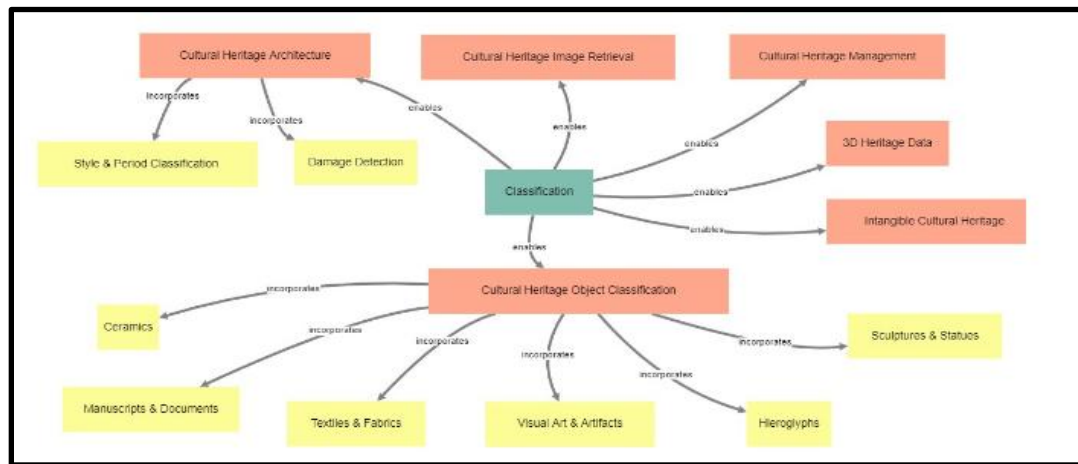


Figure 2: Representation of the classification of CH assets through AI

(Source: Gîrbacia, 2024)

Similarly, the extraction process through “choreographic sequences from traditional dance” has improved access to museums and digital CH content, while also offering advantages for archive management to support further research. A counterargument can be observed in concerns about the algorithmic decision-making process and its opacity, which may obscure “methodological transparency” in this particular process of implementing AI.

The application of computational analytical methods has the key advantage of addressing challenges regarding “long-standing interpretive norms,” as evidenced by the introduction of “data-driven validation models”. As opined by Milligan (2022), the application of “body-pose estimation algorithms” can help to understand distinct human figure postures or the “concept of pathosformeln”, while comparing various compositional structures to determine “tracing focal areas or regions of action to understand narratives” in the case of art historical sense. Application of AI also suggests a way of enhancing processes like the “methodological rigour”, and critics caution against epistemic displacement, in which various algorithmic outputs can be considered a superior form of evidence in understanding a particular figure or the tone of a historical artwork. However, a counterargument can be recorded in the form of rising conceptual tensions in the case of “experiential connoisseurship” and “machine-generated interpretation”, while there is a shortage of marginalized intuition in using excessive computational tools.

Although AI implementation in art history and cultural analysis can be considered purposive, various uncertainties, including "algorithmic bias, representational imbalance, and data ownership", are central concerns, especially when safeguarding the digitised "heritage ecosystem" of art and history. As observed by Tiribelli et al. (2024), the application of 3D modelling can fail to preserve the original form of image analysis and risk dehumanising "cultural heritage", while also undermining authenticity, such as UNESCO's code of Notion like "Outstanding Universal Value", or the "International Council of Museums (ICOM)" code. Similarly, this process can reproduce biases, as datasets might be trained on Western artefact collections in 3D modelling practices, reinforcing stereotypes among marginalised groups, and a lack of data diversity and a human approach to clarifying the concept. However, an ethical framework can also be seen as providing better "transparency, inclusivity, and human oversight", while promoting the message of amalgamating heritage technologies with societal responsibilities rather than prioritising full technological efficiency.

Read together, these four strands converge on a single underlying question rather than four separate debates: whether measurable, extractable features of an artwork can stand in for its cultural meaning. Bi et al. (2022), Gîrbacia (2024), and Milligan (2022) suggest that they can, provisionally, for narrowly defined tasks such as edge detection, 3D modelling, or pose estimation; Tiribelli et al. (2024) and the wider ethics literature suggest that once such extraction is scaled into institutional decision-making, the provisional becomes normative and cultural specificity is displaced by statistical generality. The literature reviewed here documents this tension from different disciplinary vantage points rather than resolving it, which motivates the theoretical and methodological choices made below.

3. Illustrative Case Studies

Three recent cases ground the preceding themes in concrete art-historical and heritage practice.

Attribution and authentication: Researchers at the University of Bradford applied a deep transfer-learning model to the disputed de Brécy Tondo Madonna, achieving 98% classification accuracy for genuine Raphael brushwork, cross-validated against independent pigment spectroscopy (Ugail et al., 2023). The algorithm quantified stylistic consistency precisely, yet the attribution's significance for Raphael's studio practice still required expert connoisseurship for interpretation.

3D reconstruction of damaged heritage: Shrestha et al. (2026) used 3D Gaussian Splatting, trained on ordinary smartphone photographs, to reconstruct the endangered monuments of Patan Durbar Square, Nepal, enabling near-real-time, low-cost documentation. People and birds in the source images still had to be manually segmented out, showing that human judgement remains embedded in automated pipelines.

Documentation of intangible heritage: Stacchio et al. (2024) developed DanXe, combining AI-based motion analysis with extended-reality visualisation to document dance heritage, validated through a case study of Rudolf Nureyev's choreography. Because dance exists only in performance, the case raises acute questions about whose movement trains the underlying models and who owns the resulting digital record.

4. Theoretical Underpinning

Actor-Network Theory has been used to interrogate the conceptualisation of AI implementation, highlighting the active participation of non-human tools in historical and art research. According to Aka (2025), ANT can explain the particular working processes of humans and non-humans within a large unit called a Network, thereby establishing heterogeneity and symmetry to conceptualise the "construction of reality". In this research, the theory has helped the researcher understand how the amalgamation of "human scholars, algorithms, datasets, and institutions" can enhance conceptual knowledge of the AI process for analysing art-historical facts and cultural symbolism.

Reading against the cases above, ANT's vocabulary can be operationalised rather than merely invoked. In the Raphael case, the trained network is a non-human actant whose output becomes an accepted attribution only after translation — in ANT's technical sense — through the mediating work of curators and reviewers; the network alone settles nothing. In the Patan Durbar Square reconstruction, agency is distributed among the photographer, the algorithm, and the segmentation model, none of which alone produces a usable record. DanXe's digital twin of Nureyev's choreography exists only through the continual translation of embodied movement into machine-readable data and back into public storytelling. AI in art-historical practice is thus one actant among several, not an autonomous agent or a passive tool.

5. Research Gap

Although research on artificial intelligence is expanding within art historical studies, noticeable gaps remain. First, the available literature is heavily biased towards technical performance and efficiency, with little attention to how AI transforms the field's interpretative epistemology. Although the accuracy of the analytical process is often measured, fewer studies question how algorithmic preferences for measurable features redefine the meaning-making activities on which art historical research is founded. Second, ethical discussions are abstract, lacking the means to connect to specific case studies that help identify how bias, representation and ownership issues arise in the context of actual institutions. Third, the current literature tends to frame AI as either supportive or disruptive, failing to sufficiently theorise it as a transformative analytical agent that restructures the power of scholarship. Lastly, there is a clear lack of integrative frameworks that can balance computational capacity with human judgement, and cultural context with ethical responsibility. The research sought to address these gaps by integrating analytical, interpretive and ethical insights into a critical assessment of the use of AI in art historical research and heritage protection. This imbalance is evident in the corpus reviewed here: of the sixteen core sources (Table 1), most — including Bi et al. (2022), Gîrbacia (2024), Lin and Chou (2025), Europeana (2024), and the National Museum of Australia (2024) — report technical or efficiency gains, while only Tiribelli et al. (2024), UNESCO (2025), and Westenberger and Farmaki (2025) sustain epistemological or ethical critique. The three case studies above were selected specifically to correct this imbalance.

6. Conceptual Framework

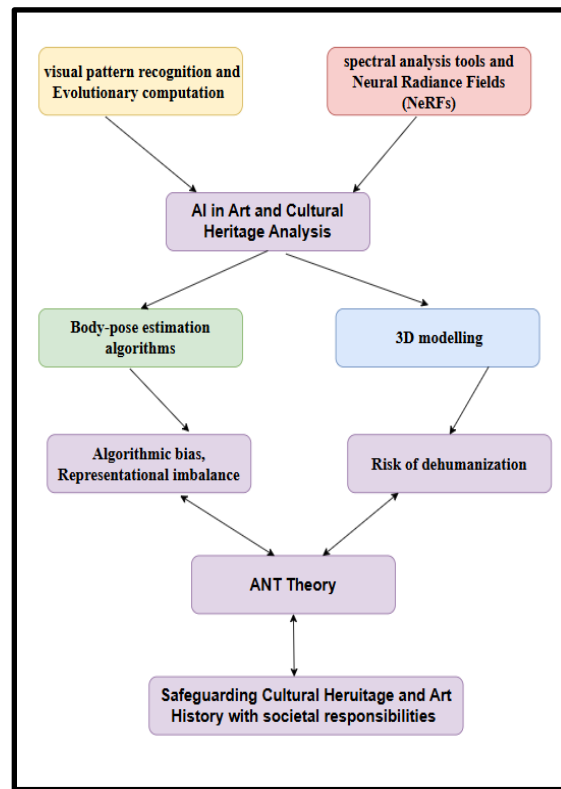


Figure 3: Conceptual Framework

(Source: Self-Developed)

7. Research Method

An exploratory qualitative design enables critical engagement with descriptions, underlying assumptions, and disciplinary transformations, thereby aligning the research with established traditions in the humanities and in digital heritage studies (Van der Vaart, 2022).

A qualitative exploratory design was adopted to interpret the conceptual, methodological, and ethical dimensions of integrating artificial intelligence (AI) into art historical research through close reading and critical synthesis of authoritative literature. The reviewed literature demonstrated that AI's role in heritage studies extended beyond technical performance to epistemological and cultural dimensions, including meaning-making, expertise, and governance. In this context, quantitative research methods were inadequate for explaining such interpretive and disciplinary shifts.

8. Data Selection Process

The purposive selection approach enables targeted examination of contemporary analytical capabilities and emerging disciplinary challenges associated with AI, without reliance on speculative or experimental claims (Ahmad and Wilkins, 2025).

The dataset comprised peer-reviewed journal articles, institutional reports, and international policy documents published between 2022 and 2026 that explicitly addressed the use of AI in art history and cultural heritage contexts. The selected PDFs were scholarly and institutionally authoritative sources documenting real-world applications of AI in heritage research, conservation, and governance. Limiting the dataset to recent publications ensured relevance to current technological developments and ethical debates. To ensure transparency and replicability, four databases and repositories — Scopus, Web of Science, Google Scholar, and JSTOR — were searched using combinations of “artificial intelligence”, “machine learning”, “art history”, “cultural heritage”, “authentication”, and “conservation”. Records were screened against explicit inclusion criteria (peer-reviewed or institutionally authored, in English, published 2022–2026, and substantively addressing AI in art-historical or heritage contexts) and exclusion criteria (purely technical computer-science papers with no heritage application, duplicate records, and non-peer-reviewed or non-institutional sources). A final corpus of sixteen core sources was retained for thematic coding, summarised in Table 1 and supplemented by the illustrative case studies discussed below.

Table 1: Literature search and selection process

Element	Detail
Databases and repositories	Scopus, Web of Science, Google Scholar, JSTOR
Search terms	“artificial intelligence”; “machine learning”; “art history”; “cultural heritage”; “authentication”; “conservation” (used in combination)
Time frame	2022–2026
Inclusion criteria	Peer-reviewed or institutionally authored; English language; substantively addresses AI in art-historical or heritage contexts
Exclusion criteria	Purely technical computer-science papers with no heritage application; duplicate records; non-peer-reviewed, non-institutional sources
Final corpus	16 core sources (peer-reviewed articles and institutional/policy reports), supplemented by 3 illustrative case studies
Analytical method	Thematic analysis; combined inductive and deductive coding aligned to the research objectives
Principal themes	(1) AI as analytical instrument; (2) methodological reconfiguration; (3) interpretive/epistemological limits; (4) ethical governance

9. Data Analysis process

Thematic analysis supports consistent interpretation of complex qualitative data while enabling critical examination of tensions between computational efficiency and humanistic interpretation (Pasupuleti et al., 2024).

Thematic analysis was selected to extract and organise data into analytical, interpretive, methodological, and ethical categories aligned with the research objectives. This method proved particularly appropriate for an interdisciplinary study involving technology, art history, and ethics. The reviewed studies emphasised thematic synthesis as an effective means of interpreting the broader cultural and institutional implications of AI, thereby reinforcing the suitability of this analytical approach.

10. Findings and Discussion

Theme 1: AI as an advanced instrument in art history analysis

According to the literature, artificial intelligence is consistently described as a high-impact analytical tool, particularly in the areas of digitisation, restoration, and comparative analysis. The POSTECH research shows that machine learning and computer vision are used to support large-scale documentation, 3D reconstruction, and the detection of material degradation at an early stage (Lin and Chou, 2025). Similarly, the literature analysis records the identification of machine learning alongside multimedia management, presented as core pillars for reshaping workflows in heritage research (Harisanty et al., 2024).

Theme 2: Art history observation with its methodological Reconfiguration

Review of the existing literature strongly indicates that AI is not merely a supportive tool but a transformative force that has restructured research methodology itself. The literature also documents the emergence of new epistemic practices, including “Automated cataloguing, predictive conservation modelling, and large-scale pattern detection”, as art history shifts towards a “data-intensive mode of inquiry” (Sánchez-Martín et al., 2025). The UNESCO report supports this assertion, noting that AI is evolving at a pace that has surpassed cultural regulation and is thus transforming the manufacture, authorisation, and dissemination of information in heritage establishments (UNESCO, 2025).

Theme 3: Limitations of the process with its interpretive and epistemological inadequacy

Despite technical efficiency, the reviewed literature consistently reflects concerns about the interpretive inadequacies of AI. The algorithms are skewed towards recognising quantifiable features, visual similarity, surface features and formal patterns, and disadvantage “symbolic meaning, historical nuance and cultural memory”. On the other hand, the UNESCO report also depicted a risk of “cultural homogenisation and loss of contextual specificity” when using AI tools on biased or incomplete datasets (UNESCO, 2025). Equally, the heritage tourism review highlighted epistemological issues in the production of heritage knowledge, especially where interpretation is placed in the hands of algorithmic analysis rather than narrative and community meaning-making (Westenberger & Farmaki, 2025).

11. Discussion

assistive tool. The methodology of the analysis revealed a strong tension between interpretive depth and computational scalability. Artificial intelligence methods are highly effective for large data volumes and for recognising formal patterns; however, the science of art history is not only about meaning, context, and cultural importance. The thematic analysis reaffirms that artificial intelligence is a transformative analytical entity, not a neutral one. On the one hand, AI expands the range of art-historical questions; on the other, it reveals epistemological blind spots that should be addressed by human interpretation. The reformation of human expertise, as seen in the results, has far-reaching disciplinary repercussions. As AI results increasingly enter institutional decision-making, concerns arise that computational outcomes will be considered epistemically superior. This displacement of scholarly authority has urged the establishment of human interpretive mediation as a key part of the research practice. This is not to say AI is simply incapable of interpretation; rather, it performs a narrower, statistically grounded form of interpretation — pattern-based inference over training data — resting on different epistemological assumptions from connoisseurial interpretation, which draws on embodied experience and cultural memory. The relevant question is therefore not whether AI can interpret, but which tasks bundled under “interpretation” in art history are reducible to pattern recognition, and which are not.

This positions the paper's contribution within adjacent literatures. Digital humanities scholarship (Milligan, 2022) shows that computation is reshaping historical method generally; computational art history (Bi et al., 2022; Gîrbacia, 2024) demonstrates specific algorithmic capabilities; AI-ethics scholarship (Tiribelli et al., 2024; UNESCO, 2025) catalogues the resulting risks. By comparison, an account of AI as a transformative analytical agent in the ANT sense, whose effects depend on the surrounding network of human mediation rather than on algorithmic properties alone — the relational claim that is this paper's principal contribution — is comparatively absent.

12. Conclusion

This paper has critically summarised how artificial intelligence (AI) has influenced art-historical studies and the preservation of cultural heritage, with a specific focus on its analytical capabilities, interpretative constraints, changes in research methodologies, and ethical consequences. The results showed that AI has made analytical practice in the art-historical sphere markedly more efficient, especially in the context of digitisation, automatic catalogue generation, visual pattern recognition, material analysis, support for authentication, and preventive conservation planning. The reviewed literature indicates that AI significantly enhanced the efficiency of analytical tasks in art-historical practice, particularly in the following fields: digitisation, automated catalogue generation, visual pattern recognition, material analysis, authentication support, and preventive conservation planning. These functions enabled large-scale, non-invasive analysis, which was beyond the practical scope of traditional manual methods.

As far as the second goal is concerned, the thematic analysis indicates that, although AI was technically effective, it still lacked interpretive capacity. The priority of algorithmic systems was rather on quantifiable visual and material qualities, restricting the appeal to symbolic meaning,

historical context and cultural meaning. Therefore, the use of AI-generated products served as an indicator of analysis, not explanatory interpretation, which confirms the need to interpret art-historical research through human interpretation.

To address the third goal, the thematic analysis indicates that AI adoption created a methodological shift in art-historical research and heritage practice. Digital data and automated processes redefined how research evidence is created, assessed, and validated.

Regarding the fourth objective, the research found that ethical and governance issues were the primary focus when adopting AI, rather than added value. Across the selected sources, recurring concerns included algorithmic bias, representational imbalance, ownership of digitised cultural materials, and cultural sovereignty.

Recommendations

- Interdisciplinary methodological models are to be developed to balance computation and human interpretation. The frameworks would facilitate a context-sensitive research practice that preserves cultural meaning while taking advantage of technological development.
- Ethical governance frameworks are recommended to be reinforced by formulating explicit institutional and policy principles that address the problems of algorithmic bias, representation, data ownership, and cultural rights. Such actions are especially required to safeguard minor and weak heritage discourses.
- The focus on the transparency and accountability of AI systems should be increased. The presence of explainable/interpretable models would increase scholarly trust and institutional responsibility in AI-assisted research.

References

- Ahmad, M., & Wilkins, S. (2025). Purposive sampling in qualitative research: A framework for the entire journey. *Quality & Quantity*, 59(2), 1461–1479.
- Aka, K. G. (2025). Actor-Network Theory-based applications in sustainability: A systematic literature review. *Cleaner Production Letters*, 8, 100084.
- Bi, Y., Xue, B., Mesejo, P., Cagnoni, S., & Zhang, M. (2022). A survey on evolutionary computation for computer vision and image analysis: Past, present, and future trends. *IEEE Transactions on Evolutionary Computation*, 27(1), 5–25.
- Europeana. (2024). *Annual report and accounts 2024*.
https://pro.europeana.eu/files/Europeana_Professional/Publications/europeana_foundation_annual_report_and_accounts_2024.pdf
- Gîrbacia, F. (2024). An analysis of research trends for using artificial intelligence in cultural heritage. *Electronics*, 13(18), 3738.
- Harisanty, D., Obille, K. L. B., Anna, N. E. V., Purwanti, E., & Retrialisca, F. (2024). Cultural heritage preservation in the digital age, harnessing artificial intelligence for the future: A bibliometric analysis. *Digital Library Perspectives*, 40(4), 609–630.

- Lin, T. Y., & Chou, L. C. (2025). A systematic review of artificial intelligence applications and methodological advances in patent analysis. *World Patent Information*, 82, 102383.
- Milligan, I. (2022). *The transformation of historical research in the digital age*. Cambridge University Press.
- National Museum of Australia. (2024). *Annual report 2023–24*.
<https://www.transparency.gov.au/publications/communications-and-the-arts/national-museum-of-australia/national-museum-of-australia-annual-report-2023-24/part-4%3A-performance-statements-/corporate-plan-priorities-and-performance>
- Pasupuleti, V., Kodete, C. S., Thuraka, B., & Sangaraju, V. V. (2024). Impact of AI on architecture: An exploratory thematic analysis. *African Journal of Advances in Science and Technology Research*, 16(1), 117–130.
- Sánchez-Martín, J. M., Guillén-Peñafiel, R., & Hernández-Carretero, A. M. (2025). Artificial intelligence in heritage tourism: Innovation, accessibility, and sustainability in the digital age. *Heritage*, 8(10), 428.
- Shrestha, P., Kapali, S., Pokharel, V., Tandukar, J., Giri, S., & Aryal, A. (2026). 3D reconstruction of cultural heritage sites: A case study of Patan Durbar Square. *Digital Applications in Archaeology and Cultural Heritage*, 40, e00492.
- Stacchio, L., Garzarella, S., Cascarano, P., De Filippo, A., Cervellati, E., & Marfia, G. (2024). DanXe: An extended artificial intelligence framework to analyze and promote dance heritage. *Digital Applications in Archaeology and Cultural Heritage*, 33, e00343.
- Tiribelli, S., Pansoni, S., Frontoni, E., & Giovanola, B. (2024). Ethics of artificial intelligence for cultural heritage: Opportunities and challenges. *IEEE Transactions on Technology and Society*.
- UNESCO. (2024). *Ethics of artificial intelligence*. <https://www.unesco.org/en/artificial-intelligence/recommendation-ethics>
- UNESCO. (2025). *Artificial intelligence and culture*. <https://www.unesco.org/en>
- Ugail, H., Stork, D. G., Edwards, H. G. M., Seward, S. C., & Brooke, C. J. (2023). Deep transfer learning for visual analysis and attribution of paintings by Raphael. *Heritage Science*, 11(1), 268.
- Van der Vaart, G. (2022). Insights and inspiration from explorative research into the impacts of a community arts project. In *Co-creativity and engaged scholarship: Transformative methods in social sustainability research* (pp. 205–227).
- Westenberger, P., & Farmaki, D. (2025). Artificial intelligence for cultural heritage research: The challenges in UK copyright law and policy. *European Journal of Cultural Management and Policy*, 15, 14009.