

**ARTIFICIAL INTELLIGENCE-ENHANCED
TRADITIONAL ARTS PRESERVATION AND
CULTURAL HERITAGE DOCUMENTATION FOR
NATIONAL DEVELOPMENT**

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Abstract

The study explored the use of machine learning, computer vision, and digital technologies in the identification, analysis, restoration, and dissemination of indigenous art forms, crafts, and expressions of culture and national identity. The introduction provides background on the relevance of indigenous art forms and how AI can help preserve and document our cultural heritage. Modernization and globalization threaten the traditional art forms,

documentation, and preservation practices in Nigeria. The design of the inquiry was qualitative, with in-depth interviews, oral history collection, and field observations in the Pankshin Local Government Area, Plateau State, Nigeria. The possibilities of AI to capture and safeguard endangered artistic traditions, interpret intricate patterns in historical artifacts, and develop user-friendly digital archives for educational, tourism, and economic outreach are truly extraordinary. It simultaneously tackles several developmental problems and offers technical solutions to the physical artifacts that are deteriorating using AI-based solutions for restoration. Traditional crafts like weaving, pottery, wood, and metalwork can have intricate patterns that can be identified and catalogued using computer vision algorithms. Documentation using AI can facilitate the production of virtual museums and AR experiences, which can also help bring more cultural heritage to people who are not connected to the traditional way. This is a significant economic impact. A nation can create a competitive advantage in the creative economy by creating a range of cultural products, digital content, and heritage tourism products that are enhanced by A.I. Moreover, the technical competencies gained from these programs are valuable for the overall application of AI and digital technologies in the workplace. Implementing the program, however, will need to overcome some barriers, namely funding limitations, skills development of technical staff, and ethical issues related to cultural ownership and community engagement to ensure that technology does not supersede cultural traditional practitioners, but serves them. With that, strategic investment in AI-driven cultural preservation is not only a cultural obligation, but an economic opportunity for sustainable national development, too.

Keywords: Artificial Intelligence, Traditional Arts Preservation, National Development, Cultural Heritage Documentation.

Introduction

Cultural heritage is defined as the traditions, practices, artifacts, and knowledge systems that characterize communities and nations. Traditional arts are one of the important aspects of Intangible Cultural Heritage and are the creative expression, craftsmanship, and aesthetic values passed on from generation to generation. But globalization, urbanization, and the loss of cultural carriers are endangering these irreplaceable cultural assets (UNESCO, 2020). This is the time when comprehensive preservation strategies are needed, and AI has experienced unprecedented development, which opens new avenues for cultural documentation and preservation.

AI technologies have provided powerful tools for capturing, analysing, archiving, and disseminating cultural heritage in ways not possible yet (UNESCO, 2020). Whether it's digitizing ancient texts or reconstructing damaged monuments, AI applications are revolutionizing the way societies preserve and interact with their cultural heritage (Champion, 2021). Furthermore, these technological interventions are not limited to preservation, but also play an important role in national development in the field of cultural tourism, education, creative industries, and social cohesion. This paper delves into the field of AI and cultural heritage preservation, ranging from the ways AI can aid in historical paperwork to its impact on general growth targets. It deals with theoretical aspects, implications, problems, and prospects of the use of AI in the preservation of culture in the context of national development schemes.

In the domain of cultural heritage preservation, AI is proving to be a revolutionary tool with features that would have been inconceivable 10 years ago. Today, machine learning systems are able to sift through large archives of cultural materials,

detect patterns unobservable to human eyes, recreate missing parts or entire works of art with high fidelity, and produce new artwork inspired by traditional aesthetics. These technologies do not supplant the skills and experience of the conservationist but complement them, allowing conservators, curators, and communities to undertake preservation work on a scale and level never before possible and with greater accuracy.

Objectives of the Study

The main aim of this study is to study the application of AI technology for improving the preservation of documentation of traditional arts and cultural heritage and to evaluate the contribution of AI-supported documentation to national development specifically the objectives are to:

- i. locate and clarify existing applications and capacities of AI technologies in traditional arts and intangible cultural heritage preservation, focusing on generative models like Generative Adversarial Networks (GANs), diffusion models, and Low-Rank Adaptation (LoRA)-based models.
- ii. reflect on the connection between AI-driven cultural heritage management and the impact on national development, such as bolstering cultural identity, fostering the creative economy, education, and protecting local cultural values.
- iii. understand the challenges, limitations, and ethical concerns of integrating AI technologies for cultural heritage preservation in the context of Pankshin Local Government of Plateau State, such as data sufficiency, infrastructure, and cultural authenticity.

This study is guided by the following research questions:

- i. What existing applications and capacities do AI generative technologies — particularly Generative Adversarial Networks (GANs), diffusion models, and Low-Rank Adaptation (LoRA)-based models — have

- in the preservation of traditional arts and intangible cultural heritage?
- ii. What is the connection between AI-driven cultural heritage management and national development, particularly in terms of bolstering cultural identity, fostering the creative economy, advancing education, and protecting local cultural values?
 - iii. What are the challenges, limitations, and ethical concerns of integrating AI technologies for cultural heritage preservation in Pankshin Local Government Area of Plateau State, particularly regarding data sufficiency, infrastructure, and cultural authenticity?

Theoretical Framework

The study uses two closely related frameworks, i.e., Social Construction of Technology (SCOT) introduced by **Trevor Pinch and Wiebe Bijker** (1984) and Cultural Heritage theory as contributed by (UNESCO, 2020). The Living Heritage perspective. Both theoretical frameworks bring deeper insight into using AI in safeguarding cultural heritage as well as providing insights on development.

Social Construction of Technology (SCOT)

The Social Construction of Technology theory (SCOT), as adopted by Akpoghiran and Akaenye (2025), offers a basic framework for understanding the relationship between cultural values and AI technology. SCOT assumes that technology does not necessarily have a predetermined social impact, but rather that social use and human agency shape that impact. As Akpoghiran and Akaenye (2025) put it, AI has the potential to change culture, but the values of the culture depend on the people. The social usage is what changes people's cultural values, not the technology itself.

This is especially relevant to this study as it challenges technological determinism (the view that AI cannot be

anything other than destructive to indigenous cultural values) and places more emphasis on human agency in shaping the use and incorporation of AI technologies into cultural contexts. However, while the SCOT framework has the potential to promote and preserve cultural values, these values are lost not because of the technology but perhaps because of its use by the human operating it (Akpoghiran & Akaenye, 2025).

When applied to the use of AI to preserve cultural identity, SCOT has several implications: communities need to have control over the use of AI to preserve their culture, AI technology needs to be designed in accordance with community values, and outcomes of cultural preservation will be affected by how communities use and engage with AI tools.

Cultural Heritage Theory: The Living Heritage Perspective

UNESCO's conceptualization of cultural heritage as a "living heritage" (2003) and the development of cultural heritage theory, in general, are developed in a way that acknowledges intangible cultural heritage as a dynamic and living system. It highlights that cultural heritage is continuously produced by communities responding to the environment and history in which they live and experience, a form of identity and continuity for them.

The living heritage approach is of special interest for this study as it contradicts preservation practices that freeze cultural expressions in time (Champion, 2021). Rather than simply being a thing to be saved, heritage is a cultural process that includes processes of meaning-making, identity formation, and community agency (Smith, 2006). This theoretical perspective emphasizes the need to engage in the preservation of heritage and the dynamism of traditional arts, and to engage with heritage communities. This is confirmed

by recent scholarship. Wang and Zhou (2025) stress the need for multi-generational transmission strategies and ways to preserve cultural memory to maintain sustainable development of ICH, while also allowing innovative reinterpretation. Likewise, Ye and Tan (2025) show how generative AI can be integrated into traditional art practices, such as that of Lingnan painting, in order to produce new ways of embodied interaction that could both preserve the culture and evolve it creatively. Their research shows that "this combination of technology and tradition allows for endangered forms to be recorded without losing any detail in the process while giving artists a new ability to build upon cultural preservation as well as cultivation" (Ye & Tan, 2025).

Cultural heritage has several roles in the development of a country. Throsby (2021) states that cultural capital has the potential to bring both cultural and economic benefits, including tourism revenue, job creation, and social cohesion, which are all aspects of sustainable development. Preserving and protecting heritage within the context of sustainable development has been highlighted as a part of multiple Sustainable Development Goals (SDGs) in the UNESCO agenda on culture and sustainable development, including SDG 4 on education and SDG 11 on sustainable cities, 11 (UNESCO, 2019). (Fiorucci et al., 2020). AI is a range of computational methods that mimic human thinking. Another relevant field is machine learning and deep learning, which can be used for pattern recognition, classification, and prediction, which are crucial for cultural heritage applications analysing cultural artefacts and practices (Fiorucci et al., 2020). The image processing and analysis visual tools allow traditional arts to be documented, monitored, and visually analysed for artifacts and condition (Pierdicca et al., 2020). Text analysis, translation support, semantic understanding, and documentation of oral traditions, historical texts, and linguistic heritage can be achieved by employing Natural Language

Processing (NLP) (Oluwaseun & Lukman, 2021). Generative AI: Neural networks that can generate content from learned patterns can simulate the restoration and complete patterns in damaged artifacts (Sha et al., 2023).

AI Applications in Traditional Arts Preservation Documentation and Digitalization

The modern approach to heritage preservation is based on digital documentation. Artifacts, performances, and culture can be captured in high resolution and in any detail with the help of imaging technologies that are enhanced by artificial intelligence (AI). The automatic identification, classification, and cataloging of cultural objects, using computer vision algorithms, can drastically reduce the amount of manual work needed to be done and make it more consistent (Llamas et al., 2017).

The 3D scanning and the artificial intelligence processing allow the creation of digital twins of the artefacts and monuments, capturing the information on the geometry and texture, which can be used for conservation and education. Such digital assets can facilitate access to cultural heritage that is virtual, and that can make it possible to engage with the heritage on a democratic basis, not geographically or physically (Champion, 2021).

Patterns Recognition and Analysis

AI is very good at spotting patterns that are not possible for humans to see. In textile arts, machine learning algorithms can be used to identify patterns, motifs, and techniques in weaving, which can be catalogued and used to recognize the different styles of weaving from different regions (Wevers & Smits, 2020). This can be extremely useful when it comes to cultural diffusion, artifact authentication, and documentation of technical knowledge.

Likewise, AI can be applied to music and dance documentation, where it can help capture the essence of musical patterns, rhythmic composition, and dance styles. In the field of music and dance documentation, AI can assist in recording the essence of musical patterns, rhythmic composition, and dance styles, thereby creating comprehensive records of performance traditions. Such analyses also assist both in preserving and transmitting the intangible cultural practices to new generations (Kico et al., 2020).

Restoration and Reconstruction

AI restoration is one of the most remarkable use cases in the domain of cultural heritage conservation. From known patterns in intact pieces of broken pieces, frescoes, or scripts, the missing component of a fragment can be recreated with the use of generative GANs or other deep learning methods (Cao et al., 2021). AI choices supplement human decision-making processes while also acting as a visualization tool for the public to participate in the process of conservation. The integration of AI technologies into virtual reconstruction allows cultural communities to maintain a connection with their disappeared cultural heritages, increase tourism, and educate at a significant scale, creating a substantial impact on cultural preservation.

The creation of a virtual reconstruction of destroyed or neglected cultural heritages via AI technology offers real influence on the preservation of cultural heritage, simultaneously supports the sector of tourism and education, and maintains connections to the lost cultural heritages. The reconstruction in conflict-ridden sites in Syrian Iraqis one example of what AI technology is capable of in the aspect of cultural restoration and preserving historical memory (Grussenmeyer et al., 2020).

Knowledge Management and Accessibility

With NLP, it is also possible to perform more efficient management of a database of cultural resources and search relevant cultural information within it efficiently. By using these techniques, historical texts can be translated through natural language processing, and the spoken narrative and a related cultural knowledge semantic network can also be constructed. Consequently, users, including academics, educators, researchers, etc., can access the relevant culture as readily as possible (Ding et al., 2023).

Intelligent recommendation is implemented to deliver cultural content to specific users with personalized content, thereby enhancing the cultural learning experience and the use of cultural websites and museums. Since the users' interests and learning behaviour can be obtained, to recommend to the users the culturally relevant objects, and to give guidance so that the user may learn cultural items in a playful yet knowledgeable manner (Raptis et al., 2019).

AI-Enhanced Heritage Preservation and National Development Implications

Economic Impact through Cultural Tourism

Culture documentation and presentation with the help of AI has a greater impact on cultural tourism, which is one of the important sources of revenue for many countries. Virtual and augmented reality experiences are used to bring visitors to these sites, whilst intelligent systems are used to optimize tourism management, minimizing overcrowding and environmental impact at these heritage sites (Gavalas et al., 2020). AI-powered recommendation and translation tools and digital cultural platforms generate audiences and revenues for tourism, far beyond the physical destination. Investments in AI-driven cultural presentation have shown their positive impact on the countries' international profile and tourism benefits (Richards, 2021).

The creative economy is a bigger opportunity. AI-driven cultural and creative products shaped by traditional arts establish new market segments and preserve traditional culture. AI technologies can assist this industry by: (i) providing virtual tourism, making heritage accessible to people who are not able to visit in person. (ii) Improving the interpretation of the site using Augmented Reality (AR) and Virtual Reality (VR) to enrich visitors' understanding. (iii) Promoting conservation that helps keep sites in condition for visitation. (iv) Supporting cultural product development which creates income while cultivating awareness of cultural heritage.

Education and Identity Formation

The heritage that has been conserved and is made available through AI technologies also plays a very important educational role. First of all, through interactive and virtual learning systems, children are introduced to traditions and crafts, thus reinforcing identity and "bridging the gap between tradition and digital information, a bridge to the future workforce and a bridge between heritage and young people" (Stylianou-Lambert, 2019). Personalized forms of cultural education can be delivered using such a system by providing tailored learning content. This can be done in accordance with individual learning styles and preferences. Young people are particularly attracted to such forms of learning, which often engage them more effectively than traditional forms of museum education.

Creative Industries and Innovation

The digital archiving and AI analysis of craft and fine arts culture thus forms a significant repository for today's creative economy's designs. Designers of all forms, artists and crafters will be able to access digitized pattern libraries or colour traditions to produce the type of fused crafts that will have respect for the traditional culture but at the same time have

appeal for today's customers (Rahaman & Tan, 2020). In such a context, the application of AI to analyse the principles of traditional aesthetics also allows the creation of new expressions of our heritage cultures that retain authentic cultural integrity and yet innovate. Such approaches may lead to new forms of economic opportunity for the creative economy as well as the possibility to continue cultural practices.

Social Cohesion and Inclusion

Cultural heritage makes society more cohesive and people more proud of their nation. The use of AI to safeguard and showcase various cultural practices fosters understanding and respect among cultures in multicultural countries. Digital archives are used to give voice and keep alive the cultural contributions of marginalized communities (Giglietto et al., 2022).

In addition, AI-driven documentation initiatives are typically community-driven, which allows for the involvement of community members, including those whose expertise is in related areas of technology, and provides an opportunity for them to share their knowledge. This approach is participatory and allows for both the development of technical capacity in communities and the authenticity of the approach. The "Our Heritage, Our Stories" project specifically targets the representation of a variety of community voices in the national collections. AI technologies can connect and make community-generated content discoverable, leading to more representative national heritage narratives, which are more representative of the diversity of contemporary societies.

Challenges and Limitations

Technical and Infrastructural Constraints Implementing

There is a need for high computing power, a skilled workforce, and good IT infrastructure to be available when

deploying IT-enabled cultural heritage conservation; these are, however, generally absent in developing countries, where needs and interests are most pronounced. IT systems may thus impose new forms of inequality in the sphere of cultural heritage conservation and access (Vincent et al., 2019).

Cultural Sensitivity and Representation

According to Christen (2019), AI systems trained on Western datasets may inadequately represent non-Western cultural forms, leading to biased documentation and analysis. Additionally, some cultural knowledge is sacred or restricted, raising ethical questions about digital documentation and access. Preservation efforts must balance technological capabilities with cultural protocols and community consent.

Authenticity and Interpretation Concerns

The bias that stems from AI models being trained on data from Western cultures means that AI outputs regarding the cultural practices of non-Western societies cannot be fully representative and may be misunderstood and incorrectly documented by the AI, states Christen (2019 [L11.1]). Furthermore, there exist categories of information and practice that can be considered holy or private, and these create potentially ethically problematic situations in relation to their access and documentation in digital format. The technologies must not override cultural procedures or community permissions, and vice versa.

Sustainability and Maintenance

Ongoing maintenance, format conversion, and technology upgrades are all needed for digital preservation. A successful long-term AI-aided preservation project implies sustainable investment and institutionalization of the system, and these features require institutional and financial support that most heritage institutions with limited resources could not satisfy (Valeonti et al., 2019).

Conclusion

AI has proven to be a powerful tool for the preservation and revitalization of traditional arts, providing unprecedented capabilities for documentation, restoration, and revitalization. The case studies featured in this paper illustrate how AI can be applied to preserve at scale and with precision that would have been unattainable with traditional approaches.

AI applications for heritage preservation have a variety of pathways to national development. AI applications can be used to boost cultural tourism and creative industries in terms of earnings, thus preserving cultural heritage. In terms of education, they offer interactive learning materials to foster cultural knowledge and skill transmission. Socially, they help to create inclusive stories of heritage which enhance cultural identity and social cohesion. They are sustainable in maintaining the heritage value for future generations through adaptive conservation practices.

But achieving these gains does not come without its own set of problems, such as authenticity, community involvement, technical constraints, and sustainability of digital preservation. Ethical principles need to be incorporated into the use of AI to ensure that technology is used for heritage values and is not destructive of heritage values. The development of sustainable heritage AI will rely on policy attention to capacity building, standards, and international cooperation.

Recommendations

- i. **Capacity Building and Technology Transfer:** Investment in the training of cultural heritage professionals in AI technologies and, at the same time, in AI experts in cultural heritage can be done by countries. However, these capabilities might only develop rapidly when using international

cooperation and technology transfer mechanisms [L16.1] (Coughenour et al., 2021).

- ii. **Ethical Framework and Guidelines:** This will help build a complete ethics of AI application on cultural heritage on aspects such as sovereignty over cultural data, informed consent of the community, diversity and representativeness, and reasonable usage of generated AI content, driven by inter-stakeholder dialogues involving members of cultural communities, AI professionals, and policymakers (Gupta et al., 2020).
- iii. **Integration with National Development Strategies:** Governments of Pankshin and Plateau State need to explicitly include AI-supported culture preservation within national development plans by defining cultural heritage as economic, educational, and social infrastructure. Making strategic investment in cultural AI initiatives would reap rewards in several development sectors.

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General Comment

The paper needs major restructuring in terms of writing style. The methodology section needs further description because it is omitted. There is a need for different sections on Results and Discussion rather than combining the two sections together. The conclusion of the article is not robust enough to support the article's thesis statement. Lastly, there is a need to correct grammatical errors.

Recommendation

The paper is recommended for acceptance subject to MAJOR REVISION and will involve another round of review.

Thank you.