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Leveraging AI and Digital Technologies for Cultural Preservation and Exchange in Nigeria

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ABSTRACT
The advent of artificial intelligence (AI) and digital technologies has revolutionized the preservation and exchange of cultural heritage, offering unprecedented opportunities for safeguarding Nigeria's rich and diverse cultural legacy. This chapter explores the potential of these technologies in promoting cultural preservation, enhancing accessibility to cultural artifacts, and fostering cross-cultural exchange within and beyond Nigeria's borders. It examines the use of AI-driven tools, such as natural language processing and image recognition, to document, digitize, and analyze indigenous knowledge systems, languages, and art forms. Additionally, the chapter highlights digital platforms' role in providing global audiences with immersive experiences, enabling the appreciation and understanding of Nigeria's cultural diversity. The integration of AI in cultural preservation can enhance accessibility and engagement, fostering a deeper appreciation of Nigeria's rich cultural diversity. This paper argues that strategic investments in digital infrastructure and educational initiatives are essential to harnessing these technologies effectively, ensuring that Nigeria's cultural heritage is preserved for future generations while promoting global cultural understanding.

INTRODUCTION

The intersection of culture and technology in Africa, particularly Nigeria, has led to significant transformations in various aspects of society. The rise of Nollywood and video films has created a cultural and technological hybrid, influencing African diaspora and religion (Uchenna Onuzulike, 2009). The internet has facilitated the emergence of the "yahooboys" sub culture among Nigerian youth, reflecting broader societal issues of fraud and corruption (Adeniran, 2008). Digital culture has impacted traditional family structures and social interactions, with digital natives embracing smart devices for social and academic purposes, while digital immigrants struggle to adapt (Akintunde, 2021). Libraries face challenges in preserving African cultural values while adapting to technological advancements, necessitating proactive professional repositioning (Omekwu, 2006). These developments highlight the complex interplay between technology and culture in Africa, affecting areas such as entertainment, education, social norms, and information dissemination.

Cultural heritage plays a vital role in preserving African and Nigerian identity, connecting generations, and fostering sustainable development. Nigeria's rich cultural heritage faces numerous challenges, including trafficking, looting, and the impacts of globalization (Onyima, 2016;

Folorunso, 2021). Despite these threats, cultural heritage remains a valuable resource for economic development, tourism, and education (Onyima, 2016). African cultural values, deeply rooted in tradition, offer inspiration and vitality for nation-building and integration (Awoniyi, 2015). In southwestern Nigeria, Yoruba cultural heritage has been instrumental in shaping political identity and nationalism, reinforcing a sense of unity and civic virtue (Ajala, 2015). To protect and harness the potential of cultural heritage, there is a need for conscious preservation efforts, collaboration with global organizations, and integration of heritage conservation into sustainable development goals (Onyima, 2016; Folorunso, 2021). This approach can help safeguard African cultural heritage while promoting community well-being and economic growth.

The preservation of cultural heritage, particularly linguistic diversity, faces significant challenges in Nigeria and across Africa due to factors such as globalization and urbanization (Onyima, 2016). However, emerging digital technologies, especially artificial intelligence (AI), offer innovative solutions for safeguarding and promoting cultural expressions (Louadi, 2024). AI has the potential to recognize and analyze linguistic patterns of endangered languages, recreate lost languages, and build educational models for teaching native languages to at-risk communities (Ermolova et al., 2024). These technologies can document, revive, and preserve endangered languages, contributing to the protection of cultural heritage (Kavitha et al., 2023). Nevertheless, challenges persist, including linguistic bias in AI systems and the lack of data for many endangered languages (Ermolova et al., 2024). Despite these obstacles, AI is recognized as a promising tool for preserving linguistic diversity and cultural heritage in the digital era (Louadi, 2024; Ermolova et al., 2024).

Nigeria's rich cultural heritage faces significant challenges due to globalization, technological advancement, and human activities like trafficking and vandalism (Onyima, 2016). Many traditional practices and artifacts are now endangered, necessitating urgent preservation efforts (Onyima, 2016; Yoko, 2023). The COVID-19 pandemic has accelerated the use of technology in cultural preservation, offering new opportunities to safeguard intangible cultural heritage (Adewumi, 2021). However, this technological shift also poses risks of misappropriation and exploitation of traditional cultural expressions (Adewumi, 2021). To address these challenges, proposed solutions include promoting multilingualism, supporting cultural initiatives, incorporating local languages and practices into education, and encouraging community involvement (Yoko, 2023). The globalization of cultural heritage presents both opportunities and challenges for Nigeria, requiring a balance between preserving local cultures and embracing global connectivity (Nwegbu et al., 2011). Effective preservation strategies should start at the domestic level before expanding internationally (Nwegbu et al., 2011).

This paper explores the application of AI and digital technologies in cultural preservation and exchange.

Importance of Cultural Preservation

The preservation of Nigeria's rich cultural heritage faces significant challenges in the era of rapid technological advancement and globalization (Onyima, 2016; Adewumi, 2021). Many traditional practices and artifacts are endangered due to factors such as trafficking, vandalism, and modernization (Onyima, 2016). However, digital technologies offer innovative solutions for safeguarding and promoting cultural heritage (Khan et al., 2018). Digitization initiatives can help preserve and distribute cultural assets, although they come with their own set of challenges, including financial, technical, and legal concerns (Khan et al., 2018). The COVID-19 pandemic has accelerated the adoption of technology in various sectors, including cultural preservation (Adewumi, 2021). To effectively preserve cultural heritage in the Industry 4.0 era, a multifaceted approach is required, leveraging technology, promoting sustainability, and fostering collaboration among governments, institutions, and communities (Abd Rahman et al., 2023). This approach can ensure the continuity of cultural identity and support education, tourism, and economic development (Abd Rahman et al., 2023).

Artificial intelligence (AI) is revolutionizing cultural heritage preservation and accessibility, aligning with UNESCO's 2005 Convention on cultural diversity. AI supports heritage site planning, virtual experiences, research, and increased access to cultural objects (Muenster et al., 2024). Memory institutions are leveraging digital environments for massive collection digitization, enhancing access and preservation (Dias da Silva & Borges, 2020). AI developments can improve online and in-situ accessibility of museum and cultural heritage experiences, catering to diverse audiences (Pisoni et al., 2021). The regulatory framework for cultural heritage protection, both at EU and national levels, is evolving to incorporate AI's potential. AI offers possibilities for enhancing cultural heritage protection and improving individual accessibility to cultural goods (Giannini & Makri, 2023). However, ethical considerations and the need for a reliable regulatory framework are crucial in developing AI applications for cultural heritage (Giannini & Makri, 2023). These advancements contribute to preserving and sharing humanity's common heritage globally.

Role of AI in Cultural Preservation

Recent research highlights the significant role of innovative technologies in preserving and promoting cultural heritage. Digital tools enable the creation of virtual tours, 3D models, and interactive platforms for cultural content

(Todorova-Ekmekci, 2021). These technologies align with the evolution of knowledge dissemination from oral traditions to the digital era, emphasizing the importance of cultural diversity in AI development (Louadi, 2024). The documentation of cultural heritage has been transformed by digital technologies, offering new opportunities for conservation efforts (Hassani, 2015). In Nigeria, institutions like the University of Ibadan have been at the forefront of preserving cultural heritage since 1948, utilizing various storage devices to collect and disseminate cultural materials (Ola & Adegbore, 2015). These advancements in digital technologies not only aid in the preservation of cultural heritage but also enhance accessibility and promote cultural exchange, supporting the objectives of international conventions on cultural diversity. The role of AI in cultural preservation include:

Digitization of Artifacts

Advanced AI tools such as computer vision enable the high-resolution scanning and cataloging of cultural artifacts, ensuring their preservation in digital form. For example, ancient manuscripts from Nigerian cultural archives can be digitized and indexed for global accessibility.

Language Preservation

With over 500 languages, many endangered, Nigeria's linguistic diversity can be safeguarded using AI-based natural language processing tools. Platforms like Google Translate are increasingly incorporating African languages, while local efforts can utilize AI for creating speech synthesis and transcription systems.

Cultural Analysis

Machine learning algorithms can identify patterns in art, music, and folklore, helping researchers document and interpret cultural expressions that are at risk of being lost.

Digital Technologies for Cultural Exchange

The UNESCO 2005 Convention on Cultural Diversity emphasizes the protection and promotion of diverse cultural expressions in the digital age (Guèvremont, 2014). Digital technologies offer opportunities for enriching cultural diversity but also risk marginalizing certain cultures (Guèvremont, 2014). The Convention allows parties to adapt policies to the digital environment without requiring amendments (Guèvremont, 2014; Irion & Valcke, 2014). The 2018 Global Report monitors the Convention's implementation and its contribution to the UN 2030 Sustainable Development Goals, highlighting progress since 2015 and recommending policy changes for the digital era (Scientific, 2018). The EU ratified the Convention within its competences, allowing member states to take initiatives (Irion & Valcke, 2014). While the Convention has made accomplishments, it also has shortcomings and future policy prospects to address (Beukelaer et al., 2015). Overall, the Convention aims to adapt cultural policies to rapid digital changes while promoting human rights and fundamental freedoms (Scientific, 2018). Digital technologies facilitate this exchange by creating platforms for collaboration and distribution, such as:

Virtual Museums and Exhibitions

Through VR and AR, Nigeria's rich cultural artifacts can reach a global audience, transcending physical and financial barriers. Virtual tours of sites like the Nok terracotta or Benin bronzes align with UNESCO's goals of promoting cultural understanding

Social Media as a Cultural Platform

Platforms like YouTube, Instagram, and TikTok allow Nigerian artists, musicians, and creators to showcase their work to global audiences. AI algorithms enhance these exchanges by personalizing content for users, ensuring broader visibility for diverse cultural expressions.

Digital Storytelling

Interactive apps and games can incorporate Nigerian myths, folklore, and history, enabling immersive cultural experiences. These digital narratives align with the Convention's aim to enhance cultural visibility and diversity in the digital domain.

Challenges in Leveraging AI for Cultural Preservation

While AI and digital technologies offer significant potential, several challenges must be addressed to align with the UNESCO 2005 Convention's principles:

Infrastructural Deficits

Many regions in Nigeria lack the necessary digital infrastructure, such as reliable internet connectivity and access to digital devices. Addressing these deficits is crucial to ensuring equitable access to cultural expressions, as emphasized in Article 7 of the Convention.

Digital Literacy

The success of digital preservation initiatives depends on the population's digital literacy. Training programs are needed to equip individuals with the skills to use these technologies, in line with Article 10, which highlights the importance of education and public awareness in promoting cultural diversity.

Funding Constraints

Developing and maintaining digital preservation projects require substantial investment. Securing funding from government bodies, private organizations, and international partners is crucial for sustainability, supporting Article 13's focus on integrating culture into development policies.

Ethical Considerations

Using AI in cultural preservation raises ethical questions related to data ownership, privacy, and potential cultural appropriation. Clear guidelines and policies are necessary to address these issues, ensuring compliance with Article 8, which mandates respect for human rights and fundamental freedoms.

Opportunities for Cultural Exchange

AI can enhance access to cultural heritage, improve conservation decision-making, and promote cultural diversity (Otero, 2021). However, challenges persist, including data biases in AI development and the need for diverse datasets to ensure equitable representation (Mohamed Louadi, 2024). The digital age presents opportunities for preserving Africa's rich cultural heritage, but it requires investment in digital literacy and the promotion of a "culture of the digital" (Mohamed Louadi, 2024). AI and digital technologies facilitate cultural exchange, allowing Nigeria's rich heritage to be shared globally. This aligns with the UNESCO 2005 Convention's objective of promoting cultural diversity through international collaboration:

Global Accessibility

Digital platforms enable global access to Nigerian cultural heritage, supporting Article 9's objective of promoting cultural diversity and accessibility to cultural content.

Collaborative Projects

International collaborations can be fostered through digital platforms, allowing researchers, artists, and cultural practitioners worldwide to work together on projects that celebrate and preserve Nigerian culture. This aligns with Article 12, which promotes international cooperation.

Educational Initiatives

Digital technologies can create educational resources that teach global audiences about Nigerian culture, supporting the Convention's emphasis on education and public awareness in promoting cultural diversity.

Case Studies

The Digital Benin Project

This initiative aims to create a comprehensive digital archive of the Benin Bronzes, accessible to a global audience. AI technologies catalog and digitize the collection, preserving it for future generations. This aligns with the Convention's principles by facilitating access to cultural heritage through digital technologies (Giannini & Makri, 2023).

Yoruba Language Preservation

AI-powered language learning apps teach the Yoruba language, using speech recognition and NLP technologies for interactive learning experiences. This supports the Convention's objective of protecting linguistic diversity (Ermolova et al., 2024).

Virtual Reality Tours of Nigerian Historical Sites

VR tours of sites like the Osun-Osogbo Sacred Grove provide immersive experiences, promoting cultural heritage tourism. This aligns with the Convention's goal of enhancing access to cultural expressions through new technologies (Alkhaliel, 2022; Singh et al., 2024).

CONCLUSION

The integration of AI and digital technologies represents a transformative opportunity to preserve and promote Nigeria's cultural heritage. Nigeria can safeguard its many cultural manifestations, provide fair access, and promote international cultural exchange by coordinating these initiatives with the UNESCO 2005 Convention. However, the values of inclusivity, moral responsibility, and cultural sensitivity must serve as the foundation for these technological interventions. When used strategically, artificial intelligence (AI) and digital tools may enable Nigeria to become a dynamic and diversified cultural powerhouse in the digital era while simultaneously preserving its heritage.

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