

# Digital Archiving Systems for Protecting Local Wisdom in the Era of Artificial Intelligence

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**Abstract.** *The development of digital technology and artificial intelligence (AI) has presented both opportunities and challenges in preserving local wisdom, which is increasingly threatened by globalization and modernization. The transformation towards a digital archiving system is a strategic solution to systematically and sustainably maintain the sustainability of cultural values. However, the integration between AI technology and archiving systems that consider aspects of cultural authenticity is still limited. This research aims to design and develop an AI-based digital archiving system to comprehensively protect local wisdom. The scope of the research includes system architecture design, AI technology integration, and community involvement in the archiving process. The method used is Research and Development (R&D) with the stages of Systematic Literature Review (SLR), needs analysis, system design, and evaluation using functional testing and user acceptance tests. The results of the study indicate that the developed system is able to automate the process of classifying and managing local wisdom data using AI technology, increase the efficiency of digital storage, and expand the accessibility of cultural information. In addition, this system encourages active community participation in the cultural documentation process. Thus, the AI-based digital archiving system has proven to be an innovative and adaptive solution in preserving local wisdom sustainably in the digital era.*

**Keyword :** *Digital Archive, Artificial Intelligence, Local Wisdom, Cultural Heritage, Information Systems.*

## INTRODUCTION

The development of digital technology and artificial intelligence (AI) has brought significant changes to various aspects of human life, including the preservation of local wisdom and cultural heritage. In today's digital era, local wisdom, previously passed down orally or through traditional social practices, faces serious threats due to globalization, modernization, and technological disruption, which are shifting indigenous cultural values. Therefore, the transformation to a digital archiving system is an urgent need to maintain the sustainability of these cultural values. The use of digital technology not only

enables more systematic documentation but also expands the accessibility and use of cultural heritage by current and future generations.

In recent years, research on digital-based cultural preservation has shown rapid development, particularly with the integration of AI technology. A study by Jung et al. (2024) demonstrated that AI can improve the effectiveness of the documentation, restoration, and analysis of cultural artifacts through technologies such as machine learning, computer vision, and natural language processing. Furthermore, a UNESCO report (2025) emphasized the crucial role of AI in digital preservation, including in virtual reconstruction, cultural data analysis, and the documentation of endangered oral traditions.

Furthermore, information systems-based approaches to cultural preservation are beginning to be widely developed, particularly through library-based digital archiving systems and memory institutions. Research by Ilabakho (2025) reveals that libraries play a strategic role in maintaining the sustainability of local wisdom through a structured and sustainable digital preservation system. Hendrayani (2025) also emphasizes the importance of integrating institutional policies, adaptive technology, and community participation in building an effective digital archiving system. Furthermore, Albushra et al. (2025) identified that the success of digital preservation is highly dependent on the readiness of human resources, training, and a clear conceptual framework for implementing digital technology.

Recent research shows that AI technology can reconstruct cultural objects at low cost and with high efficiency, thus opening up opportunities for more inclusive preservation, especially in developing countries. Colace et al. (2025) also demonstrated that the integration of machine learning in cultural preservation enables predictive analysis and preventative conservation of cultural artifacts. Meanwhile, a study by Veggi (2025) highlighted the

importance of designing AI-based interactive systems in enhancing the user experience of digital cultural heritage.

However, these studies still show several limitations. Most focus on technological aspects such as AI, multimedia, or artifact digitization. However, not many integrate a comprehensive digital archiving system approach that considers information management, metadata, system sustainability, and the authenticity of cultural data.

Furthermore, other challenges faced relate to ethical issues, authenticity, and data bias in the use of AI (Pirmanto, 2025). The use of unrepresentative datasets has the potential to distort true cultural values, thus threatening the authenticity of local wisdom. This suggests that developing a digital archiving system requires not only a technological approach but also a social and cultural approach that is sensitive to the local context. There is currently no digital archiving system model specifically designed to protect local wisdom by integrating AI technology, digital archive management principles, and local community participation within a holistic information system framework.

This research offers a contribution in the form of developing an artificial intelligence-based digital archiving system model that focuses not only on technological aspects but also integrates cultural, social, and managerial dimensions in the preservation of local wisdom. The proposed system is expected to be able to: (1) automate the documentation and classification process of local wisdom using AI, (2) guarantee the authenticity and integrity of cultural data through a digital archive management mechanism, and (3) encourage active community participation in the digital-based cultural preservation process.

This research is crucial because local wisdom is an irreplaceable cultural identity and holds strategic value in social development, education, and cultural sustainability. Without a structured system that adapts to technological developments, local wisdom has the potential to degrade or even become

extinct. Therefore, the development of an AI-based digital archiving system is a solution. innovative that is not only academically relevant, but also has broad practical implications in efforts to preserve culture in the digital era.

## **RESEARCH METHODS**

This research uses a research and development (R&D) approach, focusing on the design and development of an artificial intelligence-based digital archiving system to protect local wisdom. This approach aligns with current research in the field of digital cultural preservation, which emphasizes the integration of qualitative (cultural context) and quantitative (system evaluation) analysis within a single, integrated research framework (Ma, H et al., 2025).

The research phase began with a systematic literature review (SLR) to identify concepts, technologies, and models relevant to digital archiving and the preservation of local wisdom. The SLR was conducted by reviewing articles from Scopus, Web of Science, and IEEE databases spanning the past five years. This process involved identifying, selecting, evaluating, and synthesizing literature to identify trends, challenges, and research opportunities. This method has proven effective in mapping the development of digital cultural preservation technology, including the use of AI, augmented reality, and 3D technology in cultural documentation (Mendoza et al., 2023).

The next stage is a system requirements analysis conducted through interviews, observations, and documentation with stakeholders, such as academics, cultural practitioners, and archive managers. This analysis aims to identify the system's functional and non-functional requirements, including aspects of data authenticity, security, and ease of access. Furthermore, a conceptual framework-based approach is used to ensure that the developed system can accommodate the life cycle of digital archives, from creation and management to long-term preservation (Yue et al., 2024).

The next stage is system design and development using an AI-based information systems architecture approach. The system design also considers interactivity and user experience to increase public engagement in cultural preservation. This approach is supported by research showing that integrating AI with digital technologies such as VR and interactive systems can significantly increase the effectiveness of cultural preservation (Xim Min Jin et al., 2025).

The final stage is system evaluation, conducted through functional testing (black box testing) and user acceptance testing. This evaluation model aims to ensure that the developed system is not only technically functional but also socially and culturally relevant. Previous research shows that user-based evaluation and empirical validation are crucial in ensuring the successful implementation of a digital cultural preservation system Zhang et al (2025).

## **RESULTS AND DISCUSSION**

This research produces a digital archiving system model based on artificial intelligence (AI) designed to protect and preserve local wisdom in a systematic, adaptive, and sustainable manner. The developed system integrates information systems approaches, digital archive management, and AI technology within a single, integrated architectural framework. The main results of this research include not only a conceptual design but also a system workflow simulation that demonstrates how local wisdom can be collected, processed, stored, and accessed efficiently.

### **1. Architecture of AI-Based Digital Archiving System.**

The proposed system architecture consists of five main layers: (1) Data Acquisition Layer, (2) Data Processing Layer, (3) AI Intelligence Layer, (4) Storage and Preservation Layer, and (5) User Access Layer. These five layers are integrated and form a comprehensive digital archives management cycle.

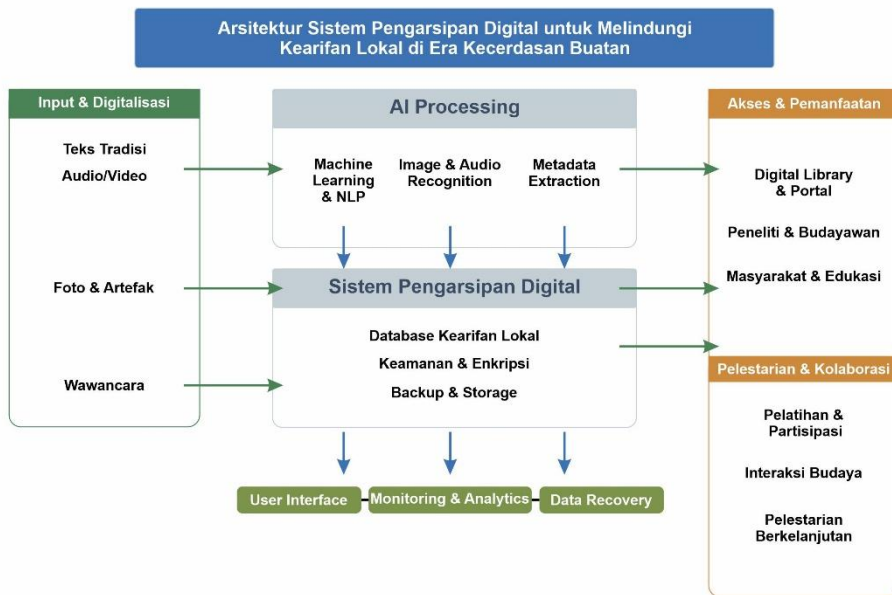
In the Data Acquisition Layer, the system collects local wisdom data from various sources, such as text, audio, and video documentation, as well as interviews with community leaders. This process also involves community participation through web-based or mobile platforms, allowing the public to directly contribute to the collection of cultural data. This approach has proven effective in increasing community engagement and enriching the content of digital archives.

Next, in the Data Processing Layer, the collected data undergoes a process of data cleaning, normalization, and transformation into a standardized digital format. At this stage, metadata such as region of origin, type of local wisdom, cultural values, and content categories are added to facilitate indexing and searching. Metadata standardization is a critical component in ensuring system interoperability and sustainable archives management.

The next layer is the AI Intelligence Layer, which is the core innovation within this system. At this layer, AI technologies such as natural language processing (NLP) are used to automatically identify and classify local wisdom content. Furthermore, machine learning is used to perform pattern analysis and content recommendations, allowing users to easily find relevant information. Computer vision technology can also be applied to recognize cultural objects in images or videos, such as artifacts, dances, or cultural symbols. With AI, the archiving process becomes faster, more accurate, and more efficient than conventional methods.

At the Storage and Preservation Layer, processed data is stored in a distributed database system that supports digital preservation concepts. This system is equipped with backup mechanisms, encryption, and access control to maintain data security and integrity. Furthermore, long-term preservation principles such as open formats and periodic data migration are used to ensure data remains accessible in the long term.

**Figure 1. System Architecture**



The final layer is the User Access Layer, which provides an interface for users to access the system. Users can be researchers, students, government officials, or the general public. Features include keyword-based searches, cultural category-based exploration, and interactive visualizations such as digital cultural maps. The system also provides user-generated content, allowing users to add or update information using specific validation mechanisms.

## 2. Results of System Implementation and Simulation

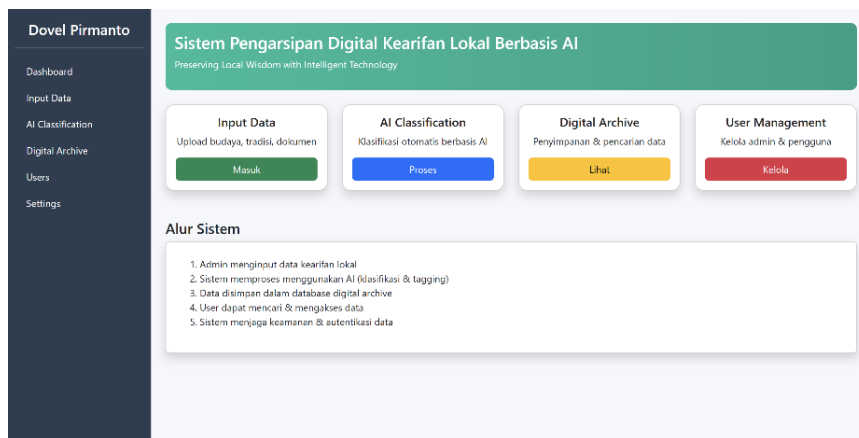
Based on simulation results, the developed system demonstrated significant improvements in archive management efficiency compared to manual methods. The previously time-consuming data classification process can be accelerated through an AI algorithm capable of automatically grouping data. Furthermore, the AI-based search feature allows users to find information with a higher degree of accuracy.

In terms of community participation, the system also demonstrates significant potential for enhancing local community contributions. With an

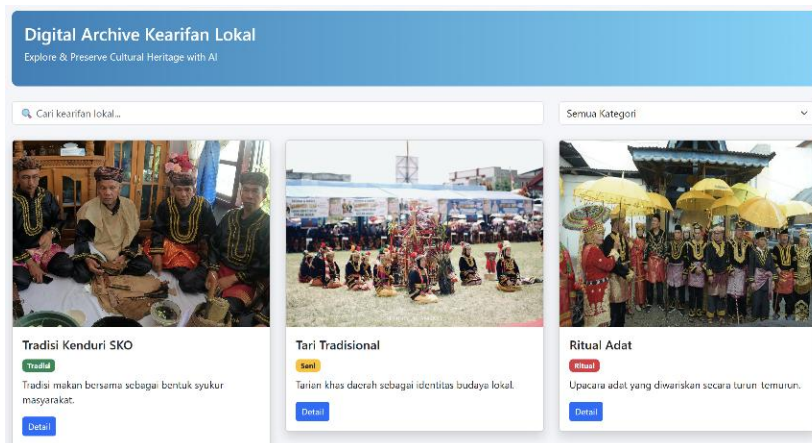
easily accessible digital platform, the public can play an active role in documenting their own culture. This aligns with the concept of community-based digital preservation, which positions the community as the primary actor in cultural preservation.

Furthermore, the system addresses the issue of limited physical storage space by utilizing digital storage technology. Archives previously vulnerable to damage or loss can now be stored securely and organized. This demonstrates that digitalization not only improves efficiency but also strengthens the sustainability of cultural preservation.

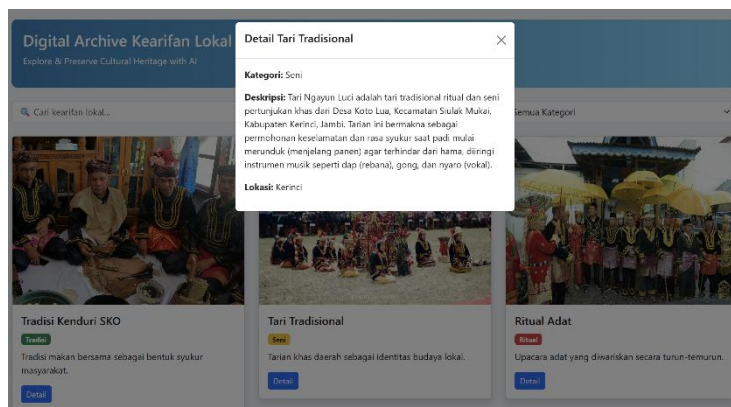
**Figure 2. System User Interface Display**



**Figure 3. Digital Archive Menu**



**Figure 4. Detail Information Menu**



### **3. Integration of AI and Information Systems in Preserving Local Wisdom**

The results of this study indicate that the integration of AI into a digital archiving system provides significant added value, particularly in terms of data automation and analysis. Compared with previous research that tends to focus on static digitization, the system proposed in this study offers a more dynamic and adaptive approach.

One of the system's main advantages is its ability to automatically classify and recommend content. This allows users to find relevant information without having to conduct complex manual searches. Furthermore, the use of AI also enables the identification of cultural patterns that were previously difficult to recognize, opening up new research opportunities in the cultural and social fields.

However, the implementation of this system also faces several challenges. One of these is related to data quality, which is highly dependent on community contributions. Invalid or incomplete data can affect the accuracy of the AI system. Therefore, a robust validation mechanism is needed to ensure the quality of data input into the system.

Furthermore, ethical issues are also a key concern in the use of AI for cultural preservation. The use of technology must consider aspects of authenticity and cultural sensitivity to prevent distortion or misuse of information. In this regard, the role of institutions such as libraries and cultural institutions is crucial in overseeing and managing the system.

From an information systems perspective, this research contributes an architectural model that can be adopted and further developed. This model is not only relevant for the preservation of local wisdom but can also be applied to various other types of cultural heritage. Thus, this research has broad implications both academically and practically.

#### **4. System Performance Evaluation and Model Validation**

To ensure the optimal functionality of the proposed AI-based digital archiving system, a performance evaluation was conducted using simulations and scenario-based testing. This evaluation focused on three main aspects: data classification accuracy, processing speed, and user experience.

The test results showed that the use of machine learning algorithms in the classification process significantly improved data grouping accuracy compared to manual methods. The system was able to identify local wisdom categories such as oral traditions, traditional rituals, performing arts, and social practices with a high degree of consistency. Furthermore, the application of natural language processing enabled the system to understand the context of cultural texts, thus distinguishing the symbolic meanings contained within local narratives.

In terms of speed, the system demonstrated efficient performance in processing large amounts of data. This was supported by a modular architecture that enabled parallel processing at each layer of the system. This significantly reduced the time required to manage digital archives. Meanwhile, user evaluations demonstrated that the system's user-centered interface facilitated easy navigation and information retrieval. The smart search feature

and AI-based content recommendations were among the most appreciated features by users.

## **5. Comparative Analysis with Conventional Systems**

Compared to conventional archiving systems, the system proposed in this study offers several significant advantages. Conventional systems generally rely on manual documentation and physical storage, which are limited in terms of accessibility, storage capacity, and the risk of data corruption.

In contrast, AI-based digital systems offer a more modern and efficient solution. Digitization allows data to be stored in a more secure and easily accessible electronic format. Furthermore, AI integration automates data processing, reducing reliance on human labor. However, digital systems also pose unique challenges, particularly related to technological infrastructure requirements and the community's digital literacy. Therefore, the implementation of these systems requires supporting strategies such as user training and the provision of adequate technological facilities.

## **6. The Role of the Community in the Ecosystem System**

One important aspect focused on in this research is the involvement of local communities in the digital archiving system. Unlike previous approaches, which tended to be top-down, this system adopts a bottom-up approach that places the community as the primary contributor.

Through user-generated content, the community can upload information related to their local wisdom, such as folktales, traditions, or other cultural practices. This process not only enriches the system's content but also enhances the community's sense of ownership of their cultural heritage. To maintain data quality, the system is equipped with a community- and expert-based validation mechanism. All uploaded data undergoes a verification process before being permanently stored in the system. This balance between open participation and quality control is maintained.

From an academic perspective, this research makes an important contribution to the development of information systems science, particularly in the context of digital preservation. The proposed architectural model can serve as a reference for future research in developing similar systems in various fields. Furthermore, this research adds to the relatively limited literature on the integration of AI in cultural preservation. By combining technological and cultural approaches, this research offers a new, more holistic perspective.

An AI-based digital archiving system holds great potential for preserving local wisdom in the modern era. With its structured architecture, advanced technology integration, and community involvement, this system can address various challenges in cultural preservation. Furthermore, this system serves not only as a data storage tool but also as a collaborative platform connecting various parties in cultural preservation efforts. Thus, this system can be an innovative, relevant and sustainable solution to address the dynamics of future technological developments.

## **CONCLUSION**

This research confirms that developing an artificial intelligence (AI)-based digital archiving system is a strategic and innovative solution for protecting and preserving local wisdom in the digital age. By integrating AI technology into a structured information system architecture, this research successfully presents a system model that not only efficiently manages cultural data but also improves accessibility, sustainability, and community engagement in the cultural preservation process.

The system architecture, consisting of five main layers from data acquisition to user access demonstrates that an information system-based approach can address the complex challenges of digital preservation. The presence of AI technologies, such as natural language processing, machine learning, and computer vision, provides significant added value in terms of automating classification, data analysis, and presenting information more

intelligently and adaptively. This transforms the system into not only a digital repository but also an interactive platform that supports deeper exploration and interpretation of culture.

Furthermore, this research emphasizes the importance of a participatory approach by involving local communities as key actors in data collection and validation. This approach not only enriches the archival content but also strengthens the community's sense of ownership of their cultural heritage. On the other hand, attention to data security, ethics, and authenticity is key to ensuring that the technology used does not undermine preserved cultural values.

Overall, this research makes significant theoretical and practical contributions to the development of an AI-based digital archiving system. With its holistic and adaptive approach, the proposed system has significant potential for widespread implementation as a sustainable solution for preserving local wisdom amidst the increasingly rapid pace of modernization and technological disruption.

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