



Unlocking Dark Archives in Ghanaian Academic Institutions: Exploring Human-AI Collaboration as a Transformative Approach

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Abstract

Memory and heritage institutions in Ghana house invaluable repositories of historical records and cultural artifacts, yet many of these treasures are inaccessible dark archives (that is, unexplored or underutilised collections). This paper explores the potential of human-artificial intelligence (AI) collaboration as a transformative approach to unlock dark archives within academic institutions. Drawing on interdisciplinary perspectives from AI and cultural heritage preservation, the study examines the methodologies, challenges, and opportunities associated with leveraging AI technologies alongside human expertise in preserving information and knowledge for posterity. The study employs a qualitative methodology using empirical findings from the Institute of African Studies Library, University of Ghana. Furthermore, the research identifies key research objectives, including assessing the readiness of information professionals in Ghana to embrace AI technologies and archiving practices. The study provides insights and recommendations for policymakers, information professionals, and researchers seeking to harness the power of human-AI collaboration to unlock dark archives and bring them to light.

Keywords: Artificial intelligence, Human-AI Collaboration, Dark Archives, Preservation, Information Professionals, Archiving Institutions, Ethical concerns, Ghana.

Introduction

Academic institutions, by virtue of their mandate, functioning, operations, curriculum, activities, and engagement with stakeholders, generate knowledge that underpins sustainable growth and development. Ensuring the collection, documentation, management, preservation, accessibility, and usability of these knowledge systems provides numerous benefits to the community. Memory and heritage institutions, such as libraries, archives, and museums, are responsible for preserving records and materials of enduring

value while maintaining the historical, cultural, and informational context and content. Their primary role is to provide access to, and to preserve knowledge.

Academic institutions house vast volumes of data in various forms, often unfortunately stored 'in the dark', and inaccessible. Moore (2006) employed the term 'dark archives' to describe such collections of data or documents that are not easily accessible due to their format, lack of indexing or restriction on access. 'Dark archives' can also be used to describe repositories that store archival resources accessible to their custodians

(Moore, 2006), are failsafe copies of light archives (publicly available version of information for use in disaster recovery operations) or are used for the preservation of content that is accessible elsewhere. Containing originals or master files, dark archives can also be the collection of digital information within libraries, archives and museums which are digitized but not publicly accessible, hidden from search engines and online discovery tools due to various restrictions (Mark, 2011, Moore, 2006). Most dark archives contain rare, valuable and sometimes sensitive information.

Dark archives that are not only limited to digital information resources exist in libraries, archives, museums, galleries, universities, research centers, government agencies and private collections. Institutions such as the Library of Congress, the British Library, the National Archives and Records Administration, the Vatican Apostolic Archives, and the Smithsonian Institution, all have hidden, restricted or uncatalogued collections. Similarly, university libraries and special collections have physical dark archives. These contain a variety of materials, including institutional records and ephemera, scientific and technical collections, historical documents, audiovisual materials, artistic and cultural collections, photographs and visual media, manuscripts and personal papers, digital archives, research data, and data sets, amongst others. Often, these materials are segregated, and tracing a particular unit as a source of access becomes a challenge. They are unprocessed, inaccessible, and underutilised collections (Jaillant, 2022; Moore, 2006). Notwithstanding, they hold valuable knowledge that are useful. As Jaillant (2022) emphasizes, in the knowledge and digital economy, access to data, is a key priority. Thus, there is a need to create avenues for the management, use and preservation of dark archives.

One way universities across Ghana have done this is by establishing spaces and communities for knowledge sharing to increase the accessibility and visibility of research output which would otherwise remain unknown and inaccessible. Academic institutions, scholars and researchers are increasingly recognising the value of unlocking these dark archives to drive interdisciplinary research and learning that is collaborative, transparent, available and accessible through applicable innovation. Artificial intelligence (AI) has emerged as being able to better integrate tools into existing workflows and long-term preservation (Cox 2023; Jyoti, 2024; Sianturi, 2024). With the human factor guiding these processes, these AI tools can enhance previously challenging access and

preservation efforts.

As modelled conceptual frameworks used in human problem solving and decision making, these systems, according to Muhammad, Muhammad, Muhammad & Ahmad (2023), behave like humans and imitate their thought and resolve processes in problem solving. They also create and use computer programs that can solve problems and achieve goals like humans (McCarthy, 2007). Consequently, the AI technological advancement in the era of information explosion is intensely transforming institutions, industries and their operations. AI technologies are also directly transforming the educational landscape globally (Tella & Ajani, 2022).

Libraries keep evolving with emerging technologies by creating virtual spaces and resources for patrons to have access and use these resources also remotely. Cox (2023) establish that artificial intelligence has revolutionised organisations and in the library profession, it has become instrumental in transforming teaching, learning, research and facilitating academic pursuit on campus and off campus. Integrating artificial intelligence into library services is also a way of ensuring that users can access and use information resources without any limitation. Thus, the urgency to unlock dark archives in academic libraries and bring them to light. Human-AI collaboration in universities can enhance access to dark archives by leveraging AI tools to identify and manage sensitive information within digital collections (Eisbach, Langer & Hertel, 2023; Peng et al, 2024).

Locating its query at the University of Ghana's Institute of African Studies (IAS), the study explores how human-AI collaboration can be used as a transformative approach to unlock dark archives for research and teaching. The ensuing section looks briefly at the IAS library, providing background that contextualizes the problems identified by the study. The discussion then turns to the study objectives and the theoretical framework adopted to achieve them, after which it reviews literature pertaining to AI tools in archiving and human-AI collaboration to manage dark archives. The methodology adopted for the study, the presentation and discussion of findings, recommendations and conclusion then follow.

The IAS Library, its dark archives, and why they matter

The IAS Library is one of the satellite libraries of the University of Ghana library system (UGLS) which comprises the main library, Balme Library,

and all satellite libraries located in the university's institutes, colleges, schools and departments. These libraries acquire collections based on the curriculum and areas of specialty and research interest. The IAS Library supports the research-intensive IAS focused on postgraduate interdisciplinary studies in history and politics, language literature and drama, media and visual arts, music and dance, societies and cultures, religion and philosophy. Apart from the Library, other units within the Institute include the Ghana Dance Ensemble, J. H. Kwabena Nketia Archives and the Manhyia Archives whose programs and activities are deeply rooted in African culture.

The IAS Library serves IAS fellows (faculty and researchers) and students. However, because it is part of the UGLS, its activities mirror what is done at Balme library with which it liaises as a matter of course. Generally, the operations of the IAS Library are governed by UGLS policies, with some exceptions. The collections of the IAS Library are basically special collections on Africa, its people, and societies. Many of these resources are in the dark due either to their sensitive nature or their deteriorating state. Table 1 below shows the various formats and materials that are dark archives at the IAS Library.

Table 1: Categories of dark archives at IAS Library

Physical Materials	Print Materials	Audiovisual Material	Other Formats
Rare books and manuscripts	Unpublished theses and dissertations	Unreleased film footage	Microforms
Historical documents	Grey literature (conference proceedings, reports)	Unpublished audio recordings	Restricted access database
Photographs and negatives	Limited circulation publications (rare newspapers)	Restricted access video recordings	Unpublished dataset (research data management)
Artifacts and objects	Private letters and correspondence	Archival oral histories and traditions	Confidential business records
Film and audio recordings	Diaries and journals	Un-broadcast television and radio programs	Personal papers and ephemera

Source: Literature 2024

Although these materials cut across African countries, efforts are made to collect about and from Ghana. This emanates from the recognition of the impact that the preservation of knowledge has on cultural identity and historical narratives. The IAS library's dark archives, like other hidden collections within memory institutions, contain information that reflect societal values, identity, and history. In academic institutions such knowledge systems reflect through institutional records and archives, unpublished manuscripts and correspondence, research dataset, historical documents and photographs, cultural artifacts, emails, speeches and inaugural lectures, etc. Identifying this knowledge system requires employing collaborative strategies that include departments and units' input in the identification, collection and management process (Boamah, 2014). As academic institutions navigate the (digital) preservation discourse, addressing issues such as funding and technological obsolescence is fundamental to the

success of making dark archives accessible (Adu & Ngulube, 2017). Thus, creating sustainable models for resource allocation and training within memory institutions will play a key role in identifying dark archives and making them accessible.

The IAS library's special collections include precolonial and colonial newspapers, magazines such as *The Talking Drum*, oral traditions and original manuscripts of speeches, articles, and books from the 1920s to 1974. These rare collections are what give the library value in terms of richness and depth. While they are in high demand, especially from universities and historical researchers abroad, they are old and are deteriorating, slowly descending into unreachable dark voids. Digitizing to ensure accessibility and long-term preservations is undebatable. Other challenges exacerbate this delicate situation. Although these resources are available at the library, their accessibility and use are impeded due to lack of standardized metadata and cataloguing practices, personnel's lack of

expertise in digital preservation, lack of training for staff in digital know how, little to no collaboration amongst stakeholders, and inadequate infrastructure and access to hardware and software that is interoperable with AI technologies and the obsolete nature of the materials.

Resistance to change in workflows with the introduction or integration of any new system persist. The adoption of artificial intelligence technologies requires new skill set among information professionals (Sianturi, 2024; Stefka, 2024). These new skills set including artificial intelligence literacy and data management skills requires change, commitment, interest and time to learn away from the very traditional roles that staff are accustomed to. Furthermore, the lack of policy hinders the ethical use of these technological advancements. Policies may exist but are not localized to suit the type of infrastructure and systems that are available and applicable.

Researching dark archives: objectives and theoretical framework

In the face of these challenges, the study explored the transformative potential of human-AI collaboration to unlock dark archives in academic institutions and was guided by the following objectives:

1. To explore avenues to create digital copies of the library's rare collections that are deteriorating for continued accessibility and long-term preservation.
2. To examine the existing challenges faced by the library in managing dark archives.
3. To evaluate the impact of human-AI collaboration on the accessibility and usability of dark archives.
4. To address the ethical implications of using AI in archiving historical collections.

The Global Digital Compact (GDC) framework undergirded the study. According to the United Nations (2023), the global digital compact is an extensive framework for global regulation of digital technology and artificial intelligence (AI). This framework is based on the premise that digital technologies are advancing every aspect of the global economy (education, industry, health, agriculture, finance, culture etc.) and offer immense potential benefits for the advancement of people and society in achieving sustainable development goals. The goal is to recognize that technologies are creating possibilities. However, although the digital landscape is changing, it must be inclusive, open, fair, safe, secure and sustainable.

The global digital compact also emphasises

the need for collaboration and partnership with all sectors of the economy and all stakeholders within their respective roles and responsibilities for the digital future hoped for. As stipulated by the United Nations (2023), the objective is to ensure that digital technologies benefits all and are responsibly used while addressing the digital divide and fostering an inclusive and safe use. Four areas of the framework were identified as being most relevant to achieving the study's objectives, namely: inclusive framework; accessibility and affordability; information integration; data privacy and security (ethical considerations). Figure 1 below shows the adapted concepts from the framework.

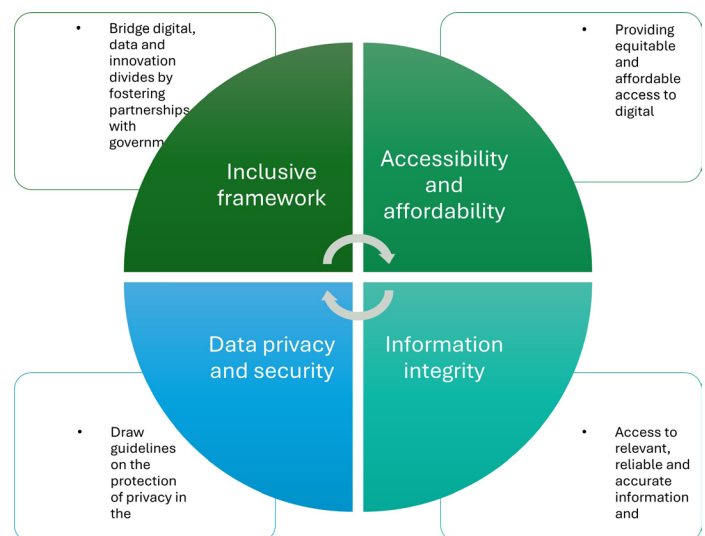


Figure 1: Adapted concepts from the GDC framework (2024)

Figure 1 depicts the inclusive framework focus on bridging the digital, data and innovation divide by fostering partnerships with government, private sector, technical communities, researchers and civil society. This is a very important aspect which requires input and support from the various stakeholders. Creating the needed infrastructure for the effective use requires partnership, expertise and commitment from all stakeholders. The digital infrastructure and its various components must also be affordable and accessible to benefit all. While information must be accessible, it must also be reliable and accurate. This is where the information professional plays a pivotal role. To ensure the ethical use of information for research, teaching, learning and decision making, there is the need to draw guidelines on the protection of privacy and security.

Technological innovations: AI tools for archiving

Both the scholarly literature and professional experience show that academic institutions must embrace technological innovations such as AI tools for archiving and preserving their digitized resources. In doing this, it is also important to consider the ethical implications of these technologies in relation to cultural representation and data integrity (Muhammed et al 2023; Lo, 2024). These efforts include scanning technologies, optical character recognition software, digital asset management, metadata standards and tools, cloud storage, automated tagging and classification systems, image recognition, archiving software, virtual reality (creating interactive digital experiences that allows users to interact with the information resources and materials innovatively), crowdsourcing and community engagement, content management systems, etc. (Cox, 2023; Cox & Mazumdar 2022).

The most significant aspect of AI systems is their innovative way of facilitating tasks and processes (Muhammad et al. 2023) and AI's contribution to various sectors cannot be overemphasized. It plays a crucial role in business digitalization by enabling the analysis of large data sets and predicting user behaviour, which leads to the development of more personalized and effective marketing strategies (Eisbach et al, 2023). It enhances operational efficiency, allowing businesses to focus on results while providing customers with relevant insights based on their preferences. However, the implementation of AI also raises ethical considerations and requires employee training, highlighting the need for a balanced approach to harness its benefits while addressing potential challenges (Michalak, 2023; Jeff, 2023). AI plays a crucial role in digitization by enhancing operational efficiency, optimizing processes, and enabling product and service customization. Its ability to analyze vast amounts of data allows organisations to make more informed decisions, driving competitive advantages in the marketplace (Kautonen & Gasparini, 2024). However, successful integration of AI requires a reorganization of business processes and attention to data privacy and security. Addressing these challenges is essential for organisations to fully leverage AI's capabilities in their digital transformation efforts, ultimately leading to improved profitability and adaptability in a rapidly evolving digital economy (Peng et al, 2024, Stella & Alina, 2024).

Artificial intelligence plays a crucial role in digitization by enhancing customer insights, enabling

predictive analytics, and automating campaign optimization (Arul & Anita, 2024). These capabilities allow organisations to tailor marketing strategies to individual preferences and behaviours, improving engagement and effectiveness. Additionally, AI-driven tools like chatbots streamline customer interactions, leading to cost efficiencies and better return on investment. However, the integration of AI also necessitates careful consideration of data privacy, algorithmic bias, and ethical implications, which must be navigated responsibly to fully harness its potential in the digital landscape (Muhammed et al 2023; Pankaj & Joyti, 2024). The integration of AI can refine processes like metadata creation and content categorization (Adu & Ngulube, 2017). This calls for training information professionals not only in the technical skills but also in digital literacy (Anandraj & Aravind, 2024; Cox, 2023; Pankaj & Jyoti, 2024).

Human-AI collaboration in managing dark archives

The era of open science does not only focus on the availability of information but dwells on its accessibility and usability. Access to data as opined by Jaillant (2022) is a key priority. Often dark archives in academic institutions are inaccessible because they are uncatalogued, not classified, unusable and not discoverable and even in instances when they are available and findable copyright becomes a major obstacle to access and use. This is where the human-AI collaboration becomes important. Academic institutions need to explore and harness the utilization of artificial intelligence to curtail the problem of access. Academic institutions can adopt strategies that not only enhance digital preservation but also prioritize access and use of rare collections. Institutions can capitalize on the use of personnel with the needed skills to work together through shared expertise for a sustainable outcome.

Artificial intelligence is reshaping the creation, use, management and preservation of information using machine learning and natural language processes to facilitate and create user's personalized experiences in a more productive and innovative way (Arul, 2024). In exploring the integration of artificial intelligence into the communication industry, Juliana (2024) concluded that artificial intelligence has tremendously transformed the media sector, improving productivity, personalization, and audience engagement across different media sectors in advertising, music, film and television, augment and virtual reality. By leveraging on this technology, they elaborated the importance

of artificial intelligence in contemporary media landscape ensuring that content creation, content moderation and consumption with the aid of artificial intelligence meets their audience expectations and enhances users' engagement. Notwithstanding, Erafy (2023) mentions algorithmic bias and privacy concerns as a critical challenge that requires attention and responsible governance in the implementation of artificial intelligence.

In transforming library services to meet modern and emerging trends in information dissemination, access and use, Pankaj and Joyti (2024) discuss a variety of artificial intelligence technologies including virtual assistants and intelligent cataloguing systems to automate procedures and provide customized services and assistance to users. Artificial intelligence technologies expedite operations and transform information dissemination and use across the digital landscape. Furthermore, artificial intelligence systems do not only save time for information professionals but also enhances decision making on resource allocation and collection development through AI insights. Artificial intelligence presents many benefits for academic libraries by transforming traditional library functions through information management, access and preservation. Digital curation and preservation of rare collections in the library has transformative potential and according to Anandraj and Aravind (2024), it revolutionizes the way knowledge is accessed and utilized using innovative solutions. These applications include advanced searching, discovery tools, virtual assistants, content recommendation systems, data analytics and digital preservation showing the impact on information management, access and dissemination.

Woefle et al (2024) benchmarked human-AI collaboration for systematic reviews and clinical trials using evidence-based appraisal tools and demonstrated that current large language models alone appraised evidence worse. They further explained that human-AI collaboration yielded high outcomes and valid results than using each model alone exhibiting reliable outcome, consistency and reduced workload with large inputs. Human-AI collaboration is a teamwork mechanism that produces an efficient outcome. According to Eisbach et al (2023), while AI requires and analyze large information (or dataset) to make recommendation on a phenomenon, the capabilities of humans examine and consider these recommendations as an integral part of decision making. In the event where AI algorithms produce biased outcomes or

false decisions, the supervision of humans can use a controlled mechanism to make informed decisions for a sustainable outcome. Thus, human-AI collaboration as stipulated by Eisbach et al (2023) must be optimized to produce accurate results.

Libraries can capitalize on intelligent technologies to transform their services as knowledge providers. Kautonen & Gasparin (2024) list digitization, discovery and information retrieval, support services for research and education, metadata production and validation, acquisition, collection development and institutional repository as some of the library services that can be improved with AI technologies. Expressing the concerns on the ethics of artificial intelligence systems, they conclude the need for human supervision to validate operations and services. To merit from the full potential of human-AI collaboration, Cox (2022) explained that, while AI technologies come with numerous benefits, it requires information professionals to reskill. These skills require not only digital literacy on AI application but to combine with the traditional roles of information professionals.

Minimizing the lack of transparency (black box) of AI, Peng et al (2024) stipulated that although human decisions can be sound or flawed, combining its capabilities with intelligent decision support systems improve the quality of decision making in organisations and maximize the potential of AI capabilities in minimizing the black box. Thus, the human mental workload in task decision behaviour was less daunting with AI support in information processing of large data and huge tasks. Sharing the same opinion with Woefle et al (2024), Peng et al (2024) elaborated that while AI systems expedite processes, its collaboration with humans produce accuracy in workflow and production. Focusing on ethics and policies, Michalak (2023) clarifies that information professionals play a key role in developing ethical AI policies and addressing the challenges of institutional resistance and lack of awareness that comes with its integration.

Challenges and opportunities in implementing AI in managing dark archives

Navigating the complexities of integrating AI technologies comes with technical challenges (AI infrastructure, data quality and training), ethical and legal issues (data privacy and security, intellectual property) and community engagement. Although artificial intelligence technologies enhance digital

preservation initiatives, unlocking dark archives using AI poses several challenges in different areas including technical challenges, human resource with the needed expertise, financial constraints, policy, lack of awareness and appreciation of dark archives, and ethical issues. It is important for academic libraries and institutions to accept the potential of AI and digital technologies not only to enhance preservation efforts but also to reshape the preservation of rare collections.

Technological advancement continues to drive many benefits for organisations. Nonetheless, just like any good venture, there is a flip side. The challenges of artificial intelligence are predominantly privacy and ethical considerations. In reshaping the library landscape, Pankaj and Jyoti (2024) enumerate challenges related to privacy, security and ethics as significant when integrating AI into library services and products. In addition, concerns about user data protection and the ethical implications of automated decision-making processes also exist. Stefka (2024) points out that the complexities and variability in academic institutions create challenges for effectively integrating AI technologies into library services necessitating a reimagining of traditional library roles to accommodate innovative advancement.

In terms of digitization and any digital preservation initiatives, challenges such as data quality issues can affect the accuracy and reliability of AI generated metadata and classification. Again, incompatibility of existing systems used with new AI applications is also a challenge in driving the digital landscape. Sianturi (2024) opined that the lack of infrastructure in libraries limits the adoption of AI and machine learning technologies making it difficult to implement them. Coupled with this, as Anandraj and Aravind (2024) indicate, is the requirement for huge investment in infrastructure. The perennial problem of limited funded faced by information professionals in academic institutions also impedes the integration of these technologies into the library's products and services, as does the lack of awareness among information professionals on the benefits and application of AI (Siantruri, 2024). Challenges of staff training, education and skill development also slows the adoption and use of AI technologies in academic libraries.

Methodology

Our study adopted a qualitative case study design underpinned by the interpretivist research paradigm, which emphasizes the understanding of social

phenomena from the perspectives and experiences of individuals situated within specific institutional and cultural contexts. This paradigm was particularly appropriate given the study's focus on how information professionals perceive and engage with AI in unlocking dark archives within academic institutions in Ghana. The qualitative case study approach enabled an in-depth exploration of contextual realities, institutional practices, and stakeholder experiences related to digital preservation and human-AI collaboration. The Institute of African Studies Library was selected because of the potential AI technologies could have in unlocking its dark archives. Additionally, the IAS Library is part of the University of Ghana's archiving ecosystem which possesses diverse archival holdings and emergent digitization practices, making it a rich site for examining the intersection of tradition and technological innovation.

Research Population and Sampling

The target population for the study consisted of key professionals involved in the management, preservation, and digitization of archival materials. A purposive sampling technique was employed to select participants who possessed both the experiential knowledge and operational authority to speak on archival processes and digital transformation within their respective units.

The final sample size comprised three participants, each holding a leadership position within their institutional domains. The justification for including each participant is outlined below:

1. Head Librarian of the Institute of African Studies (IAS) Library – Selected for their custodianship of rare and special collections, including historically significant newspapers, manuscripts, and oral traditions. Their insights were critical for understanding the access challenges and preservation needs associated with dark archives.

2. Archivist of the J.H. Kwabena Nketia Archives– Included based on their technical expertise in audiovisual archiving and prior experience in digitization projects. Their knowledge provided a valuable perspective on infrastructure readiness and the potential application of AI in managing legacy audio collections.

3. Head of the Digitization and Institutional Repository Unit at Balme Library – Chosen for their role in overseeing digitization workflows and managing the University of Ghana's institutional repository (UGSpace). Their position offered systemic insights

into technological integration, metadata practices, and institutional barriers to AI adoption.

The Nketia Archives archivist and the head of the digitization unit also oversee material similar to the IAS Library's dark archives and thus are well placed to advise on how to bring these to light.

Data Collection Procedures

Data were collected through semi-structured interviews, which offered both structure and flexibility, allowing participants to elaborate on their experiences, practices, and perceptions. Questions included: what are the "dark archives" in your unit, and what efforts have been made to make them accessible? How are current digitization activities managed, and what challenges do you face? In what ways, if any, have you explored or implemented AI technologies in archival workflows? What collaborative mechanisms exist between departments in the management of archival materials? Additionally, secondary data such as institutional reports, digitization project documents, and policy briefs were reviewed to supplement and triangulate the primary findings.

Data Analysis

The data were analyzed using thematic analysis, guided by Clarke and Braun's (2014) framework. Following transcription, interview data were coded inductively to capture recurring concepts, expressions, and narratives. These codes were iteratively reviewed and refined into overarching themes aligned with the study's objectives. Emerging themes included: "preservation vs. access dilemma," "readiness for AI integration," "ethical and policy gaps," and "cross-departmental collaboration." The credibility and trustworthiness of the analysis were ensured through triangulation with secondary data sources, member checks with participants to validate interpretations, and a reflexive approach that acknowledged the positionality of the researcher as both observer and analyst.

Unlocking possibilities: insights from respondents

It was important to know the nature and characteristics of the materials that were kept in the dark at the IAS library. The librarian explained the unique nature of some of the rare collection of materials to include rare newspaper collection (colonial and precolonial times), and rare books (bounded copies of oral traditions). Table 2 below depicts the various categories of rare collections at the institute.

Table 2: Rare collections at the Institute of African Studies Library

Rare collections at the Institute of African Studies Library	
Rare newspaper collection	These collections consist of colonial era newspapers as well as post-colonial times. They are a rich source of colonial history and contains bits and pieces of information that occurred during those periods. The most remarkable thing about this primary source of information is that they are out of print and irreplaceable
Rare Books	This bounded collection contains the traditions and histories of some selected towns in Ghana (Asanti, Fanti state, Techiman traditional state)
Audiovisuals	Audio records and collections of some oral histories and traditions of some selected towns in Ghana (Asanti, Fanti state, Techiman traditional state)

Source: Field data, 2024.

The list in table 2 shows the nature of rare collections available at the library. From discussion with the librarian, it was revealed that these materials are rich in content. They were the original copies and only available in the IAS library. The uniqueness of the newspaper collection is that they are out of print and irreplaceable. According to the librarian,

"our collections are in high demand and they attract researchers from all over the world. We are the only institution that have access to these materials. Some researchers and scholars travel all the way from Europe, America and other parts of Africa just to access the collections for their research. If we have them digitized, it will save them the stress and time of coming all the way here."

For now, access can only be granted within the library under strict supervision due to the deteriorating nature of some of the documents, especially the newspaper collection. Even with the bounded oral traditions, the content is fading, the documents have

become brittle and biological deterioration is setting in on most of the documents.

Elaborating on this point, the librarian emphasized that:

"Anytime people request to use these rare materials, we are strict and monitor how they handle them. Even with these foreigners who request them the most, we require them to bring letters from their institutions together with their identity cards before we give them access. Most of the documents are deteriorating and we can't afford to lose them. We better restrict access to them, than to completely lose them. These collections are what makes us unique globally."

The focus is to bring these dark resources to light. In view of this, it was established through interviews with the heads of IAS's J.H.Nketia Archives and the Balme Library's digitization and institutional repository unit that they have the experience, resources and expertise to assist the IAS Library achieve this. For example, they have robust infrastructure to digitize the audio and video recordings of the oral traditions. The Nketia Archivist was enthused about collaborating with the IAS Library to digitize its colonial and postcolonial documents as the Nketia Archives had itself benefitted from such institutional collaborations. According to the archivist,

"Some of the strides the Nketia Archives had made [has come from] specifically our collaboration with New York University's Audiovisual Preservation Exchange (APEX) and the Moving Image Archiving and Preservation (MIAP) program at the Tisch School, which supported the digitization of our audio reel-to-reel tapes."

Furthermore, through subsequent partnerships the Nketia archives have acquired flatbed scanners, facilitating progress with the digitizing of their photographs. Altogether, this has allowed the Nketia Archives to unlock a lot of their materials that would have otherwise remained in the dark and been inaccessible because they were deteriorating, were in obsolete formats, or were simply not known to exist. To this end the archivist has been "advocating for metadata and basic access information to be made available through the University of Ghana's website." Video digitization at the Nketia Archives, however, remains outstanding.

When asked about deploying AI tools in unlocking dark archives, the archivist, while conceding the potential usefulness of AI in archival workflows,

stated,

"my emphasis has always been on moving from analogue to digital access before applying advanced tools like AI."

At IAS, the librarian and archivist work closely together. It was revealed that there were some instances when researchers requested materials through the archivist and the next point of call, if they were not available at the archives, was the library. Oftentimes, when what was being sought after were the colonial newspapers, magazine and rare books, this referral to the library turned out to be productive for the researchers. However, some of these popular materials are not in the best preservation state.

With regards to what could be done about the deteriorating condition of the bounded copies of the rare books and newspaper collection, the head of the digitization and institutional repository unit at Balme library maintained,

"This is doable, we have digitization equipment for various types and sizes of documents. However, the IAS library must create a budget for it because a part of the newspaper scanner has broken down and so if we must digitize them, then the institute must purchase the part for us"

As to where the digitized material would live, the head of the digitization and institutional repository unit responded,

"we can create a community within the UGSpace (institutional repository) to store all the digitized content and create a link that can be shared for access to these collections at a fee from people outside of the university community. This can also help boost internally generated funds while preserving your collections."

The researchers further probed whether the institutional repository unit had considered any AI technology to make their contents more discoverable, accessible and user friendly. The response reflected the challenges faced in resource-strapped environments:

"At the moment we have not integrated any AI tool to facilitate our workflow. We are still discussing with management the essence of it and how it can increase the patronage of our resources. However, you know how funding issues are at the university. Even the software upgrades for some of our machines have not been acquired and so although we have all these digitization equipment in place, most of them are redundant. We need new machines

that integrates AI into the workflow to make us more efficient and productive. We can generate funds from our services if our systems are current and reliable."

The interviews demonstrated that all the participants were open to the adoption of AI in their operations and services. However, the issue of funding and approval by management was a concern. All the participants were committed to work together using their expertise and resources so as to 'shine some light in the dark'.

Exploring human-AI collaboration as a transformative approach

With the evolution of AI systems, integrated innovations into academic library services has become a mandate in institutions of higher learning. As Mohammed et al (2023) conclude, these innovative technologies have simplified tasks and processes, making them easier. It has become necessary for academic libraries to bring their more fragile and deteriorating rare collections, such as the IAS Library's bounded newspaper, into the light. This can be done through both digitization, utilizing AI tools and appropriate metadata to make these rare materials searchable and usable. Although the rare collections at the IAS Library were in high demand, their fragile and deteriorating nature was of much concern to the librarian. Notwithstanding this, the head of the institutional repository and digitization unit together with the Nketia Archives archivist were willing to partner and safeguard these collections. This hearkens to the inclusive framework of the global digital compact, with the willingness to collaborate being key to any integration effort and the digital future hoped for. Furthermore, as Jaillant (2022) stipulates, cross disciplinary collaboration is needed to solve the problem of dark archives.

The librarian's perspective was informed by the fact that the IAS Library has rich collections of historical value that were kept in the dark not as failsafe copies, but because of their deteriorated state. The fear of losing them due to making them accessible for use was always lingering. It is thus imperative to use innovative technologies to not only preserve them but to also make them available for use upon request. The urgency to digitize these collections cannot be overemphasized. Concurring with Muhammad et al (2023), integrating AI into library services will encourage and support intelligent decision making. It was established that although the library and archive

units have machines for creating digital contents of rare collections and audiovisual materials respectively, they have not integrated AI systems into the workflow. Participants agreed that AI systems are useful to the products and services they manage and provide.

The use of AI tools according to Jaillant and Rees (2022) facilitates access to large dataset, data analysis and visualization, scalability and supports preservation efforts (predictive maintenance, format migration, long-term preservation and accessibility). Muhammad et al (2023) provided insights on how AI effectively assist in curating digital collections and expanding access to variety of resources. At the University of Ghana, the integration of AI into administration, teaching, and research was still at the discussion stage. The closest users get is a feel of how these systems work with some of the subscribed databases, using it as an effective discovery tool. The resources that had been digitized were not as sharp and clear as the original copies. It was obvious that the scanning technologies that were used did not have high resolution and 3D scanning. Although the respondents acknowledged how AI give users an engaging experience, their existing system and infrastructure available did not allow users to innovatively engage with the materials. It was concluded that pushing for the integration of innovative systems would be easier when management pushed for such integration compared to driving these initiatives from units and departmental levels which requires both time and lobbying for management buy-in and approval.

The information professionals showed interest in adopting AI technology for their operations. However, their biggest concern was the capital-intensive commitment that comes with it. Lo (2024) establishes that information professionals must adopt strategies that caters for reskilling in integrating or adopting new technologies. Jaillant (2022) rightly states that apart from costs, access and skills gap as well as the volume of digital archive remains a challenge. Information professionals must not only provide training and support in deploying new tools but make room to integrate these trainings into their workflow to provide practical training methods that would not require additional time and resources. Another major concern was the ethical use of AI and policies that governs its fair use. Privacy and data concerns persist, and Lo (2024) confirms that, without doubt, it is important for information professionals to ensure the fair, unbiased and transparent use of AI. This can be achieved by implementing control systems and data encryption to

ensure privacy (Stefka, 2024; Sianturi, 2024; Pankaj & Joyti 2024; Anandraj & Aravind, 2024).

Despite the capabilities of AI to perform unimaginable tasks with data and transform them into simplified results, Jaillant and Rees (2022) posit the lack of trust in these technologies that sometimes create risky and unsafe situations, algorithm bias, data protection, sensitivity, national security and copyright issues. Coupled with these are the financial constraints that cause most academic institutions not to embark on the digital transformation journey to enhance research discoverability and user experiences. Technology bias is also a concern although this was not raised by the respondents. Our findings concur with Rolan et al (2019) that, despite the many benefits of AI, the cost and time needed, skills and difficulty in adopting and integrating AI with human-oriented tools in providing access and preserving digital contents together with data and technology migration remains a challenge in academic institutions. Notwithstanding, the use of AI tools enhance users experience by increasing usability and searchability.

When users come to the library to access the resources available, they also need their privacy and comfort in navigating the information gathered. Restricting access to certain collection due to its deteriorating state, makes the library lose its mandate as the knowledge hub of the institution. The need for digital curation and preservation of these rare collections in the age of AI advancement in discovery tools, virtual assistants, advance searching, content recommendation systems and data analytics has a transformative potential on users' experiences. As Anadray and Aravind (2024) state, it has revolutionized the way knowledge is utilized and accessed.

Recommendations for information professionals

Technology continues to drive change in the global economy and organisations are keeping abreast with this advancement. The integration of AI into existing library operations and automation will not only give information professionals a competitive edge but also enhance efficiency and productivity in their service provision and delivery. The most significant aspect of AI is reducing repetitive tasks and allowing information professionals to focus on more complex tasks.

Partnerships with faculty, schools, departments and units encourages collaborative projects while utilizing innovative methods (Mattone & Frullo, 2022). Prioritizing inclusive practices can create a

dynamic archiving environment where technology serves as a bridge between the past and present, ultimately enriching the collective memory and identity. Community engagement through workshops and events can further strengthen connections that can inspire creativity and innovative research in various discipline fostering a dynamic dialogue that bridges the gap between history and modernity. These engagements and partnerships can also lead to a deeper understanding to explore how historical information shapes peoples' perspectives and research interest that reflect contemporary experiences rooted in the past.

Information professionals can promote digital literacy education and ethical awareness among users (Muhammad et al, 2023). Education can be adopted from best practices around the world outlining policies governing the ethical use of artificial intelligence for transparency and equitable access to information. International organisations such as the European Commission (EC), the Organization for Economic Cooperation and Development (OECD), and the United Nations Educational, Scientific and Cultural Organization (UNESCO) have all developed policy frameworks focusing on technology globally. National policies for the adoption of these technologies in Ghana is still ongoing. This should, however, not deter institutions to develop their own local frameworks that takes into account their unique activities, products and services.

Unlocking dark archives, especially with document-based materials, requires digitization to create digital content that can be widely accessible and used. The use of AI in the digitization process is seen as a way of facilitating and disseminating information resources. These efforts, when integrated with AI, according to Erafy (2023), create a transformation in information distribution and consumption leading to an enhanced user engagement, creativity, efficiency and satisfying users information needs in a more profound way. Using AI in the information sector fosters a comprehensive understanding of the potential trajectories including the accompanying technological bottlenecks that can be at play.

The human-AI collaboration is critical. By ratio, AI systems offer enhanced discoverability and classification, automated translation and transcription, preservation and restoration and interactive research capabilities. However, when it comes to ethical accessibility and governance of data (information), humans provide the moral and contextual oversight to minimize inadvertent exposure of sensitive and

restricted data, thus promoting the ethical and meaningful access and use of data, creating a strong partnership that avoids algorithm bias and promotes the ethical use of data.

Conclusion

As academic institutions seek to enhance access and engagement with their collections, integrating emerging technological initiatives is needed. By fostering partnerships that advocate for the preservation of rare materials using their available technologies, expertise and resources, they can create a knowledge hub with resources that are discoverable, accessible and user friendly, away from the traditional perspective of information management and preservation. By collaborating and partnering with various units and expertise, information professionals will transform their institutions from static repositories to create an environment, resources, collections and dynamic spaces for learning and research. These partnerships can provide a blueprint for institutional policy and frameworks for the ethical use of AI.

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