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SUMMARAI: TRANSFORMING ACADEMIC LIBRARIES WITH INTELLIGENT KNOWLEDGE SUMMARISATION

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ABSTRACT
This paper introduces SummarAI, a generative AI framework designed to help academic libraries manage the explosion of digital content. By leveraging Large Language Models (LLMs), SummarAI automates abstract generation, enriches metadata, and provides personalized research summaries, transforming libraries into proactive knowledge hubs. Through global and Indian case studies, the study demonstrates how AI streamlines workflows and enhances discoverability. However, it also addresses critical challenges, including algorithmic bias, copyright ethics, and infrastructural readiness. The authors propose a hybrid implementation strategy—combining AI efficiency with human validation—and advocate for policy-guided adoption through networks like INFLIBNET. Ultimately, SummarAI offers a strategic roadmap for libraries to evolve into dynamic, tech-driven centers of innovation.

Keywords: *SummarAI, Generative AI, Knowledge Summarisation, Academic Libraries, Large Language Models, Digital Scholarship, Metadata Enrichment*

Introduction

The 21st-century academic library landscape has changed due to the exponential rise of scholarly publications, digital repositories, and online learning materials. Libraries must manage enormous information holdings while guaranteeing timely and relevant access for their patrons, given the millions of articles, theses, and research outputs published each year. Even if they are useful, traditional cataloging, indexing, and abstracting techniques are becoming less and less able to handle the size and complexity of contemporary information ecosystems. Innovative solutions that can improve discoverability, lessen cognitive load, and enable researchers, instructors, and students to explore knowledge more skillfully are desperately needed in light of this information deluge.

Large language models (LLMs), a type of generative artificial intelligence (AI), have emerged as a game-changing technology that can solve these problems. Generative AI uses deep learning to create human-like, context-aware summaries of complicated texts, in contrast to previous rule-based or extractive summarization systems. Academic libraries may provide individualized, effective, and user-focused knowledge services by using generative AI to synthesize content into succinct, cohesive abstracts. This transformation reflects a conceptual shift in the way libraries choose, distribute, and facilitate scholarly communication rather than just a technological advancement.

There are several advantages to using generative AI into academic libraries. By supplying abstracts for papers without them, automated summarization can improve institutional repositories, expedite metadata development, and simplify cataloging procedures. By condensing difficult works into understandable formats, AI-driven summaries help academics save time, enhance comprehension, and promote multidisciplinary investigation. Generative AI serves as an augmentation tool for libraries, eliminating tedious work and freeing up professionals to concentrate on higher-order duties like policy creation, information literacy training, and ethical supervision. However, there are important concerns with the use of generative AI. To guarantee responsible implementation, issues with accuracy, prejudice, intellectual property rights, and ethical use must be carefully considered. Libraries must strike a balance between the effectiveness of AI-driven procedures and the requirement for contextual judgment and human validation. Furthermore, professional upskilling, digital literacy, and infrastructure preparation continue to be crucial for successful integration.

The purpose of this research is to investigate how generative AI can be used in academic libraries for automated knowledge summarization. It looks at the technological underpinnings of LLMs, their useful uses in library settings, and the advantages and difficulties of using them. The study intends to offer a comprehensive understanding of how generative AI may be strategically exploited to rethink university libraries as dynamic knowledge innovation hubs by examining case studies, emerging practices, and policy frameworks. In the end, the article makes the case that generative AI should be seen as a potent augmentation tool that improves

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librarians' ability to provide more intelligent, quicker, and inclusive knowledge services in the digital age rather than as a replacement for them.

Literature Review

Numerous studies have examined the digital transformation of academic libraries, with researchers highlighting the necessity of cutting-edge systems to handle the exponential growth of intellectual content. Conventional summarization methods, such keyword indexing and manual abstracting, have long been essential to library operations. However, these approaches are becoming less and less sufficient to handle the volume and variety of contemporary scholarly resources. (Chen & Li, 2025).

Traditional Approaches to Summarisation

Previous methods of text summarization depended on extractive techniques, in which summaries were created by selecting essential sentences from documents. Although useful in some situations, extractive summarization frequently lacked consistency and was unable to convey subtle meaning. It was difficult for libraries using these methods to provide succinct but thorough abstracts for huge collections. Although precise, manual summarization required a lot of time and resources, which limited its scalability in digital systems. (Kumar & Singh, 2024).

Generative AI's emergence

Large Language Models (LLMs) and Generative AI have completely changed summarization techniques. LLMs use abstractive summarization, which creates new sentences that encapsulate the main ideas of the original material, in contrast to extractive approaches. This feature improves user comprehension by enabling summaries that are more human-like and context-aware. Research shows that generative AI can greatly enhance academic libraries' ability to create metadata, abstracts, and personalized information offerings. (OpenAI Research Team, 2023).

Uses in Academic Libraries

Numerous uses of generative AI in library settings are highlighted by recent research. Abstracts for theses, dissertations, and research publications can be produced using automated summarization algorithms, enhancing institutional repositories. Resource discoverability and cataloging efficiency are both improved by AI-driven metadata development. Additionally, users can receive customized summaries depending on their study interests through personalized summarization services, which lessens information overload and promotes interdisciplinary exploration. (Srinivasan & Rao, 2025).

Advantages and Possibilities

Academic libraries can benefit from generative AI in a number of ways. By offering succinct, pertinent information, it shortens the time needed for summarization, makes difficult texts more accessible, and improves user experience. By implementing AI-driven summarization, libraries may reallocate human resources to higher-order tasks like creating ethical rules and educating users in digital literacy. (IFLA, 2024).

Frameworks for Policy and Implementation

International organizations like IFLA (2024) and UNESCO (2025) have released guidelines for the responsible use of AI in libraries. These paradigms emphasize responsibility, inclusion, and openness in AI-driven processes. Infrastructure preparedness, professional upskilling, and capacity building are necessary for successful implementation. To strike a compromise between efficiency and ethical responsibility, hybrid approaches that combine AI automation with librarian experience are advised.

Practical Applications of Generative AI in Libraries

The integration of Generative AI (GenAI) redefines how academic libraries manage information, shifting from manual processing to automated, user-centric knowledge services.

Enhanced Discoverability and Metadata

GenAI addresses the "hidden knowledge" problem by automatically generating abstracts for theses, dissertations, and grey literature that lack summaries. It further streamlines cataloging by extracting keywords and subject headings, ensuring consistent metadata enrichment. Indian case studies (Kumar & Singh, 2024) indicate that AI-assisted cataloging significantly reduces manual workloads while increasing retrieval accuracy.

Tailored Research and Digital Scholarship

AI enables Personalized Information Services by synthesizing summaries based on a researcher's specific field. For instance, a single paper can be summarized through a technical lens for engineers or a theoretical lens for

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humanities scholars. By integrating these tools into Institutional Repositories, libraries can accelerate digital scholarship, allowing researchers to scan vast quantities of literature rapidly (Glickman & Zhang, 2024).

Pedagogy and Literacy Support
Libraries are utilizing GenAI as an educational tool to help students break down complex academic texts into digestible summaries. This supports information literacy programs by providing comparative models for critical analysis. Furthermore, global practices (IFLA, 2024) highlight the use of AI to make specialized knowledge more accessible to non-expert audiences, supporting open-access initiatives.

Global and Local Case Studies
International Trends: Libraries in North America and Europe are currently piloting hybrid workflows where AI generates preliminary data for librarian verification (IFLA, 2024).

Indian Context: Collaborative platforms like INFLIBNET and DELNET offer a framework for shared AI models, allowing institutions to pool resources and improve summary quality across diverse datasets (Srinivasan & Rao, 2025).

Ethical and Professional Oversight
Regardless of technical sophistication, human-in-the-loop validation remains a constant. Librarians serve as the final gatekeepers, ensuring that AI-generated summaries are free from bias, accurate in context, and compliant with intellectual property rights.

Challenges and Limitations of AI Adoption

The integration of generative AI into library workflows presents several systemic challenges that must be addressed to ensure academic rigor and institutional integrity.

Intellectual Integrity and Accuracy
The most significant technical barrier is the tendency for LLMs to produce "hallucinations"—factual inaccuracies presented as truth. Unlike human librarians, AI often lacks the nuanced contextual judgment required for complex scholarly texts. Furthermore, because models are trained on existing datasets, they often inherit linguistic and cultural biases, potentially marginalizing non-Western academic traditions and undermining the library's commitment to diversity.

Legal and Ethical Governance
The use of AI-generated content complicates intellectual property and copyright frameworks. Issues regarding plagiarism and the ownership of AI-synthesized abstracts remain legally ambiguous. To mitigate these risks, libraries require localized governance policies that align with international standards (e.g., IFLA, 2024), ensuring transparency and accountability for AI-driven outputs.

Resource and Infrastructure Disparities
Implementation is resource-intensive, requiring high-performance computing, secure data storage, and expensive licensing. This creates a digital divide, where libraries in developing regions may struggle to afford the necessary infrastructure. Additionally, the high energy consumption of LLMs poses a challenge to institutional sustainability goals, requiring a shift toward "Green AI" practices.

Human Capital and Trust
The success of AI depends on professional preparedness. Without robust training in AI literacy, staff may either over-rely on or unfairly dismiss these tools. Furthermore, building user trust is paramount; scholars may be hesitant to use AI summaries if they perceive them as lacking the rigor of human-curated metadata. Maintaining a human-in-the-loop model is essential to validate outputs and maintain professional standards.

Implementation Strategies for AI Integration

Successful implementation requires a balanced approach that aligns technological innovation with institutional values. The process can be categorized into four key pillars:

Technical Infrastructure and Collaboration
Libraries must develop robust, cloud-based architectures to support AI integration. This includes deploying APIs and plug-ins that link AI engines with existing library management systems and institutional repositories. To manage costs, libraries should leverage consortium models (e.g., INFLIBNET), allowing institutions to pool resources and share datasets for model training.

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The Hybrid Workflow Model
Rather than replacing human expertise, libraries should adopt a human-in-the-loop workflow. In this model, AI automates the generation of preliminary metadata and summaries, while librarians serve as ethical supervisors, validating outputs for accuracy, bias, and academic relevance. This ensures professional standards are maintained while increasing efficiency.

Ethical Governance and Oversight
Clear policy frameworks are essential to manage data privacy, intellectual property, and algorithmic transparency. Establishing AI Ethics Committees allows libraries to monitor outputs for bias and ensure compliance with international guidelines (IFLA, 2024). Additionally, libraries must adopt Green AI practices, selecting energy-efficient servers to minimize the ecological footprint of high-compute tasks.

Professional Development and User Engagement
Capacity building is critical; librarians require training in AI literacy and prompt engineering to manage these tools effectively. Furthermore, a phased adoption strategy—starting with pilot projects—allows for iterative improvements based on user feedback. Transparent workflows help build patron trust and ensure that AI services meet actual research needs.

Future Trajectories of AI in Academic Libraries

As generative AI matures, libraries must transition from passive repositories to proactive digital leaders. The following trends define the future of this transformation:

Advanced Content Delivery & Discovery
Future systems will move beyond text to multimodal summarization, synthesizing information from video, audio, and visual archives. When integrated with AI-powered recommendation engines, these tools will provide highly personalized discovery paths, shifting the library's role toward "knowledge facilitation" (Kim, 2025).

Collaborative & Specialized Infrastructure
To optimize costs and data quality, libraries will form AI consortia (e.g., DELNET, INFLIBNET) to train shared models. The evolution of Domain-Specific LLMs—trained specifically on scholarly literature—will ensure that AI outputs meet rigorous academic standards for accuracy and context (Shakudo, 2025).

Human-AI Symbiosis & Literacy
Rather than replacing staff, a Human-AI Collaboration model will emerge. Librarians will act as ethical supervisors and validators of AI outputs. Simultaneously, libraries will expand Digital Literacy Programs, teaching patrons to critically evaluate AI biases and use generative tools responsibly.

Ethical Governance & Sustainability
Future frameworks will prioritize transparency and intellectual property protection (Oxford University, 2024). Additionally, libraries will adopt "Green AI" practices, focusing on energy-efficient servers and sustainable cloud providers to mitigate the environmental impact of large-scale computation (Raghavendra et al., 2025).

Transition to Global Innovation Hubs
By integrating summarization, ethical oversight, and interdisciplinary support, libraries will redefine themselves as Global Knowledge Innovation Hubs. This evolution ensures they remain central to research and digital scholarship in the 21st century (Boateng, 2025).

Conclusion

Academic libraries currently face previously unheard-of difficulties in maintaining, curating, and sharing knowledge due to the explosive expansion of scholarly publications and digital resources. Even though they are useful, traditional summarization techniques are becoming less and less able to handle the volume and complexity of contemporary academic information. Large language models (LLMs)-powered generative artificial intelligence (AI) provides a revolutionary approach by automating knowledge summarization and improving accessibility, efficiency, and customization. The potential of generative AI in academic libraries has been examined in this research, with a focus on its uses in digital scholarship support, automated abstract production, metadata enrichment, and tailored information services. AI-driven summarization can greatly enhance discoverability and user experience, establishing libraries as proactive information facilitators rather than passive repositories, as case studies from both international and Indian contexts show. Simultaneously, the study has critically analyzed the obstacles and constraints associated with the implementation of generative AI. Accuracy, prejudice, ethical issues, infrastructure preparedness, and sustainability continue to be crucial

components of responsible implementation. The necessity of human monitoring is highlighted by the possibility of hallucinations, copyright violations, and an excessive dependence on AI outputs. In order to validate outputs and guarantee contextual relevance, librarians must continue to be at the center of AI workflows. Libraries may responsibly integrate generative AI through implementation tactics include professional training, policy formulation, pilot projects, hybrid workflows, and collaborative platforms. The basis for effective integration is further reinforced by user involvement, sustainable practices, and ethical oversight bodies. These tactics guarantee that AI functions as an enhancement tool, enabling rather than displacing librarians.

Future directions include collaborative AI platforms, multimodal summarization, integration with recommendation systems, and specialized domain-specific LLMs. Libraries will increasingly serve as centers for information innovation, using AI to provide services that are more intelligent, quicker, more inclusive. In order to ensure that technological innovation is in line with the goal of equitable information dissemination, ethical governance, sustainability, and digital literacy will continue to be essential foundations.

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