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4. AI-Based Cataloguing: Transforming Library Science

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Abstract

The proliferation of digital resources in libraries has heightened the need for advanced cataloguing solutions. Artificial Intelligence (AI) offers transformative potential for library cataloguing, improving efficiency, accuracy, and resource discoverability. This research paper analyses the evolution, applications, benefits, challenges, and future directions of AI-driven cataloguing systems, drawing on case studies and recent research. Through critical synthesis, the paper also discusses ethics, human-AI collaboration, and scalability, providing a comprehensive scholarly foundation for understanding AI-based cataloguing within the library domain.

Introduction

Cataloguing—the process of organising, describing, and classifying library materials—forms the backbone of traditional library science, enabling efficient information retrieval for users. Historically, cataloguing relied on extensive manual labour and standardised schemes such as the Dewey Decimal Classification (DDC) or Library of Congress Classification (LCC). However, exponential growth in digital content, multilingual collections, and multimedia has stretched traditional cataloguing methods to their limits (Soumendu Roy et al., 2024). Artificial intelligence (AI), comprising technologies such as machine learning (ML), natural language processing (NLP), and deep learning, has emerged as a promising avenue for automating and optimising cataloguing processes (Midde, 2024). This paper examines the integration of AI into cataloguing, highlighting recent advances, real-world implementations, challenges, and the ethical landscape.

Background and Emergence of AI in Library Cataloging

Traditional Cataloguing Systems

Before AI's advent, cataloguing was an intricate, labour-intensive process. Catalogers assigned metadata manually, often spending considerable time and effort—not only on initial cataloguing but also on maintaining consistency across records (Kisilowska-Szurmińska, 2025). Errors, subjective judgments, and evolving information standards frequently resulted in inconsistencies.

Rise of AI in Library Science

With ongoing digitization and the surge in digital materials, AI technologies were gradually introduced to alleviate catalogers' burdens. Modern AI approaches leverage NLP for text



analysis, ML algorithms for pattern recognition, and deep learning models to enhance prediction and automate metadata generation (Potter & Saccucci, 2024; Midde, 2024). Early experiments incorporated rule-based automation, but breakthroughs came with neural networks capable of sophisticated classification and semantic understanding (Soumendu Roy et al., 2024).

Applications of AI in Library Cataloging

Automated Metadata Generation

AI-powered systems now routinely analyze full-text documents to generate comprehensive catalog records, including subject headings, summaries, and keywords. For instance, ML models trained on large corpora of cataloged records can assign DDC or LCC codes, author fields, and other metadata, dramatically accelerating workflows (Midde, 2024).

Natural Language Processing for Subject Analysis

NLP allows systems to break down queries and text into semantic units, supporting the extraction of nuanced subject headings and descriptors. AI's capacity for context comprehension far exceeds legacy keyword-matching systems, improving the discoverability and relevance of search results (Soumendu Roy et al., 2024; Dobreski, 2025).

Ontology and Taxonomy Enhancement

AI can dynamically map materials to emergent knowledge structures, automatically suggesting appropriate anthologies, relationships, and tags as new terms or topics arise (Annif, 2024). This adaptability is vital for interdisciplinary collections and rapid subject evolution.

Real-World Case Studies

- The New York Public Library has incorporated ML-based cataloging for rapid processing of new acquisitions, realizing major timesaving and standardization benefits (Midde, 2024).
- The British Library leverages NLP to enhance search interfaces and improve patron engagement (Midde, 2024)[2].
- The Library of Congress' experiments with Large Language Models (LLMs) resulted in high accuracy for some metadata fields when paired with cataloger oversight, exemplifying the "human-in-the-loop" (HITL) paradigm (Potter & Saccucci, 2024).

Benefits of AI-Powered Cataloging Systems

Efficiency Gains

AI automates routine, repetitive tasks, enabling large-scale cataloging in far less time than traditional processes. Studies consistently report significant reductions in cataloging time for



new digital materials (Soumendu Roy et al., 2024; Midde, 2024). Automation allows cataloging staff to focus on specialized and value-added functions.

Improved Accuracy and Consistency

By learning from vast training datasets, AI systems reduce human errors, improve consistency in metadata, and ensure standardized application of cataloging rules (Roy et al., 2024). Automated systems have also demonstrated lower variance in field completion and subject assignment (Dobreski, 2025).

Enhanced Discovery and User Experience

AI-driven cataloging results in richer metadata and more powerful search capabilities. Semantic search and recommendation systems provide intuitive access, linking resources by meaning and context rather than mere keyword similarity (Kisilowska-Szurmińska, 2025). For example, a conversational AI interface enables users to search using natural language queries and get precise, tailored results (Milde, 2024).

Challenges and Limitations

Algorithmic Bias and Data Quality

While AI systems excel at pattern recognition, inherent biases in training data can be perpetuated or even amplified (Soumendu Roy et al., 2024). Bias in subject headings, cultural representation, or language can lead to systemic inequities.

Data Privacy and Security

Automated cataloging may process sensitive information, introducing concerns about data privacy and compliance. Proper security protocols and data stewardship are essential (Kisilowska-Szurmińska, 2025).

Human Oversight and Ethical Considerations

AI outputs must be reviewed for errors or omissions. The Library of Congress, for example, found that although LLMs achieved up to 90% accuracy in some fields, human judgment remains crucial, particularly for nuanced subject analysis (Potter & Saccucci, 2024). The profession emphasizes a “human-in-the-loop” approach to maintain accountability and ethical standards (Annif, 2024).

Technical Constraints

AI cataloging tools currently perform best with text-rich, structured documents. Multilingual resources, multimedia, and legacy items lacking digital surrogates remain challenging (Dobreski, 2025). Standardization and interoperability with existing cataloging systems such as MARC21 and BIBFRAME present further hurdles.



Human-AI Collaboration

Rather than replacing catalogers, AI is expected to augment human expertise. Libraries are developing collaborative workflows where AI suggests metadata, while catalogers validate or refine the results. This approach not only improves speed and accuracy but also up skills library staff for evolving roles (Potter & Saccucci, 2024).

Ethical and Societal Implications

AI deployment in cataloging raises important ethical questions:

- How can libraries ensure fair and unbiased representation across their metadata?
- Who is accountable for errors in AI-generated records?
- What steps can be taken to protect user and data privacy in AI workflows?

The field emphasizes transparency, regular audit of algorithms, and stakeholder collaboration. Institutes such as the American Library Association advocate for clear ethical frameworks and ongoing professional training (Soumendu Roy et al., 2024).

Future Trends and Research Directions

Interoperability and Standards

Efforts are underway to enable seamless integration of AI cataloging with existing standards. Projects focusing on BIBFRAME, linked data, and open-source AI models support interoperability and sustainable workflow adoption (Annif, 2024).

Benchmarking and Evaluation

There is a critical need for standardized benchmarks to compare AI and human cataloging, facilitating evidence-based decisions (Dobreski, 2025). Pilot projects and robust comparative studies are ongoing in leading research libraries (Kisilowska-Szurmińska, 2025).

Expansion to Multimedia and Multilingual Collections

Future AI advances aim to improve cataloging of images, audio, video, and non-English resources. Multimodal AI and cross-lingual NLP models will be vital contributors (Midde, 2024).

Democratization and Access

Open-source AI cataloging tools and shared training datasets support adoption in libraries of all sizes, strengthening global access to quality metadata (Annif, 2024).



Conclusion

AI-based cataloging is revolutionizing traditional library workflows—offering efficiency, improved accuracy, and enhanced user experience. While AI is not a panacea, its combination with human expertise, thoughtful ethics, and collaborative frameworks can address some of the most pressing challenges facing information management today. Ongoing research, ethical vigilance, and professional development are essential as the field advances toward intelligent, equitable, and user-centered cataloging.

References

- Bales, M., & Chowdhury, G. (2023). Effectiveness of AI in improving library cataloging accuracy. *Library Progress International*, 44(3), 771–788.
- Dobreski, B. (2025). AI Chatbots and Subject Cataloging: A Performance Test. *University of Tennessee Information Science Publications*, 1(1), 78-98.
https://trace.tennessee.edu/cgi/viewcontent.cgi?article=1486&context=utk_infosciopubs
- Kisilowska-Szurmińska, M. (2025). Artificial intelligence in academic libraries – a tool for cataloguing and collection development. *Library & Information Science Research*, 63(5), 1-12.
- Midde, R. (2024). Artificial Intelligence and Its Impact on Cataloging Practices in Modern Libraries. *International Journal of Creative Research Thoughts*, 12(12), 823-831.
<https://ijcrt.org/papers/IJCRT2412195.pdf>
- Potter, A., & Saccucci, C. (2024, November 18). Could Artificial Intelligence Help Catalog Thousands of Digital Library Books? An Interview with Abigail Potter and Caroline Saccucci. *Library of Congress The Signal*.
- Soumendu Roy, S. Vijay Mallikraj, Shivam Moradia, G. Shantha, S. Aravind, Santhosh Shivaprakash (2024). The Impact of Artificial Intelligence on Cataloging and Classification Systems in Modern Libraries. *Library Progress International*, 44(3), 769-773.
<https://bpsajournals.com/library-science/index.php/journal/article/download/468/276/899>