



Storing and retrieving information in libraries in the age of artificial intelligence

The concept of "information storage and retrieval" in libraries has evolved from mere archiving processes. From traditional to intelligent systems that rely on prediction and neural connectivity.

:Dimensions of development and radical transformation

1. The philosophy of information storage: From "containers" to "interconnected data" :
Storage is no longer just about placing a book on a shelf (physical or digital), but has become relational storage.
أ. The information : Linked Data
is stored in a format that allows machines to understand the relationships between authors, subjects, and history (for example: if the system stores information about "Ibn Khaldun", it automatically links it to sociology, Tunisia, and the (fourteenth century).
ب. Long-term digital preservation use :
ت. The content is automatically transferred to new formats before the old ones become unreadable Artificial intelligence to predict "data corruption".
2. "Information retrieval: The era of "generative engines"
: Today's retrieval goes beyond the list of results to direct answers
أ. Integrating models such as Large-scale linguistic models within the library: (GPT) with
This prevents trusted library catalogs to provide evidence-based answers "informational hallucinations".
ب. Audio and video search: The ability to upload an image of a manuscript and request the system to retrieve all books that discuss this script or that time period.
3. Deep indexing Organization and classification:
Artificial intelligence does not classify the book as a single unit, but rather analyzes its internal components.



ت. "Content segmentation : The ability to retrieve a specific "paragraph" or "statistical table"

.within a 500-page book, without having to read the entire book

ث. Automated subject classification: The use of algorithms to detect and classify hidden

.subjects within texts with an accuracy that surpasses traditional human classifications

4. Awareness - Recommendation Systems: Context

أ. Cross-disciplinary recommendation : If you are researching "Islamic architecture," the system might suggest a book on "geometry" or "art history," because it recognizes that there are deep conceptual links between them

ب. The system is self-evolving; whenever the user clicks : Learning through reinforcement on a particular result, the system understands that this result is the "most relevant" and raises its ranking for other researchers

5. Robotics and Logistics: The Library That Never Sleeps

أ. Dark storage facilities : These are high-density storage facilities fully operated by robots, where books are arranged not by subject, but by "size" to utilize every cubic centimeter, and the robot retrieves them in seconds

ب. For live inventory: Smart shelves sense the weight and location of a Internet of Things book, and give an immediate alert if a book is lost or misplaced

6. Big Data: Envisioning the Future of Knowledge

أ. Smart citation analysis: not just the number of times a book is cited, but the "type" of citation (is it an endorsement or a critique?), which helps the library assess the quality of its holdings

ب. Knowledge Maps : Converting search results into interactive graphs that show the thematically researcher how topics are connected to each other both temporally and

7. Ethics: Governance and Digital Bias

أ. Algorithmic transparency : The researcher has the right to know "why" the system suggested this particular book to him, to ensure there is no intellectual bias or commercial prejudice



Filtering out misleading content: Developing smart filters that distinguish between "peer-reviewed scientific research" and "fake news" or "pseudoscience" before they are stored in the library's database.

8. "The librarian: from " keeper of information " to "knowledge mediator .

أ. The librarian :Command engineering R becomes an expert in formulating complex AI queries to assist researchers

ب. Data keeper : Ensuring that the data on which the library's intelligence is trained is "clean," legal, and ethical"

9. Internet of Things and Augmented Reality

أ. Smart navigation: Using augmented reality via the phone to guide the researcher to the correct shelf within the physical library via an arrow that appears on the screen

ب. Smart cards : A membership card that stores the user's preferences, and once they enter the library, the table lighting is adjusted or book suggestions are displayed on a screen near them

10. Generative Digital Preservation and Restoration

أ. To " Reconstructing damaged texts: Using " competitive adversarial networks predict missing words in worn historical documents based on the writer's style in the rest of the document

ب. Live Web Archiving : Storing and analyzing changing digital content (such as websites) in real time to ensure that modern digital heritage is not lost

table illustrates the key differences between traditional libraries and smart libraries in the age of artificial intelligence

The Smart Library (The Age of Artificial Intelligence)

traditional library

Comparison point



Dynamic and relational storage : .data Content is transformed into linked And mathematical vectors that understand the meaning	Static storage : This relies on storing "containers" (books" in fixed (PDF files .locations	The nature of information storage
Semantic and generative retrieval : understanding the context of the question and providing direct and reliable answers across large linguistic .models	search : Relies on letter matching (Keyword Match)	retrieval mechanism
Automated analysis of Indexing Deep chapter and table content, and Automatically with extraction of tags .high accuracy	indexing : This is time-consuming and relies on general .pointers	Organization and Classification
Contextual and predictive awareness : Recommendation systems that analyze researcher behavior and proactively . linkingcross-domain support	Constant: Based on most read" lists or " .general rankings	Source recommendation
logistics : Using ground robots and ASRS drones for live inventory, and an .to retrieve books in secondssystem	Human and manual: manual inventory and physical search for .books on shelves	Warehouse Management
		Data analysis includes simple statistics such as the number of borrowers and available books. Predictive Big Data)) analytics forecasting future involves user needs and identifying search trends through .knowledge maps
Engineer and Knowledge Broker: and Data Prompt Engineering Expert in Governance to ensure quality and .ethics	Guardian of resources: Focuses on manual organization	librarian



	and providing .traditional assistance	
Smart shelves , Internet of Things For navigation, and enhanced reality smart environmental sensors to preserve manuscripts	Silent infrastructure : ordinary seats and shelves	Environmental technology
Algorithm governance: Addressing algorithmic bias , combating information hallucinations, and ensuring .digital privacy	Traditional: It relates to academic integrity .and plagiarism	Ethics
Generative digital restoration : Using adversarial networks to reconstruct missing parts in old documents	Manual chemical restoration: complex and expensive physical restoration .processes	Preservation and Restoration

The impact of artificial intelligence on beneficiaries

The impact of smart transformation doesn't stop at the library's walls or algorithms; it extends to and redefines the relationship between the researcher Experience) . shaping the user experience and knowledge . The impact of artificial intelligence on users can be explained from several angles

1. Time and effort efficiency (from hours to seconds)

Previously, researchers would spend hours browsing indexes and reading sub-indexes of books to ensure their relevance to their topic ; however, in the age of artificial intelligence, they obtain

Automatic summarization : The user can now obtain a comprehensive summary of the content of a book or a long research paper in seconds, which helps him to make a quick decision to .read the whole thing or move on to another source



Direct access to information: Thanks to deep indexing, the user does not need to read an entire book to find a specific statistic; artificial intelligence directs him directly to the required page and line.

2. The transformation of "information illiteracy" into "guidance skills" : The skills required of the beneficiary have changed to

The user : Formulating inquiries learns how to interact with the intelligent system to obtain more accurate results, which raises their level of critical thinking accuracy : The user no longer needs to memorize complex classification codes; it is enough for "them to speak in natural language with the library's "smart assistant

3. A personalized and customized search experience : The smart library treats each user as a unique case

smart research file : Based on the user's previous interests, the system suggests the latest research and manuscripts that are relevant to their specialization as soon as they arrive at the library.

Smart learning environments : The library provides users with visual knowledge maps that show them how the topics they are looking for are related to other fields, opening up "interdisciplinary" research horizons that they had not thought of"

4. Enhancing inclusivity and accessibility : The greatest human impact of artificial intelligence has been for beneficiaries with special needs

Enabling blind people to instantly access any printed book by converting : speech conversion-it into a natural human voice

machine translation : Breaking down the language barrier; where the researcher can retrieve information from sources in languages he does not know (such as Chinese or German) and obtain an accurate translation of the core ideas

5. Quality of scientific research and innovation



research gaps : Artificial intelligence helps researchers (especially graduate students) identify areas that have not been adequately researched by analyzing "knowledge maps" and big data, thus reducing research duplication and stimulating innovation.

Verification of reliability: The system provides the user with tools to detect plagiarism or verify the authenticity of references, which improves the quality of scientific output.

6. Psychological and social impact

The user can "live" Changing the reading environment: through augmented reality technologies inside the manuscript or view a three-dimensional display of historical information, making the learning process more enjoyable and attractive to new generations.

Independence: The user has become more independent in accessing information without needing to wait for human assistance at every step, while the "librarian" remains a reference for more complex problems.

.A table illustrating the impact of artificial intelligence on the user journey

The impact on beneficiary (The Age of Artificial Intelligence)	newly	Impact on the user in the past (before artificial intelligence)	Stage
Reduce frustration and speed up the process	Dialogue in natural language with the regime	Confusion in choosing keywords	the beginning
Directing efforts towards the most important resources	Viewing intelligent automated summaries	Reading the introductions of dozens of books manually	sifting
Focus your mind on analysis, not mere transmission.	Automated extraction of ideas and data	Taking notes by hand is tiring	comprehension
Globalization of knowledge and broadening horizons	Instant translation of global sources	Adherence to the language sources he knows	Access