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ARTIFICIAL INTELLIGENCE ADOPTION AND UTILIZATION BY LIBRARIANS IN UNIVERSITY LIBRARIES IN KWARA STATE, NIGERIA

Abdrahman Atanda MOUSTAPHA
Kwara State University, Nigeria, abdrahman.moustapha@kwasu.edu.ng

Ibrahim .O. YUSUF Mr.
Kwara State Collège of Arabic & Islamic Studies, Ilorin, yolarewaju75@gmail.com

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Abdrahman .A. MOUSTAPHA (CLN/NLA)

Kwara State University, Nigeria

Abdrahman.moustapha@kwasu.edu.ng

ORCID: 0000-0003-1900-2527

+2348033660831

Ibrahim .O. YUSUF (CLN/NLA)

Kwara State College of Arabic & Islamic Legal Studies, Ilorin, Nigerian

Yolarewaju75@gmail.com

+2347067347425

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Abstract

The study investigated how librarians working in various university libraries in Kwara State, Nigeria, adopt and use artificial intelligence. The study raised four research goals as well as four research questions. A descriptive survey method and random sampling techniques with 450 randomly selected librarians from Kwara State Universities, Nigeria, were used for the research. Five research assistants were trained on how to contact respondents and secure their consent before distributing the structured questionnaire designed by the researcher, who assisted in the tool distribution process. The researcher was able to retrieve 410 copies of the 450 questionnaires that were given to the respondents. However, the rate of return was 91%, which is a respectable amount. A self-designed questionnaire was used to elicit responses from the respondents, and a simple percentage was adapted for data analysis. The results showed that there was little adoption of AI in university libraries in Kwara State, Nigeria. The research also reveals that security scanning devices at the entrances and exits of university libraries are the most prevalent AI systems, while other AI systems such as bots, chatbots, face recognition, touch recognition, RFID technologies, humans, AI classification tools, machine-readable catalogs, and not smart AI features are still missing from the Kwara State University libraries. A self-designed questionnaire was used to elicit responses from the respondents, and a simple percentage ratio was adapted for data analysis. The findings revealed that AI has received minimal attention in university libraries in Kwara State, Nigeria. According to the study, the most common AIs are security scanning equipment at university library entrances and exits, followed by robotics, chatbots, face recognition, and touch recognition. *RFID technologies, humanoids, AI classification tools, machine-readable catalogs, and AI smart features are still lacking in Kwara State's university libraries. The results of this study also indicate that librarians in a university library are aware of the many ways in which artificial intelligence can be applied to provide services. The results of the study indicate that obstacles to adoption include significant disruption caused by artificial intelligence in traditional library services, a lack of skills and a need for training prior to adoption, irregular power supply, and a lack of adequate infrastructure for adoption, among other problems. The study recommended the need to organize training for librarians to enhance their skills in using artificial intelligence to provide services, and the university administration and libraries should commit and provide the necessary support for the adoption of artificial intelligence by providing the necessary infrastructure to ensure its rapid implementation.*

Keywords: *adoption; uses; artificial intelligence; librarians; university libraries; Kwara State; Nigeria*

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INTRODUCTION

The adoption and deployment of artificial intelligence (AI) librarians in libraries attached to universities in Kwara State, Nigeria, is a topic of great interest in today's rapidly changing digital landscape. AI, as defined by Oracle (2022), sees AI as software or hardware that can perform tasks by simulating human intelligence and then iteratively improve itself using the data it collects. Artificial intelligence includes a wide range of fields, which are not limited to The librarians' adoption and deployment of artificial intelligence (AI) in libraries attached to universities in Kwara State, Nigeria, is a topic of immense importance in today's rapidly changing digital landscape. Artificial intelligence, as defined by Oracle (2022), sees AI as software or hardware that can carry out tasks by simulating human intellect and then iteratively improves itself using the data it gathersAI spans a vast range of topics, including but not limited to philosophy, linguistics, psychology, and other areas of life (Deloitte, 2022).An emerging trend that is getting more attention as the world moves toward a more digital economy is the application of artificial intelligence in libraries. According to Omame and Alex-Nmecha (2020), AI has the potential to transform the way libraries are handled, from how library items are categorized and organized to how librarians and patrons interact.

For university libraries to fully deploy AI to meet their diverse service needs, they first need to adopt and implement these tools. According to Ajani et al. (2022), the application of artificial intelligence (AI) in university libraries can increase the effectiveness of library operations in general and reference services in particular. AI can help libraries organize, store, and retrieve information to better manage their digital holdings. Application of artificial intelligence in university libraries, according to Sivarajah et al. (2017), improves data set evaluation,

particularly for large data sets used for analysis involving many data sets. It also helps eliminate tedious and repetitive tasks. As a result, integrating AI into library operations helps foster the growth of capabilities that transcend human intellect. Libraries, especially those in universities, have had a difficult time adopting digital technology, and they also show resistance to change when new technologies are used for a variety of library functions in developing countries such as Nigeria (Wheatley & Hervieux, 2019).

Similarly, researchers in the literature have often argued that AI can be used in the field of library security, with university libraries now deploying AI-based facial recognition technology to track and monitor users, particularly in areas of service (American Library Association, 2022; Datagen, 2022). Only a few scientific papers have been published in the field of research, making the adoption, implementation, and use of AI in university libraries a relevant topic and a relatively new idea. This information was discovered through literature searches. Bhatia (2018) emphasized that there is a disconnect between AI research and AI applications in the literature, which supports the aforementioned

The purpose of this study was to fill the knowledge gap and serve as a resource for academics working on similar projects on how librarians at university libraries in Kwara State, Nigeria, use artificial intelligence.

Objectives of the study

The objectives of the study are the following:

1. To determine the extent to which librarians in university libraries in Kwara State use artificial intelligence.
2. Find out which AI classes university libraries might use.
3. Look at how artificial intelligence is being used in university libraries to provide services.
4. Identifying the obstacles that prevent university libraries from using artificial intelligence

Research questions

The investigation provided answers to the following questions:

1. What is the rate of adoption of AI by university libraries in Kwara State, Nigeria?
2. What types of AI are available for university libraries to use?
3. How do university libraries use artificial intelligence to provide services?
4. What are the obstacles that prevent the adoption of artificial intelligence in university libraries?

Literature review

The literature review was performed in line with the research objectives of the study.

Level of adoption by librarians of artificial intelligence in university libraries

The extent to which librarians use AI in academic libraries is currently the subject of much empirical research in the literature. Yusuf et al. (2020) evaluated the application of artificial intelligence for effectiveness in providing library services in a study of university libraries in Nigeria. The study unequivocally showed that the adoption of AI by librarians in university libraries in Nigeria, particularly in Kwara State, is relatively low as a result of a variety of challenges specific to developing countries. However, as observed by Grant and Camp (2018), many academic libraries, mainly in developed nations, have embraced AI to suit their customers' diverse reader service needs, such as circulation, serials, and reference services. Ajani et al. analyzed librarians' desire and knowledge to embrace AI for services and procedures in academic libraries in Nigeria, notably in Kwara State, in 2022.Due to their conflicting feelings, the results show that librarians are not yet ready to use AI in their academic libraries. As a result of these data, it can be concluded that most academic libraries in Nigeria, especially Kwara State, have poor adoption of AI. In another study, Okunlaya et al. (2022) evaluated a unique AI framework for library operations in preparation for the digital revolution of higher education. The current body of research indicates that university libraries have a low acceptance rate for using AI to provide innovative alternatives to the services they currently provide. Practically in every field of academic and research libraries today, according to Olayode (2022), technology is being used, and Nigeria is not being left behind because the acceptance and application of technology in Nigeria is not a modern concept. Manjunatha and Patel looked at the use of smart technology in the libraries of the College of Engineering in Karnataka (2020). Data shows that most

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engineering university libraries are already familiar with smart technologies and have adopted block chain, augmented reality, artificial intelligence, and other advanced systems.

Types of artificial intelligence available in university libraries

However, Olayode (2022) looked at the use of AI and technical improvements in the provision of library services with respect to the types of AI that can be applied in academic libraries. According to the report, the University of Calabar is already using bots and robots to handle part of its service needs. Nawaz and Salahuddin considered the application of artificial intelligence in library reference services (2020). The results of the study showed that Chabot can be used to effectively provide library reference services. Oname and Alex-Nmecha (2020) conducted research on the use of AI in libraries.The study emphasized the use of expert shelf-reading systems, book-reading bots, and library reference services, among other applications. An investigation by Yu et al. (2019) on the use of smart libraries for artificial intelligence The study cites some applications of artificial intelligence that could be used in smart libraries, including facial recognition, chatbots, and self-service AI systems. Ali et al. (2020) assessed librarians' sense of university and their use of AI tools. According to the study, university libraries may use the following AI systems: Google Chat for chat reference, Google Drive, Drive One, big data cloud computing, RFID, 3M Gates, thumb Google Translator for translation services, among other things. Al-Amiri and Othman (2022) investigated how artificial intelligence could improve library operations and services.The researchers were able to prove through their examination that robots help provide library services. Vesak and Babu (2020) looked at the deployment of automated AI in libraries. The findings suggested that robots can execute the majority of the functions done in libraries.

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Using artificial intelligence to provide services in university libraries

According to the scientific literature, researchers have looked at ways to use artificial intelligence to provide library services. During the COVID-19 epidemic, Nawaz, Gomez, and Saldin (2020) investigated artificial intelligence technologies for library resources and services. According to the study, the use of artificial intelligence can help with a variety of library services.However, AI can be used for user identification in speech or typing recognition, monitoring users as they use library resources and services, chatbots for reference services, bot assistants, monitoring drones for library security, and AI alarms to remind users when it's their time. Scheduled appointments with a librarian, and AI-based tutorials to keep users abreast of the latest discoveries in their field. The AI revolution in libraries is expected to have a significant impact on a number of areas, including data processing, literacy, and online and virtual services (Winkler & Kiszl, 2021). Studies have shown that humanoid robots in libraries can be used for a variety of tasks, includin

g teaching, building communities, and assisting librarians. Other applications of AI in libraries include online messaging chat services, automation of library procedures, and improvement of service delivery effectiveness (Nguyen, 2020; Nawaz & Saldeen, 2020; Igbinovia & Okuonghae, 2021). Yao et al. conducted a study on intelligent talking robots to improve library services. (2015). The results show that the Xiaotu robot, which can interact with users and provide assistance, is effective in promoting library reference services. Fernandez (2016) also made the case that AI can be used in a number of areas of library operations, relieving librarians of some of the tedious chores. In support of the aforementioned, Corrado (2021) indicated that artificial intelligence can be applied in many areas of technical service, such as assigning and creating

subject headings, taxonomies, and metadata descriptions. Librarians act as moderators and controllers of metadata ethics and privacy in these applications. In 2019, Mughali researched how AI can be used in libraries. The results show that artificial intelligence can be used for expert systems in libraries, such as Refsearch, indexes, online reference help, Amswerman systems, and Plexus Expert, which have also proven useful in performing tasks related to acquisition, cataloging, classification, cataloging, and other library procedures.

Challenges that prevent the adoption of artificial intelligence in university libraries

This part will focus on a literature review and discussion of the barriers to AI adoption in university libraries.. According to Tait and Pierson (2022), the adoption of AI and robotics in libraries may be hindered by a lack of skills and the need for training prior to implementation. Consistent with the above view, Hervieux & Wheatley (2021) argued in their study that the low adoption rate of AI and bots in libraries is due to a lack of knowledge about these technologies. In their investigations of the use of chatbots in university libraries, Kaushal and Yadav (2022) found that despite the huge advantages of chatbots for improving reference services in libraries, their major drawback, a major intrusion on privacy, has to be removed by software designers during the development phase. In their research on some of the barriers to the adoption of artificial intelligence in academic libraries, Youssef et al. (2022) focused primarily on the lack of awareness of librarians on how to use artificial intelligence to meet their service needs and the great disruption that artificial intelligence has caused to traditional library services, which still shocks most library professionals. From a different angle, the study by Korenke and Stiglitz (2017) emphasized that the use of AI poses a threat to the work of librarians and that caution must be taken before its widespread application in libraries. The results of the previous study are largely consistent with the World Bank Development Report (2016), which indicates that the

adoption of artificial intelligence will lead to job losses in the majority of developing countries, with most of these losses occurring in Ethiopia, China, Thailand, and India. Liau (2019) conducted research on the benefits of bots for library operations. The researcher highlighted some of the barriers that might prevent libraries from adopting robots. These include the high skill requirements of working with bots, the need to redesign workflows, the fact that bots are only designed to perform one or two tasks and cannot be used for all library activities, the fact that bots sometimes have tantrums that can disrupt library services, and more. Oghenetega, Umeji, and Obue (2014) cited a number of factors working against the adoption of these AIs in library operations, including poor maintenance ethics, inadequate staff training, high costs, communication issues, a lack of adequate facilities, and epileptic strength. Supply, economic, political, and technological issues.

Research Results:

Demographic description of the study participants

Distribution of respondents by gender

Table 1: Distribution of study participants by gender

Sex	Frequency	Percentage e %
Male	122	30%
Female	290	70%
Total	412	100%

From Table 30% of the study participants were male, while 70% are female. This finding point out

that more females participated in the study than males.

Distribution of the Respondents by their Cadre
Table 2: Distribution of the Participants by Cadre

Cadre of Librarians	Frequency	Percentage %
Assistant Librarian	108	26%
Librarian II	215	52%
Librarian I	70	17%
Senior Librarian	19	5%
Deputy University Librarian	---	---
University Librarian	---	---
Total	**412**	**100%**

From Table 2 above, most of the librarians who participated in the study are in the cadre of a librarian II (52%), followed by an assistant librarian (26%), a librarian I (17%), and a senior librarian (5%). No university librarian or deputy librarian participated in the study.

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ANALYSIS OF THE KEY FINDINGS OF THE STUDY

Research Question 1: What is the adoption level of AI by librarians in University Libraries in Kwara State, Nigeria?

Table 3: the adoption level of AI by librarians in University Libraries in Kwara State, Nigeria

Artificial Intelligence Adopted in University Libraries	Adopted	Not Adopted
Robots are adopted for use in my university library	7(2%)	405(98%)
Chatbots are embedded in the library Website for swift reference services.	12(3%)	400(97%)
Face recognition technology is adopted for security purposes in my university library	22(3%)	390(97%)
Thump recognition technology is adopted in my University Library	9(2%)	403(98%)
RFID technologies are adopted in my university library	7(2%)	405(98%)
Humanoids are adopted in my university library	33(3%)	379(97%)
AI classification tools like, Shelf Pro, CUTT-x. Coal Sort and N-cube are adopted in my university library	6(2%)	406(98%)
Machine Readable Catalogue (MARC) is adopted in my university library	13(10%)	399(90%)
Artificial intelligence smart features are adopted in my university library	8(2%)	404(98%)
Security Scanning Machines are adopted for scanning users at the point of entrance in my university library	302(73%)	110(27%)

From Table 3 above, it is glaring that the adoption of AI in university libraries in Kwara State, Nigeria is totally low

Research 2: What are the types of AI that can be available in University Libraries?

Table 4: The types of AI that can be available in University Libraries

Types of AI Available in University Libraries	Frequency	Percentage
Robots are available in my university library	48	11%
Chatbots are available in my university library	186	45%
Face recognition technologies are available in my university library	25	6%
Thump recognition technology is available in my University Library	30	7%
RFID technology is available in my university library	84	20%
Humanoids are available in my university library	22	5%
AI classification tools are available in my university library	18	4%
Machine Readable Catalogue (MARC) is available in my university library	75	18%
Artificial intelligence smart features are available in my university library	105	25%
Security Scanning Machines are available for scanning users at the point of entrance in my university library	399	97%

t is evident from Table 4 above that security scanning devices, which are procured to scan patrons and visitors at the entrance/exit point of the university library and critical service locations, are the only AI technology accessible in the majority of university libraries in Kwara State, Nigeria. Most university libraries in Kwara State, Nigeria, do not have access to other AI tools such as robots, chatbots, facial recognition, touch recognition, RFID technologies, humans, AI classifiers, machine-readable catalogs, or smart AI features. This data indicates that university libraries in Kwara State, Nigeria, have a limited set of AI technologies.

Research Question 3: How is AI used for service delivery in university libraries?

Table 5: The use of AI for service delivery in University Libraries

Note: SA: Strongly Agree; A: Agree; D: Disagree; SD: Strongly Disagree

S/N	The Use of AI for Service Delivery	SA	A	D	SD
1.	User identification in the area of speech, or typing, monitoring	227(55%)	55(13%)	95(23)	35(8%)
2.	AI chatbots can be used for reference services	210(55%)	88(21%)	32(8&)	80 (19%)
3.	Drone Surveillance for Library Security	212 (51%)	90 (22%)	85 (21%)	25(6%)
4.	AI alarms for notifying users time of their scheduled visit with a librarian	134(33%)	95(23%)	158(38%)	25(6%)
5.	Humanoid Robots can be used in libraries for teaching, community building, assistant to the librarians	145(35%)	116(28%)	95(23%)	56(14%)
6.	AI can be used for automating library routines	202(49%)	66(16%)	100(24%)	44 (11%)
7.	For technical service delivery like assigning and creating subject's headings, classification as well as metadata description	205(50%)	103(25%)	78 (19%)	26(6%)
8.	Face Recognition can be used for Library Security	102(25%)	115(28%)	145(35%)	50(12%)
9.	For online messaging needs	174(42%)	130(32%)	85(21%)	23(5%)

Table 5 indicates that librarians are quite sophisticated about the various ways AI can be used to deliver services in university libraries.

Research Question 4: What are the challenges that militate against the adoption of AI in University Libraries?

Table 6: The challenges that militate against the adoption of AI in University Libraries?

Note: SA: Strongly Agree; A: Agree; D: Disagree; SD: Strongly Disagree

S/N	Challenges against AI Adoption in University Libraries	SA	A	D	SD
1.	The lack of skills and the need for training before the adoption of AI in university libraries.	190(46%)	54(13%)	68(17%)	100(24%)
2.	The issue of high privacy intrusion by Chatbots	165(40%)	96(23%)	46(12%)	105(25%)
3.	Low awareness level by librarians on how to apply AI for their service needs	125(30%)	72(18%)	95(23%)	120(29%)
4.	High disruption brought by AI on traditional library services	215(52%)	70(17%)	50(12%)	77(19%)
5.	AI is perceived as a threat to the job of librarians in university libraries	202(49%)	50(12%)	52(13%)	108(26%)
6.	The need to redesign workflow can be a major challenge for Librarians in the adoption of AI	108 (26%)	125(30%)	94(23%)	85(21%)
7.	AI in the form of robots can only perform specific routines hence they cannot be adopted for all library services.	122(30%)	140(34%)	41(10%)	109(26%)
8.	Lack of sufficient infrastructure to adopt AI in university libraries	198(48%)	128(31%)	40(10%)	46 (11%)
9.	Erratic Power Supply	198(48%)	120(29%)	29(7%)	65(16%)
10.	Technical issues can affect the full adoption of AI in university libraries.	185(45%)	68(17%)	60(14%)	99(24%)

The results of Table 6 above showed that it was clear that the adoption of AI is seriously hindered by a number of issues. The study's findings specifically mention the high disruption that AI will cause to traditional library services, the lack of skills and the need for training prior to the adoption of AI in university libraries, unstable power supplies, and the lack of adequate infrastructure for the adoption of AI in university libraries, among other issues.

Discuss the results.

From the demographic distribution of the study participants, it was revealed that more females participated in the study than males. Also, it was revealed that the majority of the study participants are in the second librarian cadre. The study's findings were discussed in light of the research objectives.

The level of adoption of artificial intelligence in university libraries in Kwara State, Nigeria

The results showed that there was little or no adoption of AI in university libraries in Kwara State, Nigeria. This finding is congruent with the findings of Yusuf et al. (2020), who discovered that a number of factors contribute to the low percentage of AI adoption or non-adoption among librarians in Nigerian university libraries.The results support a study by Ajani et al. (2022), which found that, due to their conflicted feelings, academic librarians are not yet ready to use AI in their libraries. As a result of these findings, it is possible to conclude that most academic libraries in Nigeria, notably in Kwara State, have a low level of AI adoption. This finding contrasts with research by Grant and Camp (2018), which found that many academic libraries, mostly in affluent countries, have embraced AI to suit the various service needs of their users, including reference and circulation services.

Types of artificial intelligence that can be adopted in university libraries

The results show that the only AI technology available in the majority of university libraries in Kwara State, Nigeria, is security screening equipment, which is purchased to scan visitors and patrons at the entry and exit points of the university library and critical service locations. Other AI tools, including bots, chatbots, facial recognition, touch recognition, RFID technologies,

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humanoids, AI grading tools, machine-readable catalogs, or smart AI features, are not often available in Kwara State, Nigerian university libraries. This information reveals that there is little or no collection of AI technologies available in university libraries in Kwara State, Nigeria. The University of Calabar, contrary to what Olayode (2022) discovers, is already using bots and chatbots for specific service needs.

Using artificial intelligence to provide services in university libraries

It can be concluded from the results that librarians have a comprehensive understanding of the many ways in which artificial intelligence can be used to provide services in university libraries because the weighted mean of 2.98 was greater than the mean of the criteria, which was 2.50. This is in line with the majority of previous research showing how AI can be used to improve a range of library services (Nguyen, 2020; Saldeen, 2020; Igbinovia & Okuonghae, 2021). Corrado's research (2021) has also shown how technical services such as creating and assigning subject headings, categorizing data, and describing metadata can all benefit from the use of AI. According to the Sanji et al. (2022) study, chatbots can be used to construct artificial intelligence for referrer services.

Challenges that prevent the adoption of artificial intelligence in university libraries

The results revealed a weighted mean of 2.86, which is higher than the standardized mean of 2.50, indicating that AI adoption is stymied by a number of obstacles.The results of the study specifically point to the significant disruption that artificial intelligence will bring to traditional library services, the skills shortage and the need for training before adopting AI in university libraries, unstable power supplies, and a lack of adequate infrastructure for adopting AI in university libraries, among other challenges. This finding is in line with a study by Youssef et al.

from 2022, which finds most of the library staff still in shock over the massive disruption caused by the AI it brought to traditional library services, which has an impact on its adoption of AI technology. This finding is in line with previous studies that found that librarians' lack of competence significantly hindered the adoption of AI in university libraries (Oghenetega, Umeji, & Obue, 2014; Liau, 2019; Tait and Pierson, 2022).

Conclusions and recommendations

The study examined the adoption and use of artificial intelligence by librarians in universities in Kwara State, Nigeria. Artificial intelligence (AI) is one of the major developments of the Fourth Industrial Revolution, specifically in the service delivery frameworks of companies and organizations. Libraries and information centers are actively monitoring developments in the use of artificial intelligence in order to meet various service requirements. Robots, humans, facial recognition software, drones, chatbots, thumb recognition, and other types of artificial intelligence (AI) are becoming more popular and can be used in library services. The study found that Kwara State, Nigeria, has not adopted AI for library services as expected. Security screening technology at library access and exit points is the most popular instrument employed by university libraries in Kwara State, Nigeria, to prevent illegal appropriation or theft of library resources by bad users.Amnesty International It has the potential to be useful to university libraries as it can be combined to suit library service requirements. Examples include the use of chatbots for reference services, facial recognition, artificial intelligence for user mapping and collection security, surveillance drones, and human networks for routine library work such as welcoming guests and stocking volumes, among others. Despite these possibilities, AI has not been fully adopted by Nigerian institutions in Kwara State, and as a result, adoption rates in

university libraries remain quite low.Disadvantages include, among others, the great disruption caused by AI to traditional library services, a lack of skills and a need for training before applying AI in university libraries, an irregular power supply, and inadequate infrastructure for applying AI in university libraries. However, to improve the adoption of AI to improve services in university libraries in Kwara State, Nigeria, the researcher recommends the following:

1. Training should be organized for librarians to enhance their skills in using artificial intelligence to provide services.

2. The university administration and libraries must be committed to providing the necessary support for the adoption of artificial intelligence by providing the necessary infrastructure to ensure its rapid implementation.

3. Librarians should be directed to change the perception that artificial intelligence will take over their jobs. Instead, they should look at AI as something that can complement their efforts in university libraries.

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