UNDERSTANDING AI ADOPTION FOR INFORMATION RETRIEVAL: EVIDENCE FROM LIS STUDENTS IN ODISHA

Anchal Mahana
Gangadhar Meher University, Sambalpur, Odisha
anchal.mahana@rediffmail.com

ABSTRACT

Although AI is rapidly transforming the field of information retrieval, some issues prevent it from being fully utilized. Thus, this study looked at ethical concerns and understanding of AI algorithm bias as determinants of using AI for information retrieval among Odisha LIS students. It examined a group of undergraduate library and information science (LIS) students in Odisha using a descriptive type of correlational study approach. The accidental sampling strategy of the non-probability type was used to pick 213 respondents in total for the investigation. The Statistical Packages for Social Sciences (SPSS) version 21 was used to analyze the collected data using both descriptive and inferential statistics. The study's conclusions showed a strong correlation between LIS students in Odisha's usage of AI for information retrieval, ethical concerns, and awareness of AI algorithm bias. The study also revealed that LIS students were highly aware of the possibility of bias in AI algorithms used for information retrieval. Despite this, the study found that LIS students use AI extensively for information retrieval. The study came to the conclusion that Odisha's LIS curriculum's structure and content give students a knowledge-advantage by exposing them to the fundamentals of ICT application to librarianship. Consequently, the students are able to identify the moral dilemmas or problems associated with using AI to retrieve information.

Keywords*: Information Retrieval; Artificial Intelligence; ChatGPT; AI Algorithm Bias; LIS students; Odisha*

INTRODUCTION

Artificial Intelligence (AI) has rapidly advanced in all areas of human endeavor throughout the contemporary technological era. The core of human existence has been impacted by its widespread adoption and integration with human operations and activities. Personalized and efficient service delivery (Reis et al., 2020; Chen et al., 2021; Gupta et al., 2024), content creation (Kim, 2023; Rudnicka et al., 2024), risk assessment and security reinforcement (Sayler, 2019; Alhayani et al., 2021), and information retrieval within an information system (Adelakun, 2024; Akın İnsel et al., 2024). AI has evolved into a concept with several facets and definitions to accommodate its use in a variety of settings. Collins et al. (2021) offered several definitions of AI in the context of information systems research. Kolbjørnsrud et al. (2021, p. 77) provided one such definition, stating that AI is "a subset of IT that can sense their environment, comprehend the collected information, learn, and derive actions based on interpreted information and their implemented objectives." According to a study of the different definitions provided by Collins et al. (2021), artificial intelligence (AI) is machine learning (ML) that functions as an algorithm that mimics human reasoning abilities to analyze data and information in order to carry out cognitive activities, make decisions, and solve issues. These functional outputs can be skewed by the nature of data and information that the AI has been trained with, which causes a bias in its algorithm.

Artificial intelligence algorithm bias is the "unfair" or biased result of AI's operations as a result of the distorted data and information it has been given. Algorithm bias typically happens when an algorithm's decisions prejudice a particular group of people (Friis & Riley, 2023). Such bias is known as AI algorithm bias when it appears in the programming, operations, and results of AI. Nazer et al. (2023) claim that this prejudice is ingrained in the AI prediction algorithm's development process. By implication, AI's "fairness" may be called into question because of its innate bias, which leads to social problems like intolerance, discrimination, and inequality, among others. Panch et al. (2019) provided a more detailed explanation of this problem when they criticized societal inequality as a detrimental effect of AI that could disadvantage some groups of individuals in terms of loans, criminal investigations, and prison sentences. Because the AI has been taught to produce specific search results that do not necessarily represent a balanced view laced with impartiality, this bias also affects the type of information returned on a given search query. According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2023), search engines exhibit partiality in processing large data that reflects prejudices and stereotypes online when they prioritize

the majority of clicks depending on user preferences and geography. Because information retrieval is a major component of the services provided by library and information science (LIS) professionals, AI algorithm bias presents specific ethical issues or ramifications for them (Saeidnia, 2023). This presents the expert with the challenge of determining which of the retrieved data should be given priority. However, with the introduction of AI into their service delivery system, LIS professionals have long struggled with ethical issues related to AI use.

The use of AI raises a number of ethical issues, including "transparency, fairness and justice, responsibility, nonmaleficence, and privacy" (Huang et al., 2023, p. 808); misuse of personal information or monitoring of people's lives (Klimova et al., 2023); fairness, transparency, accountability, safety, and human autonomy (Slimi & Carballido, 2023). The need for systems that encourage the ethical and responsible use of AI is increased by these ethical issues with AI, which are significant contemporary challenges. This led to the 2021 adoption of UNESCO's AI ethical proposals by all 193 Member States (UNESCO, 2024). In order to solve the issues of AI algorithm bias, the recommendation gives all AI actors principles that illustrate the necessary ethical direction. These suggestions are predicated on the knowledge that the advancement of increasingly complicated and sophisticated AI leads to increasingly complex and sophisticated tendencies for misuse in all domains, including public and private health, security, government, media, law, and education. The recommendation is that, even if AI technologies are becoming more and more crucial in the provision of information, search engine algorithms and content curation are problems that have an impact on information retrieval. The bias in the AI technology's information retrieval method implies that some ethical issues are imposed.

Since information retrieval is unquestionably one of the most crucial tasks in libraries, LIS students are required to become proficient in this area in order to be ready for professional practice, which calls for the use of AI technologies to retrieve information that users require. However, in doing so, the LIS students are expected to be aware of the ethical issues that should be taken into account when using AI for information retrieval as well as the existence of some bias in AI algorithms. Thus, the purpose of this study was to investigate how ethical concern and understanding of AI algorithm bias predict the adoption of AI for information retrieval among LIS students in Odisha. Despite the growing adoption and usage of AI tools among LIS students in the nation, there is a substantial gap in the literature from the region on AI algorithm bias and AI ethics in LIS education, which is why Odisha was chosen for this study. Furthermore, although research on AI and algorithmic prejudice is available worldwide, there is a significant lack of literature on the topic in the Odishan setting. Thus, the necessity of doing localized research with an emphasis on Odishan LIS students was strengthened. Therefore, the study looked at ethical concern and awareness of AI algorithm bias as predictors of using AI for information retrieval among Odisha LIS students.

Research Questions

The following research questions guided the study:

1. What is the level of LIS students` awareness of AI algorithm bias for information retrieval?
2. What are the different ethical concerns associated with the use of AI for information retrieval among LIS students in Odisha?
3. What is the level of use of AI for information retrieval among LIS students in Odisha?

Hypotheses

The following hypotheses were tested at 0.05 significance level.

Ho_1: There is no significant relationship between AI algorithm bias awareness and use of AI for information retrieval among LIS students in Odisha.

Ho_2: There is no significant relationship between AI ethical concerns and use of AI for information retrieval among LIS students in Odisha.

Ho_3: There is no joint significant relationship among AI algorithm bias, ethical concerns and use of AI for information retrieval among LIS students in Odisha.

LITERATURE REVIEW

LIS students' awareness of AI algorithm bias for information retrieval

The application of AI technology has led to global advancements in information search and retrieval. AI-powered systems can swiftly search through enormous amounts of data to extract particular information depending on user requests, according to Hill et al. (2023). Tech behemoths like Google incorporate algorithms into their search engines, as noted by Noble (2018). These algorithms aid in the ranking of search results (Manjunatha, 2023). However, a review of the literature reveals that stakeholders are worried about the possibility of systematic errors or biases in AI algorithms, which could result in skewed conclusions regarding the fairness and accuracy of information retrieved (Shin, 2021; Lacave & Molina, 2022). It is well known that search results from systems employing AI algorithms frequently exhibit bias. On a variety of information platforms, algorithm bias is evident. Ahmad et al. (2021) claim that platforms with biased algorithms make fake news, misinformation, and disinformation worse. Indeed, Shin and Shin (2023) discovered that search engine AI algorithms had biases in favor of particular demographic groups, resulting in unequal access to information.

Despite the possibility of inadvertent biases, research has demonstrated that algorithmic bias originates from three primary sources: training data, the method used, and sociocultural influences (Akter et al. 2021). The programmer who creates the code is primarily to blame for AI bias. According to Shin et al. (2022), algorithms simply reflect or magnify the social prejudice of the person who wrote the programs. Such bias can have far-reaching effects on consumers' access to, trustworthiness of, and exclusivity of information. Scholars have attempted to investigate students' knowledge of AI algorithm bias. According to Lacave and Molina (2022), students can contribute to the creation of algorithmsRamachandran et al. (2021) studied how students at three institutions felt about big data algorithms and search engines. According to the study, students' understanding and perception of algorithm bias might vary from being defensive and unaccepting of its existence to being open and receptive of it.

Additionally, a survey on students' perceptions of bias in search algorithms and machine learning was conducted by Fu et al. (2020). From autumn 2018 to spring 2019, 700 students from various institutions took part in the survey. According to the report, pupils are aware of algorithm prejudice. The majority of respondents think that private businesses should be in charge of regulating artificial intelligence algorithms. Additionally, a large number of students admit the possibility of algorithm bias in algorithm creation. Additionally, the study suggests that students are aware of search engines and how algorithm bias functions online. In a similar vein, McDonald and Pan (2020) found that students are aware of the bias in AI that disadvantages certain groups according to their gender and race. The study looked at how search engines may be impacted by Amazon Alexa's language processing limits, which could lead to intentional discrimination against a range of groups. In a different approach, Lacave and Molina (2022) looked into undergraduates' understanding of the gender biases of algorithms and the potential consequences. The study found that gender segregation was due to the segregation of data collected.

Ethical concerns associated with the use of AI for information retrieval

Beyond the problem of algorithm bias in information retrieval, there are other ethical issues to take into account while utilizing AI. According to O'Neil (2016), one of the main topics of discussion about the appropriate usage of AI algorithms is privacy. Protecting sensitive data is crucial as AI analyzes enormous volumes of user data to tailor recommendations and enhance services. Transparency and fairness are two more ethical aspects of AI (Bradley, 2022). In the meanwhile, despite efforts to lessen bias and improve fairness, Yu et al. (2023) noted that service conversational information retrieval (CIR) systems like ChatGPT and Bard lack the integration of moral constitution. However, Bernard and Balog (2023) suggested that an information retrieval system must satisfy the fairness, accountability, transparency, and ethics test (also known as FATE) in order to be deemed worthy. Regretfully, the study only looked at these four areas of ethical concern with AI systems. In the meantime, Ghotbi and Tung Ho (2021) looked at Japanese college students' understanding of ethical issues surrounding the employment of AI systems. According to the study, the majority of students believed that the main ethical problem with AI was unemployment. The percentage of respondents who identified inequality, discrimination, privacy invasion, and security breaches as ethical

concerns was quite low. The study concluded that the moral awareness of college students regarding AI technologies is quite limited and recommended including ethics of AI in the curriculum. On his part, Hodonu-wusu (2024) in considering the useful of AI to library user, posited that there is need to reflect on its ethical and equitable factors.

According to Schedl et al. (2022), ethical question in the use of AI systems are related to the issue of fairness, non-discrimination, diversity, and transparency. The discussion has been stimulated by findings of past studies that identified harmful biases in data, algorithm and corresponding list of retrieved documents. These biases can result in unfair treatment or even discrimination against certain users or groups of users e.g. with respect to their gender, age and personality trait (Lambrect & Tucker, 2019; Schedl, et.al. 2015; Melchiorre, Zangerle & Schedl, 2020).

McDonald and Pan (2020) affirmed that AI design can be bias against certain individual, they tend, and on the whole the respondents believe that responsibility of AI design bias and fairness implications resides with the company rather than the designer. It was also discovered that having a human expert is the most effective strategy to reduce prejudice. In order to close the ethical gaps and guarantee that AI systems are built and taught to support inclusive, diverse, and equal access to information for all users, coordinated efforts must be undertaken to overcome these biases (Hodonu-wusu, 2024; Bradley, 2022). One of the biggest obstacles to teaching AI ethics is that data greatly influences the training and assessment process, which in turn defines the AI's moral alignment (Soni, 2023). Ylipulli and Luusua (2019) succinctly summarized this problem when they pointed out that as AI occasionally relies on historical data, it is likely to reflect prejudice and discrimination found in the society from which the data is gathered. Makhortykh (2023) explained that AI has been applied in the area of information retrieval. The importance of AI driven IR system has increased due to the growth in the amount of information available in the cyberspace commonly called information overload. The phenomenon promoted the need for advance IR mechanism for satisfying information needs.

Use of AI for information retrieval among LIS students

An increasing amount of research has been done on the potential advantages and difficulties of employing AI for information retrieval. AI has the potential to greatly improve the efficacy and efficiency of IR procedures for a variety of information users. Information enthusiasts now find generative AI tools like ChatGPT helpful in a variety of ways, particularly when it comes to answering queries, composing essays, summarizing documents, and creating scripts (Allam, et.al. 2023). Students may access and analyze vast volumes of information more quickly with the use of AI software, which improves search results, increases accuracy, and more.

A study conducted by Malik et al. (2023) on 245 undergraduate students from 25 postsecondary institutions in Eastern and Central Indonesia demonstrated the potential of AI for academic essay writing. Additionally, the study shows that AI-powered tools can help students with essay outlines, language translation, grammatical checks, and plagiarism detection. Additionally, it was found that AI might improve students' writing skills. However, the researchers note that a strong reliance on AI for knowledge impedes ethical writing habits, creativity, and critical thinking.

Similarly, Bin-Nashwan et al. (2023) claimed that since ChatGPT, an AI language model, was introduced in 2022. Content creation is one of the many jobs that the application is used for. Additionally, it is employed in academic tasks like information retrieval, concept generation, literature summaries, and essay writing. For the majority of students, using tools like ChatGPT has been essential. Conversational chatbots are used by ChatGPT to quickly produce text that sounds human. With about 100 million users as of January 2023, AI Chabot ChatGPT is reportedly the user application with the quickest rate of growth (Duarte, 2023 referenced in Bin-Nashwan et al. 2023).

METHODOLOGY

The descriptive kind of correlational research design was used in the investigation. The ability of this research design to characterize the study's variables and determine their relationships led to its selection. Undergraduate LIS students in Odisha made up the study's population. Because their course curriculum exposes them to AI and related technologies for IR, LIS students in Odisha were selected for this study. In order to achieve this, a sample size of 213 respondents was chosen using the non-probability accidental sampling technique.

The instrument used for data collection was a self-developed structured questionnaire. The questionnaire was divided into four sections (section A to D). While section A focused on the respondents' bio-data, section B addressed the level of LIS students' awareness of AI algorithm bias in the context of IR. It was measured on a four-point scale of "very high" "High", "Low" and "Very Low". Section C elicited data on the ethical concerns associated with the use of AI for IR. The section was measured on a four-point scale of "Strongly Agree", "Agree", "Disagree" and "Strongly Disagree". Section D on the other hand, focused on the level of use of AI for information retrieval. It was measured on a four-point scale of "very high" "High", "Low" and "Very Low".

To ensure the validity of the instrument, a copy of the questionnaire was given to two experts in the field of LIS. Their comments and suggestions were used to draft the final copy of the instrument. Furthermore, the reliability of the instrument was ascertained using the Cronbach Alpha method. A reliability coefficient of 0.88 (AI Algorithm bias awareness), 0.87 (ethical concern) and 0.89 (Use of AI for IR) was achieved and considered adequate in line with Kennedy (2022).

Google Forms was used to transform the completed questionnaire into an online survey. The responders received the survey link via WhatsApp. The survey collected data for four weeks, and reminder emails were sent out on a regular basis to guarantee maximum participation. The researchers made sure the highest ethical standards were adhered to despite the low-risk nature of the study, particularly with regard to informed permission, confidentiality, anonymity, and voluntary participation. A total of 213 valid replies were obtained and utilized in the study at the conclusion of the data collection period. The Statistical Package for the Social Sciences (SPSS) version 28 was used in conjunction with descriptive and inferential statistics to analyze the gathered data. The descriptive statistics collected included frequencies, mean and standard deviation; whereas the inferential statistics employed in the study included the Pearson Product Moment Correlation r (PPMC) and multiple regression. The Pearson Product Moment Correlation r was used to test hypotheses 1 and 2 because it allowed the researcher to measure the relationship that existed between two variables, while the multiple regression was used to test hypotheses 3 because it helped to show the relationship that existed among all three variables of the study.

Presentation of Results

This section present the results of the data analysis carried out using the retrieved data. The presentation is in accordance with the study`s demographics, research questions and hypotheses.

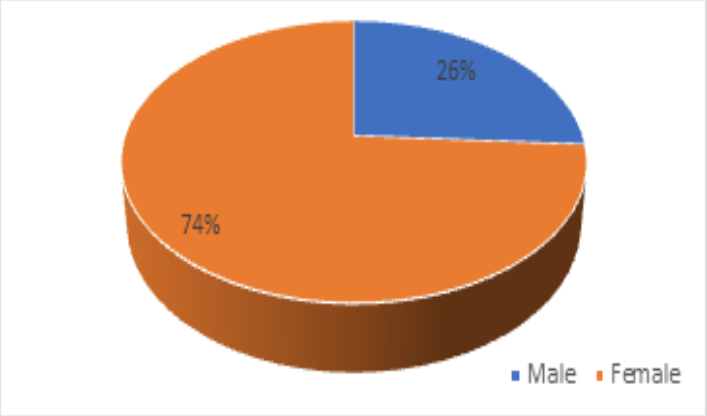

Figure 1: Gender Distribution

Figure 1 shows the gender distribution of the respondents. The figure shows that majority of the respondents (74%) are male, while female accounted for 26% of the total population of the study. The implication of this is that male LIS student participated more in the study than their female counterpart.

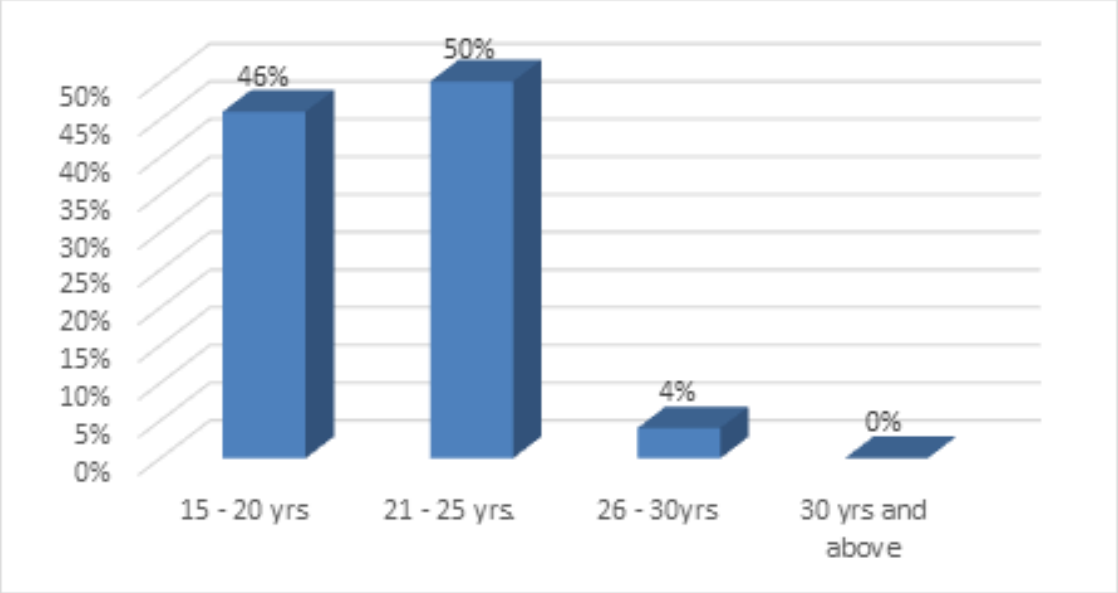

Figure 2: Age of Respondents

The age distribution of the study's respondents is shown in Figure 2. 46% of the respondents are between the ages of 15 and 20, while 50% are between the ages of 21 and 25. In contrast, none of the participants was older than 30, and only 4% of responders were between the ages of 26 and 30. Therefore, it can be assumed that most undergraduate LIS students at Odishan universities are between the ages of 15 and 25.

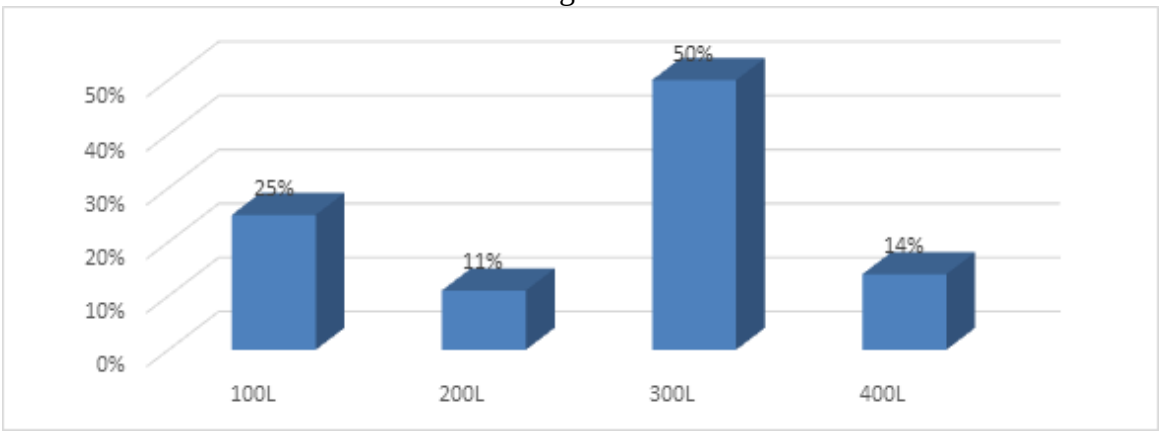

Figure 3: Level of Study of Respondents

The respondents' degree of education is displayed in Figure 3. According to the graphic, 50% of responders are in the 300 level, 25% are in the 100 level, 14% are in the 400 level, and 11% are in the 200 level. This demonstrates that the study's respondents came from all four levels of Odishan universities' undergraduate LIS programs.

Research Question 1: what is the level of LIS students` awareness of AI algorithm bias for information retrieval?

Table 1: Mean ratings of the level of LIS students` awareness of AI algorithm bias for information retrieval

S/N	Items	Very Low Level (%)	Low Level (%)	High Level (%)	Very High Level (%)	$\bar{X}$	SD
1.	I am aware that AI algorithms are trained based on data that may not be representative of the real world, thus resulting in the production of biased information	3(1.4)	41(19.2)	117(54.9)	52(24.4)	3.02	.70
2.	I am aware that the design and implementation of AI algorithm sometimes inadvertently introduces bias in information retrieval	7(3.3)	50(23.9)	112(52.6)	45(21.1)	2.86	.71
3.	I am aware AI algorithm produce weak result from regions with less training data such as Africa	5(2.3)	51(23.9)	112(52.6)	45(21.1)	2.92	.74
4.	I am aware that the availability of online resources could affect the kind of information retrieved from AI	11(5.2)	73(34.3)	88(41.3)	41(19.2)	2.75	.83
5.	I am aware that unintended bias sometimes occur when retrieving information from AI due to some algorithmic decision-making process	7(3.3)	48(22.5)	112(52.6)	46(21.6)	2.92	.75
6.	I am aware that unintended bias sometimes occur when retrieving information from AI due to some algorithmic decision-making process	4(1.9)	44(20.7)	112(52.6)	53(24.9)	3.00	.73
	Cluster Mean = 2.91						**.74**

The cluster mean of 2.91 with a standard deviation of.74, as shown in Table 1, indicates that LIS students are highly aware of AI algorithm bias for IR. This suggests that LIS students are highly conscious of the possibility of bias in AI algorithms, particularly in relation to IR.

Research Question 2: What are the different ethical concerns associated with the use of AI for information retrieval among LIS students in Odisha?

Table 2: Mean ratings of respondents on different ethical concerns associated with the use of AI for information retrieval among LIS students in Odisha

S/N	Items	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)	$\bar{X}$	SD
1.	Lack of transparency in AI decision making due to the opacity of AI algorithm	4(1.9)	48(22.5)	124(58.2)	37(17.4)	2.91	.68
2.	There is privacy concern as AI often require access to vast amounts of personal data	8(3.8)	36(16.9)	110(51.6)	59(27.7)	3.03	.77
3.	Unequal access to technology and the internet can exacerbate the digital divide, limiting access to AI-powered information retrieval for certain communities	4(1.9)	34(16.0)	116(54.5)	59(27.7)	3.08	.71
4.	AI can promote misinformation as the information retrieved from AI are sometimes inaccurate	11(5.2)	42(19.7)	100(46.9)	60(28.2)	2.98	.83

5.	Biased AI algorithms can disproportionately disadvantage marginalized groups in their access to information	10(4.7)	38(17.8)	112(52.6)	53(24.9)	2.98	.79
6.	There are concerns about the security of data collected by AI technologies	10(4.7)	27(12.7)	114(53.5)	62(29.1)	3.07	.78

All six of the elements in Table 2 were recognized by LIS students as ethical issues related to the use of AI for information retrieval. However, the participants ranked data security issues and uneven access to technology and the internet as the most ethical concerns related to the use of AI for information retrieval. This implies that the use of AI for information retrieval by LIS students in Odisha raises a number of ethical questions and concerns.

Research Question 3: What is the level of use of AI for information retrieval among LIS students in Odisha?

Table 3: Mean ratings of respondents on the level of use of AI for information retrieval among LIS students in Odisha

S/N	Items	Very Low Level (%)	Low Level (%)	High Level (%)	Very High Level (%)	$\bar{X}$	SD
1.	I regularly use AI to make factual inquiries	10(4.7)	38(17.8)	102(47.9)	63(29.6)	3.02	.82
2.	I use AI to get research information	9(4.2)	23(10.8)	101(47.4)	80(37.4)	3.18	.79
3.	I use AI to get personalized search result from the internet	13(6.1)	31(14.6)	102(47.9)	67(31.5)	3.05	.84
4.	I normally rewrite letters, memos and other write-ups using AI tools	28(13.1)	74(34.7)	77(36.2)	34(16.0)	2.55	.91
5.	I use AI to carry out voice search in the internet	32(15.0)	71(33.3)	74(34.7)	36(16.9)	2.54	.94
6.	I use AI to get more information about a given Product/services	12(5.6)	43(20.20	99(46.5)	59(27.7)	2.96	.84
	I use AI to generate information on my assignments	14(6.6)	32(15.0)	94(44.1)	73(34.3)	3.06	.87
Cluster Mean = 2.90							**.85**

LIS students in Odisha use AI for IR at a high level, as indicated by Table 3's cluster mean of 2.90 and standard deviation of.85. This implies that LIS students use AI for information retrieval at a high rate despite the ethical issues surrounding this technology. This is true even if using the technology comes with a number of unknowns.

Hypothesis One: There is no significant relationship between AI algorithm bias awareness and use of AI for information retrieval among LIS students in Odisha.

Table 4: Pearson r on the relationship between AI algorithm bias awareness and use of AI for information retrieval among LIS students in Odisha

Variables	Mean	Std. Dev.	N	R	df	Sig. (p)
AI algorithm bias awareness	17.48	3.20	213	.413**	211	.000
use of AI for information retrieval	20.36	3.97	213			

AI algorithm bias awareness and the use of AI for IR among LIS students in Odisha are significantly correlated, according to data analysis in Table 4. The P value for the computed r (0.413) was less than 0.05. This suggests that using AI for IR will be impacted by awareness of AI algorithm bias. As a result, the null hypothesis is rejected, suggesting that the usage of AI for IR and awareness of AI algorithm bias are significantly correlated.

Hypothesis Two: There is no significant relationship between AI ethical concerns and use of AI for information retrieval among LIS students in Odisha.

Table 5: Pearson r on the relationship between AI ethical concerns and use of AI for information retrieval among LIS students in Odisha

Variables	Mean	Std. Dev.	N	R	Df	Sig. (p)
AI ethical concerns	18.05	3.22	213	.323**	211	.000
use of AI for information retrieval	20.36	3.97	213			

With a calculated r of 0.323 against a P value <0.05, Table 5 demonstrates a strong association between AI ethical concerns and the usage of AI for information retrieval among LIS students in Odisha. This suggests that the use of AI for information retrieval by LIS students in Odisha may be impacted by ethical issues related to AI. As a result, the null hypothesis was rejected, suggesting that there is a substantial correlation between LIS students in Odisha using AI for information retrieval and ethical concerns about AI.

Hypothesis Three: There is no joint significant relationship among AI algorithm bias, ethical concerns and use of AI for information retrieval among LIS students in Odisha.

Table 6: Summary of multiple regression analysis on the significance of relationship among AI algorithm bias, ethical concerns and use of AI for information retrieval among LIS students in Odisha

b. Predictors: (Constant), Ethical concerns, AI for Info retrieval

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.542[a]	.294	.287	2.702

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
	Regression	637.842	2	318.921	43.678	.000[b]
	Residual	1533.350	210	7.302		
	Total	2171.192	212			

Table 6's data reveals a substantial correlation between LIS students in Odisha's usage of AI for IR, ethical concerns, and awareness of AI algorithm bias. The regression coefficient (R) of.524 and the coefficient of determination (R2) of.294 demonstrate this. The P-value of 0.00 for the computed F value of 43.678 is less than the critical P-value of 0.05. As a result, the null hypothesis was disproved. This suggests that there is a substantial association between the three variables under investigation.

DISCUSSION OF FINDINGS

According to the study, LIS students are highly conscious of the possibility of bias in AI algorithms, particularly when it comes to information retrieval. This can be because of their strong literacy abilities and the technological exposure they received from their program's curriculum. This study's findings are consistent with those of Okuonghae et al. (2022), who found that LIS students possess high levels of

technological proficiency and are cognizant of the possibility of bias in technology use. This is largely attributed to the fact that LIS students are introduced to course like Introduction to ICT, System Analysis and Design, Introduction to Programming, Software Packages amongst others; these courses put them at higher chances of being aware of the potential bias in AI algorithm in the context of information retrieval.

The study found that among the ethical issues surrounding the use of AI for information retrieval include a lack of openness in AI decision making, privacy concerns, unequal access to technology and the internet, the ability to spread false information, biased AI algorithms, and data security. There are certain doubts regarding the application of the technology for IR because of these ethical issues. The results are consistent with earlier studies (Bradley, 2022; Bernard & Balog, 2023), which found that among the ethical issues surrounding the use of AI are privacy, data security, biased algorithms, and a lack of transparency. The future of the technology and how it will be incorporated into the information ecosystem are made even more unknown by these worries.

According to the report, LIS students employ AI for IR at a significant rate. This is true even though using the technology raises a number of ethical issues. However, the technology's unique features—such as natural language processing, pattern and voice recognition, and intuitive user interactions—as well as the ease of retrieving information from information systems may be responsible for its widespread use (Echedom & Okuonghae, 2021). This result is consistent with Bin-Nashwan et al. (2023), who found that ChatGPT and other AI technologies are becoming more popular, particularly in academia. The study's findings also support those of Malik et al. (2023), who found that undergraduate students in particular use AI extensively for a range of tasks, including essay outlines, grammar checks, and language translation.

The study also found a strong correlation between the use of AI for information retrieval and awareness of AI algorithm bias. This indicates that the general level of AI usage for information retrieval may be impacted by a greater knowledge of AI algorithm bias. This realization validates the conclusions of Hajigholam and Mirhosseini (2023). The use of the technology is restricted in some areas where the bias is apparent due to concerns about AI algorithm bias. As a result, the data utilized to train AI technologies must have equitable representation. Additionally, the study demonstrated a strong correlation between LIS students in Odisha's usage of AI for IR and ethical worries about AI. This is mostly because of problems with data security and privacy concerns, as well as a lack of openness among the operators of various AI technologies. This result supports Schedl et al.'s (2022) assertion that privacy and a lack of transparency are ethical issues that may restrict the application of AI.

Lastly, the study found that among LIS students in Odisha, awareness of AI algorithm bias, ethical concerns, and the usage of AI for information retrieval are significantly correlated. This demonstrates how the usage of AI for information retrieval is related to awareness of AI algorithm bias and other ethical issues. Stakeholders' concerns about the ethical implications of AI use have so far prevented the technology from being widely used. This study's findings are consistent with those of Bradley (2022), Schedl et al. (2022), and Bernard and Balog (2023), who found that the various ethical issues surrounding the usage of AI are limiting its application. The degree of uncertainty surrounding the innovation has increased as a result.

CONCLUSION

Given its relevance to IR, a fundamental idea in the practice of librarianship, it is imperative that LIS students comprehend how AI functions. However, Odisha's LIS curriculum's structure and content give students a knowledge-advantage by exposing them to the fundamentals of ICT application to librarianship. Therefore, it should come as no surprise that the majority of these students utilize AI extensively for information retrieval and are aware of the bias in search results caused by algorithms. Therefore, it is anticipated that this awareness will direct their evaluation and use of the information that has been retrieved. The students are able to identify the moral dilemmas or problems associated with using AI for IR. Therefore, the proper utilization of AI for IR by students is hinged on several factors including their awareness of possible algorithm bias and ethical concerns.

LIMITATION OF THE STUDY

1. The study examined all LIS students in Odisha; however, only 213 responses were elicited voluntarily from the students which imply that the study has a weak power of generalization.

2. The study could not adopt/adapt a standard scale for measuring its variables because there seem to be none in existence at the time of this research. However, the pilot study conducted is hoped to have strengthen the integrity of the self-developed instrument.

3. The study in its data collection method used a self-assessment scale instead of cognitive test to ascertain AI algorithm bias awareness, which makes the study prone to social desirability bias.

REFERENCES

1. Adelakun, N. O. (2024). Exploring the Impact of Artificial Intelligence on Information Retrieval Systems. *Information Matters,* 4(5). Retrieved fromhttp://dx.doi.org/10.2139/ssrn.4834942
2. Ahmad, N., Milic, N. & Ibahrine, M. (2021). Data and Disinformation. *Computer, 54(7),*105-110. https:doi.org/10.1109/mc.2021.3074261
3. Akter, S., McCarthy, G., Sajib, S., Michael, K., Dwivedi, Y., DAmbra, J., & Shen, K. N.(2021). Algorithmic bias in data-driven innovation in the age of AI. *International Journal of Information Management,* 60. Retrieved fromhttps://doi.org/10.1016/j.ijinfomgt.2021.102387
4. Akın İnsel, M., Gonce Kocken, H., Albayrak, I. & Karakuş, S. (2024). Data-driven AI forinformation retrieval of biomedical images. In R. Malviya, S. Sundram, R. Kumar Dhanaraj & S. Kadry (Ed.), *Digital Transformation in Healthcare 5.0: Volume 1: IoT, AI and Digital Twin* (pp. 307-330). Berlin, Boston: De Gruyter. Retrieved from https://doi.org/10.1515/9783111327853-011
5. Alhayani, B., Mohammed, H. J., Chaloob, I. Z. & Jehan Saleh Ahmed, J. S. (2021).Effectiveness of artificial intelligence techniques against cyber security risks apply of IT industry. Materials Today: Proceedings. Retrieved from https://doi.org/10.1016/j.matpr.2021.02.531
6. Allam, H. Dempere, J. Vishwesh, A., Parakash, D., Mazher, N., Ahamed, J. (2023). Artificial Intelligence in Education: An argument of Chat-GPT Use in Education, 2023 9th International Conference on Information Technology Trends (ITT), Dubai, United Arab Emirates, 2023. 151-156. Retrieved from https://doi.org/10.1109/ITT59889.2023.10184267
7. Bernard, N. & Balog, K. (2023). A systematic review of fairness, accountability, transparency and ethics in information retrieval. *ACM Computing survey.* Retrieved from *https://doi.org/10.1145/3637211*
8. Bin-Nashwan, S. A. Sadallah, M. & Bouteraa (2023) Use of ChatGPT in academia: Academic integrity hangs in the balance. *Technology in Society,* 75. Retrieved from https://doi.org/10.1016/j.techsoc.2023.102370
9. Bradley, F. (2022) Representation of libraries in artificial intelligence regulations and implications for ethics and practice. *Journal of Australia Library Information Association* 71(3), 189-200. Retrieved from https://doi.org/10.1080/24750158.2022.2101911
10. Chen, T., Guo, W., Gao, X. & Liang, Z. (2021). AI-based self-service technology in public service delivery: User experience and influencing factors. *Government Information Quarterly*, 38(4), 101520. Retrieved from https://doi.org/10.1016/j.giq.2020.101520
11. Echedom, A. U., & Okuonghae, O. (2021). Transforming academic library operations in Africa with artificial intelligence: Opportunities and challenges: A review paper. *New Review of Academic Librarianship*, 27(2), 243–255. Retrieved from https://doi.org/10.1080/13614533.2021.1906715
12. Fahimirad, M., and Kotamjani, S. S. (2018). A review on application of artificial intelligence in teaching and learning in educational contexts. International Journal of Learning and Development, 8(4), 106-118.
13. Friis. S. & Riley, J. (2023). AI and machine learning: Eliminating algorithmic bias is just the beginning of equitable AI. Harvard Business School. Retrieved from https://hbr.org/2023/09/eliminating-algorithmic-bias-is-just-the-beginning-of-equitable-

i#:~:text=Algorithmic%20bias%20occurs%20when%20algorithms,criminal%20justice%2C%20and%20credit%20scoring.

14. Fu, S., & Cutchin, S. M., & Howell, K., & Ramachandran, S. (2020, April), Full Paper: Algorithm bias: Computer science student perceptions survey paper presented at proceedings of the 2020 ASEE PSW Section Conference, canceled, Davis, California. Retrieved from https://peer.asee.org/36036
15. Ghotbi, N. & Tung Ho, M. (2021). Moral awareness of college students regarding artificial intelligence. *Asian Bioethics Review 13(4)*, 421-433. Retrieved from https://doi.org/10.1007/s41649-021-00182-2
16. Guleria A., Krishan K., Sharma V., Kanchan T.(2023). ChatGPT: Ethical concerns and challenges in academics and research. J. Infect. Dev. Ctries.,17(9):1292-1299. Retrieved from https://pubmed.ncbi.nlm.nih.gov/37824352/
17. Gupta, P., Anand, A., Singh, J., Rana, S. & Kumar, A. (2024). Study on artificial intelligence (AI) initiatives in e-service delivery systems: a service process perception model. *International Journal of Services Operations and Informatics*, 12(4), 344-366
18. Hajigholam, A., & Mirhosseini, M. (2023). A scoping review on the impact of algorithm bias on the perceived fairness. *Research Square*. Retrieved from https://doi.org/10.21203/rs.3.rs-3428999/v1
19. Hill, J. E., Harris, C. Clegg, A. (2023) Method for using Bing's AI-powered search engine for data extraction for systematic review. *Research and Synthesis Method 15 (2),* 347-353. Retrieved from https://doi.org/10.1002/jrsm.1689
20. Hodonu-wusu, J. O. (2024). The rise of artificial intelligence in libraries: the ethical and equitable methodologies, and prospects for empowering library users. *AI and Ethics* 1-11. Retrieved from https:doi.org/10.1007/s43681-024-00432-7
21. Huang, C., Zhang, Z., Mao, B. & Yao, Z. (2023). An overview of artificial intelligence ethics. IEEE transactions on artificial intelligence, 4(4), 799-819. Retrieved from https://doi.ieeecomputersociety.org/10.1109/TAI.2022.3194503
22. Igwe, K.N. & Sulyman, S.A. (2022). Smart libraries: Changing the paradigms of library services. *Business Information Review*, 39(4), 1–6. Retrieved from https://doi.org/10.1177/02663821221110042
23. Ikedinachi, A. P., Misra, S., Assibong, P. A., Olu-Owolabi, E. F., Maskeliūnas, R., & Damasevicius, R. (2019). Artificial intelligence, smart classrooms and online education in the 21st century: Implications for human development. *Journal of Cases on Information Technology (JCIT)*, 21(3), 66-79.
24. Jackson, M. C. (2021). Artificial intelligence & algorithmic bias: the issues with technology reflecting history & humans. *J Bus Technol Law*, 16:299.
25. Johansson J. & Herranen, S. (2019). The application of artificial intelligence (AI) in human resource management: current state of AI and its impact on the traditional recruitment process. Bachelor thesis, Jonkoping University.
26. Kennedy, I. (2022), Sample size determination in test-retest and cronbach alpha reliability estimates. *British Journal of Contemporary Education* 2(1), 17-29.
27. Kim, T. W. (2023). Application of artificial intelligence chatbots, including ChatGPT, in education, scholarly work, programming, and content generation and its prospects: a narrative review. *Journal of Educational Evaluation for Health Professions*, 20, 38. Retrieved from https://doi.org/10.3352/jeehp.2023.20.38
28. Klimova B, Pikhart M and Kacetl J (2023) Ethical issues of the use of AI-driven mobile apps for education. *Front. Public Health* 10:1118116.

29. Kolbjørnsrud, V., Amico, R., & Thomas, R. J. (2017). Partnering with AI: how organizations can win over skeptical managers. Strategy and Leadership 45(1):37-43. Retrieved from http://dx.doi.org/10.1108/SL-12-2016-0085

30. Lacave, C & Molina, A. I. (2022). A pilot experience to raise awareness among computer science undergraduate about the gender bias of algorithm. In Garcia-Penalvo, F. J., Garcia-Holgado, A. (eds). Proceedings TEEM 2022: Tenth International Conference on Technological Ecosystems for Enhancing Multiculturality: TEEM 2022. Lecture Notes in Educational Technology. Springer, Singapore 414-423. Retrieved from https://doi.org/10.1007/978-981-99-09421_42

31. Lambrect, A. & Tucker, C. (2019) Algorithm bias? An empirical study of apparent gender-based discrimination in the display of stem career ads. *Management Science 65(7)*, 2966-2981. Retrieved from https://dx.doi.org/10.2139/ssrn.2852260

32. Makhortykh, M. (2023) No AI after Auschwitz? Bridging AI and memory ethics in the context of information retrieval of genocide-related information. In A. Mukherjee, J. Kulshrestha, A. Chakraborty, and S. Kumar (Eds.), *Ethics in Artificial Intelligent: Bias, Fairness and Beyond*, 71-83. Springer. Retrieved from https://doi.org/10.1007/978-981-99-7-184-84

33. Malik, A. R., Pratiwi, Y. Andajani, K. Numertayasa, I. Suharti, S. Darwis, A. (2023). Exploring artificial intelligence in academic essay: higher education student's perspective. *International Journal of Education Research Open* 5, Retrieved from https://doi.org/10.1016/j.ijedro.2023.100296

34. Manjunatha, K. (2023) A study on impact of artificial intelligence (AI) on library services. *International Journal of Research in Library Science (IJRLS) 9(4)*, 189-199. Retrieved from https://10.26761/ijrls.9.4.2023.1696

35. McDonald, N. & Pan, S. (2020) Intersectional AI: A study of how information science students think about ethics and their impact. Paper Presented at the Proceedings of the ACM on Human-Computer Interaction, 4(147), 1-19, Retrieved from https://doi.org/10.1145/3415218

36. Melchiorre, A. B., Zangerle, E. & Schedl, M. (2020). Personality bias of music recommendation algorithms in recsys 2020: Fourteenth ACM Conference on Recommender Systems. Virtual event, Brazil, September 22-26, 2020, Rodrygo.L.T. Santos, Leandro. Balby Marinho, Elizabeth M. Daly, Li Chen, Kim Falk, Noam Koenigstein, and Edleno silva de moura (eds.) ACM, 533-538. Retrieved from https://doi.org/10.1145/338313.3412223

37. Njoto S (2020). Research paper gendered bots? Bias in the use of artificial intelligence in Recruitment. Retrieved from https://arts.unimelb.edu.au/__data/assets/pdf_file/0008/3440438/Sheilla-Njoto-Gendered-Bots.pdf

38. Noble, S.U. (2018). Algorithm of oppression: How search engines reinforce racism. New York University Press. Retrieved from https://doi.org/10.18574/nyu/9781479833641.001.0001

39. O'Neil, C. (2016) Weapons of math destruction: How big data increases inequality and threatens democracy. New York, NY: Broadway Books

40. Okuonghae, O., Igbinovia, M. & Adebayo, J. (2022). Technological readiness and computer self-efficacy as predictors of E-learning adoption by LIS students in Odisha. *Libri*, *72*(1), 13-25. Retrieved from https://doi.org/10.1515/libri-2020-0166

41. Panch, T., Mattie, H. & Atun, R. (2019). Artificial intelligence and algorithmic bias: implications for health systems. *J Glob Health*, 9(2):010318. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6875681/

42. Ramachandran, S., Cutchin, S. M. & Fu, S (2021) Raising algorithm bias awareness among computer science students through library and computer science instruction. Paper presented at 2021 ASEE Virtual Annual Conference Content Access, Virtual Conference. Retrieved from https://10.18260/1-2-37634

43. Reis, J., Amorim, M., Cohen, Y., Rodrigues, M. (2020). Artificial Intelligence in Service Delivery Systems: A Systematic Literature Review. In: Rocha, Á., Adeli, H., Reis, L., Costanzo, S., Orovic, I.,

Moreira, F. (eds) Trends and Innovations in Information Systems and Technologies. WorldCIST 2020. Advances in Intelligent Systems and Computing, vol 1159. Springer, Cham. https://doi.org/10.1007/978-3-030-45688-7_23

44. Rudnicka, Z., Szczepanski, J. & Pregowska, A. (2024). Artificial intelligence-based algorithms in medical image scan segmentation and intelligent visual content generation: A concise overview. *Electronics*. 2024; 13(4):746. Retrieved from https://doi.org/10.3390/electronics13040746
45. Saeidnia, H. R. (2023). Ethical artificial intelligence (AI): Confronting bias and discrimination in the library and information industry. Library Hi Tech News, Vol. ahead-of-print No. ahead-of-print. Retrieved from https://doi.org/10.1108/LHTN-10-2023-0182
46. Schedl, M. Gomez, E. & Lex, E. (2022) Retrieval and recommendation systems at the crossroads of artificial intelligence, ethics and regulation. In: SIGIR 22: Proceedings of the 45th International ACM SIGIR Conference on Research and Development in Information Retrieval; 2022 July 11-15; Madrid, Spain. New York: Association for Computing Machinery; 2022. Pp. 3420-3424. DOI: https://10.1145/3477495.3532683
47. Schedl, M. Hauger, D., Farrahi, K. & Tkalic, M (2015). On the influence of user characteristic on music recommendation algorithms in advances in information retrieval. 37th European Conference on IR research, ECIR 2015, Vienna, Austria, March 29-April 2, 2015. Proceedings (Lectures Notes in Computer Science, Vol. 9022), Allan Hanbury, Gabriella Kazai, Andreas. Rauber and Norbert Fuhr (Eds.). 339-345. https://doi.org/10.1007/978-3-319-16354-3_37
48. Shin, D & Shin, E. (2023) Datas Impact on Algorithm Bias. *Computer 56(6),* 90-94. Retrieved from https://doi.org/10.1109/mc.2023..3262909
49. Shin, D, Zaid, B., Biocca, F. & Rasul, A. (2022). In platform we trust? Unlocking the black-box of news algorithms through interpretation of AI. *Journal of Broadcast Electronic Media 66(2),* 235-256. Retrieved from https://doi.org/10.1080/08838151.2022.2057984
50. Shin, D. (2021). Embodying algorithm, enactive artificial intelligence and the extended cognition: You can see as much as you know about algorithm. *Journal of Information Science* 49(1), 1-14. Retrieved from https://doi.org/10.1177/0165551520985495
51. Slimi, Z. & Carballido, B. V. (2023). Navigating the ethical challenges of artificial intelligence in higher education: An analysis of seven global AI Ethics policies. *TEM Journal*, 12(2), 590-602.
52. Soni, D. N. (2023). The role of artificial intelligence in information and library science: Opportunities and ethical considerations. *International Journal of Research in Humanities & Social Sciences 11(7),* 41-43.
53. UNESCO (2023). Artificial Intelligence: examples of ethical dilemmas. Retrieved from https://www.unesco.org/en/artificial-intelligence/recommendation-ethics/cases
54. UNESCO (2024). Ethics of artificial intelligence: The recommendation. Retrieved from https://www.unesco.org/en/artificial-intelligence/recommendation-ethics
55. Ylipulli, J. & Luusua, A. (2019) Without libraries what have we? Public libraries as nodes for technological empowerment in the era of smart cities, AI and big data. Conference: 9th International Conference on Communities and Technologies-Transforming Communities. ACM press, New York. Pp 92-101
56. Yu, Y. Wang, J. Zhang, Y. Zhang, L. Yang, Y. & Sakai, T (2023) EALM: Introducing multidimensional ethical alignment in conversational information retrieval proceedings of the Annual International ACM SIGIR conference on Research and Development in information Retrieval in Asia Pacific Region, 32-39.
57. Zheng H., Zhan H. (2023). ChatGPT in scientific writing: A Cautionary Tale. *Am. J. Med*. 136(8):725-726. Retrieved from https://doi.org/10.1016/j.amjmed.2023.02.011