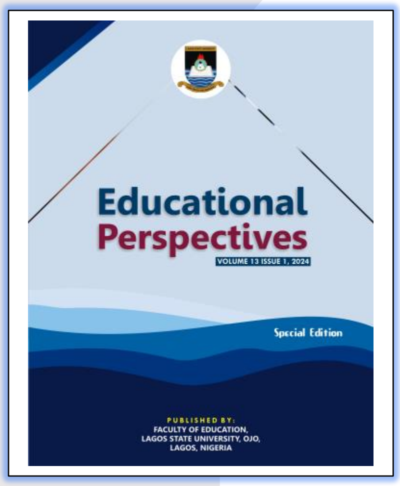

Awareness, Skills and Knowledge of Lecturers and Students in Machine Learning in Lagos State University.

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ABSTRACT

The study was carried out to assess the awareness, knowledge and skills of computer science lecturers and students in machine learning in Lagos State University, Ojo, Lagos State. The sample for the study consisted of One hundred (100) selected Lecturers and students of Lagos State University using the simple random sampling technique. A selfdeveloped Questionnaire designed in line with Likert's attitudinal four-point rating scale was used for data collection. The drafted questionnaire was face and content validated by the researcher's supervisor and other research experts. The Kuder-Richardson formula 21 was used to determine the reliability coefficient of the research instrument. A total of one hundred (100) copies of the validated research instrument were administered on selected respondents using the spot technique to ensure high percentage returns. The data collected was analyzed using simple percentage and frequency counts for demographic data, while the inferential statistics of One Sample T-test was used to test all stated hypotheses at 0.05 level of significance. Findings from the study revealed that a significant difference was recorded in the lecturers and students' awareness of the use of machine learning. A significant difference was recorded in the lecturers and students' knowledge in machine learning. And a significant difference was recorded in the lecturers and students' skills in the application of machine learning in solving problem.

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Introduction

Today's classrooms are not merely evolving to incorporate more technology and digital resources; they are also increasingly investing in machine learning. This technology has emerged as a new frontier in education, with the potential to redefine not only how education is delivered but also to foster deeper, more personalized learning experiences for students (Makridakis, 2017). Machine learning promises to enable customized in-class teaching by providing real-time feedback based on individual student behaviors and other factors, which can lead to improved learning outcomes. Additionally, machine learning plays a critical role in assessments and evaluations by helping to eliminate biases, ensuring a fairer and more accurate measurement of student performance.

As one of the most powerful emerging technologies, machine learning is at the forefront of artificial intelligence and human interaction (Anjali, 2019). The growing integration of AI in educational settings has significant long-term implications for students, particularly in terms of increasing their access to and understanding of AI technologies. This emergence of AI in education can reshape the learning process, especially in higher education, where the challenges are more complex and the opportunities to explore AI solutions are vast (Ikedinachi, Amaechi, & Azubuike, 2019).

Popenici and Kerr (2017) highlight that the realm of higher education presents a distinct set of challenges, as the exploration of AI solutions is likely to restructure traditional learning processes. When educators are deeply involved in utilizing machine learning, they can inspire students to appreciate its relevance in both educational contexts and broader sectors. This involvement is expected to enhance students' creative achievements and overall engagement with the subject matter.

The demand for professionals with expertise in machine learning is rapidly increasing, making it crucial for educational institutions to ensure that graduates are adequately prepared to meet industry needs (Saini & Ramesh, 2019). However, there is limited research on the awareness, knowledge, and skills of computer science lecturers and students regarding machine learning. This gap underscores the need to explore these areas further to identify deficiencies in the current education system and develop strategies to bridge them. Understanding the gaps in lecturers' knowledge and skills will enable institutions to design targeted training programs that enhance the quality of education provided to students.

Machine learning is a branch of computer science that originated from research in pattern recognition and computational learning theory within the field of artificial intelligence. As defined by Alpaydin (2010), it involves creating and refining algorithms that can learn from and make predictions based on data. These algorithms construct models from sample inputs to make data-driven decisions, rather than following rigid, pre-programmed instructions (Annina et al., 2015).

Understanding machine learning involves two main perspectives: general knowledge and domain-specific knowledge. General knowledge includes fundamental concepts from computer science, statistics, and neuroscience, which provide the foundation for machine learning. For instance, knowledge of neuroscience can be applied to enhance neural network design (Domingos, 2015). On the other hand, domain-specific knowledge refers to expertise in particular fields, such as physics, chemistry, engineering, or linguistics. This type of knowledge can be integrated into machine learning algorithms to improve their performance by incorporating domain-specific equations, logic, and prior knowledge.

The evolution of machine learning is rooted in the development of general knowledge. In 1943, the first mathematical model of a neuron network was created, based on the understanding of brain cells (McCulloch & Pitts, 1943; Rosenblatt, 1957). Later, the invention of the perceptron in 1957, which aimed to mimic the perceptual processes of a biological brain, laid the groundwork for modern deep neural networks (Rosenblatt, 1957). The continuous development of these algorithms, combined with increasing data availability and computational power, has propelled the rise of artificial intelligence (Goodfellow et al., 2016).

Domain-specific knowledge is crucial in improving the accuracy and performance of machine learning models. For example, expert ratings can be used to guide data mining tools in evaluating loan applications more accurately (Sinha & Zhao, 2008). Incorporating domain knowledge into the design of training datasets can lead to better predictions and outcomes. Human expertise is also vital in various machine learning applications, such as evaluating machine-generated videos (Li et al., 2018). Even in scenarios where machine learning surpasses human performance, such as in the game of Go (Silver et al., 2017), initial learning from human experience can significantly speed up the learning process.

While the focus in machine learning has traditionally been on software and algorithms, there is a growing interest in redesigning the hardware. Current computers, based on the von Neumann architecture, consume much more power than biological brains. For example, IBM's Blue Gene/P supercomputer, which simulated 1% of the human cerebral cortex, consumed up to 2.9 MW of power, while the human brain operates at only about 20 W (Hennecke et al., 2012; Modha, 2017).

It's important to note the distinctions between machine learning, deep learning, and neural networks. Although these terms are often used interchangeably, they represent different levels within the broader field of artificial intelligence. Neural networks are a subset of machine learning, and deep learning is a further subset of neural networks (Goodfellow et al., 2016).

Statement of the Problem

Machine learning is rapidly evolving and significantly impacts various industries through its data-driven decision-making capabilities (Jordan & Mitchell, 2015). Despite the growing number of educational programs available, there is a critical lack of understanding regarding the awareness, skills, and knowledge levels of both lecturers and students in this field. This research aims to investigate these areas to identify gaps that may hinder effective teaching and learning.

Research Hypotheses

To aid the study, the following research hypotheses were formulated by the researcher;

$H0_1$: There is no significant difference between the lecturers' and students' awareness of the use of machine learning.

$H0_2$: There is no significant difference between the lecturers' and students' knowledge in machine learning.

$H0_3$: There is no significant difference between lecturers' and students' skills in the application of machine learning in solving problem

Methodology

The research study adopted a survey type of descriptive research design. The population of the study comprises of students and lecturers of Lagos

State University, Computer Science Department, Lagos State. A total number of ninety (90) undergraduate students and ten (10) lecturers from Computer Science Department in Lagos State University was used for the study. Forty (40) 300L and fifty (50) 400l students were selected using simple random sampling technique.

Two self - developed questionnaires which were validated using face and content validity were the instruments used for data collection. There is one for collection of data from the students while the other was used to collect data from the lecturers. The questionnaire is a close-ended type, which contains a set of pre-determined options to the items presented.

The questionnaires comprise of three sections each. The students' questionnaire consisted of section A, section B and section C. Section A was designed to seek information about respondent's personal data. Section B consist of item designed to seek for the response of correlate issue on awareness and knowledge of computer science students in machine learning while section C, asked questions on students' skills in the use of machine learning. The section B adopted scale has ratings of two response options of YES (Y) and NO (N) while section C Scale was structured using Likert scale responses modes of Highly Skilled (HS), Moderately Skilled (MS), Not Skilled (NS) and Never Use (NU).

Data Analysis

The responses from the data collection were analyzed using simple percentage and frequency counts for analysis of bio data of respondents while the stated hypotheses were tested using One Sample T-test inferential statistic through Statistical Package for Social Science (SPSS).

Data Presentation

Table 1: Distribution of Lecturers by Sex

Sex					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	8	80	80	80
	Female	2	20	20	100
	Total	10	100	100	

From table 1 above, it could be observed that 8 (80%) of the lecturers were Male, while the remaining 2 (20%) were Female.

Table 2: Distribution of Lecturers by Qualification

Qualification					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	B.Sc.	1	10	10	10
	M.Sc.	6	60	60	70
	PhD	1	10	10	80
	Professor	2	20	20	100
	Total	10	100	100	

From table 2 above, it could be observed that 1 (10%) of the lecturers had B.Sc., 6 (60%) of the lecturers had M.Sc., 1 (10%) of the lecturers had a PhD, while the remaining 2 (20%) were Professors.

Table 3: Distribution of Students by Sex

Sex					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Male	57	63.3	63.3	63.3
	Female	33	36.7	36.7	100
	Total	90	100	100	

From table 3 above, it could be observed that 57 (63.3%) of the students were Male, while the remaining 33 (36.7%) were Female.

Table 4: Distribution of Students by Level

Level					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	300 Level	69	76.7	76.7	76.7
	400 Level	21	23.3	23.3	100.0
	Total	90	100	100	

From table 4 above, it could be observed that 69 (76.7%) of the students were in 300 level, while the remaining 21 (23.3%) were in 400 level.

Testing Stated Hypotheses

Hypothesis One

Hypothesis one states that there is no significant difference in lecturers and students' awareness of the use of machine learning.

Table 5: Difference in lecturers and students' awareness of the use of machine learning.

Variable	N	Mean	SD	Std. Error Mean	t-value	Df	Sig
Awareness	100	7.6700	1.67003	0.16700	61.855*	99	0.000

From table 5 above, it could be observed that a significant t-value ($t=61.86$; $p<0.05$) was obtained at 0.05 level of significance, therefore the hypothesis is hereby rejected. This implies that a significant difference was recorded in the lecturers and students' awareness of the use of machine learning.

Hypothesis Two

Hypothesis two states that there is no significant difference in lecturers and students' knowledge in machine learning.

Table 6: Difference in lecturers and students' knowledge in machine learning.

Variable	N	Mean	SD	Std. Error Mean	t-value	Df	Sig
Knowledge	100	8.3200	1.51010	0.15101	64.102*	99	0.000

From table 6 above, it could be observed that a significant t-value ($t=64.10$; $p<0.05$) was obtained at 0.05 level of significance, therefore the hypothesis is hereby rejected. This implies that a significant difference was recorded in the lecturers and students' knowledge in machine learning.

Hypothesis Three

Hypothesis three states that there is no significant difference in lecturers and students' skills in the application of machine learning in solving problem.

Table 7: Difference in lecturers and students' knowledge in machine learning.

Variable	N	Mean	SD	Std. Error Mean	t-value	Df	Sig
Skills	100	19.8400	9.27113	0.92711	14.195*	99	0.000

From table 7 above, it could be observed that a significant t-value ($t=14.20$; $p<0.05$) was obtained at 0.05 level of significance, therefore the hypothesis is hereby rejected. This implies that a significant difference was recorded in the lecturers and students' skills in the application of machine learning in solving problem.

Discussion of Findings

The first hypothesis, which proposed that there is no significant difference in the awareness of machine learning between lecturers and students, was tested using a t-test at a 0.05 significance level. The results indicated a significant difference, leading to the rejection of the hypothesis. This suggests that lecturers and students differ in their awareness of machine learning. This finding is supported by NixUnited (2021), who noted that while machine learning is widely recognized, many people struggle to fully understand it. Additionally, Mikalef and Gupta (2021) highlighted that artificial intelligence, which encompasses machine learning, is significantly altering human interactions with technology and the broader world, particularly in educational settings (Popenici & Kerr, 2017; Ikedinachi et al., 2019).

The second hypothesis, which posited that there is no significant difference in the knowledge of machine learning between lecturers and students, was also tested using a t-test. The results showed a significant difference, leading to the rejection of this hypothesis as well. This aligns with the findings of Sinha and Zhao (2008), who argued that domain knowledge plays a crucial role in enhancing learning performance. Similarly, Li et al. (2018) and Ikedinachi et al. (2019) emphasized the importance of integrating domain-specific knowledge and human expertise in improving machine learning outcomes and educational practices.

The third hypothesis examined the difference in skills related to the application of machine learning between lecturers and students. The t-test results revealed a significant difference, leading to the rejection of the hypothesis. This finding is consistent with Goodfellow (2014), who suggested that integrating human expertise with machine learning can significantly improve its effectiveness. Furthermore, Popenici and Kerr (2017) noted that while AI applications can simplify certain tasks in higher education, more complex educational challenges remain.

The study was conducted to assess the awareness, knowledge, and skills of computer science lecturers and students in machine learning at Lagos State University, Ojo, Lagos State. The sample consisted of 100 lecturers and students selected using simple random sampling. Data were collected using a self-developed questionnaire designed based on a Likert scale, which was validated by research experts. The reliability of the instrument was confirmed using the Kuder-Richardson formula 21. A total of 100 questionnaires were distributed and analyzed using simple percentages for demographic data and a one-sample t-test for hypothesis testing at a 0.05 significance level.

Conclusion

Based on the findings of this study, several conclusions can be drawn: Machine learning, a significant application of artificial intelligence, is ushering in a new era, especially in the field of education. The interaction between humans and machines has the potential to transform how we study, memorize, understand, and generate knowledge. This study, which focused on the awareness, knowledge, and skills of computer science lecturers and students in machine learning at Lagos State University, found notable differences in these areas. Specifically, there was a significant disparity in the awareness, knowledge, and application skills related to machine learning between lecturers and students. Machine learning is crucial for maintaining a balance between technology and education and enhancing interactions between lecturers and students in higher education institutions.

Recommendations

Based on these conclusions, the following recommendations are proposed:

Nigerian universities should develop comprehensive strategies to improve the training and technological skills of lecturers. This will ensure they are well-equipped to fulfill their responsibilities effectively and keep pace with advancements in machine learning and other technologies.

Universities should implement a pooled procurement system to acquire and distribute up-to-date technological equipment. This will support both lecturers and students by providing the necessary tools for effective learning and teaching.

Efforts should be made to increase student access to essential tools and resources related to machine learning. This will facilitate better learning experiences and outcomes in higher education settings.

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