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Original Research Article

Development of a Past Questions Repository System

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KEYWORDS
Past Question,
Artificial Neural Network,
Repository.

ABSTRACT
Limited access to past examination question papers and the slow response time of existing question paper repositories have contributed significantly to poor academic preparation, leading to increased course failure rates among university students. Many traditional repositories suffer from inefficient search mechanisms, delayed retrieval, and restricted availability, making it difficult for students to obtain relevant past questions when needed. This paper presents the implementation of an Artificial Neural Network (ANN) within an electronic repository of past examination question papers in a university setting to address these challenges. The repository represents a significant advancement in academic resource management by providing a streamlined, user-friendly, and highly accessible platform for students and staff. Through an intuitive interface and efficient search tools, users can easily navigate extensive collections of question papers spanning multiple disciplines, courses, and semesters. The integration of ANN technology enhances accessibility and system performance by reducing search time by up to 5 ms through automated classification of student queries, thereby minimizing delays associated with complex database operations. The system also incorporates security measures to ensure the confidentiality and integrity of stored question papers while promoting environmental sustainability by reducing reliance on printed materials.

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INTRODUCTION

In recent years, the exponential rise of online learning platforms has reshaped how higher education institutions design, deliver, and evaluate academic learning. Digital technologies now underpin flexible course delivery, remote assessment, and on-demand access to educational resources. The digitization of educational materials, particularly past examination questions, has garnered attention in scholarly literature due to its potential to enhance accessibility, preservation, and educational outcomes. (Jimoh et al, 2024)

Despite the potential benefits, few universities have implemented comprehensive online repositories tailored to their specific academic ecosystems (Idubor, 2022).. Existing systems are often fragmented, lack intuitive interfaces, or fail to incorporate automated updating and feedback mechanisms. Therefore, developing a robust and scalable Online University Past Questions and Answers Repository represents an important step toward enhancing digital learning infrastructure in higher education. This study explores the design, development, and implementation of such a system, focusing on usability, performance, and its potential impact on students' learning outcomes (Oladele et al, 2023).

Literature Review

Past questions are very important study tools because they help students understand exam formats, the types of questions that usually appear, and the level of difficulty expected in their exams (Olowe & Adebayo, 2020). Many

students rely on past questions to build confidence and reduce examination fear, and research shows that practicing with past questions can improve student performance (Nwachukwu & Osuagwu, 2021). However, most traditional past question repositories are not well organized. They may contain scanned documents, PDFs, or folders that are difficult to search through, especially when students need specific topics or subjects (Okoro & Iroegbu, 2019).

One major problem with existing systems is that they depend heavily on manual uploading and sorting of questions. This makes the systems slow and difficult to manage as the number of questions increases (Ahmed & Umar, 2021). Overall, the introduction of AI-powered past question repositories is seen as a major step forward in educational technology. While past questions already help students prepare for exams, combining them with AI makes the process faster, smarter, and more personalized. Researchers agree that there is a strong need for systems that not only store past questions but also provide intelligent support to help students learn more efficiently (Suresh & Thomas, 2020).

Another major area where AI is transforming education is content organization and information retrieval. Educational systems such as learning management systems (LMS) and digital libraries use AI to organize materials, recommend relevant resources, and help students find what they are looking for more quickly (Johnson et al., 2020).

Research Gap

The recent research by (L. F. Jimoh,2024) has proposed a digital repository to store past questions as part of library reservation system. The research has provided remote access to some of library materials like past questions papers, but the main limitation of the work is it lack implementation of artificial intelligent functionalities that can boost the speed of accessing the past question papers. This research proposed the implementation of Artificial neural network in classification of students who can access some specific type of past question papers to the system in order to boost the search speed. The students names and their past academic performances are inside a dataset where the students will be classify according to who can access a specific past question and who cannot access based on the past performance for that course, then the classified data pushed to web database for use by repository system.

MATERIALS AND METHODS

This section details the experimental setup, technical specifications, and procedural framework employed to achieve the research objectives. It is categorized into hardware/software configurations and the conceptual models used for system development.

Tools Used for the Research Work

Many technical tools have been used in carrying out the implementations aspect of the research work where some are physical system like computer used in running other software tools while other tools are softwares like weka for running classification, wam server for hosting the repository application.

Table 1: Software Tools

S/N	Name	Description	Use for
1	Weka	Weka is an open-source platform that provides a collection of tools for performing machine learning and data mining tasks.	Implementation of Classification Algorithm
2	Microsoft word	Word editor	Writing work reports.
3	Operating System	Windows 8	Computer OS
2	Wamp Server	WampServer is a free web development environment for Windows that combines Apache, PHP, and MySQL/MariaDB into a simple, all-in-one installation.	Implementation of web app parts of the research project

Table 2: Hardwares Tools

S/N	Name	Description	Use for
1	Computer System	1. Processor of 1.30GHz 2. Install Memory (RAM) 2.00GB, 32 or 64 bit Operating system.	1. Running OS 2. Running MATLAB
2	A smart mobile phone	1. Processor 1.5ghz	1. Running android OS 2. Running Our case study systems.

Models and techniques

Artificial neural networks (ANNs)

An artificial neural network is a parametric model composed of many simple units ("neurons") arranged in layers; by learning connection weights between units it can automatically discover hierarchical, multi-level representations of data for tasks such as classification, regression, and generation (Y LeChun., 2015). The ANN was used in classification of students based on their previous academic performance as explained in section 3.3

Flowchart

Flowchart shows how actions flow from beginning to an end in the operations of the system. There are two flowcharts where the first flowchart describe how classification is done on student unclassified-dataset (input) using weka by Artificial neural network and generated a classified dataset of students (output), the second flowchart describe how interactive web app repository collect the classified dataset as input for student database and allow admin and student perform upload/view of past questions.

Classification Flowchart

Here the first flowchart (Figure 1) describe how ann is used to classify students that can access a specific past question paper and student that cannot access the past question.

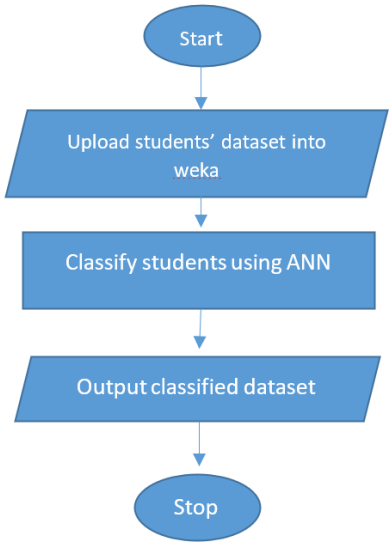

Figure 1: Students dataset classification on weka using ANN

Figure 2 is the second flowchart where action perform on the web app repository system is described from start (upload of classified student dataset) to an end (upload/view of past question) by both student and admin.

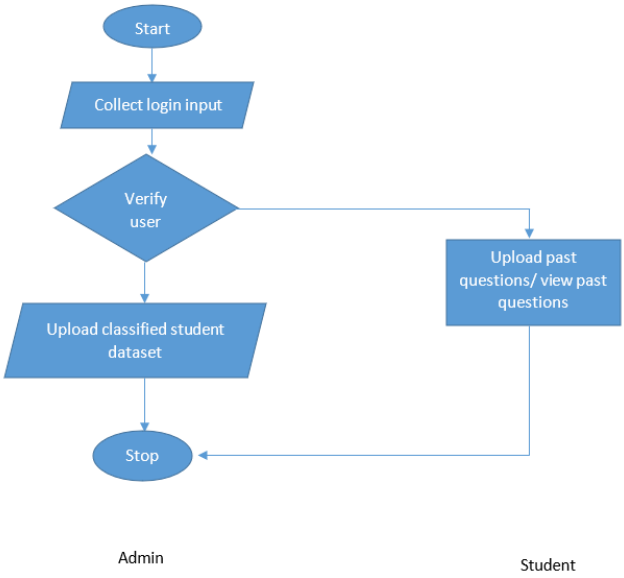

Figure 2: operations on past question repository system by admin and student

How ANN Works

Step 1: Each input is multiplied by a weight, then summed: Here the input is the dataset where the value needed to be classify.

$$Z = (x1w1) + (x2w2) + \ldots + b \ldots \quad (1)$$

Where:

x = input

w = weight

b = bias

Step 2: Activation Function

The result is passed through an activation function to introduce non-linearity.: Here the result from step 1 which is the multiplications of input and weight is passed to a function called activation functions.

Sigmoid → output between 0 and 1

Example: Sigmoid

$$f(z) = \frac{1}{1+e-z1} \ldots \quad (2)$$

e is Euler's number (≈ 2.718)

z is the input (often a weighted sum in neural networks)

The output of f(z) is always between 0 and 1

Step 3: Output

The neuron sends its output to the next layer which is training the ANN

Training the ANN (Learning Process)

ANN learns using training data with known outputs.

Step 1: Forward Propagation

a. Inputs move from input layer → hidden layer → output layer
b. ANN makes a prediction

Step 2: Error Calculation

$$\text{Error} = \text{Actual} - \text{Predicted} \ldots\ldots\ldots\ldots \quad (3)$$

Step 3: Backpropagation

a. The error is sent backward through the network
b. Weights are adjusted to reduce the error

Step 4: Weight Update

Weights are updated using gradient descent:

$$w = w - \eta \frac{\partial \text{Error}}{\partial w} \ldots\ldots\ldots \quad (4)$$

Where:

η = learning rate

This process repeats for many iterations (epochs) until the error is minimized.

RESULTS AND DISCUSSIONS

The result first is the result from the weka where Artificial neural network (ANN) use to perform classification of students that can be allowed to access a specific pass questions based on their past performance in the course. The second part of the result is where web application of the real implementation of the system, where students can upload past question or view the uploaded past question.

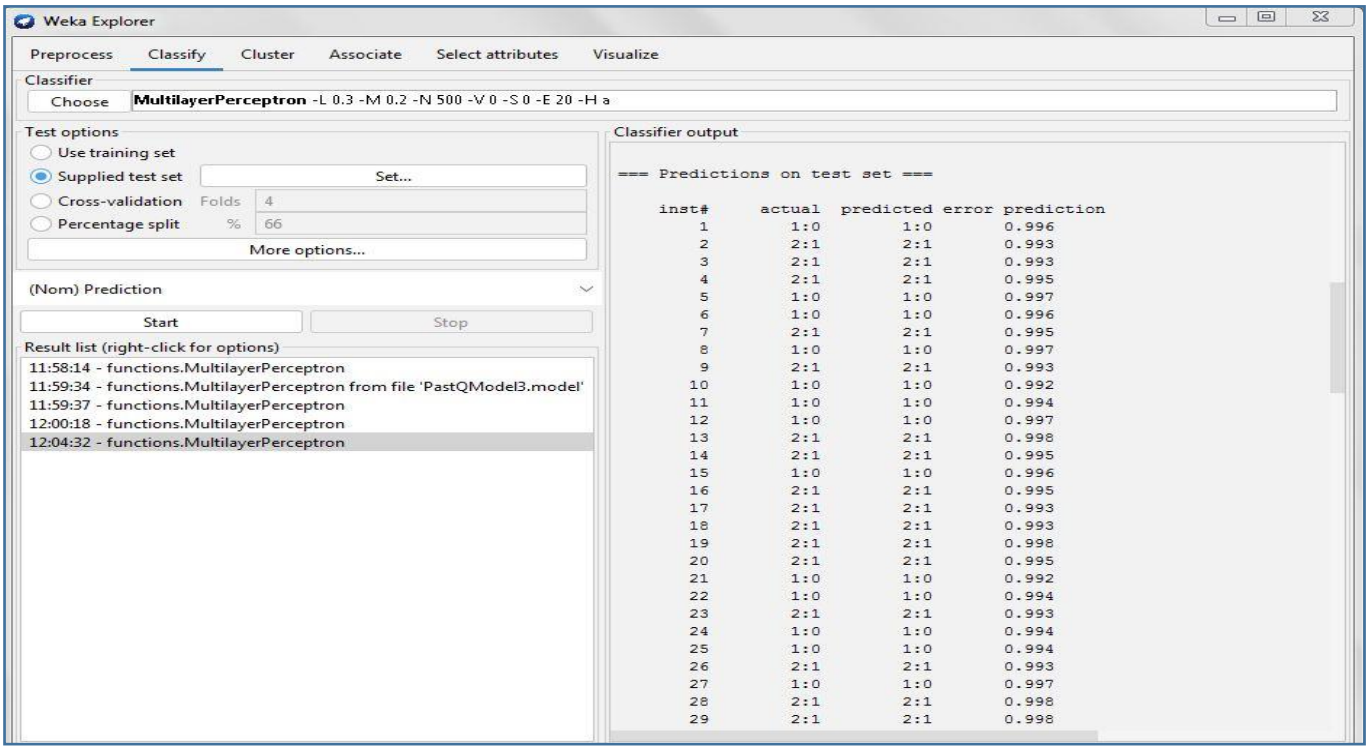

Figure 3: classifications of students on weka by ANN

From the results obtained, two types of datasets were used. The first was a training dataset, in which the Artificial Neural Network model was trained using 1,000 instances of students' past performance. The model was then tested using 100 instances with missing prediction values. The results show that the model correctly classified students

who could access the past question for the course with a value of 1, while those who could not access the past question were assigned a value of 0.

After the training and testing for the model important detail of the result are confusion matrix, accuracy data is presented in figure 4.

```
=== Detailed Accuracy By Class ===

               TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
               1.000    0.000    1.000      1.000    1.000      1.000    1.000     1.000     0
               1.000    0.000    1.000      1.000    1.000      1.000    1.000     1.000     1
Weighted Avg.  1.000    0.000    1.000      1.000    1.000      1.000    1.000     1.000

=== Confusion Matrix ===

  a  b   <-- classified as
 38  0 |  a = 0
  0 62 |  b = 1
```

Figure 4: Accuracy details

The above picture shows the accuracy data for the prediction perform using artificial neural network algorithm.

The second part of the result presentation present result of the developed web application (Past Question repository system) where the classified data is uploaded into the database ready to be used.

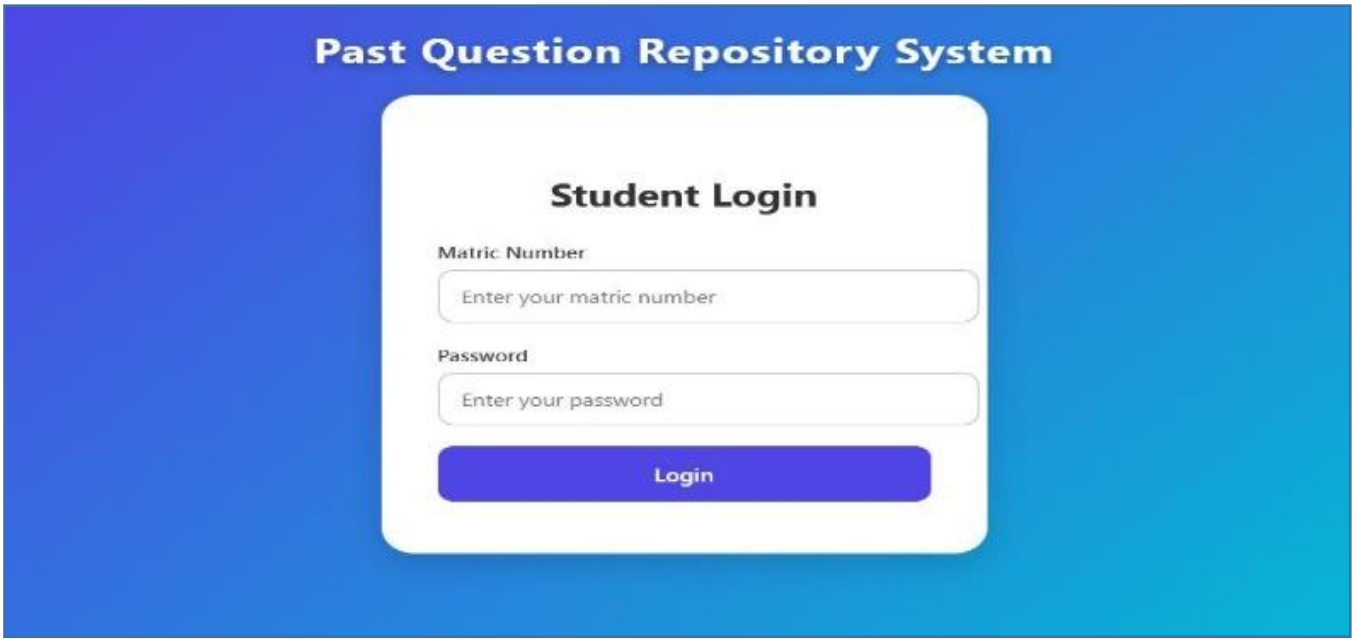

Figure 5: Login page

Students must login to the system before they are given access to the past question repository. This is done by inputting matric number and password.

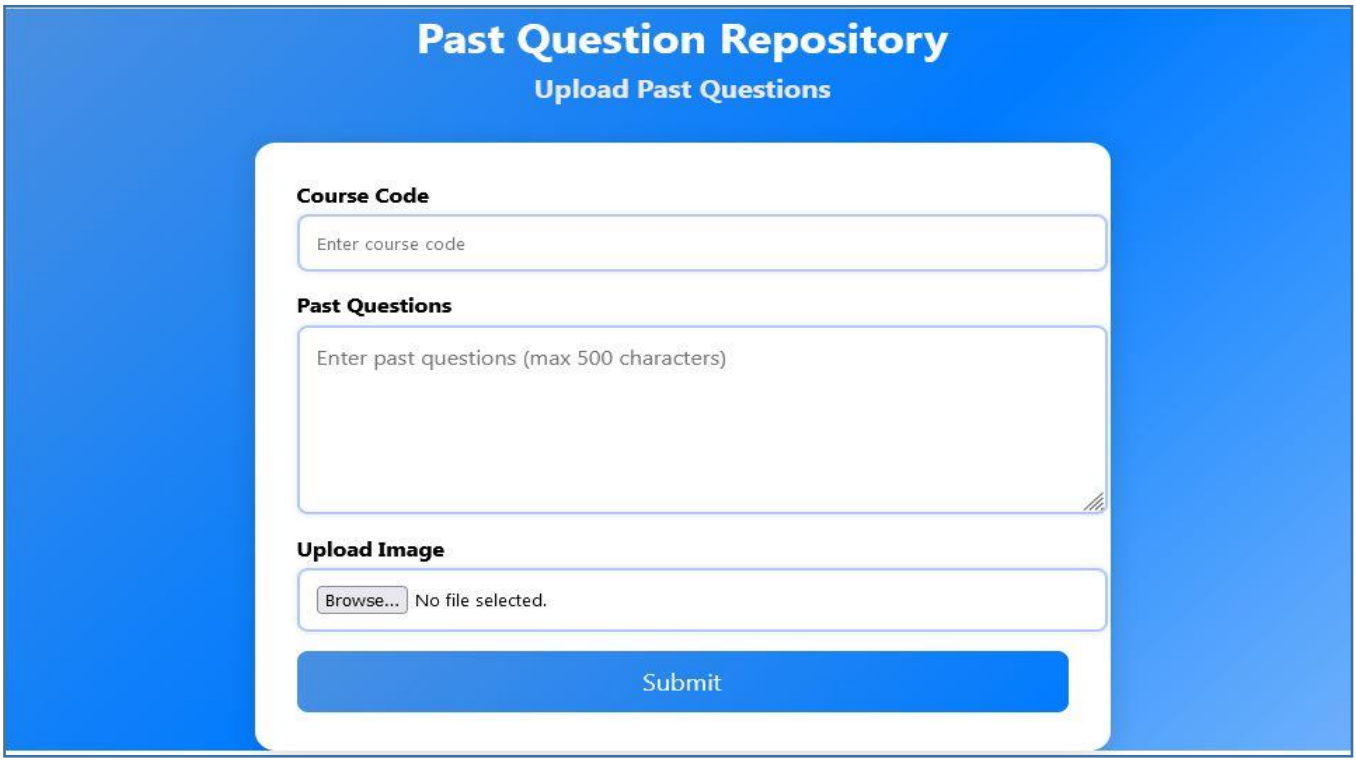

Figure 6: The Past Question upload page

At this page student is able to upload past question willingly to the repository making it available for the subsequent students offering the course to access. It's a form that consist of course code, Question and question paper image.

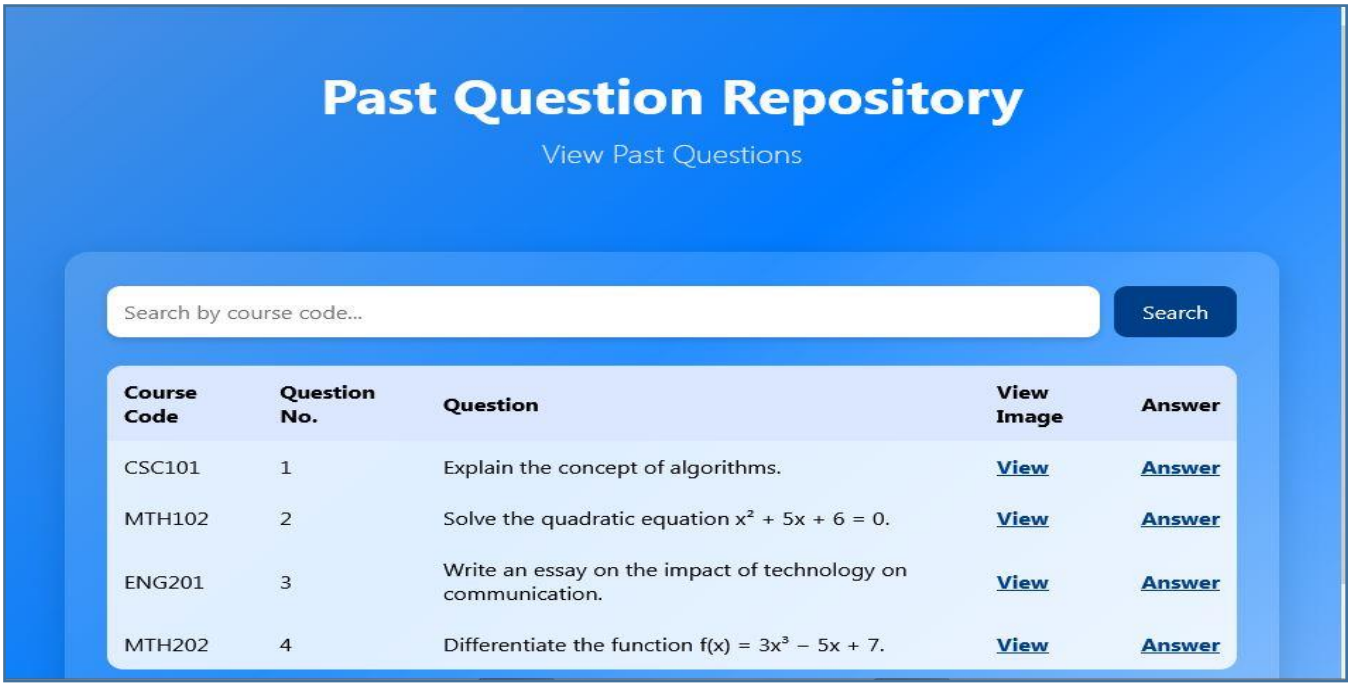

Figure 7: At this page student classified with value of 1 from the prediction can be able to access

the past questions as shown above. The view page show a table consisting the list of related past questions for a specific course. The table consist of course code, question no., questions, view link for the picture of the question paper and lastly a link to the answer for the past question if available.

Recent academic research have developed many past question repository solutions where academic past questions are being kept in the system for helping students to boost their academic performance. The challenge faced by those research is that they lack to implement any Artificial intelligent or machine learning terminologies in order to reduce the query time in performing a search in a sql databse because of the nature of the system where millions of academic past question s are store and access simultaneously.

Table 3: Comparison

Parameter	Current system	Proposed ANN model
No.of query instance	1000	10000
Time	10ms	5ms

From the above table it takes current repository system 10ms to perform a query for 1000 instance from a database while it took the proposed model only half time as of the current system, this is because data classification is initially done using Ann which make the query short and fast.

CONCLUSION

This research presented the design and implementation of an Artificial Neural Network (ANN)–enhanced electronic repository for managing and accessing university past question papers. The system addresses major limitations found in traditional repositories, particularly the slow retrieval time caused by large database queries and the absence of intelligent classification mechanisms. By integrating ANN to classify students based on their academic performance, the platform significantly reduces search time—up to 5ms compared to conventional methods—thereby improving system responsiveness and user experience.

The results from the ANN model, trained and tested in Weka, demonstrated high accuracy in predicting student eligibility to access specific past questions. Furthermore, the developed web application provides an intuitive interface through which students can log in, upload past questions, and access course-related materials efficiently. The repository not only enhances learning by providing structured access to past examination materials but also contributes to sustainability through reduced dependence on printed paper archives.

REFERENCES

Ahmed, B., & Umar, S. (2021). *Challenges in managing digital academic repositories in higher institutions*. Journal of Educational Systems, 8(2), 44–52.

Jimoh, L. F., Oyaniyi, L. O., & Jimoh, A. (2024). Design and implementation of digital collection of past questions papers in Auchi Polytechnic library. *Journal of Electronics and Communication Engineering Research*, *10*(8), 09–15. https://doi.org/10.35629/5941-10080915

Johnson, T., Miller, R., & Zhang, P. (2020). *Artificial intelligence applications in digital libraries and learning management systems*. Educational Computing Review, 42(3), 215–230.

LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *Nature*, *521*(7553), 436–444. https://doi.org/10.1038/nature14539

Nwachukwu, C., & Osuagwu, O. (2021). *Impact of past question practice on student academic performance*. Nigerian Journal of Educational Assessment, 19(1), 60–72.

Olowe, T., & Adebayo, A. (2020). *The relevance of past examination questions in student exam preparedness*. African Journal of Education Research, 14(2), 112–121.

Okoro, E., & Iroegbu, C. (2019). *Evaluating the usability of digital question banks in tertiary institutions*. Journal of Information Management Studies, 7(4), 28–36.

Suresh, M., & Thomas, A. (2020). *AI-powered academic support systems: A review of intelligent repository designs*. International Journal of Applied Artificial Intelligence, 33(5), 393–410

Oladele, F. A., & Afolabi, I. T. (2023). Design and development of an online university past questions and answers repository. *Journal of Digital Learning and Instructional Technology*, *3*(2), 112–125. ISSN: 2814-0397.

Idubor, E. O. (2022). Institutional repository development in Nigerian universities: Benefits and challenges. *Niger Delta Journal of Library and Information Science*, *5*(1), 45–58. ISSN: 3026-8141.