

AI-Enhanced Learning Assistant Platform

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ABSTRACT

The AI-Enhanced Learning Assistant Platform is a revolutionary system designed to enhance learning, with cutting-edge features like question and answer generation, answer evaluation, identification of weak areas, recursive testing, an integrated query forum, and expert chat support. This platform makes use of artificial intelligence (AI) technology to try to satisfy the many needs that students and teachers have. Using natural language processing and machine learning, the platform's question and answer generating feature generates relevant questions on its own from the provided content. This encourages participation and in-depth subject understanding. The answer evaluation section provides quick feedback for improvement by utilizing AI algorithms to assess the accuracy and caliber of student responses. One of this platform's key advantages is its capacity to identify students' areas of weakness. Through the analysis of performance patterns and root causes, the system can generate customized recommendations and learning materials to help overcome those constraints. Through repeated practice, the program gradually pushes students to increase their understanding of the material by creating adaptive exams. Through the integrated query forum, students can collaborate and ask for assistance from others by asking questions and receiving answers from teachers and their peers. Furthermore, by enabling real-time communication between users and subject matter experts, the expert chat support tool fosters an engaging and motivating learning environment.

Keywords: *AI-enhanced learning assistant, Question & Answer generation, answer evaluation, weak area identification, recursive testing, integrated query forum, expert chat support, artificial intelligence, natural language processing, machine learning, personalized recommendations.*

I. INTRODUCTION

The AI-Enhanced Learning Assistance Platform is a state-of-the-art tool designed to transform learning with a plethora of features. Thanks to its cutting-edge technology, its platform specializes in producing Q&A, evaluating answers, detecting students' weak areas, recursive testing

for knowledge building, an integrated question forum, and professional chat assistance. This platform combines the power of machine learning and artificial intelligence to offer a holistic solution that benefits both teachers and students.

The primary strength of this platform is its exceptional ability to generate Q&A. By examining the provided content, the AI-enhanced algorithms can generate relevant questions to gauge the learners' comprehension. This function enhances critical thinking and problem-solving skills in addition to helping to reinforce previously taught principles.

Another is the platform's noteworthy answer assessment capacity. Students can get quick feedback on their responses, which helps them identify areas that need improvement. Students can track their progress and focus on strengthening their areas of weakness with the use of this tool, which will result in more successful learning outcomes.

The platform can identify students' areas of weakness, which sets it apart from traditional learning systems. By evaluating performance across a wide range of topics and domains, the AI algorithms are able to pinpoint the areas where students want additional assistance. By ensuring that each student receives specific support to overcome their own challenges, this tailored approach increases the efficacy of learning.

Recursive testing is used by the platform to further cement knowledge. This approach uses spaced repetition, where students are regularly tested on content they have already acquired, to optimize memory retention. This approach helps people retain information by progressively reiterating previously taught material.

Students can ask questions about difficult subjects on the platform's integrated question forum, in addition to these features. This forum fosters knowledge sharing, peer-to-peer communication, and collaborative learning within a community of learners.

For more complex inquiries, the site provides competent chat support. Professionals in the domain are able to interact with students in real time and provide personalized guidance and explanations. Students may be able to understand complex concepts more deeply if they have direct access to subject-matter experts.

In summary, the AI-Enhanced Learning Assistant Platform is a comprehensive and all-inclusive technology that transforms the process of learning. Thanks to its cutting-edge features, which include Q&A generating, answer evaluation, identification of weak regions, recursive testing, integrated query forum, and professional chat assistance, this platform offers learners personalized and efficient learning opportunities. Through the use of AI, this platform increases educational opportunities, resulting in better learning outcomes and academic performance.

II. RELATED WORKS

[1] The author says that in the future, according to this notion, artificial intelligence will be crucial in changing the dynamics of teaching and learning. It lays a lot of focus on making learning more connected, improving student engagement, and guaranteeing fair access to education. The goal is to establish inclusive and productive learning environments using AI technologies. Teachers will be able to deliver more individualized instruction and information by utilizing AI, which will change the educational environment and lead to better learning outcomes.

[2] The tremendous effects of artificial intelligence on the field of education are examined in this book chapter. It highlights the convergence of AI capabilities and human intelligence, signaling a revolution in the methods of instruction and learning. This shift entails reevaluating conventional teaching strategies, implementing AI-driven methods to enhance the educational process, and promoting more efficient and customized learning paths for students.

[3] The readiness of educators to incorporate artificial intelligence into their lesson plans is the main emphasis of this study. It explores the idea and empirical evaluation of educators' readiness for integrating AI into the classroom. To ensure that AI technologies are successfully integrated into educational contexts, it is imperative to comprehend the views and challenges of educators.

[4] To improve personalized and adaptable learning in higher education, an AI-enabled intelligent assistant is

presented in this study. This system uses artificial intelligence (AI) to deliver students personalized learning experiences based on their unique needs and learning preferences. Teachers can design more dynamic and flexible learning environments thanks to technology.

[5] An AI-based learning assistant designed specifically for higher education is presented in this research. To improve learning, it integrates speech recognition, indexing, and natural language processing. With the use of this cutting-edge technology, students will be able to access an extensive and engaging learning resource that will aid them throughout their academic career.

[6] This thorough study explores the possible benefits, dangers, and moral issues related to implementing AI in the classroom. In order to guarantee that AI technologies are utilized for the advantage of pupils while resolving issues about privacy, bias, and fairness, it places a particular emphasis on ethical deployment.

[7] It is most likely going to talk about how AI is changing the news business. AI is used to create content, suggest articles, and expedite the transmission of news. AI's capacity to analyze enormous volumes of data and provide news that is customized to each reader's interests is what is driving this change in the news production and consumption environment.

[8] The evolution of AI-assisted interpreting for language specialists is most likely explored in the content. It's possible that AI technologies may be created to help translators in a variety of situations, improving the accuracy and efficiency of their work. This could be especially helpful in circumstances where instantaneous language interpretation and translation are required.

[9] The topic of conversation is how sensors and artificial intelligence may work together in biomedical and healthcare platforms. AI-enhanced sensors, which offer sophisticated data analysis and diagnosis, have the potential to completely transform the healthcare industry. Healthcare services that are more effective and individualized are made possible by these technology.

[10] This article probably talks about how AI is used in the fashion industry to suggest new trends in clothing. Blockchain technologies and AI are probably going to be used to deliver personalized style advice. This creative strategy might improve the experience of shopping for fashion and inform customers of the newest styles.

III. EXISTING SYSTEM

There are several issues with the existing AI-Enhanced Learning Assistant Platform system that lower its

effectiveness and user experience. First off, the provided material has a significant influence on how questions and answers are generated by the platform. This restriction limits the breadth and variety of knowledge that can be covered, potentially excluding important concepts or subjects that students should be aware of. Secondly, the response evaluation mechanism on the platform is not entirely dependable. On rare occasions, it may give students inaccurate or incomplete feedback on their responses, which could lead to misleading feedback and hinder their learning. This undermines the goal of providing each student with tailored, effective assistance.

Furthermore, identifying a student's areas of weakness isn't always accurate or comprehensive. It may be difficult for the system to pinpoint the specific issues that kids are facing, which makes it difficult for mentors or instructors to offer tailored support. The children may find it more challenging to overcome their challenges and improve their comprehension as a result.

The recursive testing feature, which attempts to reinforce information through repeated tests, may bore and tire students. This could lead to a decline in motivation and interest, which would reduce the overall efficacy of the learning process.

Additionally, the professional chat assistance and integrated question forum cannot be sufficient or respond slowly to the needs of the pupils. Insufficient number of proficient experts on the platform to provide timely and precise assistance would irritate users and complicate the learning process.

Lastly, there was not enough flexibility or adaptability in the platform to accommodate different learning methods and preferences. For certain children, alternative teaching methods that prioritize hands-on or visual learning may be more successful, and the system may not provide enough support for them.

The AI-Enhanced Learning Assistant Platform has many potential benefits, but in order to develop a more effective and user-friendly system, it is imperative to be aware of these disadvantages as well. Enhancements in content production, response evaluation, identification of weak areas, recursive testing, support responsiveness, and adaptability are needed to satisfy the diverse demands of students and improve the platform's overall performance.

IV. PROPOSED SYSTEM

The state-of-the-art AI-Enhanced Learning Assistant Platform was developed with the goal of fundamentally altering the way students study. This comprehensive platform has a range of components designed to improve students' understanding and proficiency in several subject

areas. The platform's first key feature is the Q&A generating engine, which uses artificial intelligence to generate relevant questions based on the content that is given. This feature encourages critical thinking and a deeper understanding of the material in addition to assisting with knowledge assessment.

Additionally, the platform offers a function called answer evaluation, which assigns a score to the precision and quality of the students' responses. Students may identify and correct their mistakes with the use of this tool, which provides quick feedback, ultimately improving their learning outcomes. Additionally, the technology employs complex algorithms to identify students' areas of weakness so that tailored training and targeted interventions are possible. By highlighting their areas of weakness, the platform helps students focus their efforts on improving their understanding of specific courses or ideas.

Recursive testing is a feature of the platform that allows for comprehensive knowledge reinforcement. This implies that in order to ensure that previously learned concepts are maintained and comprehended, tests are administered on a regular basis. By reviewing earlier knowledge, students can strengthen their understanding and avoid forgetting crucial information over time.

Additionally, students can engage in debate and ask questions of one another in the integrated query forum. Children can develop a sense of community and learn from each other's perspectives and experiences by doing this. The expert chat support feature enhances the educational experience by connecting students with subject matter experts who can provide guidance and clarification as required.

By combining these many elements, the AI-Enhanced Learning Assistant Platform seeks to provide a thorough and dynamic learning environment. Pupils are equipped with the skills necessary to actively engage with the curriculum, identify and address their areas of weakness, and seek out expert help when needed. The ultimate objective of this platform is to optimize learning outcomes and guarantee that students receive the tools and support they require for success.

V. SYSTEM ARCHITECTURE

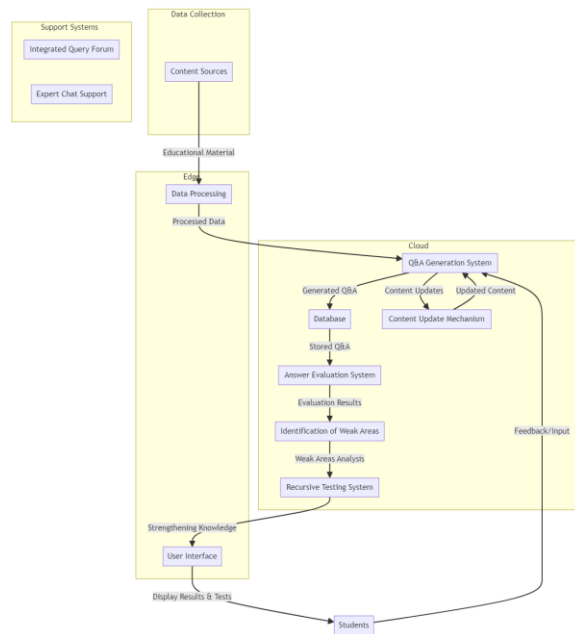


Fig 1. System architecture

Figure 1, The AI-Enhanced Learning Assistant Platform streamlines student education by cycling through support, content aggregation, and processing for AI use. The cloud-based Q&A system generates and updates questions from this content. Students' answers are evaluated to pinpoint and analyze weak spots, with a Recursive Testing System offering focused practice. Interactions occur via a user interface, with results displayed for progress tracking and knowledge reinforcement. Continuous feedback ensures the system's adaptiveness, keeping educational material relevant and personalized, thereby fostering an evolving learning journey.

VI. METHODOLOGY

1. Creating Q&A Out of Provided Content:

This AI-Enhanced Learning Assistant Platform module aims to generate accurate questions and responses based on the provided content. By evaluating the content and applying natural language processing techniques, the system is able to understand the context and extract relevant information to create meaningful queries. Students are able to evaluate and reinforce their grasp of the subject by answering these generated questions. The module employs advanced algorithms to ensure that the questions cover a wide range of topics and difficulty levels, providing a comprehensive learning experience.

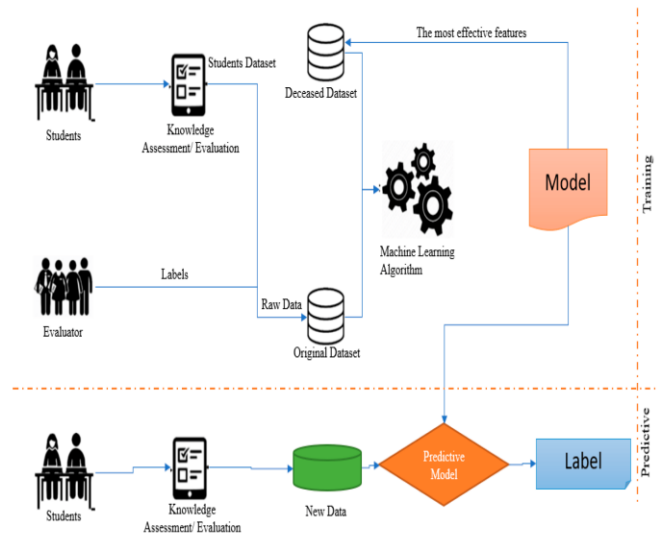


Fig.2. Overview of the research approach related to evaluating student knowledge assessment using ML techniques.

2. Evaluation of the Correctness and Quality of Student Answers to the Generated Questions:

The purpose of this module is to evaluate the correctness and quality of student answers to the generated questions. After comparing the students' responses to the expected responses, it provides them with in-depth feedback. To identify the areas of weakness for each student, the program also looks at the trends of incorrect responses. It's critical to comprehend the specific concepts or areas that students struggle with in order to facilitate tailored learning. By identifying these weak areas, the system may adjust the course material and provide additional resources, helping students improve their comprehension and get better results.

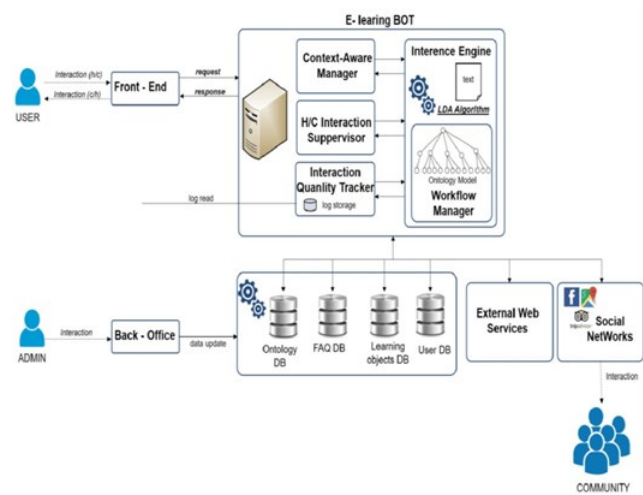


Fig.3. Chatbot integrated with AI for E-Learning

3. Recursive Testing to Enhance Knowledge:

This module makes use of recursive testing to enhance and broaden students' understanding of the material. After the learner provides feedback on the initial set of questions, the technology generates follow-up questions that concentrate on the areas where the learner struggled or made mistakes. The purpose of these follow-up questions is to assess the students' reasoning skills and encourage them to go over and reinforce their previous information. Iterative learning is made easier by recursive testing, which gives students the opportunity to practice and improve their understanding of the material over time. Long-term memory retention is also aided by repeating key concepts and clearing up any misunderstandings or comprehension gaps.

In addition to these three features, the proposed system also includes an Integrated Question Forum and Expert Chat Assistance. By enabling students to engage in dialogue and question-asking with instructors and classmates, the Integrated Query Forum promotes collaborative learning. Through the Expert Chat Support, students can have direct contact to subject matter experts and receive tailored guidance and support that will enhance their learning experience as a whole. Together, these elements comprise a comprehensive and state-of-the-art AI-enhanced learning assistant platform that supports students in their academic pursuits.

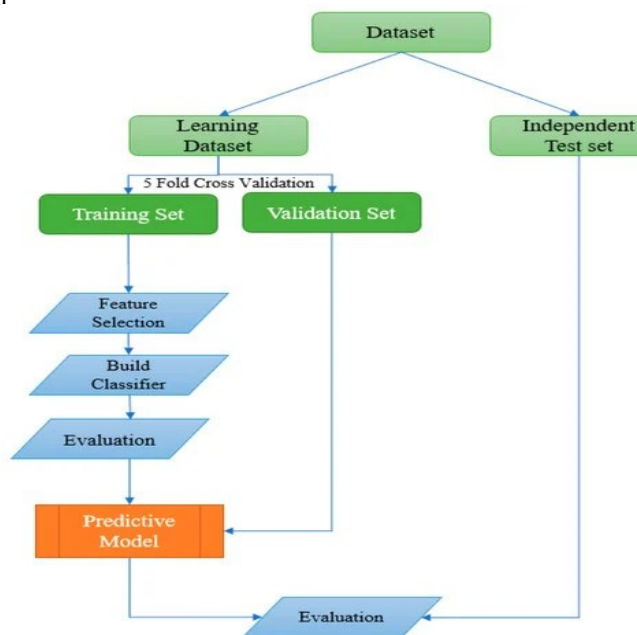


Fig.4.Flowchart refers to the ML process used to assess student performance.

VII. RESULTS AND DISCUSSION

The AI-Enhanced Learning Assistant Platform is a cutting-edge technology with a range of capabilities to enhance students' learning opportunities. With the use of the

platform's advanced Q&A authoring feature, students can formulate questions based on the available content. This tool helps students grasp the material more fully while promoting critical thinking and problem-solving abilities. Additionally, the platform offers a tool called answer evaluation, which assesses students' responses for accuracy and quality and provides helpful feedback for improvement.

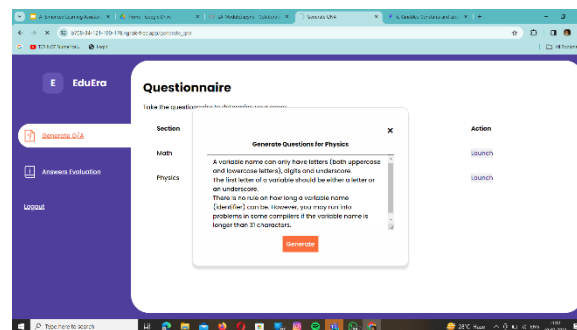


Figure 5. Online Questionnaire

The system's capacity to identify students' areas of weakness is yet another crucial element. The platform analyzes each learner's performance and learning patterns to identify specific topics or areas in which they might be struggling. This enables targeted intervention and customized learning opportunities to address these issue areas. Recursive testing features on the platform allow students to test themselves repeatedly as a way to reinforce and practice what they have learned. This approach enhances comprehension and retention of the learning content.

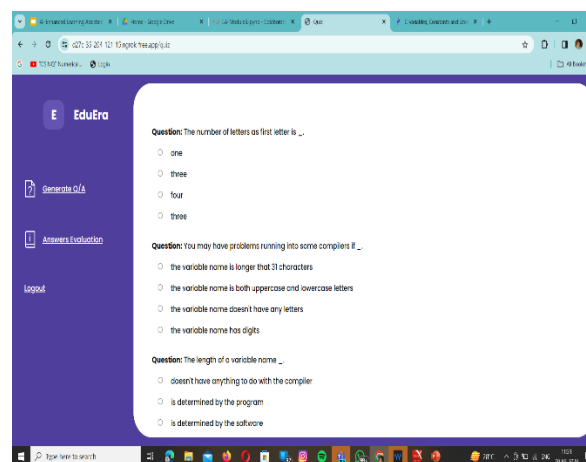


Figure 6. Online Questionnaire - 1

In addition to these features, the platform has an integrated question forum where students can communicate and pose questions. This encourages collaborative learning and makes it easier for students to share knowledge with one another. The technology also provides expert chat support, which enables students to ask questions and get real-time

responses from subject-matter experts.

A complete and state-of-the-art system that leverages technology and artificial intelligence to enhance learning is the AI-Enhanced Learning Assistant Platform. It provides a range of functions, such as Q&A generation, response evaluation, weak area identification, recursive testing, integrated query forum, and professional chat support, to help students learn and improve their overall academic performance.

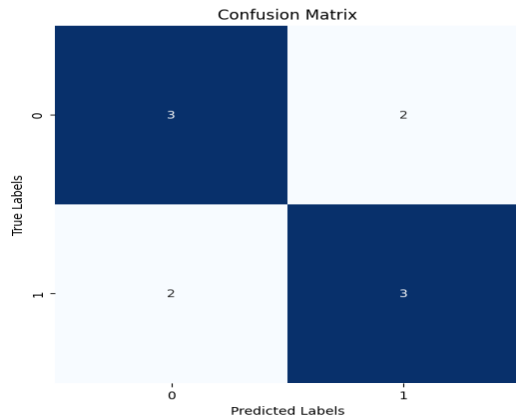


Figure 7. Confusion Matrix

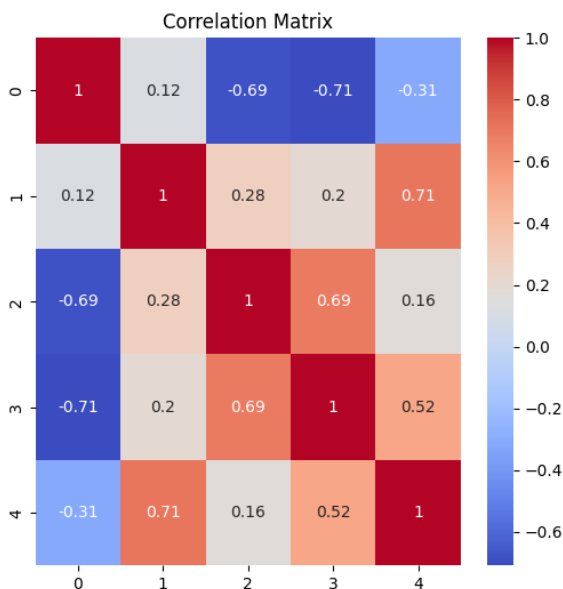


Figure 8. Correlation Matrix of dataset features

VIII. CONCLUSION

The AI-Enhanced Learning Assistant Platform, in conclusion, is a sophisticated and complete system that provides a variety of capabilities to improve the learning experience. Students may quickly understand the main

ideas thanks to its capacity to produce Q&A from the offered text, and they can solidify their understanding through recursive testing. The platform also excels at pinpointing pupils' areas of weakness, enabling individualized instruction to meet particular requirements. Students have additional ways to get clarification and professional advice thanks to the integrated question forum and expert chat help. This website is an excellent resource for students looking to expand their knowledge and raise their academic achievement thanks to its robust features and answer evaluation system.

IX. FUTURE WORK

As part of the ongoing development for the AI-Enhanced Learning Assistant Platform, the Q&A creation process should be upgraded. This can be accomplished by using advanced natural language processing techniques, such as deep learning models, to generate questions and answers from the provided content that are more accurate and contextually relevant. Additionally, the answer evaluation module needs to be enhanced with more sophisticated algorithms that assess response quality by considering coherence, relevance, and accuracy, among other factors. Furthermore, by carrying out a more comprehensive examination of the students' performance data and applying machine learning algorithms to detect patterns and opportunities for enhancement, it ought to be feasible to more precisely pinpoint the students' weak points. It might be possible to enhance the recursive testing feature by customizing the questions to each student's specific strengths and weaknesses. A query forum, where students may pose questions and get answers from experts and their peers, would foster a collaborative learning atmosphere. Finally, students will be able to get immediate help and explanations for complicated concepts by implementing an AI-powered expert chat support system. These upgrades would significantly raise the effectiveness of the platform and enhance the educational process as a whole.

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