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FACULTY:	Applied and Computer Sciences
DEPARTMENT:	Computer Sciences
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ASSESSMENT NAME:	AI Solution: Student Learning Platform
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DECLARATION

We, at this moment, declare that the work submitted in this document is our own and where we have used the work of others, we have fully acknowledged and referenced them following the academic standards.

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AI-Powered Student Learning Platform

The Student Learning Platform is an AI-powered tool designed to help students improve their learning by providing personalized feedback. It uses AI technology to analyse student's test results and predict the areas where they might need extra help. This information is then used to suggest relevant study materials. The platform's goal is to offer adaptive learning, which is especially important in today's educational landscape, where personalized learning experiences can greatly benefit students.

Business Objectives

As the founders of the Student Learning Platform, our main objectives are clear. Since our platform is AI-powered and focused on personalized learning, we want to achieve the following:

1. Enhance our Students' Learning Outcomes

We aim to provide each student with a personalized learning experience tailored to their unique needs, using AI and data analytics. Our goal is to help students improve their academic performance by identifying areas where they struggle and offering targeted study materials to support them.

2. Promote Adaptive Learning

We want to offer adaptive learning paths that adjust based on each student's progress. This way, every student gets a customized learning experience that's right for them.

3. Increase Student Engagement and Retention

To keep students engaged, we plan to use interactive quizzes, real-time feedback, and continuous monitoring of progress. We also want to ensure that students stay on the platform by providing engaging and relevant content, as well as personalized recommendations that cater to their interests and needs.

Business Success Criteria

To measure the success of our Student Learning Platform, we will establish key performance indicators. We define success by:

We will measure the improvement in student grades, test scores, or learning progress as a result of using this platform. Specifically, we will track:

- The number of students that show significant improvement in identified weak areas.
- The overall improvement in student performance metrics.
- User Engagement Metrics

We will monitor the following metrics to gauge user engagement:

- Active users: The number of students that regularly use our platform.
- Time spent on the platform: How long students engage with the content.
- Quiz completion rates: How often students complete quizzes and interact with personalized feedback.

Business Background

Many current educational platforms struggle with providing personalized, detailed feedback to students. This is mainly because they lack the tools to analyse performance in a data-driven way. The Student Learning Platform solves this problem by using AI to evaluate student performance, identify problem areas, and offer custom learning paths tailored to each student's needs.

Problem Definition

The Problem:

Students often have difficulty identifying the specific topics or subjects they struggle with and struggle to find study resources based on the topics they need to improve; this leads to inefficient study habits. Traditional feedback methods are not always helpful because they don't provide data-driven insights that can direct student's attention to their weak areas.

Why It Matters:

This problem is highly relevant to modern education, where adaptive and personalized learning is becoming increasingly important. The platform's AI technology addresses this issue by offering tailored learning experiences that focus on individual student needs, making learning more efficient and effective.

The Benefit:

By providing personalized learning paths, the platform helps students improve their performance. It saves time by highlighting areas where students should focus and encourages more effective study habits.

Poster
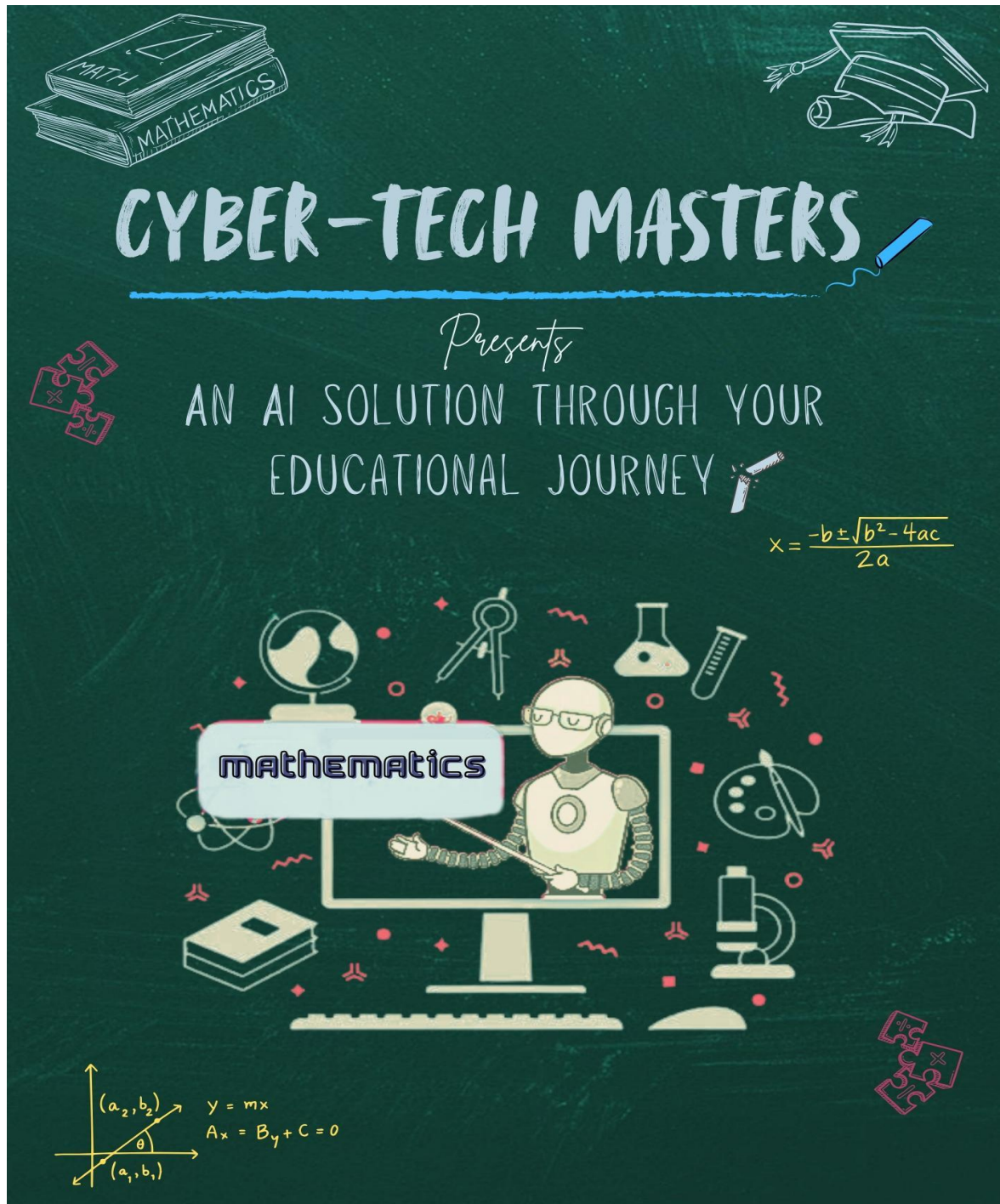
Solution Overview

The Student Learning Platform works by analysing test data through an AI model. The platform identifies a student's weak areas in subjects like mathematics and generates feedback that is personalized for them. This feedback includes suggested study materials and advice on how to improve performance in these weak areas.

How the AI Solution Works:

- Machine Learning Approach: The platform uses supervised machine learning, particularly regression models, to predict future performance based on current test results. The model helps identify areas that need improvement.
- Data: The platform uses student test data and previous performance to train the model. This data is cleaned and prepared before being analysed. Important features, such as test scores and the number of attempts on a subject, are used to train the AI system.
- Model Evaluation: The performance of the AI model is measured using the mean squared error metric for linear regression. This tool helps evaluate how accurately the model predicts weak areas. The system is tested on a separate validation dataset to make sure the feedback is reliable, and cross-validation is used to ensure it works well with new data.
- Time Series Analysis: The platform uses Time Series Analysis to monitor a student's performance over time. This allows the system to provide feedback based on the student's learning history and identify long-term trends in their performance.

Solution Techniques

The Solution Techniques employed by the Student Learning Platform focus on improving the accuracy and adaptability of the AI model through two key components:

1. Feature Selection

Feature selection involves identifying and using the most relevant data points to accurately predict student performance. Key features include:

- The Number of Attempts: The number of attempts that students take can provide insights into persistence and learning curves. Tracking how many tries a student makes before mastering a concept reveals important patterns in understanding and retention.
- Test Scores: Provides direct feedback on student understanding and helps identify strengths and weaknesses.

By focusing on these critical features, our platform can deliver precise and meaningful predictions, helping students concentrate on their weak areas.

2. Improvement Mechanisms

To ensure our AI model remains effective, continuous improvement mechanisms are implemented:

- Regular Retraining: Our AI model is updated with fresh data from student's ongoing activities to improve its predictive accuracy over time.
- Adaptive Learning: Our platform's feedback loop improves as the AI learns which types of feedback lead to the greatest student improvement, allowing the system to become more personalized over time.

Deep Learning

Our Student Learning Platform uses the artificial neural networks deep learning technique, which learns the complex pattern of our data to improve the accuracy, predictions, and efficiency of the AI model. Deep learning is crucial to analysing complex student data and delivering precise, personalized learning experiences.

- Predicting Performance with Deep Learning:

The artificial neural networks are employed to enhance the platform's ability to predict how students will perform in future tests. This model can recognize and analyse intricate patterns in the data, such as how a student's performance changes over time and the impact of factors like study habits, time spent on tasks, and test results on their learning outcomes.

Softbot

The softbot plays a significant role in improving user experience and providing real-time assistance. Essentially, the softbot serves as a virtual assistant that guides students through quizzes, delivers personalized feedback, and offers learning resources based on their performance.

- Key Functions of the Softbot:

When a student starts a quiz, the softbot can assist by offering instructions and even hints if they seem to struggle. For example, if a student gets stuck on an Algebra problem, the softbot might provide a helpful tip like, "Remember to isolate the variable first." This makes the quiz-taking experience more interactive and supportive.

- Personalized Learning:

Once the student completes the quiz, the softbot immediately analyses the results. It identifies which answers were correct and which were wrong, providing personalized feedback for each category—Algebra, Geometry, or Probability. For instance, after the quiz, it might say, "You performed well in Geometry but struggled with Algebra. Here's a link to a resource that could help you improve your Algebra skills." The softbot also predicts how the student might perform in future quizzes based on their past results using the machine learning model (currently, linear regression). So, it can give insights like, "Based on your recent quizzes, I predict you'll score 7 out of 10 on your next Geometry quiz."

- Progress Monitoring:

Additionally, the softbot doesn't just stop at feedback. It goes a step further by suggesting resources for improvement, linking to external websites like Khan Academy or offering internal study guides. This ensures that the student not only knows where they need to improve but also has the tools to make progress.

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BA_Student_Learning_Platform

by Mielie

General metrics

11,221	**1,598**	**183**	**6 min 23 sec**	**12 min 17 sec**
characters	words	sentences	reading time	speaking time

Score

93

This text scores better than 93% of all texts checked by Grammarly

Writing Issues

38	✓	**38**
Issues left	Critical	Advanced

Writing Issues

1   **Clarity**

1   Paragraph can be perfected   ▬▬▬▬▬

Unique Words

Measures vocabulary diversity by calculating the percentage of words used only once in your document

31%

unique words

Rare Words

Measures depth of vocabulary by identifying words that are not among the 5,000 most common English words.

37%

rare words

Word Length

Measures average word length

5.5

characters per word

Sentence Length

Measures average sentence length

8.7

words per sentence

1. *The artificial neural networks are employed to enhance the platform's ability to predict how students will perform in future tests.*

   Paragraph can be perfected

   Clarity