Integration of AI for Adaptive Learning for MCQ Selection in Parakh

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Abstract. Personalized learning experiences have undergone revolutionary transformations as a result of the use of artificial intelligence (AI) into education. The application of AI-driven adaptive learning methods designed especially for the Parakh assessment system's multiple-choice question (MCQ) selection is examined in this abstract. In order to dynamically evaluate a student's ability and modify the question complexity in real time, the suggested method makes use of machine learning models. The system carefully chooses questions that address each learner's unique learning gaps and offer suitable challenge levels based on past performance data and question information. Preprocessing assessment data, extracting features from student interaction logs, and creating a recommendation system to improve the accuracy of MCQ selection are all part of the methodology. Evaluation measures like knowledge retention rates, time to completion, and response accuracy are utilized to evaluate the effectiveness of the system. By optimizing learning outcomes, this AI-based strategy seeks to provide a more stimulating and productive assessment environment. The method might completely change the way formative evaluations are carried out and guarantee that every student gets a customized education that is in line with their particular academic requirements.

Keywords. Adaptive Learning, Artificial Intelligence, MCQ Selection, Machine Learning.

1   INTRODUCTION

In the ever-changing educational environment of today, personalized learning plays a crucial role in increasing student involvement and improving academic achievements. Conventional teaching methods that are the same for all students are gradually being substituted by personalized approaches that address the unique requirements, skills, and learning preferences of each individual learner. The incorporation of Artificial Intelligence (AI) in education, especially with adaptive learning technologies, has greatly speeded up this transformation. AI-powered systems have the ability to examine extensive data regarding student actions, achievements, and engagements, then customize the learning process instantly based on this data. AI can significantly influence the process of choosing multiple- choice questions (MCQs) in assessments. The Parakh evaluation system, created for educational assessments, can utilize artificial intelligence to adapt question difficulty according to a student's progress. Using machine learning algorithms helps the system evaluate a learner's current skills and anticipate areas where improvement may be necessary. This method guarantees that every student is appropriately challenged, avoiding both too much pressure and not enough stimulation, thus fostering constant enhancement. This study investigates the implementation of AI-driven adaptive learning methods in the Parakh system's MCQ selection. The system customizes the assessment process by analysing historical performance data and question metadata. The process includes preparing the data obtained from student engagements, extracting features, and creating a recommendation system that chooses multiple-choice questions to address the specific learning needs of individual students. In this way, the system improves the accuracy of formative evaluations, guaranteeing that students get specific assistance and feedback that is in line with their academic development. This article explores how AI-driven systems have the possibility to transform educational evaluations, establishing a dynamic and effective setting that caters to various students' requirements immediately.

2   RESEARCH METHODOLOGY

The methodological approach to combining AI with adaptive learning for multiple-choice question selection in Parakh consists of multiple crucial phases. At first, information is gathered from various sources such as surveys,

evaluations, and internal documents. The information is prepared and changed before use to maintain consistency and quality, with a specific emphasis on student performance data and interaction records. Two AI models being used include a Topic Alignment model, assessing the correlation between student learning outcomes and teaching objectives, and a Doubt Detection model, pinpointing challenging or unclear areas for students. These models contribute to an Adaptive Learning System (ALS) that produces customized multiple-choice questions (MCQs) based on students' specific learning needs. The system assesses how well information is remembered, how accurate responses are, and how long it takes to finish, enabling instant changes in question difficulty for the best learning outcome. This approach, based on AI, seeks to automate the manual process of evaluating student performance to give personalized feedback promptly, with the end goal of enhancing the academic results and learning experience.
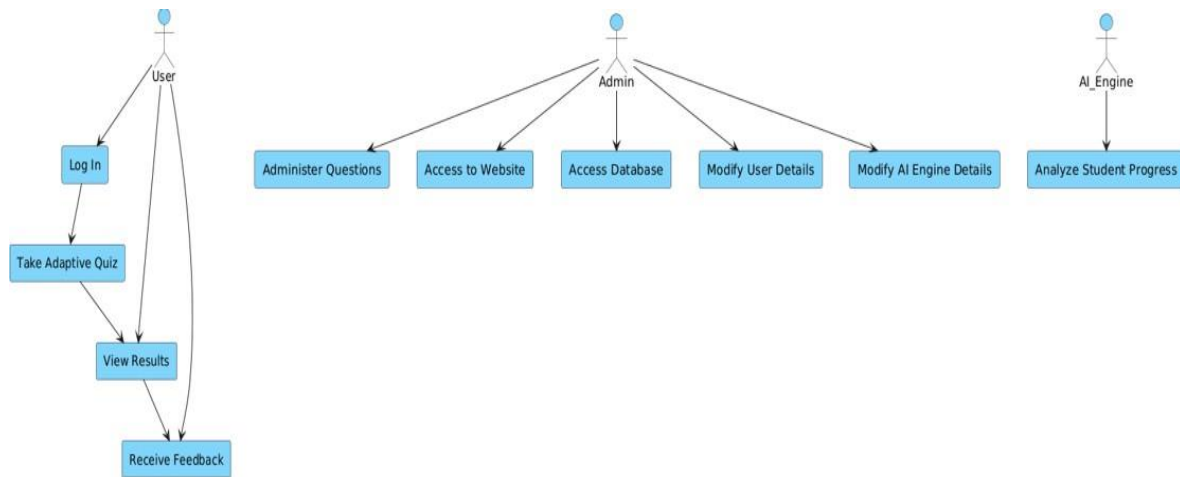

FIGURE 1: Use Case diagram for the Parakh website

3   RESULTS AND DISCUSSION

The initial findings of the Adaptive Learning System (ALS) pilot program in Parakh indicated notable enhancements in educational achievements, as students noted a boost in perceived knowledge levels from 3.91 to 5.31 post-system implementation. Students emphasized the advantages of custom quizzes focusing on their weak areas and commended the system's adaptability, enabling them to study at their preferred speed. ALS proved to be successful in improving student participation in both cognitive and emotional tasks, enhancing focus, motivation, and enjoyment in the learning process. The capability of the system to give immediate feedback and modify question difficulty according to performance was highly valued, aiding students in improving weaker areas. Although the results show potential, the study recommends additional research with bigger sample sizes to investigate how the system's AI models can be scaled and improved for better adaptive learning capabilities.

3.1 Preparation of tables

The below table consists of the key features of the Parakh Assessment website and the impact it makes on any individual students' learning curve.

Key Features	Description	Impact on Student's Learning Curve
Baseline Test	A comprehensive assessment to determine a student's current knowledge level.	Provides a starting point by identifying strengths and weaknesses, tailoring the learning path.

Adaptive Assessments	AI-powered tests that adjust question difficulty based on performance in real-time.	Challenges students appropriately, reducing frustration or boredom, and improving engagement.
Personalized Learning Paths	Tailored recommendations for assessments and modules based on baseline test results.	Ensures students focus on areas needing improvement, allowing for efficient learning.
Real-time Feedback	Immediate feedback on performance after assessments.	Helps students quickly understand mistakes and reinforces concepts, promoting faster learning.
Performance Analytics	Detailed analysis of test results to track progress and pinpoint weak areas.	Empowers students to monitor their progress, stay motivated, and adjust learning strategies.
Modules and Resources	A curated set of learning materials and assessments in various domains.	Provides structured content that helps students focus on key concepts within their field of study.
Interactive Dashboards	Visual representation of a student's progress and performance over time.	Offers clear insights into growth, motivating students to continue improving their skills.
Domain- specific Expertise	Assessments and modules targeted at specific knowledge domains.	Allows students to focus on niche areas of study, leading to mastery of specific subjects.
Goal-setting and Tracking	Allows students to set learning goals and monitor progress towards achieving them.	Encourages a proactive learning approach, enabling students to stay focused and organized.

Sign In

Username:

Password:
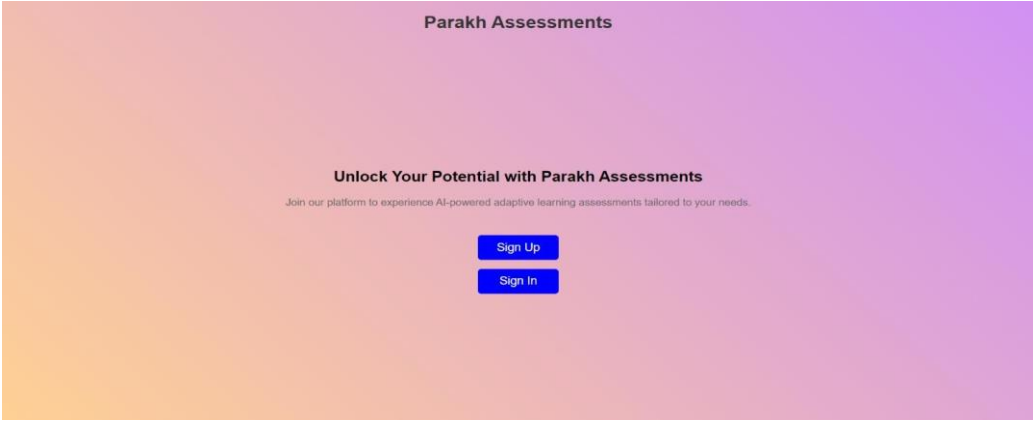
Signin

Don't have an account? Sign up here.

FIGURE 2. Website Home of Parakh Assessments

FIGURE 3. Sign Up and Sign In Page for the website
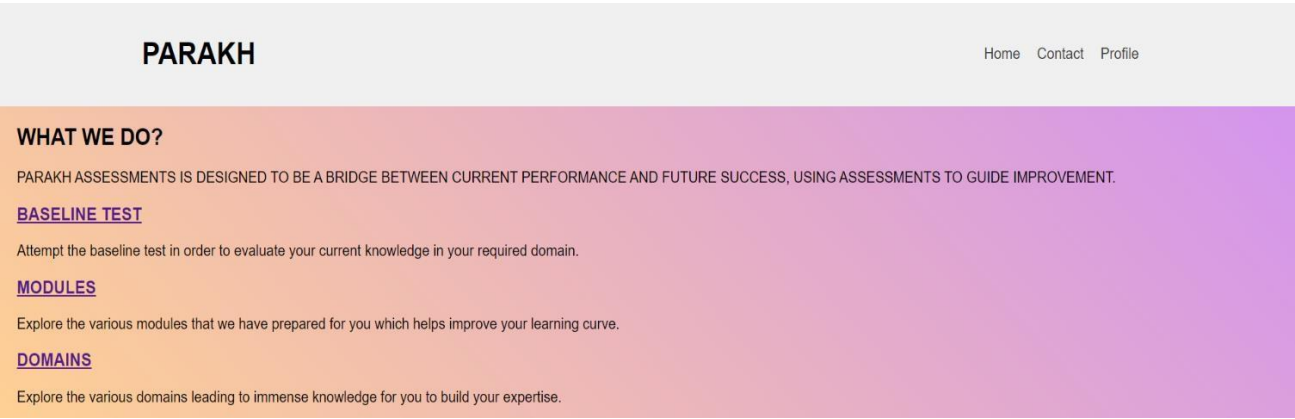
FIGURE 4. Homepage of Parakh Assessments
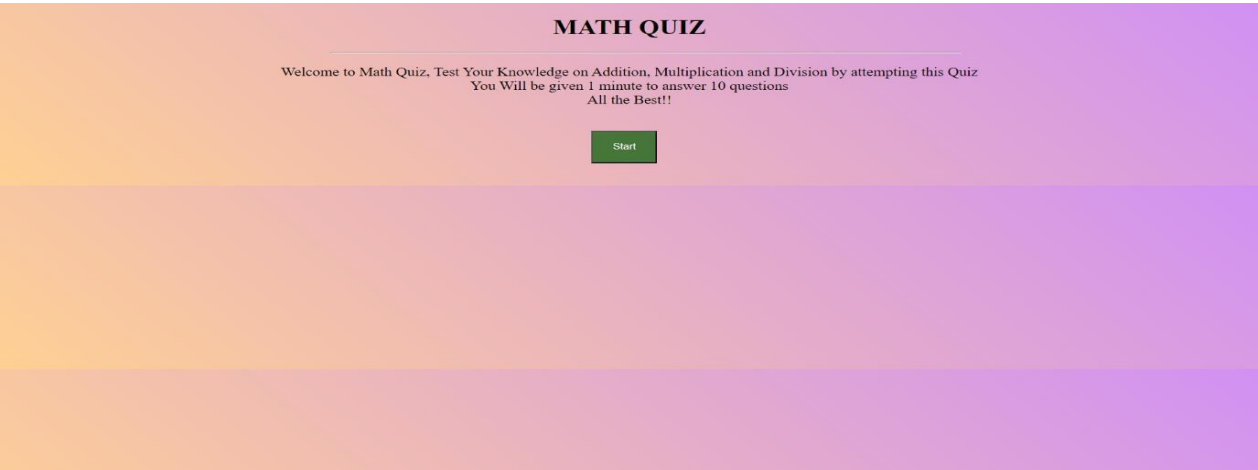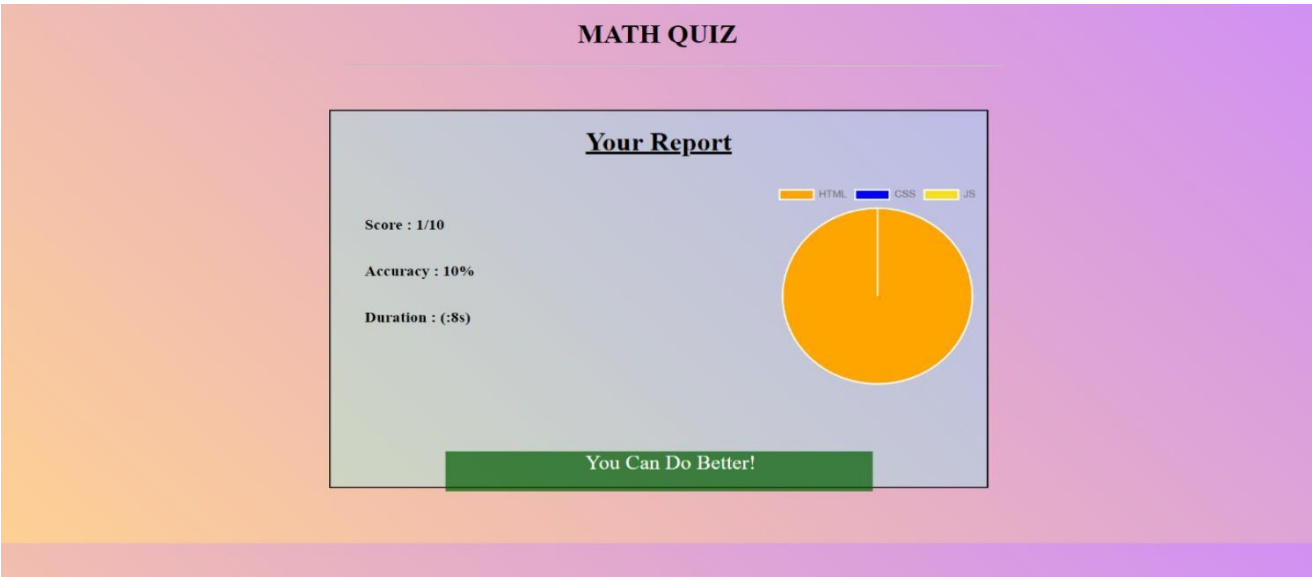

Figure 5. Assesment

Figure 6. Assessment Report

4   DECLARATIONS

4.1   Study Limitations

The main constraint was the limited sample size, as the ALS was tested with just one group of 44 students, possibly impacting the results' generalizability. The researchers emphasized the importance of conducting more studies across various courses and larger student groups to evaluate the system's effectiveness. Moreover, the research recommended incorporating more thorough comparisons in future studies, such as conducting mock assessments that do not involve ALS, in order to more accurately evaluate its influence on learning results.

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