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Smart Assignment Generator

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Abstract: *This project presents an AI-Based Assignment Generator and Evaluation System designed to automate assignment creation and performance assessment in educational institutions. The system supports two types of users Teacher and Student each with specific functionalities. Teachers can upload subject-wise PDF materials and manage multiple subjects through a web-based dashboard. Using machine learning and natural language processing techniques, the system automatically generates assignments in the form of Multiple. Choice Questions (MCQs), short-answer questions, and long-answer questions without providing answers.*

Students can log in using their unique ID to access subject-wise assignments, submit completed work, and view their performance reports. The system automatically evaluates submitted assignments and displays results through graphical analytics to help teachers monitor student progress. Additionally, new students are required to take an entry-level test to determine their knowledge level. Based on their performance, the system assigns appropriate difficulty levels (easy or hard) for future assignments, enabling personalized learning. By integrating automated question generation, intelligent evaluation, and adaptive assessment, the proposed system reduces manual workload for teachers, enhances efficiency, and promotes data-driven academic improvement.

Keywords: Machine Learning, Assignment Generation, Natural Language Processing (NLP), Automated Evaluation System, Adaptive Learning, Educational Management System

I. INTRODUCTION

In traditional education systems, teachers spend a significant amount of time preparing assignments, creating question papers, and evaluating student submissions. This process becomes more complex when a teacher handles multiple subjects and a large number of students. Manual assignment creation and evaluation not only increase workload but also make it difficult to provide personalized learning based on individual student performance.

The proposed AI-Based Assignment Generator and Evaluation System aims to automate the process of assignment creation and assessment using Machine Learning (ML) and Natural Language Processing (NLP) techniques. The system provides two user roles: Teacher and Student. Teachers can upload subject-wise PDF study materials through a secure dashboard. Based on the uploaded content, the system automatically generates assignments in the form of Multiple Choice Questions (MCQs), short answer questions, and long-answer questions. The system generates only questions without providing answers, allowing teachers to maintain evaluation control. Students can log in using their unique ID to access subject-wise assignments, submit their completed answers, and view their performance reports. The system automatically evaluates submitted assignments and displays the results using graphical analytics, helping teachers track student progress efficiently.

Additionally, new students are required to take an entry-level test to assess their knowledge level. Based on their performance, the system assigns either easy level or hard-level assignments, enabling adaptive and personalized learning. By integrating automated question generation, intelligent evaluation, and performance tracking, the system reduces manual effort, improves accuracy, and enhances overall academic management.

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II. LITERATURE SURVEY

Automatic question generation and evaluation have been active research areas in educational technologies, with significant advances leveraging Natural Language Processing (NLP) and Machine Learning (ML). Ch and Saha [1] explored automatic multiple choice question (MCQ) generation from textual data, emphasizing the integration of syntactic parsing and semantic analysis. Their survey provided a comprehensive review of techniques such as term extraction, distractor selection, and semantic role labelling that are essential for transforming unstructured educational content into structured assessment items.

Muñoz et al. [2] presented an intelligent educational framework for automatic question generation and evaluation in the context of compiler education. Their work demonstrated how rule-based and statistical learning methods can be used to generate context-specific questions and assess student responses. They highlighted that automated evaluation mechanisms can significantly reduce instructor workload, a key motivation for systems that aim to automate educational assessment.

In a broad survey, Das et al. [3] investigated automatic question generation (AQG) and answer assessment techniques across various domains. The authors analyzed template-based approaches, key phrase extraction, and transformer-based models, noting the strengths and limitations of each in generating high-quality questions. The study also examined automated grading methods, underscoring the need for adaptive assessment systems capable of handling diverse answer types.

Adaptive question generation based on probabilistic student models was investigated by researchers in [4], where question difficulty was dynamically generated according to student knowledge levels. Their work introduced probabilistic frameworks that predict student competence and adjust the difficulty of generated items. This adaptive approach supports personalized learning, aligning with the requirement for entry-level testing and customized assignment allocation in modern intelligent tutoring systems.

Vijaya Lakshmi et al. [5] proposed DeepQuest, a deep learning-based question generation system capable of producing descriptive and objective questions from textual input. Their method utilized neural network architectures to identify salient topics and generate structured questions, demonstrating the effectiveness of deep learning for scalable question generation. DeepQuest's framework highlights how ML models can enhance the quality and relevance of generated assessments across multiple subjects.

Although prior work has made significant progress in automatic question creation and evaluation, most existing systems focus on specific question types or isolated components of the assessment pipeline. For instance, research in [1–5] primarily addresses MCQ generation, adaptive question difficulty, or intelligent evaluation separately, without integrating these components into a unified teacher–student educator system. Therefore, there is a need for an end-to-end platform that combines automated assignment generation, multi-type question synthesis, performance evaluation, and adaptive difficulty allocation all within a single web-based application

III. METHODOLOGY

The proposed AI-Based Assignment Generator and Evaluation System follows a modular and role-based architecture consisting of authentication, teacher and student modules, content processing, machine learning-based question generation, evaluation, analytics, and a centralized database layer. The system begins with secure user authentication, where teachers and students log in using their credentials. Based on the user role, access is granted to the respective module.

In the Teacher Module, educators can manage multiple subjects, upload PDF-based study materials, and monitor student performance. Once a PDF is uploaded, the system performs content processing, which includes text extraction, NLP-based preprocessing, and keyword detection. The processed content is then forwarded to the ML Question Generator, which automatically generates multiple- choice, short-answer, and long-answer questions without providing answers. These generated assignments are stored in the database and mapped according to subjects.

In the Student Module, students can take an entry-level test (if new), view subject-wise assignments, and submit their responses. Submitted answers are processed by the Evaluation Engine, where MCQs are automatically graded and descriptive answers are evaluated using text similarity techniques. Scores are calculated and stored in the database.

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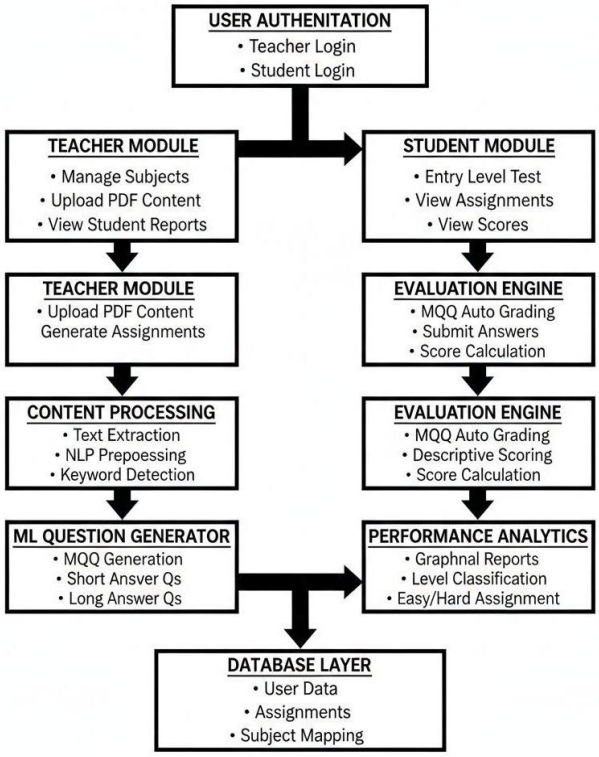
Finally, the Performance Analytics module generates graphical reports, classifies student levels, and assists in assigning easy or hard difficulty assignments based on performance. The Database Layer supports all modules by securely storing user data, assignments, subject mappings, and evaluation results, ensuring efficient system operation.

BLOCK DIAGRAM



IV. OBJECTIVE

1. To develop an automated assignment generation system that creates MCQs, short-answer, and long-answer questions from uploaded PDF study materials using Machine Learning and NLP techniques.
2. To reduce the manual workload of teachers by automating assignment creation and student evaluation processes.
3. To implement an intelligent evaluation engine capable of automatically grading objective questions and assessing descriptive answers using text similarity methods.
4. To design an adaptive learning mechanism that assigns easy or hard difficulty levels based on student performance in entry-level tests and previous assessments.
5. To provide performance analytics through graphical reports and score visualization, enabling teachers to monitor student progress effectively.

V. PROBLEM DEFINATIONS

Traditional assignment preparation and evaluation processes are manual, time-consuming, and difficult to manage when handling multiple subjects and large numbers of students. Teachers must create questions from study materials and evaluate student responses individually, which increases workload and reduces efficiency. Existing systems lack automated question generation, intelligent evaluation, and adaptive difficulty allocation based on student performance.

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Therefore, there is a need for an ML-based system that can automatically generate assignments from uploaded content, evaluate submissions, and provide performance analytics to support efficient and personalized learning

VI. FUCTIONAL REQUIREMENTS

1. The system shall allow teachers and students to securely register and log in using role-based authentication.
2. The system shall enable teachers to upload subject-wise PDF materials for assignment generation.
3. The system shall automatically generate MCQs, short-answer, and long-answer questions from uploaded content using ML and NLP techniques.
4. The system shall allow students to view subject-wise assignments, submit responses, and take an entry-level test if they are new users.
5. The system shall automatically evaluate submitted assignments, calculate scores, and display performance analytics through graphical reports.

VII. NON FUCTIONAL REQUIREMENTS

1. Performance: The system should process PDF uploads, question generation, and evaluation efficiently with minimal delay.
2. Security: The system must ensure secure authentication, encrypted data storage, and restricted access based on user roles.
3. Scalability: The system should handle multiple subjects, teachers, and a large number of students without performance degradation.
4. Usability: The user interface should be simple, intuitive, and easy to navigate for both teachers and students.
5. Reliability: The system should provide consistent performance, accurate evaluation results, and minimal downtime during operation.

VIII. CONCLUSION

In conclusion, the proposed AI-Based Assignment Generator and Evaluation System provides an intelligent and automated solution for assignment creation and student assessment. By integrating Machine Learning and Natural Language Processing techniques, the system can generate various types of questions from uploaded study materials and evaluate student responses efficiently. The role-based architecture ensures smooth interaction between teachers and students while maintaining secure data management.

The inclusion of entry-level testing and difficulty-based assignment allocation enables adaptive learning, supporting personalized education. Additionally, performance analytics and graphical reports help teachers monitor student progress effectively. Overall, the system reduces manual workload, improves accuracy in evaluation, and enhances the efficiency of academic management in modern educational environments.

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