TECHNICAL REPORT

AI – POWERED INTERACTIVE LEARNING ASSISTANCE FOR CLASSROOMS

TEAM NAME: MIND MATE

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Abstract

AI-Powered Interactive Learning Assistant designed to enhance classroom education by making learning more accessible, engaging, and personalized. The system allows administrators to upload study materials in formats like PDF, DOCX, or TXT, which are then processed using natural language processing (NLP) to extract key topics. Based on the extracted content, the AI automatically generates quizzes to help students test their understanding. A standout feature of the platform is the integrated AI doubt-solving assistant, which enables students to ask questions through text or voice and receive instant, context-aware responses powered by a language model. This assistant promotes self-paced learning and reduces reliance on constant teacher intervention. By integrating automated content delivery, evaluation, and real-time support, the system transforms traditional classroom learning into a more intelligent and interactive experience.

Introduction

Imagine a dedicated digital teaching assistant that learns from your uploaded lessons and actively engages students in learning by answering questions and generating quizzes based on that exact content. By combining the power of large language models with retrieval-augmented generation (RAG)**,** this system intelligently retrieves relevant snippets from your uploaded slide decks to provide accurate, on-topic explanations. When a student asks a question, it responds directly from the material; and when prompted, it can instantly create multiple-choice quizzes grounded in the same source. This dual chat-and-quiz functionality not only reinforces learning through Q&A but also keeps students actively engaged and supports teachers by delivering curriculum-aligned, real-time educational experiences**.**

Problem Statement

In traditional classroom settings, students often lack personalized academic support, and teachers struggle to address individual doubts due to limited time and large class sizes. Many students hesitate to ask questions openly, leading to unresolved queries and gaps in understanding. Moreover, learning materials are usually static and lack interactivity, making it difficult to maintain student engagement. Existing digital tools often fail to provide real-time, context-aware support aligned with classroom content. Teachers also spend significant time creating quizzes and assessments manually. Since students learn at different paces, a one-size-fits-all teaching approach is ineffective. There is a growing need for an AI-powered assistant that can understand lesson content, generate relevant quizzes, answer student queries, and summarize key points in real time. Such a tool can support teachers by automating repetitive tasks and help students by offering instant, interactive, and personalized learning support. This would make the classroom environment more efficient, inclusive, and engaging for all learners.

Motivation Behind the Project

The motivation behind developing an **AI-Powered Interactive Learning Assistant for Classrooms** stems from the growing need to enhance traditional teaching methods with intelligent, accessible, and self-paced learning tools. In many educational settings, students often struggle to clarify doubts outside classroom hours and lack personalized assessment tools. Teachers also face challenges in continuously evaluating students and addressing individual learning gaps. By automating the delivery of learning materials, generating topic-based quizzes, and providing instant AI-driven doubt clarification, this project aims to bridge the gap between instructors and students. The goal is to make learning more engaging, efficient, and independent—empowering students to learn at their own pace while reducing the workload on educators.

Data Source

The primary data source for this project is the **study material uploaded by the administrator** in formats such as PDF, DOCX, or TXT. These documents serve as the foundational input for the system. Once uploaded, the content is extracted using text parsing and Natural Language Processing (NLP) techniques to identify key concepts, topics, and context. This processed data is then used to generate quizzes and provide accurate, topic-specific doubt resolution. The quality and effectiveness of the AI assistant heavily depend on the clarity and structure of the uploaded notes. No external datasets are required, as all learning material is dynamically created from the admin-provided content, ensuring the assistant remains **contextually relevant to each subject and topic** being taught in the classroom.

Work

We developed an **AI-powered interactive learning assistant** designed to enhance classroom learning by combining content delivery, automated evaluation, and intelligent doubt resolution. The work carried out includes the following key components:

1. **Admin Interface for Content Upload:**
   A secure portal was built for administrators to upload study materials in various formats such as PDF, DOCX, or TXT.
2. **Content Extraction and Processing:**
   Implemented a backend system using Natural Language Processing (NLP) to parse and extract key topics, summaries, and keywords from the uploaded notes.
3. **Student Interface for Learning:**
   Designed a user-friendly interface for students to access the processed notes in an organized, topic-wise manner.
4. **AI-Based Quiz Generation:**
   Developed a module that automatically generates quizzes based on the extracted content, including multiple-choice and short-answer questions.
5. **Instant Feedback System:**
   Enabled instant quiz evaluation with explanations and topic-wise performance analysis.
6. **Doubt-Resolution Chatbot:**
   Integrated an AI assistant capable of understanding student questions—typed or spoken—and responding with accurate, context-aware answers.
7. **System Integration and Testing:**
   All modules were integrated into a seamless platform and tested to ensure smooth functioning, accuracy of AI responses, and user-friendliness.

Team members and contribution:

1. **Prasanna (Frontend Developer) :**Designed and implemented the user interface using React and Tailwind CSS. Handled file upload (Drag & Drop) features and user interaction components

2. **Akhil (Backend Developer) :** Implemented backend logic using build tools and managed application structure. Integrated services like quiz generation and doubt resolution (AI module or APIs if applicable)

3. **Sai Teja(Debugger & Documentation Lead) :** Tested and debugged the application to ensure smooth functionality.Prepared and maintained project documentation, including user guide and report**.**

Result

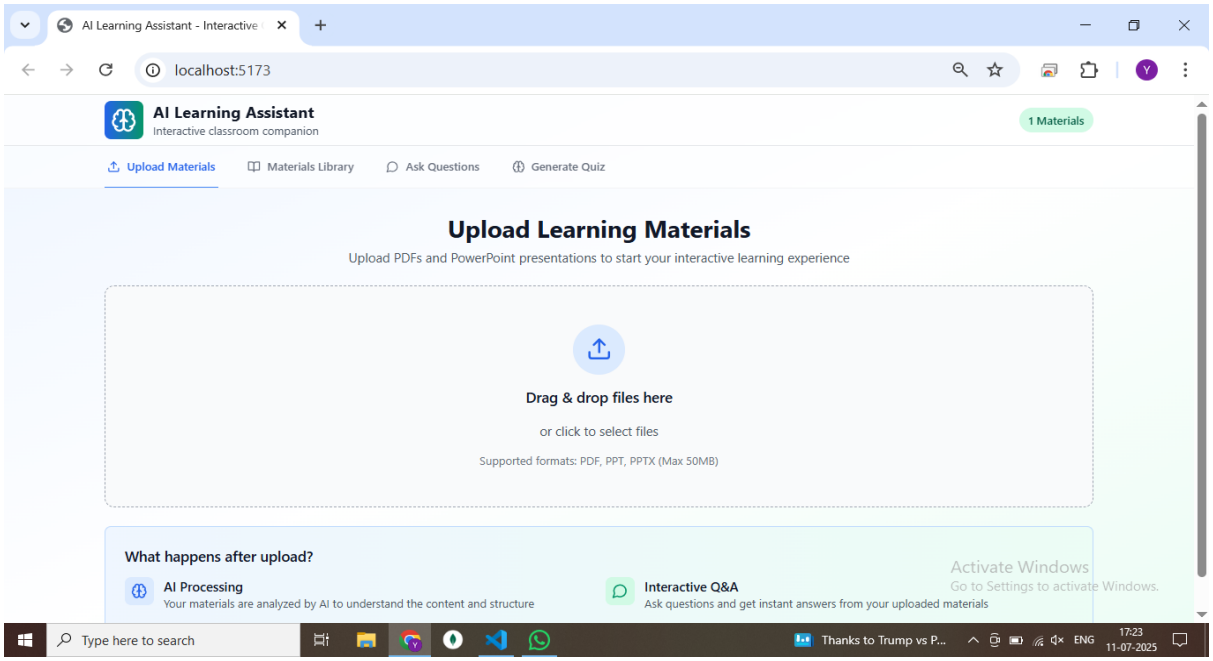

Fig 1 : Upload materials

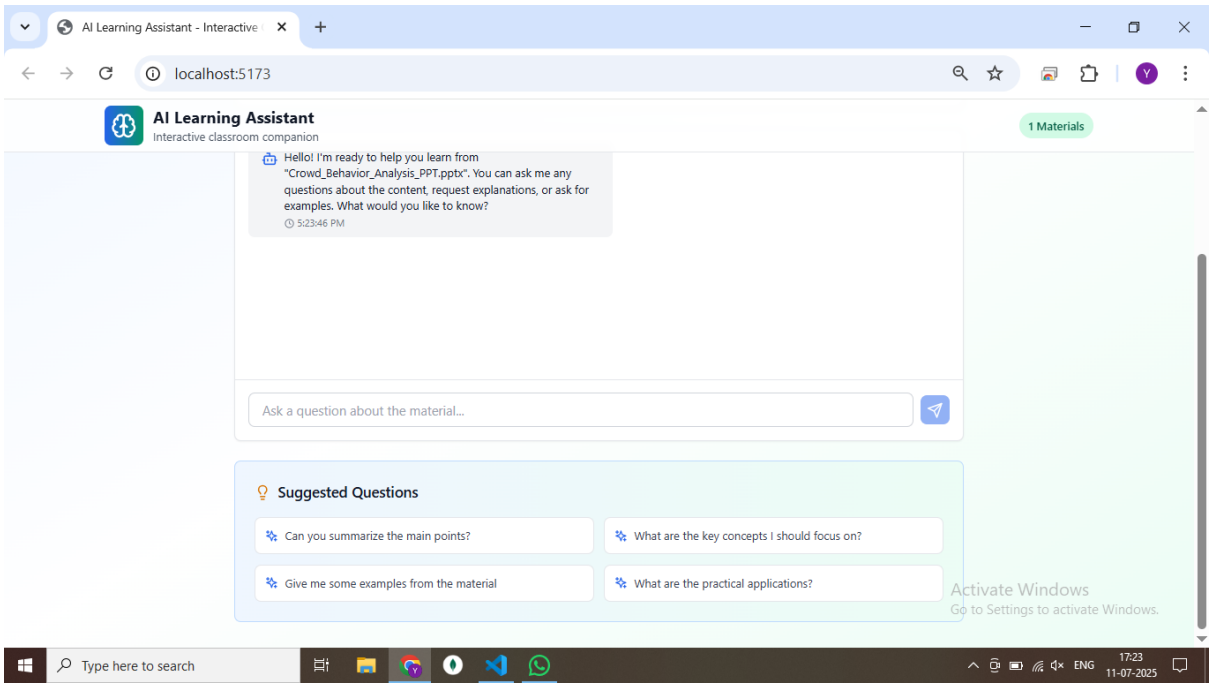

Fig 2 : Chatbox

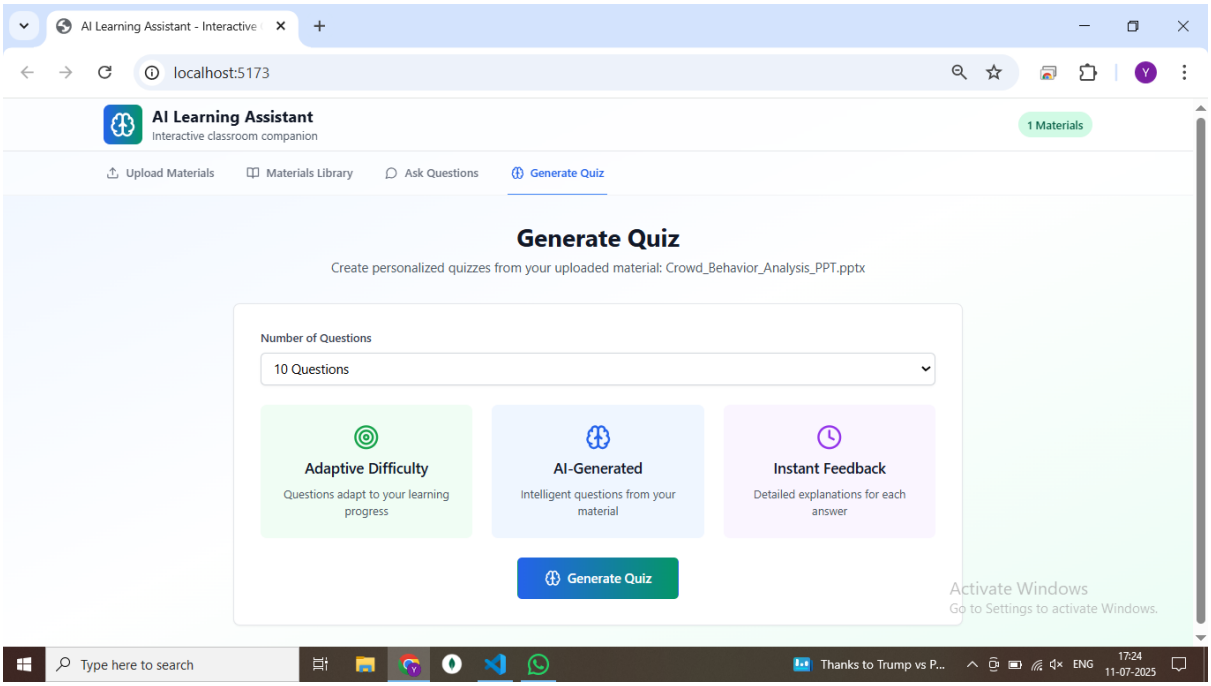

Fig 3 : Generate Quiz

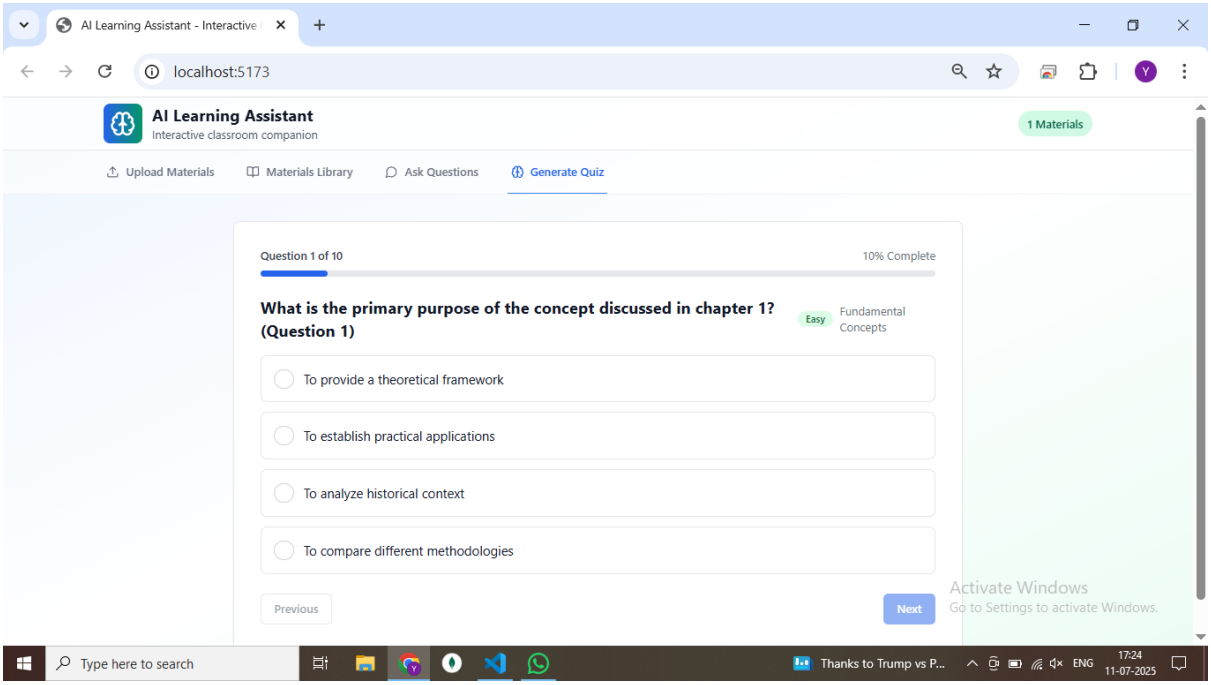

Fig 4 : Display Quiz Question

Links of the result:

Result model link:

https://drive.google.com/file/d/19SAwjse5V2UDTGh5jHmdUHdzKRiifkxU/view?usp=sharing

Github link : https://github.com/yprasanna11/IntelUnnathiProject