

PROJECT DOCUMENTATION

EDUTUTOR AI - Personalized Learning with Generative AI and LMS Integration

1.Introduction

- **Team ID** : NM2025TMID03319
- **Team member** : AFRAH R
- **Team member** : RITHU YESUPATHAM
- **Team member** : SWATHY B
- **Team member** : DISHA T V

2.Project Overview

- EduTutor AI is an AI-powered educational assistant designed to help learners understand concepts and practice through quizzes. The system currently offers two primary features:
- **Concept Explanation:** Users can input a topic or concept, and the AI generates a detailed explanation with examples to make learning easier and more intuitive.
- **Quiz Generation:** Based on the given topic, the AI automatically creates five questions of varying types, including multiple choice, true/false, and short answer, with answers provided at the end for self-assessment.
- The platform is implemented using Python, Gradio for the user interface, and IBM Granite AI model for natural language processing. It runs entirely in Google Colab, making it easily accessible without requiring any local setup.

3. Key Features

- Interactive Concept Explanation
- Users can type any topic or concept.
- The AI provides detailed explanations with examples, making complex ideas easier to understand.
- Dynamic Quiz Generation
- Generates 5 quiz questions per topic automatically.
- Includes multiple question types: Multiple Choice, True/False, and Short Answer.
- Provides answers in a separate section for self-assessment.
- User-Friendly Interface
- Built with Gradio for a simple and intuitive dashboard.
- Tabs separate Concept Explanation and Quiz Generator for easy navigation.
- AI-Powered Learning
- Uses IBM Granite AI model to generate accurate, context-aware responses.
- Adapts explanations and quiz content based on the user's input.
- Accessible Platform
- Runs directly in Google Colab, requiring no complex local setup. Shareable public link allows easy access for students and educators.

4. System Architecture

- EduTutor AI is structured into three main components:
- Google Colab Environment
- Serves as the execution platform.
- Handles installation of dependencies (transformers, torch gradio) and launches the AI application.
- No external server setup is required; all processing runs within the Colab notebook.
- Gradio User Interface

- Provides a clean and interactive interface with two tabs:
- Concept Explanation – for entering a topic and receiving AI-generated explanations.
- Quiz Generator – for entering a topic and generating a set of quiz questions along with answers
- Enables users to interact with the AI easily via text input and output boxes.
- Generates a shareable link so others can access the app without installing anything locally.
- AI Backend (IBM Granite Model)
- Uses the IBM Granite AI model (granite-3.2-2b-instruct) via the Hugging Face Transformers library
- Handles all natural language processing, including generating explanations and quizzes.
- Automatically adapts to the input topic and produces contextually relevant outputs.

Workflow Summary:

- User inputs a topic in the Gradio interface.
- The backend sends the input to the IBM Granite AI model.
- Model generates a response (concept explanation or quiz).
- Gradio displays the AI output to the user in the respective tab.
- This architecture ensures that the system is fully functional in a cloud environment, requires minimal setup, and deliver interactive AI-powered learning features.

5.Setup Instructions

Prerequisites:

- Google account with access to Google Colab.
- Internet connection for installing packages and loading the AI model.

Steps to Run the Project

- Open Google Colab.

- Install the required Python packages by running:
- `!pip install transformers torch gradio -q`
- Import necessary libraries and load the AI model using the provided code.
- Run the Gradio application by executing the notebook cells containing the interface code.

Once the application runs, you can:

- Enter a topic in the Concept Explanation tab to get detailed explanations.
- Enter a topic in the Quiz Generator tab to create quiz questions with answers.

Notes:

- The project runs entirely in Colab; no local server setup is needed.
- Model loading may take some time depending on the internet connection.

Running the Application

- To run the EduTutor AI application, follow these steps:
- Open the Google Colab notebook containing the project code.
- Ensure all required packages are installed by running
- `!pip install transformers torch gradio -q`
- Execute the code cells to load the AI model.
- The IBM Granite model will be loaded into memory.
- GPU acceleration will be used automatically if available.
- Launch the Gradio interface by running the notebook cells containing the interface code.

Interact with the application:

- Concept Explanation Tab: Enter a topic to receive a detailed explanation with examples.
- Quiz Generator Tab: Enter a topic to generate 5 quiz questions with answers.

- The Gradio interface runs directly in Colab and provides a user-friendly interactive dashboard for exploring AI-powered learning features.

Notes:

- Model loading may take a few minutes depending on internet speed.
- No additional setup or servers are required.

6. Known Issues

- Model Loading Time
- The IBM Granite AI model can take several minutes to load, especially on slower internet connections.
- Colab Session Limitation
- Google Colab sessions can automatically disconnect or reset after some time, which will require re-running the setup
- No Persistent Storage
- Quiz questions and user input are not saved permanently. Closing the session will clear all previous interactions.
- Internet Dependency
- An active internet connection is required for package installation and loading the AI model from Hugging Face.
- Limited Error Handling
- Inputs such as extremely long text or invalid topics may cause unexpected outputs.
- There is no built-in input validation for edge cases.

7. Future Enhancements

- Persistent Quiz Storage

Integrate with a database (e.g., Pinecone, Google Drive, or SQLite) to save quiz history for future reference.

- Performance Tracking

Add scoring and analytics to provide learners with feedback on their strengths and weaknesses.

- User Authentication

Implement login functionality for different roles (students and educators) using Google OAuth or similar services.

- Enhanced Question Types

Support more interactive quiz formats, such as fill-in-the-blank or matching questions.

- Multilingual Support

Enable explanations and quizzes in multiple languages to make the tool accessible to a wider audience.

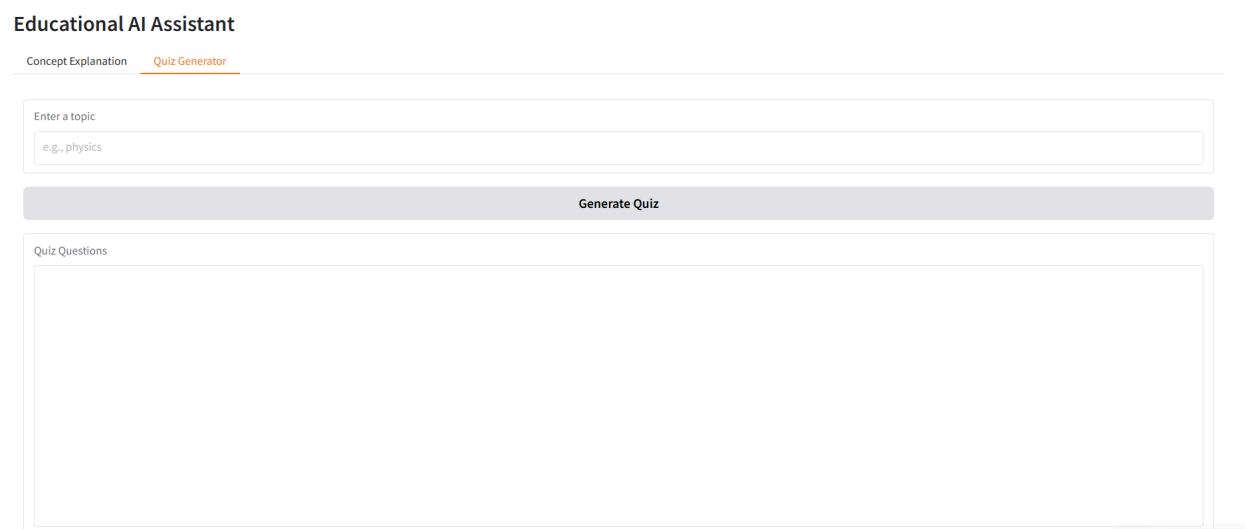
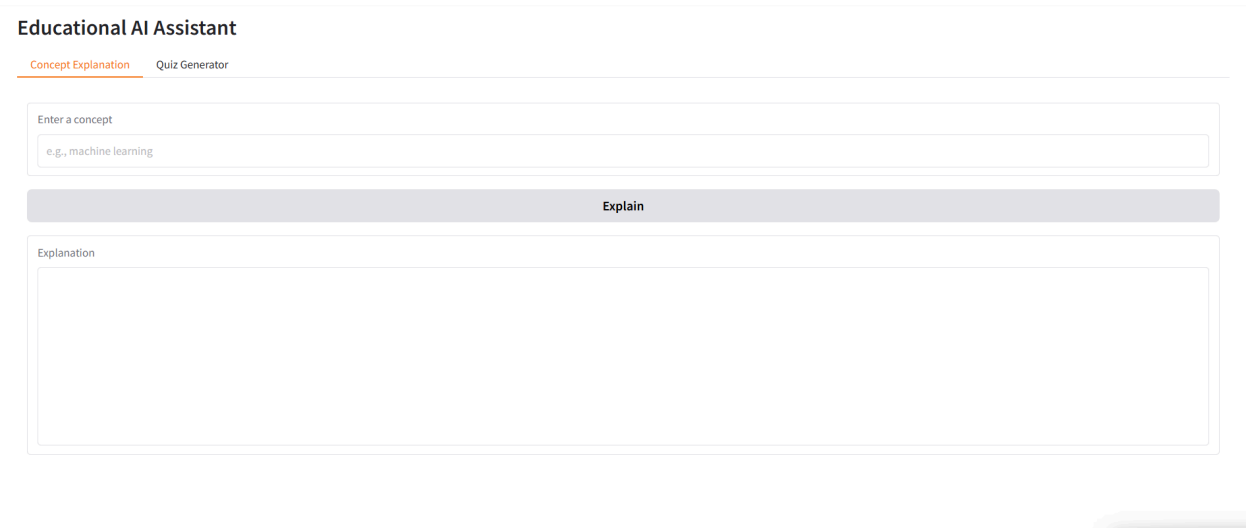
- Voice Input/Output

Allow users to input topics via speech and receive explanations and quizzes in audio format for accessibility.

- Gamification Features

Introduce points, badges, or leaderboards to make learning more engaging.

8. Screenshots



Educational AI Assistant

[Concept Explanation](#)

[Quiz Generator](#)

Enter a concept

IBM quantum computing

Explain

Explanation

IBM, a leading technology company, has been at the forefront of developing and advancing quantum computing. Quantum computing is a revolutionary approach to information processing that leverages the principles of quantum mechanics to perform complex calculations much more efficiently than classical computers for specific tasks. Here's an in-depth look into IBM's quantum computing initiatives, including hardware, software, and services.

1. Quantum Hardware:

IBM has introduced several quantum processors with varying capabilities, starting from their early prototypes like the IBM Q System One (2019) to the more advanced systems like the IBM Q System Version 2 (2020) and the IBM Eagle processor (2021).

a. IBM Q System One:

The first IBM quantum computer to be announced publicly, the Q System One was unveiled in 2019 as part of a collaboration with Daimler and the New York State Department of Economic Development. It was a stationary, commercial-grade quantum computer designed to provide a stable environment for researchers and developers to explore the practical aspects of quantum computing.

Key features of the Q System One:

- Quantum volume (QV) of 128, indicating a superior level of quantum processing power.
- Maintained at a cryogenic temperature of 5 millikelvin (-272.95°C) to ensure minimal decoherence for qubits.
- Encapsulated in a shielded, hermetically-sealed enclosure for better protection against environmental noise.

b. IBM Q System Version 2:

Educational AI Assistant

[Concept Explanation](#)

[Quiz Generator](#)

Enter a topic

IBM cloud computing

Generate Quiz

Quiz Questions

- Multiple Choice:** Which of the following is NOT a core service offered by IBM Cloud?
 - A) IBM Cloud for Financial Services
 - B) IBM Cloud for Healthcare
 - C) IBM Blockchain
 - D) IBM Cloud Marketplace
- True or False:** IBM Cloud provides a unified management console for deploying and managing resources across various cloud environments.
- Short Answer:** Describe the IBM Cloud Hybrid Benefits feature, including how it supports data transfer and synchronization between on-premises and cloud environments.
- Multiple Choice:** Which of the following is a key feature of IBM Cloud's Watson services?
 - A) AI-powered chatbots for customer support
 - B) Watson OpenScale for ethical AI management
 - C) Watson Machine Learning for predictive analytics
 - D) All of the above
- True or False:** IBM Cloud offers dedicated instances for customers requiring high-security, high-performance computing needs.

ANSWERS