EduTutor AI: Personalized Learning with Generative Al and LMS Integration

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1. Introduction

EduTutor AI is an **AI-powered educational assistant** that helps learners by:

- Explaining complex concepts with examples.
- Generating interactive quizzes for practice.

It is built using **Hugging Face Transformers**, **PyTorch**, and **Gradio** for a simple and interactive web UI. The project is designed to run on **Google Colab** for easy accessibility and GPU acceleration.

2. Project Overview

The project has two main features:

1. **Concept Explanation** – Users input a concept (e.g., *Binary Search*, *Photosynthesis*), and EduTutor AI generates a detailed explanation with examples.
2. **Quiz Generator** – Users input a topic, and the system generates 5 quiz questions with an answer key.

Target Users: Students, teachers, and self-learners.
Goal: Provide a lightweight, interactive AI tutor that runs directly in a browser.

3. System Architecture

Components:

- **Frontend (Gradio UI):** User input and result display.
- **Backend (Hugging Face Model + PyTorch):** Generates explanations and quizzes.
- **Deployment:** Hosted via **Colab** (with optional share=True for a public link).

Flow:

1. User enters a concept/topic in Gradio interface.
2. Request sent to **Granite 3.2 Instruct model** (Hugging Face).
3. Model processes prompt → generates response.
4. Output displayed in Gradio textbox.

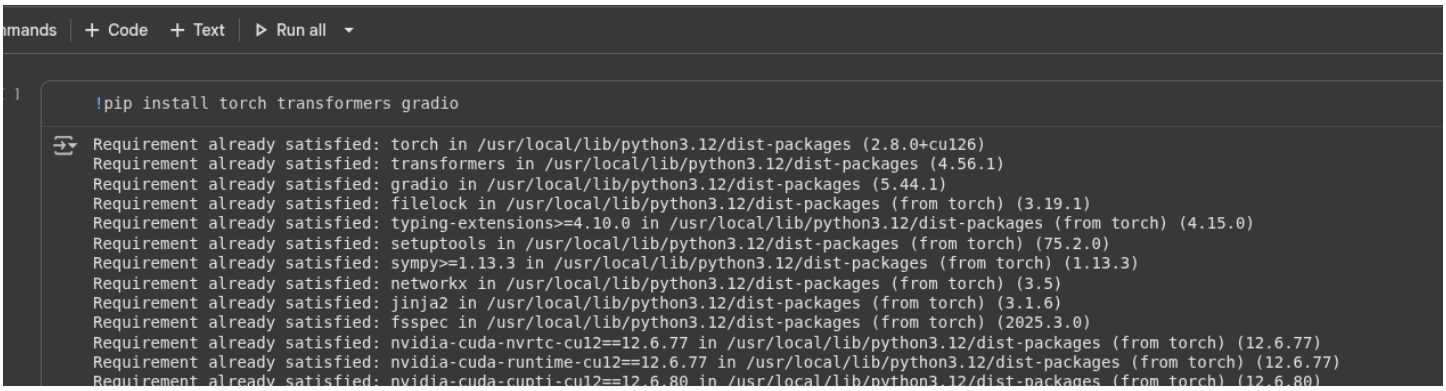
4. Setup Instructions

Using Google Colab

1. Open the Colab notebook.
2. Run the first cell to install dependencies:

!pip install torch transformers gradio

3. Copy the **project code** into a new Colab cell.
4. Run all cells.
5. Gradio will display a link to access the app.



5. Folder Structure

Since this is a **Colab project**, the structure is simple:

```
EduTutorAI/
├── U.ipynb            # Main Colab Notebook
├── edututorai.py      # Python file (optional modular script)
├── requirements.txt   # List of dependencies
├── README.md          # Documentation
├── assets/            # (Optional) images/screenshots/diagrams
```

6. Running the Application

- Open the Colab notebook.
- Run all cells.

- At the end, Gradio will display two URLs:
    - **Local URL** (works only in Colab runtime).
    - **Public Shareable URL** (if share=True is enabled).

7. API Documentation

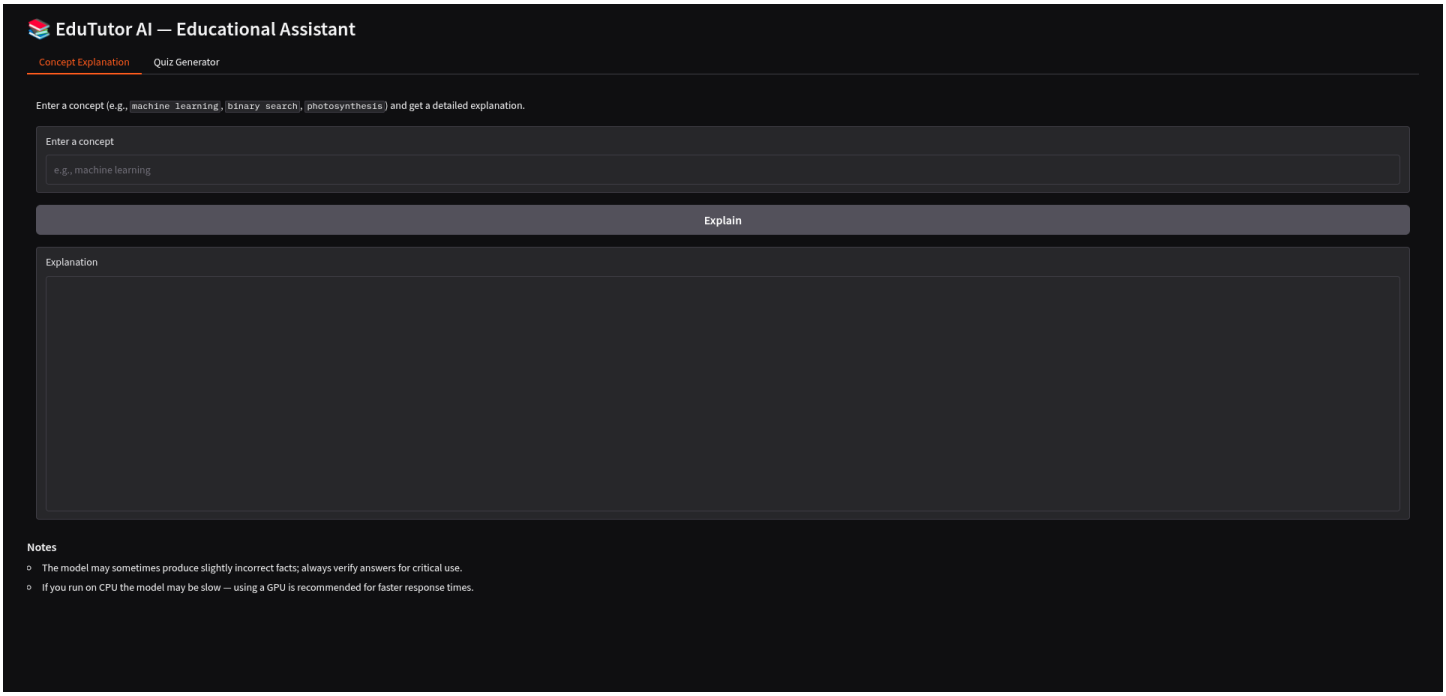
This project does not expose a REST API separately (since it's wrapped in Gradio).
But internally:

- **generate_response(prompt, max_new_tokens, temperature)**
    - Inputs: prompt (string), max_new_tokens (int), temperature (float)
    - Output: Generated response text
- **concept_explanation(concept)**
    - Input: Concept name
    - Output: Detailed explanation with examples
- **quiz_generator(concept)**
    - Input: Topic name
    - Output: Quiz (5 questions + answers)

8. Authentication

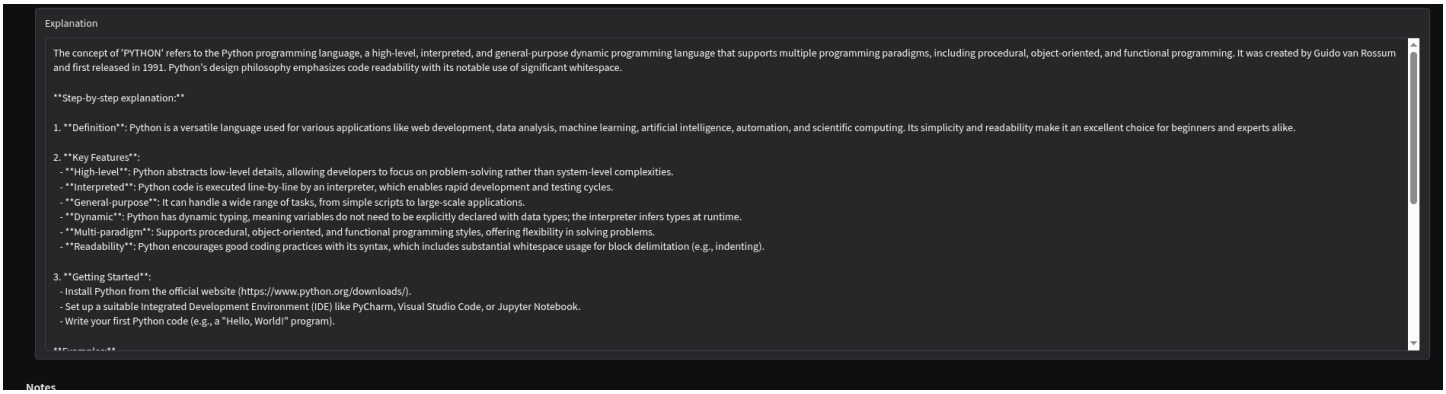
Currently, no authentication is implemented (open access).
Possible enhancements:

- Add **API key-based authentication**.
- Restrict **public share links** with passwords or tokens.



9. Testing

- **Manual Testing:**
  - Enter different concepts (e.g., "binary search", "gravity") → check output relevance.
  - Generate quizzes and cross-check answers.
- **Performance Testing:**
  - Run on both **CPU and GPU** (Colab free tier + Pro).
  - Compare response times.
- **Future:**
  - Add **unit tests** for helper functions (using pytest).



10. Conclusion & Future Enhancements

EduTutor AI is a lightweight educational AI app that:

- Explains concepts clearly.
- Creates quizzes for practice.
- Runs easily on Google Colab with Gradio.

Future Enhancements

- Add **multi-language support**.
- Save **generated quizzes to PDF/Google Drive**.
- Add **student performance tracking**.
- Implement **login system** for personalized learning.
- Deploy to **Hugging Face Spaces** or **Render** for permanent hosting.