

- **EDUTUTOR AI: PERSONALIZED LEARNING WITH GENERATIVE AI AND LMS INTEGRATION**

Project Documentation

1. Introduction

Project Title—>EduTutor AI: personalized Learning with generative AI and LMS integration

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2. Project Overview

Purpose:

EduTutor AI is designed to provide personalized, AI-powered educational support for students. The system helps learners understand concepts, practice with quizzes, and receive interactive explanations. It reduces the need for constant teacher supervision by acting as a smart tutor that adapts to each student's needs.

Features:

Concept Explanation –

Explains any topic (like Physics, Math, Computer Science, etc.) in simple, step-by-step language.

Can adapt explanations to the student's level (school, college, or competitive exams).

Practice & Quizzes –

Generates custom questions, quizzes, and exercises instantly.

Gives step-by-step solutions and hints to improve learning.

Quiz Generator

Key Point: Practice learning

Functionality: Creates quizzes and MCQs dynamically for any subject/topic.

Personalized Learning Path

Key Point: Adaptive guidance

Functionality: Suggests study plans based on student progress.

Doubt Solving Chatbot

Key Point: Conversational interface

Functionality: Students can ask questions in natural language and get answers.

Report & Progress Tracking

Key Point: Performance insights

Functionality: Generates reports on learning outcomes and weak areas.

Multimodal Input Support

Key Point: Flexibility

Functionality: Accepts text/PDFs for summarization and question generation.

Gradio/Streamlit UI

Key Point: Easy-to-use dashboard

Functionality: Provides an interactive interface for students/teachers.

3. Architecture

Frontend (Streamlit/Gradio):

Provides dashboards, quiz pages, chat interface, and student progress reports.

Backend (FastAPI):

Hosts APIs for question generation, explanations, and report creation.

LLM Integration (Hugging Face Granite / Open-Source Models):

Handles NLP tasks such as summarization, concept explanation, and quiz generation.

Vector Search (FAISS / Pinecone optional):

Embeds study materials and enables semantic search.

ML Modules:

Used for progress tracking, quiz difficulty adjustment, and recommendation system.

4. Setup Instructions

Prerequisites:

Python 3.9+

pip & virtual environment

API keys (Hugging Face, optional DB)

Installation:

1. Clone repository
2. Install dependencies (pip install -r requirements.txt)
3. Configure .env with API keys
4. Run backend (FastAPI)
5. Launch frontend (Streamlit/Gradio)

5. Folder Structure

```
edututor_ai/
├── app/           # FastAPI backend
├── app/api/       # API routes (chat, quiz, report)
├── ui/           # Streamlit/Gradio frontend
├── quiz_generator.py # Quiz generation logic
├── concept_explainer.py # Handles topic explanations
├── report_generator.py # Creates student reports
├── document_embedder.py # For semantic search
└── main.py       # Entry point
```

6. Running the Application

Start FastAPI server

Run Streamlit/Gradio dashboard

Navigate UI (quiz, chat, reports)

Upload study material or ask questions

7. API Documentation

POST /ask – Student query → AI response

POST /generate-quiz – Generate quiz for subject/topic

GET /progress-report – Fetch student performance insights

POST /upload-material – Upload notes/PDF for question generation

8. Authentication

JWT-based authentication

Role-based access (student, teacher, admin)

9. User Interface

Sidebar navigation

Quiz & reports dashboard

Real-time chatbot interface

Progress visualization (charts, scorecards)

10. Testing

Unit Testing: Quiz generation, explanation accuracy

API Testing: Postman/Swagger UI

Manual Testing: Student usability, quiz difficulty check

11. Known Issues

Limited subject coverage in early version

Requires good internet connection for LLM queries

12. Future Enhancements

Voice-based tutoring

Mobile app integration

Multilingual support

Gamified learning features

13. Advantages

Saves time for both students and teachers.

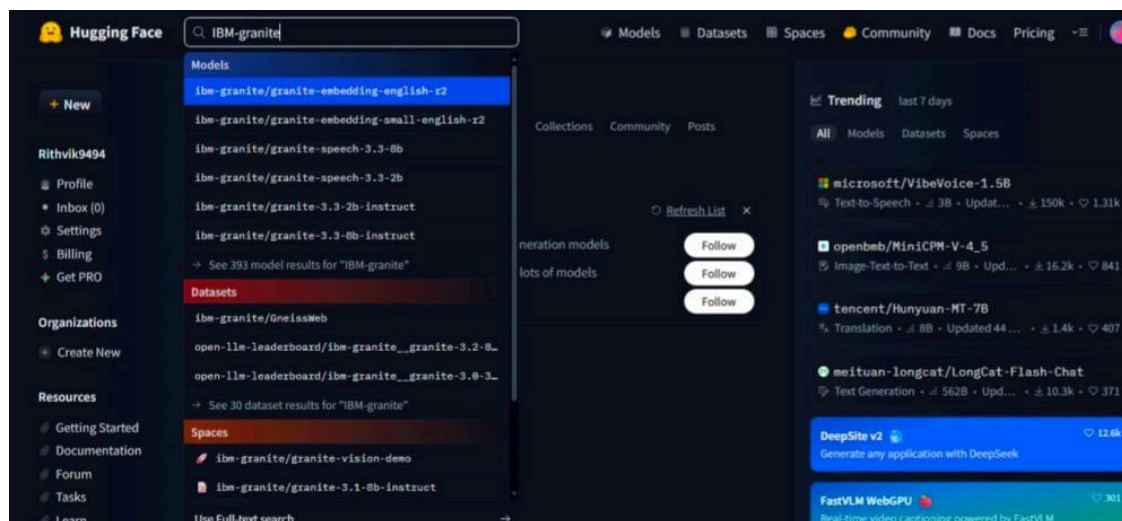
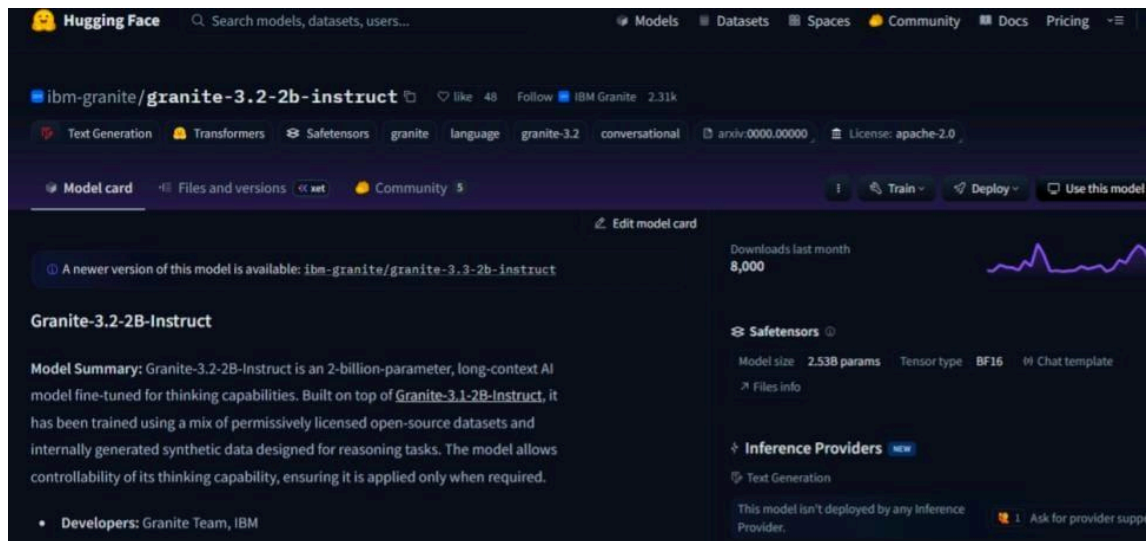
Provides personalized learning.

Easy to deploy in Google Colab (no heavy setup).

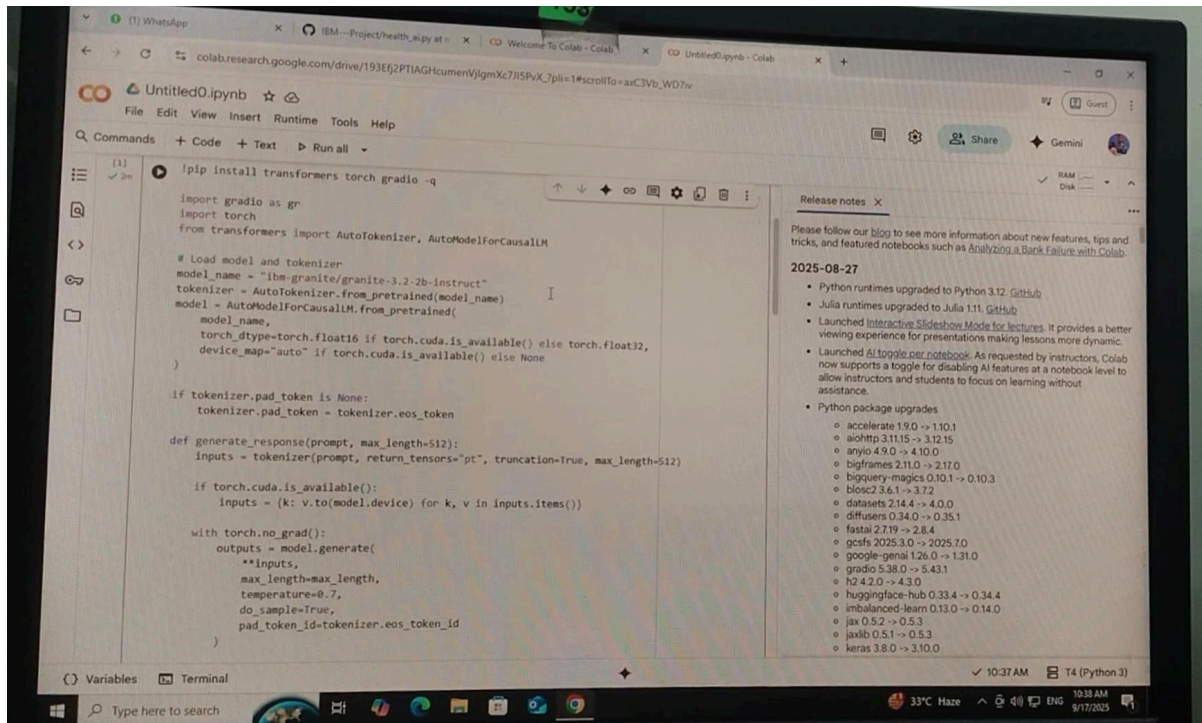
Cost-effective (open-source based).

14.Screenshots:

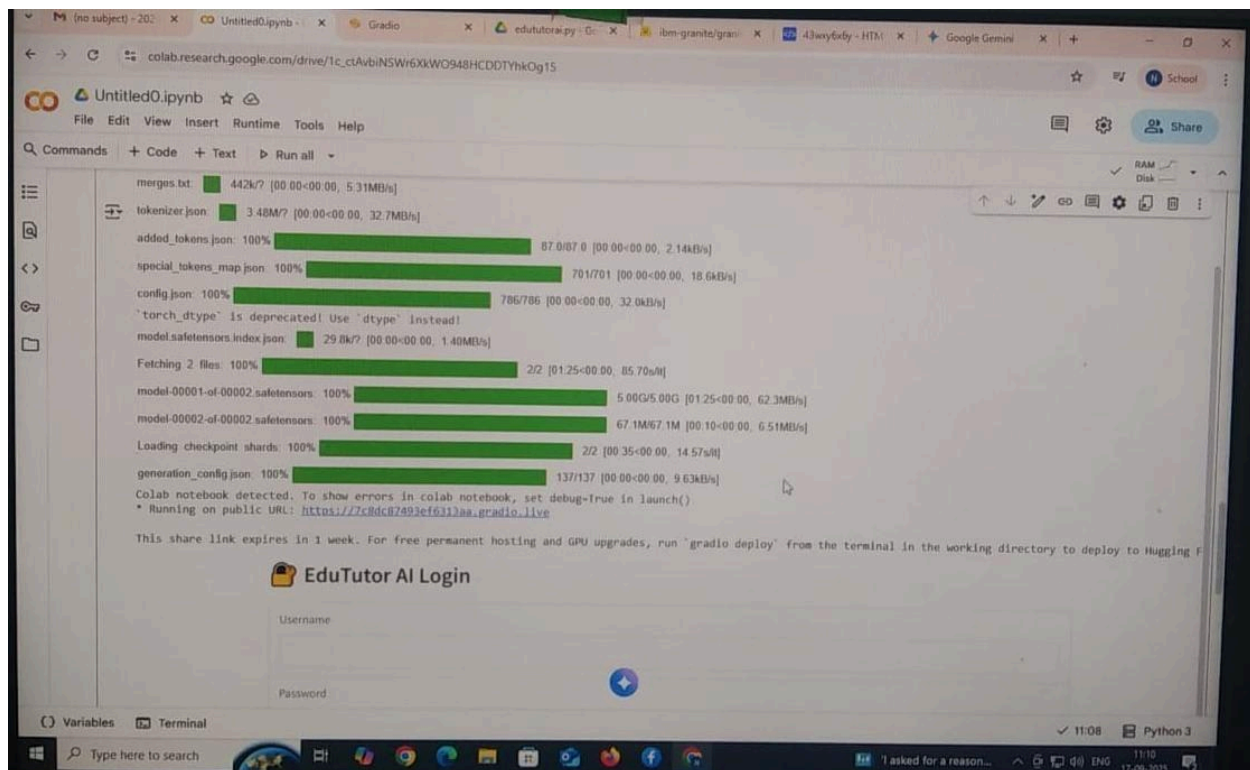
HUGGING FACE

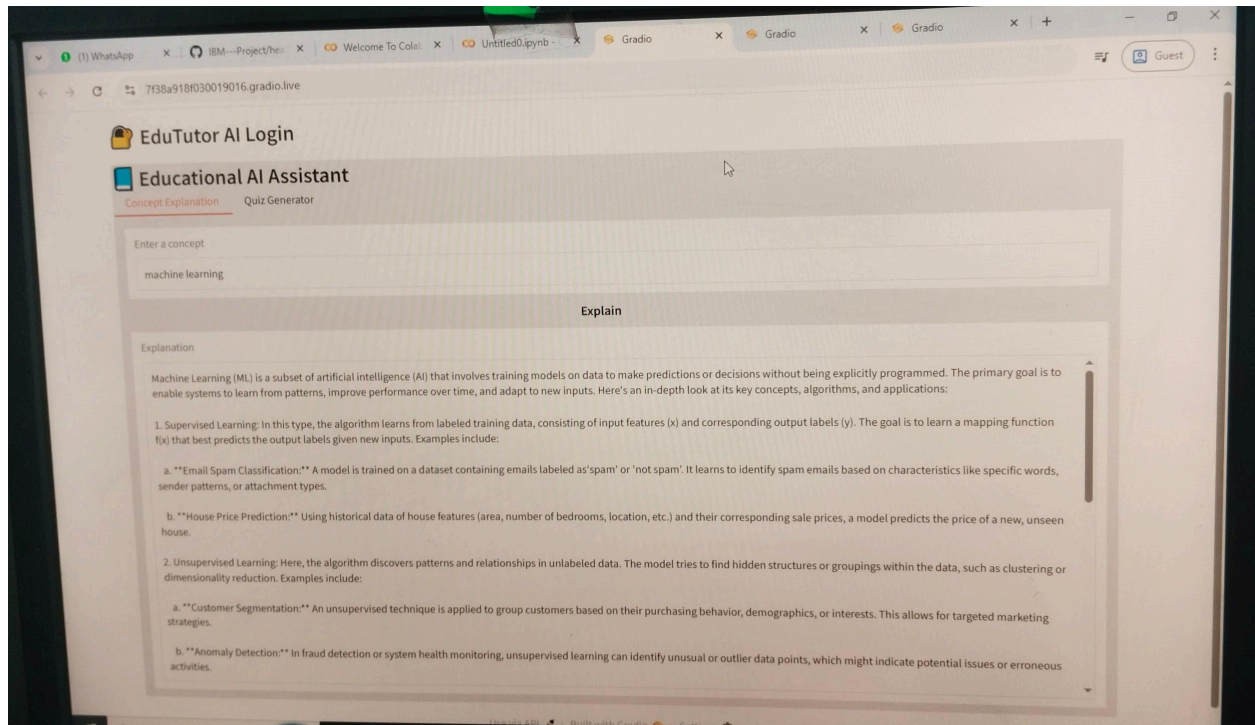


CODING



OUTPUT





15. Conclusion

EduTutor AI is a smart educational assistant that combines AI with interactive learning. It enhances student productivity, improves understanding, and reduces dependency on traditional methods. With future improvements, it can become a complete AI tutor platform.