EduTutor AI: Personalized Learning with Generative AI and LMS Integration

Project Overview

EduTutor AI is an AI-powered personalized education platform that transforms how students learn and how educators assess progress. It integrates dynamic quiz generation, student performance evaluation, Google Classroom synchronization, and real-time feedback—all powered by IBM Watsonx and Granite foundation models.

Key Features

1. **Dynamic Quiz Generation**: Uses IBM Watsonx (Granite model) to generate MCQs based on selected topic and difficulty.
2. **Real-Time Evaluation**: Instant scoring and feedback using AI backend logic.
3. **Google Classroom Integration**: Syncs student data and subjects to maintain curriculum alignment.
4. **Educator Dashboard**: View analytics, quiz history, and performance trends using data stored in Pinecone DB.
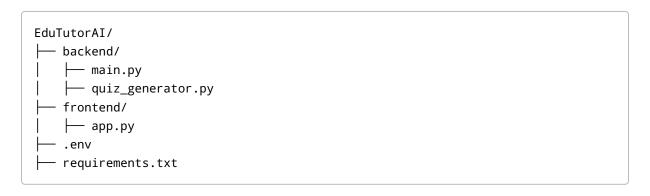

System Architecture

Modular AI-Powered Architecture:

- **FastAPI Backend**: Handles all API logic, quiz generation, scoring, and classroom sync.
- **LangChain + Watsonx**: Generates quizzes from prompts via Granite LLM.
- **Pinecone Vector DB**: Stores student embeddings, quiz metadata, and allows similarity search.
- **Streamlit Frontend**: Role-based dashboards (Student & Educator), quiz interface, OAuth login.

Technology Stack

- **Python 3.11+**
- **FastAPI**
- **Streamlit**
- **IBM Watsonx & LangChain**
- **Pinecone Vector DB**
- **Google OAuth + Classroom API**

Folder Structure

```
EduTutorAI/
├── backend/
│   ├── main.py
│   ├── quiz_generator.py
├── frontend/
│   ├── app.py
├── .env
├── requirements.txt
```

.env File (Environment Variables)

```
WATSONX_MODEL_ID=granite-13b-instruct-v2
WATSONX_API_KEY=your_ibm_watsonx_api_key
WATSONX_ENDPOINT=https://us-south.ml.cloud.ibm.com
WATSONX_PROJECT_ID=your_project_id
PINECONE_API_KEY=your_pinecone_api_key
PINECONE_INDEX_NAME=edututor
```

How to Run

Backend

```
uvicorn backend.main:app --reload
```

Frontend

```
streamlit run frontend/app.py
```

Scenarios

1. Personalized Learning

Student logs in, syncs classes, and receives AI-generated quizzes tailored to their level.

2. Educator Dashboard

Teacher sees detailed analytics including quiz history, scores, and performance indicators.

3. Diagnostic Testing

AI generates an initial test, then adapts difficulty based on performance.

4. Classroom Sync

Syncs courses, subjects, and student info from Google Classroom.

Future Improvements

- Add chat-based tutor support.
- Enable quiz export to PDF.
- Integrate additional LMS platforms like Moodle.

Contributors

- Project Lead: VANGARA VENKATESH
- AI Integration: Watsonx / Langchain
- Backend API: FastAPI
- Frontend UI: Streamlit
- Cloud Storage: Pinecone

License

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