

EDUTUTOR AI- PERSONALIZED LEARNING

Project Documentation

1. Introduction

Project Title: Edututor AI – Personalized Learning

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2. Project Overview

Purpose:

Edututor AI is designed to transform education through personalized and adaptive learning. It leverages AI models to explain concepts in simple terms, generate interactive quizzes, and help learners at their own pace. The project aims to support students, teachers, and institutions by making learning more engaging and efficient.

Existing Features:

Concept Explanation: Learners can input any topic and get a detailed, simplified explanation with examples.

Quiz Generator: Automatically generates multiple types of questions (MCQ, True/False, Short Answer) with answers.

Planned Features:

Learning progress tracking and analytics.

Personalized recommendations for further study.

Multilingual support for diverse learners.

AI-powered doubt resolution chatbot.

3. Architecture

Frontend:

Built using Gradio UI with two tabs:

Concept Explanation – Explains any concept in detail.

Quiz Generator – Creates topic-based quizzes with answers.

Backend:

Model: IBM Granite 3.2-2B Instruct (Hugging Face model).

Frameworks: PyTorch, Transformers library.

Functionality:

Text generation for explanations.

Quiz creation with different question types.

Planned Enhancements:

Integration with FastAPI for scalable backend.

Database support to store student progress and quiz results.

Advanced ML algorithms for adaptive learning paths.

4. Setup Instructions

Run the following command to install required libraries:

```
!pip install transformers torch gradio PyPDF2 -q
```

This will install dependencies for model loading and Gradio UI.

5. Folder Structure

Suggested project structure:

```
|— app/                # Backend logic (future FastAPI integration)
|   |— granite_llm.py   # Handles model communication
|   |— document_tools.py # Future text/PDF helpers
|   |— forecast.py      # Planned: learning analytics
|   |— anomaly.py       # Planned: anomaly detection for performance
|
|— ui/                 # Frontend components
|   |— concept_tab.py   # Concept explanation UI
|   |— quiz_tab.py      # Quiz generator UI
|
|— edututor_project.py  # Main entry file with Gradio UI
|— requirements.txt     # Dependencies
```

6. Running the Application

1. Install dependencies.
2. Run the edututor_project.py file.
3. Gradio will generate a link – open it in a browser.
4. Use Concept Explanation or Quiz Generator tabs to interact.
5. Planned: Save results, track learning history, and download reports.

7. API Documentation (Planned with FastAPI)

POST /explain-concept – Generate concept explanation.

POST /generate-quiz – Create quiz questions and answers.

POST /track-progress – Save student progress and results.

POST /recommend-topics – Suggest next learning topics.

8. Authentication

Future secure deployment will support:

Token-based authentication (JWT or API keys).

OAuth2 for login (Google, Microsoft).

Role-based access (Student, Teacher, Admin).

9. User Interface

Gradio UI with clean tabs.

Concept Explanation: Input topic → get detailed explanation.

Quiz Generator: Input topic → get multiple question types + answers.

Planned tabs: Progress tracking, recommendations, and reports.

10.Screen Shot

Educational AI Assistant

Concept Explanation

Quiz Generator

Enter a concept

Machine Learning

Explain

Explanation

As the name suggests, semi-supervised learning combines the advantages of supervised and unsupervised learning. It operates on datasets that have a mix of labeled and unlabeled data. The algorithm typically takes advantage of the large amount of unlabeled data to improve performance on the labeled data.

Examples:

- Speech Recognition: In the domain of speech recognition, the training data usually consists of a mix of labeled audio clips (e.g., recordings of specific words or sentences) and unlabeled audio segments. The semi-supervised learning model can leverage these unlabeled audio clips to recognize and improve pronunciation and intonation patterns in the labeled data.

- Object Tracking in Videos: In object tracking scenarios, especially involving rare or new objects, video

Educational AI Assistant

Concept Explanation

Quiz Generator

Enter a topic

Physics

Generate Quiz

Quiz Questions

5. True/False: According to the theory of relativity, time dilation occurs only when an object is moving at a significant fraction of the speed of light.

ANSWERS:

1. B) $KE = 0.5mv^2$

2. True

3. Wave-particle duality is a fundamental concept in quantum mechanics that suggests particles like electrons and photons can exhibit both wave-like and particle-like properties. This duality is demonstrated through experiments such as the double-slit experiment, where particles create an interference pattern typically associated with waves.

11. Testing

Unit Testing: For model prompt generation and response formatting.

Manual Testing: Verifying concept explanations and quiz quality.

Planned: Automated testing with FastAPI and Pytest.

12. Known Issues

Limited to text input currently.

No progress tracking or multilingual support yet.

No authentication in the current version.

13. Future Enhancement

Add learning analytics and progress tracking.

Support CSV/Excel input for bulk quiz generation.

Implement AI-based doubt resolution.

Generate PDF progress reports for students.

Add voice interaction for accessibility.

PROJECT DEMO VIDEO LINK:

<https://drive.google.com/file/d/1glbtffRutZIMcSXYIggjxsUFCkN7T6rc/view?usp=drivesdk>