Educational AI Assistant Using IBM Granite LLM

1. Introduction:

Project Title: Educational AI Assistant Using IBM Granite LLM

- Team Member:P.Koperundevi
- Team Member:M.Harini
- Team Member:E.Sulochana
- Team Member:C.Renuka

2. Project Overview:

Purpose:

The Educational AI Assistant supports learning and teaching with two core features:
1. Concept Explanation – Generates clear and detailed explanations of academic concepts with examples.
3. Quiz Generator – Creates quizzes with multiple question types and an answer key.

Features:

1. Concept Explanation
2. Quiz Generation
3. AI-Powered Educational Insights
4. Simple and Interactive Gradio UI
5. Flexible Input Options (custom concept/topic entry)
6. Accessible Deployment with Public Sharing
3. Architecture

Frontend (Gradio):

- Two tabs: Concept Explanation and Quiz Generator.- Collects inputs through textboxes and displays outputs interactively.

Backend (Python):

- Handles tokenization, prompt construction, and text generation.
LLM Integration:
- Uses ibm-granite/granite-3.2-2b-instruct model via Hugging Face.
- Config: temperature=0.7, do_sample=True, max_length=800–1000.

3.Deployment Layer:

- Runs locally or publicly using share=True.
4. Setup Instructions
Prerequisites:
- Python 3.9+
- pip & virtual environment tools
- Hugging Face Transformers & Torch

4.Installation Process:

1. Clone the repository
2. Install dependencies with: pip install -r requirements.txt
3. Run: python app.py
4. Open the Gradio link in a browser
5. Folder Structure
app/ – Main application folder
concept_explanation.py – Handles explanation prompts
quiz_generator.py – Generates quiz questions and answers
utils.py – Helper functions
model_loader.py – Loads IBM Granite LLM

interface.py – Defines Gradio UI

main.py – Entry point

requirements.txt – DependenciesREADME.md – Documentation

5.Running the Application:

Run: python main.py

Access in browser at: http://127.0.0.1:7860

Public link available with share=True

6. API Documentation (Future Integration):

- POST /explain-concept → Returns detailed explanation of a concept
- POST /generate-quiz → Returns quiz questions + answers

7. Authentication:

Current demo runs in open environment.

Secure deployment options include API keys, JWT, OAuth2, and role-based access.

8. User Interface:

Tabs:

1. Concept Explanation – Enter concept → Get explanation with examples
2. Quiz Generator – Enter topic → Generate 5 quiz questions + Answer Key

User-friendly layout with real-time results.

9. Testing:

- Unit Testing: Verified prompt handling and response formatting
- Manual Testing: Checked with topics like Machine Learning, Physics
- Edge Cases: Tested empty inputs, long inputs, and abstract topics

10. Screenshot:

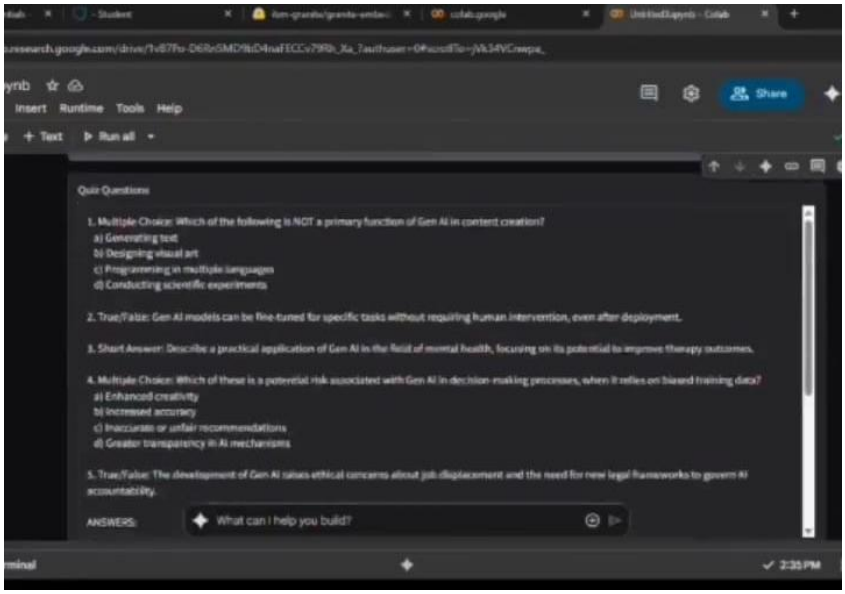

Fig 1.content explanation

11. Known Issues:

Long/complex topics may cause truncation

Model loading can be slow initially without GPU

No authentication in demo

Responses may vary in accuracy

Future Enhancements

Multi-language support

Export quizzes to PDF/Word for teachers

Adaptive difficulty levels (beginner, advanced)

Integration with LMS (Moodle, Google Classroom)

Personalized learning recommendations

Mobile-friendly deployment