

Project Title

Project Documentation

1 . Introduction

- Project title: EduTutor AI: Personalized Learning

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2.] Project Overview •

purpose:

The purpose of EduTutor AI is to provide personalized learning support using Generative AI with IBM Granite models.

The project helps students with concept explanations, quiz generation, and interactive learning through AI-driven solutions.

It leverages Google Colab for execution with low setup and GitHub for version control.

- Features:

Concept Explainer

Key Point: Simplified learning

Functionality: Generates easy-to-understand explanations for complex topics.

Quiz Generator

Key Point: Interactive practice

Functionality: Creates quizzes based on chosen topics for self-assessment.

AI Integration with IBM Granite

Key Point: Generative AI support

Functionality: Uses Hugging Face Granite models to enhance learning outcomes.

Cloud Deployment

Key Point: Easy accessibility

Functionality: Runs smoothly on Google Colab with GPU support.

GitHub Integration

The frontend is built with Gradio, offering an interactive interface for students to access explainers and quizzes.

Backend (Python & IBM Granite):

Python scripts interact with IBM Granite models on Hugging Face to generate learning content and responses.

Deployment (Google Colab):

The project is deployed on Google Colab with GPU acceleration for efficiency and low-cost execution.

Version Control (GitHub):

Project code and files are maintained on GitHub for collaboration and progress tracking.

4. Setup Instructions

Prerequisites:

- o Python 3.8 or later
- o Google Colab with T4 GPU enabled
- o Hugging Face account for IBM Granite models
- o GitHub account for version control

Installation Process:

- o Access the Naan Mudhalvan Smart Internz Portal and enroll in EduTutor AI.
- o Select IBM Granite model from Hugging Face (e.g., granite-3.2-2b-instruct).
- o Run the notebook in Google Colab, install dependencies, and execute code.
- o Upload the project to GitHub with documentation and source code.

5. Folder Structure

app/ – Contains main project scripts for quiz generation and explainers.

ui/ – Contains Gradio interface code.

notebooks/ – Google Colab notebooks for running the project.

README.md – Documentation of the project.

6. Running the Application

To start the project:

- Open Google Colab and load the EduTutor AI notebook.
- Enable GPU runtime and install dependencies.
- Run the provided Python code cells to generate explainers and quizzes.
- Open the Gradio link to interact with the application.
- Upload your project files to GitHub for submission.

7. API Documentation

The project relies on IBM Granite Hugging Face API models.

APIs used include:

POST /generate-explainer – Generates concept explanations.

POST /generate-quiz – Creates quizzes based on topics.

GET /project-progress – Tracks project progress on Naan Mudhalvan portal.

8. Authentication

The project runs in an open environment for demonstration.

For secure deployment, integrate:

- Token-based authentication for API access
- GitHub user authentication for collaboration

9. User Interface

The interface is simple and student-friendly:

Sidebar with navigation

Tabs for quizzes and explainers

Real-time AI-generated content

Output preview in Gradio

10. Testing

Testing was done in multiple phases:

Unit Testing: For AI model prompt responses.

Manual Testing: For quiz and explainer generation.

Integration Testing: Google Colab and Hugging Face API connectivity.

Edge Case Handling: Invalid topics, large quiz sizes, missing API keys.

11. Screenshots

(Add screenshots of Colab notebook, Gradio app, and GitHub repo)

12. Known Issues

- Dependent on internet connectivity for API access.
- Limited to IBM Granite model capacity.

13. Future Enhancements

- Add support for more subjects and multimodal learning (PDFs, images).
- Enhance analytics and personalized student feedback.
- Deploy as a standalone web app beyond Google Colab.

colab.google

EduTutor AI.ipynb - Colab

colab.research.google.com/drive/1j0YkgEbl1fyXC6VvnJlnVVM_vL_xrpGE#scrollTo=Zi_Fx1-dSroV

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EduTutor AI.ipynb

File Edit View Insert Runtime Tools Help

Commands Code Text Run all

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[2]

app.launch(share=True)

... /usr/local/lib/python3.12/dist-packages/huggingface_hub/utils/_auth.py:94: UserWarning:
The secret `HF_TOKEN` does not exist in your Colab secrets.
To authenticate with the Hugging Face Hub, create a token in your settings tab (<https://huggingface.co/settings/tokens>), set it as secret in your Google Colab and restart this notebook.
You will be able to reuse this secret in all of your notebooks.
Please note that authentication is recommended but still optional to access public models or datasets.
warnings.warn(
tokenizer_config.json: 8.88k/? [00:00<00:00, 800kB/s]
vocab.json: 777k/? [00:00<00:00, 10.2MB/s]
merges.txt: 442k/? [00:00<00:00, 26.6MB/s]
tokenizer.json: 3.48M/? [00:00<00:00, 88.2MB/s]
added_tokens.json: 100% 87.0/87.0 [00:00<00:00, 7.74kB/s]
special_tokens_map.json: 100% 701/701 [00:00<00:00, 57.2kB/s]
config.json: 100% 786/786 [00:00<00:00, 98.9kB/s]
`torch_dtype` is deprecated! Use `dtype` instead!
model.safetensors.index.json: 29.8k/? [00:00<00:00, 2.49MB/s]
Fetching 2 files: 0% 0/2 [00:00<?, ?it/s]
model-00001-of-00002.safetensors: 66% 3.30G/5.00G [01:57<01:16, 22.2MB/s]
model-00002-of-00002.safetensors: 100% 67.1M/67.1M [00:08<00:00, 7.42MB/s]

Variables Terminal

Executing (2m 41s) T4 (Python 3)

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The screenshot shows a Google Colab notebook with the following content:

```
app.launch(share=True)
```

A warning message is displayed:

Warning: The secret "HF_TOKEN" does not exist in your Colab secrets. To authenticate with the Hugging Face Hub, create a token in your settings tab (<https://huggingface.co/settings/tokens>), set it as secret in your Google Colab and re-run the cell. You will be able to reuse this secret in all of your notebooks. Please note that authentication is recommended but still optional to access public models or datasets.

Progress bars are shown for the following files:

- tokenizer_config.json: 8.88k/? [00:00<00:00, 800kB/s]
- vocab.json: 777k/? [00:00<00:00, 10.2MB/s]
- merges.txt: 442k/? [00:00<00:00, 26.6MB/s]
- tokenizer.json: 3.48M/? [00:00<00:00, 88.2MB/s]
- added_tokens.json: 100% [00:00<00:00, 7.74kB/s]
- special_tokens_map.json: 100% [00:00<00:00, 57.2kB/s]
- config.json: 100% [00:00<00:00, 98.9kB/s]
- model.safetensors.index.json: 29.8k/? [00:00<00:00, 2.49MB/s]
- Fetching 2 files: 100% [02:57<00:00, 177.15s/it]
- model-00001-of-00002.safetensors: 100% [02:56<00:00, 118MB/s]
- model-00002-of-00002.safetensors: 100% [00:08<00:00, 7.42MB/s]
- Loading checkpoint shards: 100% [00:19<00:00, 8.18s/it]

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Set as default

EduTutor AI.ipynb

File Edit View Insert Runtime Tools Help

Commands + Code + Text ▶ Run all

RAM Disk

[2] ✓ 4m

app.launch(share=True)

vocab.json: 777k/? [00:00<00:00, 10.2MB/s]

merges.txt: 442k/? [00:00<00:00, 26.6MB/s]

tokenizer.json: 3.48M/? [00:00<00:00, 88.2MB/s]

added_tokens.json: 100% 87.0/87.0 [00:00<00:00, 7.74kB/s]

special_tokens_map.json: 100% 701/701 [00:00<00:00, 57.2kB/s]

config.json: 100% 786/786 [00:00<00:00, 98.9kB/s]

`torch_dtype` is deprecated! Use `dtype` instead!

model.safetensors.index.json: 29.8k/? [00:00<00:00, 2.49MB/s]

Fetching 2 files: 100% 2/2 [02:57<00:00, 177.15s/it]

model-00001-of-00002.safetensors: 100% 5.00G/5.00G [02:56<00:00, 118MB/s]

model-00002-of-00002.safetensors: 100% 67.1M/67.1M [00:08<00:00, 7.42MB/s]

Loading checkpoint shards: 100% 2/2 [00:19<00:00, 8.18s/it]

generation_config.json: 100% 137/137 [00:00<00:00, 12.4kB/s]

Colab notebook detected. To show errors in colab notebook, set debug=True in launch()

* Running on public URL: <https://c16f4ea39074427388.gradio.live>

This share link expires in 1 week. For free permanent hosting and GPU upgrades, run `gradio deploy` from the terminal in the working directory to deploy to Hugging F

Educational AI Assistant

Variables Terminal

12:28 T4 (Python 3)

31°C Haze 12:29 16-09-2025

The screenshot displays a Google Colab notebook environment. The notebook is titled "Educational AI Assistant" and is currently open to the "Concept Explanation" tab. The interface within the notebook includes a text input field for entering a concept, with the example "e.g., machine learning" provided. Below the input field is a prominent grey button labeled "Explain". Underneath this button is a large text area designated for the "Explanation". The notebook's top toolbar features standard Colab menus: File, Edit, View, Insert, Runtime, Tools, and Help. The bottom toolbar shows the "Variables" and "Terminal" tabs. The browser's address bar at the top indicates the notebook is hosted on Google Colab with the URL: colab.research.google.com/drive/1j0YkgEbL1fyXC6VvnJlnVVM_vL_xrpGE#scrollTo=Zi_Fx1-dSroV. The Windows taskbar at the very bottom shows the system time as 12:29 on 16-09-2025, with a temperature of 31°C and a "Haze" weather condition.

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colab.research.google.com/drive/1j0YkgEbl1fyXC6VvnJlnVVM_vL_xrpGE#scrollTo=Zi_Fx1-dSroV

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EduTutor AI.ipynb ☆ ☁

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Enter a concept

Explain Gen AI

Explain

Explanation

Explain Gen AI, also known as Explainable Artificial Intelligence (XAI), is a subfield of artificial intelligence that focuses on creating AI models capable of clearly and understandably explaining their decision-making processes to human users. The primary objective of Explain Gen AI is to bridge the gap between the complex, often opaque, nature of AI algorithms and the need for transparency, accountability, and trust in AI systems, particularly in high-stakes domains such as healthcare, finance, and criminal justice.

Traditional AI models, especially those based on complex deep learning architectures like neural networks, often serve as "black boxes," making it difficult for humans to comprehend the rationale behind their decisions. This lack of transparency can be problematic in situations where explanations are required for compliance, patient education, or ethical justifications.

In contrast, Explain Gen AI aims to develop AI systems that provide human-interpretable explanations, allowing users to:

1. Understand the AI's rationale for making specific decisions,
2. Validate the AI's outputs,
3. Assess the reliability and robustness of the AI model.

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✓ 12:28 T4 (Python 3)

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colab.google

EduTutor AI.ipynb - Colab

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colab.research.google.com/drive/1j0YkgEbl1fyXC6VvnJlnVVM_vL_xrpGE#scrollTo=Zi_Fx1-dSroV

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EduTutor AI.ipynb

File Edit View Insert Runtime Tools Help

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generation_config.json: 100% 137/137 [00:00<00:00, 12.4kB/s]

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This share link expires in 1 week. For free permanent hosting and GPU upgrades, run `gradio deploy` from the terminal in the working directory to deploy to Hugging F

Educational AI Assistant

Concept Explanation

Quiz Generator

Enter a topic

Gen AI

Generate Quiz

Quiz Questions

1. Multiple Choice: What is the primary purpose of generative AI models like me?
a) To classify data into predefined categories
b) To generate new content, such as text, images, or music
c) To predict future events based on historical data

Variables Terminal

12:28 T4 (Python 3)

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