

EduTutor AI – Project Documentation

1.Introduction

Project Title : EduTutor AI: Personalized Learning with Generative AI and LMS Integration

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2.Project Overview

EduTutor AI is an AI-powered educational assistant that helps students learn concepts and generate quizzes dynamically. It uses **IBM Granite LLM** for natural language understanding and **Gradio** for an interactive web interface. The platform supports:

- Concept explanations with examples
 - Quiz generation (multiple choice, true/false, short answer)
 - Shareable web interface for easy access
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2.Features

- **Concept Explanation:** Users enter a concept, and the AI generates a detailed explanation.
 - **Quiz Generation:** Users enter a topic; AI creates 5+ quiz questions with answers.
 - **Interactive UI:** Gradio interface with tabs for explanations and quizzes.
 - **AI Powered:** Uses Granite foundation model through Hugging Face Transformers.
 - **Cross-Platform:** Can be run on CPU or GPU.
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3.Tech Stack

- **Frontend & UI:** Gradio
- **AI/ML:** PyTorch, Hugging Face Transformers, IBM Granite LLM
- **Language:** Python 3.10+

4. Project Structure

```
EduTutorAI-Gradio/
├─ app.py           # Main Gradio app
├─ requirements.txt  # Python dependencies
├─ README.md        # Project documentation
└─ models/          # (Optional) Pretrained or fine-tuned models
```

5. Installation

1. Clone the repository:

```
git clone https://github.com/username/EduTutorAI-Gradio.git
cd EduTutorAI-Gradio
```

2. Create a virtual environment:

```
python -m venv venv
source venv/bin/activate  # Linux/macOS
venv\Scripts\activate     # Windows
```

3. Install dependencies:

```
pip install -r requirements.txt
```

4. Run the app:

```
python app.py
```

5. Open the Gradio interface (the terminal will provide a local URL or a shareable link).

6. Usage

- **Concept Explanation:** Enter a topic (e.g., "Machine Learning") → Click “Explain” → Get AI-generated explanation.
 - **Quiz Generation:** Enter a topic → Click “Generate Quiz” → Get 5+ questions with answers.
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7.Future Improvements

- Integrate with **React frontend** for a full LMS-style platform.
 - Connect to a **backend database** to store quizzes and track progress.
 - Add **Google Classroom or LMS integration**.
 - Implement **adaptive difficulty** based on student performance.
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8.Dependencies

- Python 3.10+
 - Gradio
 - PyTorch
 - Transformers
 - IBM Granite LLM
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Screenshots :

1.Getting IBM Granite model from Hugging Face

The screenshot shows the Hugging Face model page for `ibm-granite/granite-3.3-2b-instruct`. The page includes a header with the Hugging Face logo and navigation links. The model card features a summary, key features, and a model tree. The summary states that the model is a 2-billion parameter 128K context length language model fine-tuned for improved reasoning and instruction-following capabilities. The model tree shows the base model `ibm-granite/granite-3.3-2b-base` and its derivatives: `Finetuned (3)`, `Adapters (3)`, `Finetunes (19)`, and `Merges (3)`. The page also displays the number of downloads (174,612) and the license (Apache 2.0).

Model Summary: Granite-3.3-2B-Instruct is a 2-billion parameter 128K context length language model fine-tuned for improved reasoning and instruction-following capabilities. Built on top of Granite-3.3-2B-Base, the model delivers significant gains on benchmarks for measuring generic performance including AlpacaEval-2.0 and Arena-Hard, and improvements in mathematics, coding, and instruction following. It supports structured reasoning through `<think></think>` and `<response></response>` tags, providing clear separation between internal thoughts and final outputs. The model has been trained on a carefully balanced combination of permissively licensed data and curated synthetic tasks.

- **Developers:** Granite Team, IBM
- **GitHub Repository:** [ibm-granite/granite-3.3-language-models](#)
- **Website:** [Granite Docs](#)
- **Release Date:** April 16th, 2025
- **License:** [Apache 2.0](#)

Downloads last month: 174,612

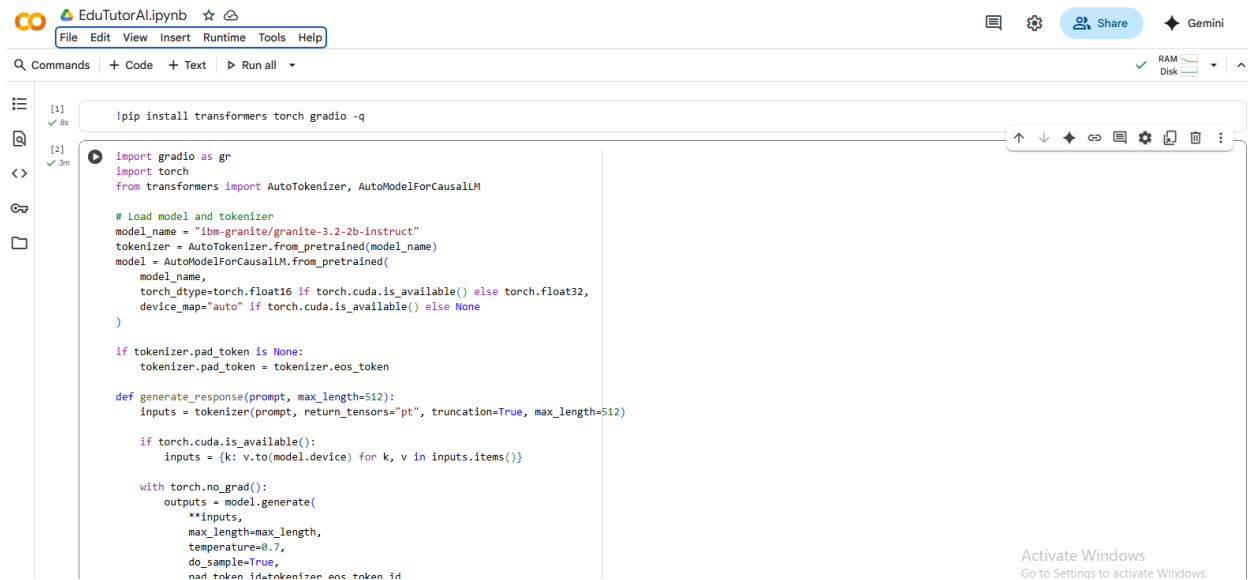
Safetensors: Model size: 2.53B params, Tensor type: BF16, Chat template, Files info

Inference Providers: Text Generation. This model isn't deployed by any Inference Provider. Ask for provider support

Model tree for ibm-granite/granite-3.3-2b-instruct:

- Base model: [ibm-granite/granite-3.3-2b-base](#)
- Finetuned (3): [this model](#)
- Adapters: 3 models
- Finetunes: 19 models
- Merges: 3 models

2. Coding in Google Colab



The screenshot shows the Google Colab interface with the following code in the main editor:

```
[1] ✓ 8s | !pip install transformers torch gradio -q

[2] ✓ 3m | import gradio as gr
import torch
from transformers import AutoTokenizer, AutoModelForCausalLM

# Load model and tokenizer
model_name = "ibm-granite/granite-3.2-2b-instruct"
tokenizer = AutoTokenizer.from_pretrained(model_name)
model = AutoModelForCausalLM.from_pretrained(
    model_name,
    torch_dtype=torch.float16 if torch.cuda.is_available() else torch.float32,
    device_map="auto" if torch.cuda.is_available() else None
)

if tokenizer.pad_token is None:
    tokenizer.pad_token = tokenizer.eos_token

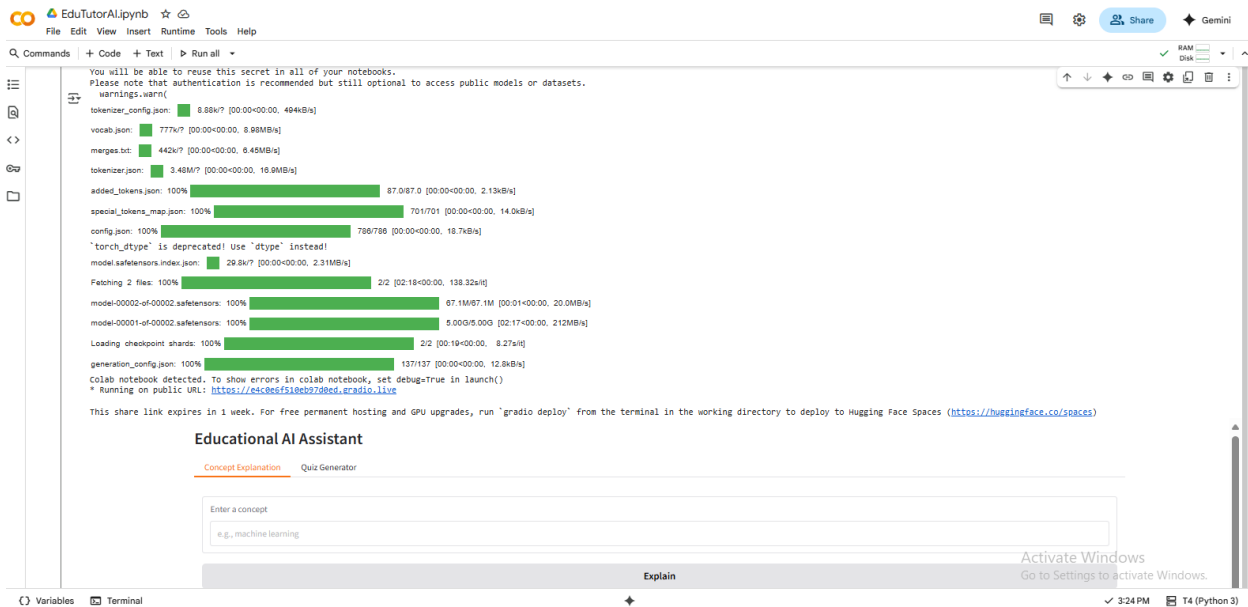
def generate_response(prompt, max_length=512):
    inputs = tokenizer(prompt, return_tensors="pt", truncation=True, max_length=512)

    if torch.cuda.is_available():
        inputs = {k: v.to(model.device) for k, v in inputs.items()}

    with torch.no_grad():
        outputs = model.generate(
            **inputs,
            max_length=max_length,
            temperature=0.7,
            do_sample=True,
            pad_token_id=tokenizer.eos_token_id
```

On the right side of the interface, there is a watermark that says "Activate Windows Go to Settings to activate Windows."

3. Running the code



The screenshot shows the Google Colab interface with the execution progress of the code. The progress bar is green, indicating successful execution. The output shows the following progress:

- tokenizer_config.json: 8.88k/7 [00:00<00:00, 494kB/s]
- vocab.json: 777k/7 [00:00<00:00, 8.98MB/s]
- merges.txt: 442k/7 [00:00<00:00, 8.45MB/s]
- tokenizer.json: 3.48M/7 [00:00<00:00, 16.8MB/s]
- added_tokens.json: 100% [00:00<00:00, 2.13kB/s]
- special_tokens_map.json: 100% [00:00<00:00, 14.0kB/s]
- config.json: 100% [00:00<00:00, 18.7kB/s]
- "torch_dtype" is deprecated! Use "dtype" instead!
- model.safetensors.index.json: 29.8k/7 [00:00<00:00, 2.31MB/s]
- Fetching 2 files: 100% [02:18<00:00, 138.32kB/s]
- model-00002-of-00002.safetensors: 100% [00:01<00:00, 20.0MB/s]
- model-00001-of-00002.safetensors: 100% [02:17<00:00, 212MB/s]
- Loading checkpoint shards: 100% [00:19<00:00, 8.27kB/s]
- generation_config.json: 100% [00:00<00:00, 12.8kB/s]

Colab notebook detected. To show errors in colab notebook, set debug=True in launch().
* Running on public URL: <https://colab.research.google.com/notebooks/ibm-granite-3.2-2b-instruct>

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 Face Spaces (<https://huggingface.co/spaces>)

Educational AI Assistant

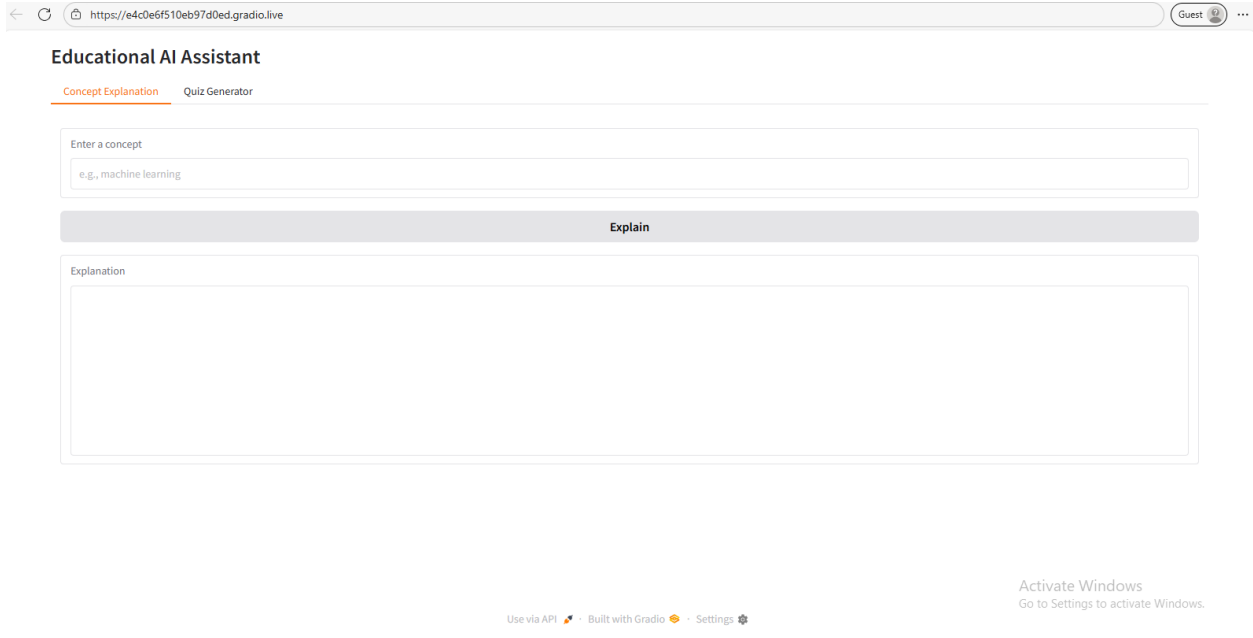
[Concept Explanation](#) [Quiz Generator](#)

Enter a concept
e.g., machine learning

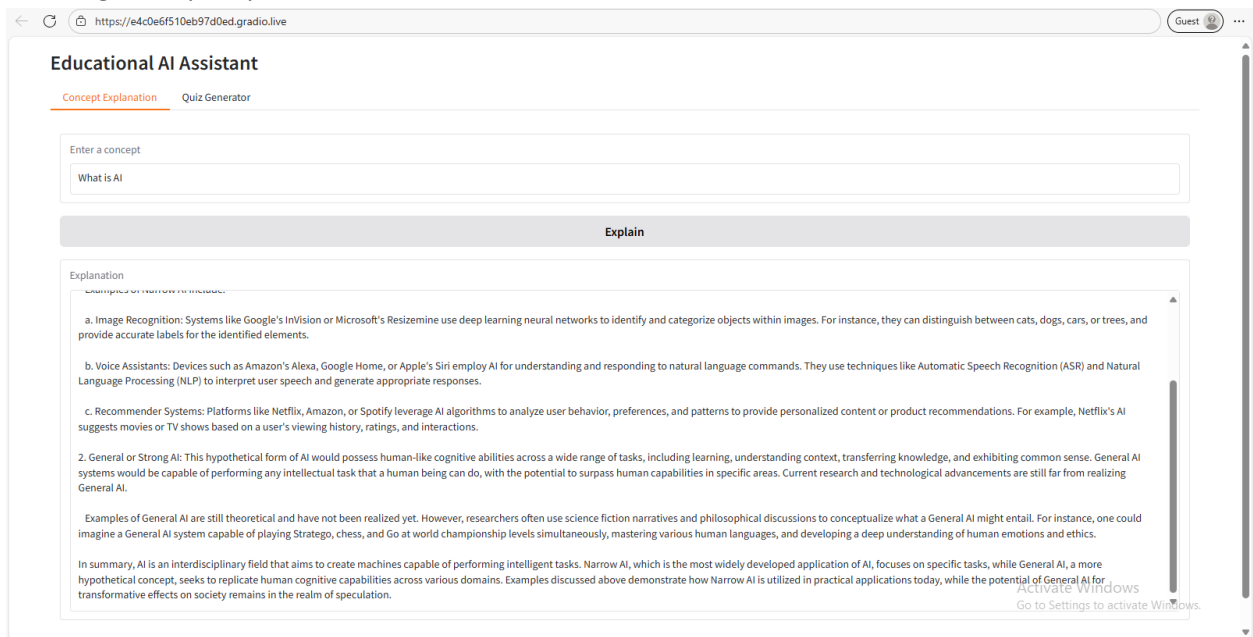
Explain

At the bottom of the interface, there is a watermark that says "Activate Windows Go to Settings to activate Windows."

4. Testing the Public URL



5. Testing concept explanation



6. Testing quiz generation

[Concept Explanation](#)
[Quiz Generator](#)

chemistry

chemistry

Generate Quiz

B) $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$

5. True/False: Photosynthesis is a process primarily driven by chemical reactions, not involving light energy.

1. A) H_2O

2. True

4. D) $H_2 + O_2 \rightarrow 2H_2O$

5. False

Photosynthesis is a process driven by light energy, primarily involving chlorophyll and other pigments in plants, algae, and some bacteria to convert light energy, usually from the sun, into chemical energy in the form of glucose (sugar).

in the form of glucose (sugar).
Go to Settings to activate Windows.