Name: Minhaj Asghar

AI Study Assistant

Overview

AI Study Assistant is a smart, RAG-based (Retrieval-Augmented Generation) system that helps users learn about Artificial Intelligence by asking questions in natural language. It combines retrieval from a knowledge base with advanced language models to provide accurate and informative answers. The assistant supports both extractive and generative QA, as well as summarization.

Key Features

- **RAG-based architecture:** Combines document retrieval (FAISS) with language models (Flan-T5) for contextual answers.
- **Context-aware QA** using deepset/roberta-base-squad2
- **Text Summarization** with facebook/bart-large-cnn
- **Generative QA** using google/flan-t5-large
- **Interactive UI** built using Gradio

Technologies Used

- Python
- LangChain
- Hugging Face Transformers
- Sentence Transformers
- FAISS (Facebook AI Similarity Search)
- Gradio

- Google Colab

Workflow

1. Document Loading: The AI knowledge base is uploaded and read using LangChain's TextLoader.

2. Text Splitting: Text is split into smaller chunks using CharacterTextSplitter.

3. Embedding Generation: Using all-MiniLM-L6-v2, chunks are converted into dense vector embeddings.

4. Indexing with FAISS: The embeddings are stored in a FAISS index for fast and relevant retrieval.

5. Retrieval + QA:

- **Retrieval:** Top relevant chunks are retrieved based on the user's query.
- **Answer Generation:**
  - roberta-base-squad2 handles extractive QA.
  - flan-t5-large generates answers in natural language.

6. Summarization: Long context is summarized using bart-large-cnn.

7. Gradio Interface: A simple UI for typing questions and viewing answers.
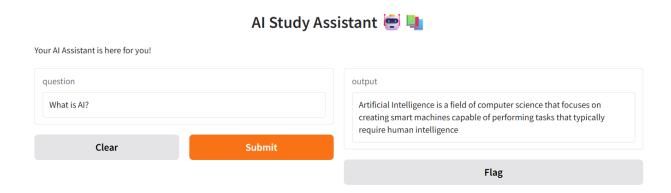
Sample Questions

- What is Artificial Intelligence?
- What are the applications of AI?

- Summarize the types of AI.
- Difference between General AI and Narrow AI?

How to Use

1. Clone or open the Colab notebook.

2. Upload the AI_Study_Assistant_Knowledge_Base.txt file.

3. Run all cells to process the data and start the assistant.

4. Use the Gradio interface to ask questions.

Screenshot

AI Study Assistant 🤖 📚

Your AI Assistant is here for you!

question

What is AI?

| Clear | Submit |

output

Artificial Intelligence is a field of computer science that focuses on creating smart machines capable of performing tasks that typically require human intelligence

Flag

RAG Architecture Highlight

This project follows the RAG pipeline:

- **Retrieve:** Use FAISS to fetch relevant content chunks.
- **Augment:** Combine retrieved content with the user's question.
- **Generate:** Use a generative model to produce a well-formed answer.

Future Work

- Add voice input/output
- Deploy as a web app
- Expand to support PDF and website inputs
- Use memory-based chat history for conversation continuity

Credits

- Hugging Face Transformers
- LangChain
- Gradio
- FAISS