

AI Study Bot

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1. Project Overview

AI Study Bot is an intelligent chatbot developed using FastAPI, MongoDB Atlas, LangChain, and Groq LLM. The system is designed to help learners understand and retain knowledge through structured explanations, quizzes, flashcards, and practice questions. The bot maintains conversational memory by storing previous interactions in MongoDB, allowing it to provide context-aware responses.

2. Technology Stack

1. Backend Framework: FastAPI
2. Database: MongoDB Atlas (Cloud)
3. LLM Integration: Groq API (openai/gpt-oss-20b model)
4. Prompt Engineering: LangChain
5. Data Validation: Pydantic
6. Deployment Platform: Render

3. Memory Implementation Explanation

The chatbot stores every user message and assistant response in MongoDB Atlas with the following fields: user_id, role (user/assistant), message, and timestamp. When a new request is received:

1. The system retrieves all previous chats for the given user_id.
2. These messages are sorted chronologically using timestamps.
3. The conversation history is passed to the LLM using LangChain.
4. The model generates a context-aware response.
5. Both the user query and assistant response are stored back in MongoDB. This implementation enables conversational memory, allowing the bot to remember previous questions and provide personalized, contextual responses.

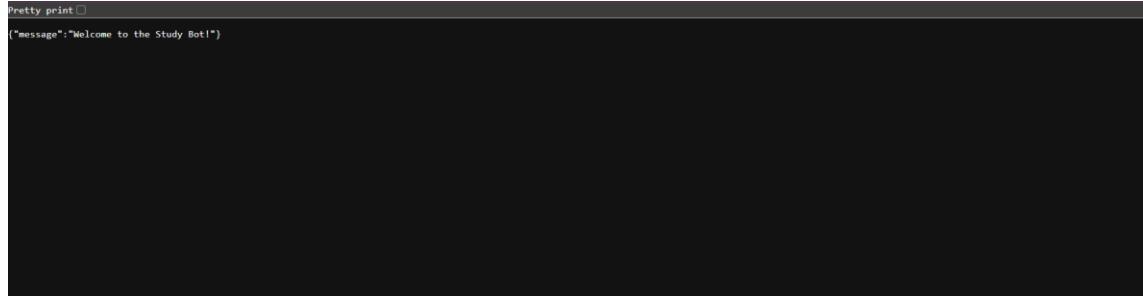
4. API Endpoints

Method	Endpoint	Description
GET	/	Returns welcome message
POST	/chat	Accepts user_id and question, returns AI response

5. Deployment Details

Hosted API Link: <https://study-bot-xqem.onrender.com/> GitHub Repository: <https://github.com/Master-Rizen/Study-Bot>

6. Screenshots



Responses

Curl

```
curl -X 'POST' \
-H 'Content-Type: application/json' \
-d '{
  "user_id": "string",
  "question": "Hi What's your speciality and explain photosynthesis in 2-3 lines"
}'
```

Request URL

<https://study-bot-xqem.onrender.com/chat>

Server response

Code	Details
200	<p>Response body</p> <pre>{ "response": "I'm a study-bot that helps learners grasp concepts, create clear explanations, and design quizzes or flashcards to reinforce learning. \n\n**Photosynthesis (2-3 lines):** Plants convert sunlight, water, and carbon dioxide into glucose and oxygen. Chlorophyll in chloroplasts captures light energy, which powers the conversion of CO₂ and H₂O into glucose (C₆H₁₂O₆) and releases O₂ as a by-product. This process fuels plant growth and supplies oxygen for aerobic organisms." }</pre> <p>Download</p> <p>Response headers</p> <pre>access-control-allow-credentials: true access-control-allow-origin: * alt-svc: h3=":443"; ma=2400 cf-cache-status: DYNAMIC cf-ray: 9d1863867f8ccda7-HYD content-length: 341 content-type: application/json date: Mon, 19 Dec 2022 19:51:18 GMT priority: u1,i rndr-id: b6e81de-0f60-4aa2 server: cloudflare strict-transport-security: offxPrI vary: Accept-Encoding x-render-origin-server: unicorn</pre>

Responses

7. Future Improvements

- Implement user authentication and session management.
- Add frontend interface for better user interaction.
- Improve prompt optimization for more accurate responses.
- Add analytics dashboard for tracking user learning progress.