FitBot: An AI-Powered Personalized Fitness Chatbot

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***Abstract*--As systems are implemented to respond to needs of the user and generate recommendations, artificial intelligence is still changing health, wellness, and personal fitness. But the majority of fitness apps continue to offer template guides which fail to examine circumstances, fitness skills and personal targets. The study fills this gap by presenting FitBot which is a virtual fitness assistant built on a Retrieval-Augmented Generation (RAG) architecture. FitBot uses FAISS to combine curated fitness data with semantic embeddings as well as vector search. GROQ LLMs (Mixtral / LLaMA-3) have high generative capabilities that are used to generate accurate, context-sensitive, and engaging answers in numerous areas, such as exercise, nutrition, recuperation, injury prevention, and motivation. The hybrid design enhances reliability, reduces hallucinations, and yields an interesting conversation, which naturally reacts to user questions.**

Keywords— Artificial Intelligence, GROQ, Fitness Chatbot, RAG, FAISS, Embeddings, Personalized Coaching.

I. INTRODUCTION

It is an instrument that has been introduced in the field of health and personal wellness through artificial intelligence (AI). More and more people resort to the internet to investigate diet options, new lifestyles and exercise regimens. Most fitness applications are, however, not sufficient because they lack instructions that are helpful or do not have a personal touch. Such restrictions tend to cause misinformation, de-motivation and lack of commitment to the fitness programs.

FitBot was created to address these problems and provide personalized and science-based recommendations. FitBot combines AI and organized data to generate contextually relevant and natural responses based on retrieved information rather than using predetermined answers. It is built using a RAG framework, where semantic retrieval enhances the output of the Large Language Model.

The updated version of FitBot uses GROQ LLMs, selected for efficiency, low latency, and improved real-time interaction compared to earlier Gemini-based implementations. Streamlit is used for the chatbot interface, enabling an intuitive and accessible user experience.

FitBot is designed to function as a virtual trainer capable of answering queries about exercise form, nutrition, hydration, injury prevention, flexibility routines, and daily fitness guidance. This will enable the users who do not have access to trainers or nutritionists to get expert-type support.

II. RELATED WORK

A. Rule-Based Fitness Systems

Digital fitness assistants were the first to use rule-based logic. They interpolated user input on established rules and sent responses stored in the database. As good as they were in the simple FAQs, the systems were not flexible enough and could not support the contextual or follow up queries.

B. Deep Learning-Based Fitness Apps

As neural networks advanced, a number of platforms started using deep learning in personalized recommendations. Such models forecasted calories, the best exercises, or the development trends based on the trends of user data. Although they were better than rule-based systems, they were heavy in terms of data requirements and had no dynamic conversational capabilities.

C. Generative AI within Dialogue Systems

The superior natural language capabilities were modeled by Large Language Models. The GPT-style models supported expert-like re-responses but tend to create hallucinations when not supported with retrieval; hence, cannot be used to perform health and fitness applications.

D. *Retrieval-Augmented Generation (RAG)*

RAG guarantees the accuracy and relevance. It does not use generative parameters only to rely on the results but instead draws domain-specific data to a curated knowledge base. This decreases hallucinations and contributes to reliability. Technologies used include:

- MiniLM-L6-v2 Sentence Transformers for embeddings
- FAISS for high-speed semantic similarity search

This is further extended by FitBot, which delivers quick, context-driven, and natural language answers with the help of GROQ LLMs.

III. Methodology

FitBot is developed on the basis of tiered architecture that manages user queries with efficiency. The approach complies with the concepts of Retrieval-Augmented Generation.

A. *Overall Architecture*

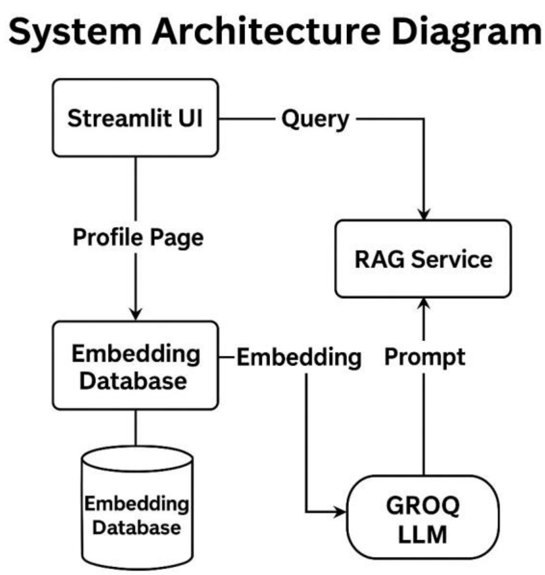

Fig. 1. System architecture of the FitBot RAG-based chatbot.

The pipeline starts with the input of the user and terminates with the response created by the LLM. It consists of the UI layer, embedding generation, FAISS retrieval and GROQ-based response generation.

B. *User Interface (Streamlit)*

FitBot offers a chat-based interface that is built on Streamlit with a clean interface. It obscures the complexity in the background and aids in natural interaction.

Responsibilities include:

- The user messages are accepted and displayed.
- Keeping record about the session.
- Requesting queries to the back-end.
- Structuring chatbot response.

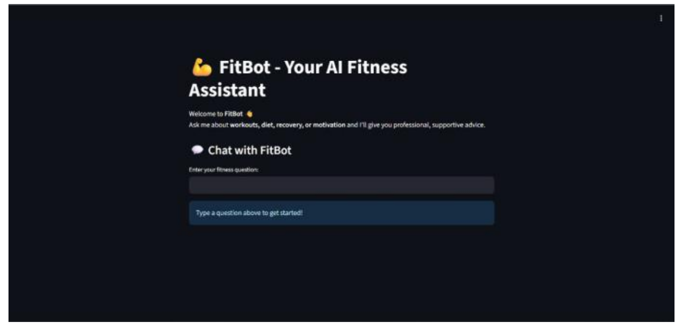

Fig. 2. User interface layout for interacting with FitBot.

C. *Knowledge Base Construction*

The knowledge base consists of domain-verified fitness content sourced from authorized workout manuals, exercise science research, and nutritional guidelines. Text is divided into manageable chunks to improve retrieval precision.

D. *Embedding Generation*

Semantic understanding is central to FitBot. MiniLM-L6-v2 Sentence Transformers convert text chunks into 384-dimensional embeddings through:

1) Tokenization
2) Transformer encoding
3) Embedding generation
4) Normalization

E. *Vector Store and FAISS Retrieval*

FAISS stores the embeddings and performs fast similarity search using cosine similarity. It ensures:

- Millisecond-level retrieval
- High recall precision
- Scalability

F. *Response Generation using GROQ LLM*

FitBot now uses GROQ Mixtral/LLaMA LLMs instead of Google Gemini due to:

- High inference speed
- Low latency
- Strong reasoning ability
- Cost-efficiency

Retrieved context and the user query are merged into a prompt and sent to the LLM for generating structured, conversational responses.

G. *End-to-End Workflow Summary*

FitBot's workflow:

- User enters a query
- Query embedding is generated
- FAISS retrieves relevant chunks
- GROQ LLM processes query + context
- Final response is generated
- Response is displayed

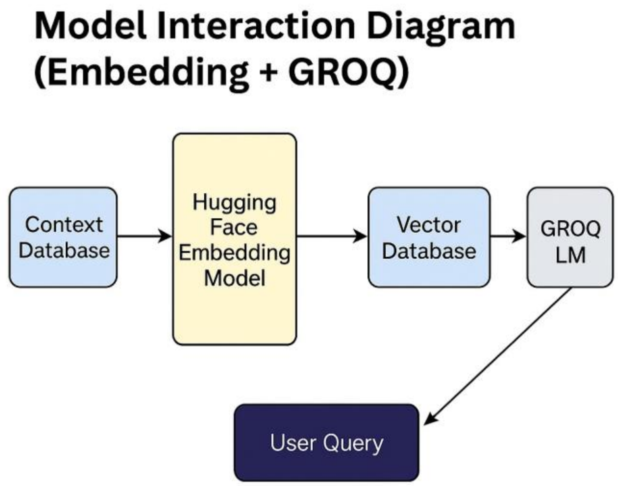

Fig. 3. Model interaction flow between embeddings, FAISS retrieval, and the GROQ LLM.

IV. Results and Discussion

A. Functional Evaluation

Tested on 20 fitness-related queries, FitBot produced relevant answers for 17 queries, achieving an 85% success rate.

B. Performance Metrics

- Average response time: 2.3 seconds
- Hardware: Intel i5, 8GB RAM
- Environment: Stable network, repeated thrice per query
- Knowledge base size: 4,000 words

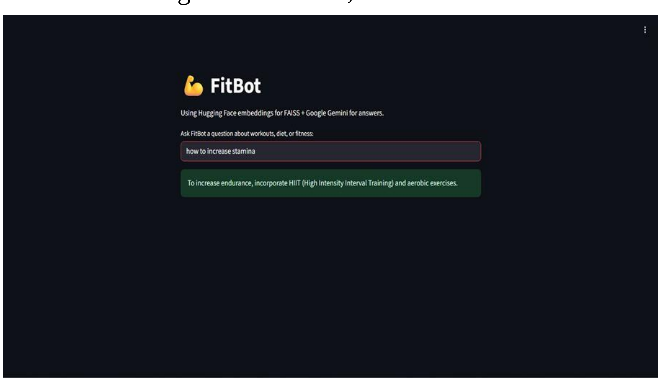

Fig. 4. Response generation pipeline using GROQ's Mixtral/LLaMA model.

V. Conclusion

A RAG-based architecture powered by GROQ LLMs significantly enhances accuracy, personalization, and usability in fitness chatbots. FitBot fills the void between the hard-core fitness applications and the smart chatbots.

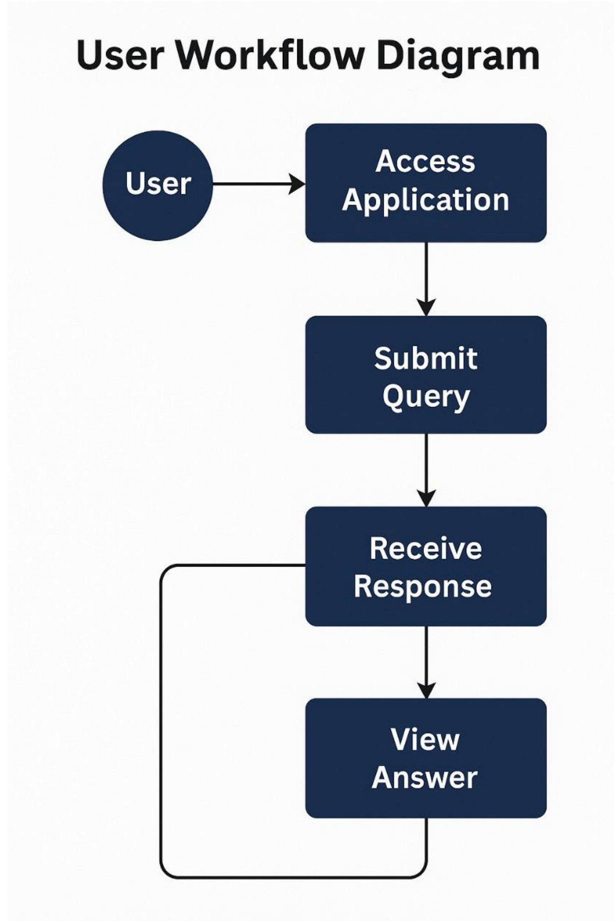

Fig. 5. User workflow outlining the steps from query submission to response delivery.

Key highlights include:

- Embeddings, FAISS, and GROQ LLM integration with Streamlit.
- 85% response accuracy
- Low latency interaction that is appropriate in real-time chat.

The wearable integration, personal tracking and community fitness may be added to FitBot.

A. Summary of Work

- FitBot is an AI-driven personalized fitness chatbot that increases the dead fitness applications with smart communication.
- It is based on a RAG structure that combines FAISS recall with GROQ LLMs.
- The system is an effective integration of Streamlit, Sentence Transformers, and LLMs.

B. Key Achievements

- 85% success rate in 20 questions
- 2.3-second response time
- Certified fitness expertise base.

C. Real-World Impact

FitBot makes fitness more accessible, particularly to its users who do not have trainers, and can enhance wellness by initiating AI-mediated interactions.

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