### **AI-Powered Health Coach App**

**Introduction**

The Health Coach AI project leverages Large Language Models (LLMs) to generate personalized meal and supplement recommendations by integrating OpenAI’s ChatGPT and Anthropic’s Claude using LangChain. This system compares outputs to determine the best response for business use in a subscription-based meal and supplement service. By integrating conversational AI, the system enhances user engagement, provides structured meal planning, and suggests tailored supplements, thereby improving customer retention and business efficiency.

**Experimentation and Findings**

Initially, the project tested response selection based on length, assuming that longer responses would be more detailed. However, this approach proved ineffective as verbosity did not always equate to relevant nutritional recommendations. A second experiment introduced a scoring system based on four key metrics: nutritional accuracy (keyword analysis), personalization (diet customization), supplement integration, and readability (response formatting). Claude performed better in supplement recommendations, often suggesting creatine, omega-3, and multivitamins, whereas ChatGPT excelled in structuring balanced meal plans. The scoring system significantly improved response selection, making it a more effective approach for generating meal and supplement plans.

The goal of the Health Coach App is to generate personalized meal plans and coaching insights based on user input. The app uses OpenAI’s ChatGPT and Anthropic’s Claude to optimize response quality by selecting the best output.

### **Specific Prompts Used**

To generate meal and supplement recommendations, the following prompts were tested across both OpenAI's GPT-4-Turbo and Anthropic’s Claude-3 Opus:

* **General Meal Plan Request:** "I am a beginner in fitness and I want you to create a meal plan for 1 week to gain muscle. Please include breakfast, lunch, dinner, and snacks."
* **Supplementation Guidance:** "What supplements should I take to support muscle growth and overall health? Provide a breakdown of why each supplement is beneficial."
* **Customized Diet Plan:** "I am lactose intolerant and follow a plant-based diet. Can you create a personalized high-protein meal plan for muscle gain?"
* **Comparison of Meal Approaches:** "Provide two different meal plans: one high-carb for endurance training and one high-protein for muscle gain."
* **Response Optimization:** "Summarize the benefits of creatine, whey protein, and omega-3 fatty acids in one concise paragraph."

**Architecture of Prototype**

**Inputs:**

The Health Coach App is designed with several key components. The major inputs include user dietary preferences, health goals like weight loss or muscle gain, and any food allergies or restrictions. Core functions include AI response generation, response evaluation, and memory management to ensure continued personalization. Additionally, LangChain manages multi-LLM interactions, with OpenAI GPT-4-Turbo providing detailed meal plans and Anthropic Claude-3 Opus enhancing supplement suggestions. The project is structured with a secure environment for API keys and a modular folder system for scalability.

**Functions:**

The major functions of the app include user input handling, which captures dietary preferences and restrictions, and AI query execution, which processes queries through OpenAI and Anthropic APIs. Response filtering plays an important role in evaluating AI-generated content based on keyword relevance for example. Memory storage is also implemented to retain user preferences for future recommendations, enhancing personalization over time. Finally, meal plan generation structures the AI's responses into easy-to-follow diet plans using bullet points, bolded headers, and numbered tips tailored to the user’s needs.

**Providers:**

The app integrates multiple providers, primarily OpenAI’s ChatGPT and Anthropic’s Claude, to ensure a diverse and complex AI-generated response system. As stated, a memory storage system is used for storing user memory, allowing for more personalized coaching over time.

**Folder Assumptions:**

To maintain organization and efficiency, the project follows a structured folder system:

Health\_Coach\_Project/

│── .venv/ # Virtual environment for dependency management

│── .vscode/ # VS Code settings and configurations

│── Main.py # Main AI chatbot script

│── keys/ # Secure folder for API keys

│ └── .env # Stores OpenAI and Anthropic API keys

│── requirements.txt/ # Requirements text file

### **Conclusion and Future Work**

The Health Coach AI successfully enhances personalized meal planning by leveraging multiple AI models, and scoring AI responses based on business relevance to produce superior results. Future improvements include API integrations for nutritional databases, a web-based chatbot interface for broader accessibility, and potential fine-tuning of models for customized fitness and nutrition recommendations. This project validates the use of AI in optimizing meal-planning businesses, delivering personalized experiences at scale.