Hackathon Project Phases Template for Advancing Nutrition Science through Gemini AI project.

Project Title: Advancing Nutrition Science through Gemini AI

Team Name: Byte Barigade

Team Members:

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Phase-1: Brainstorming & Ideation

Objective:

- The primary objective of this project is to utilize Gemini AI to advance the science of nutrition by providing deeper insights into the relationships between diet and health and to improve individual health ,optimize nutrition,and faster sustainable food systems through data-driven insights.

Key Points:

1. **Problem Statement:**

- In today's vast-paced world, individuals are increasingly conscious of their health and nutrition but often lack the tools and information necessary to make informed dietary choices. Accessing accurate and detailed nutritional information for various food items can be time-consuming, and many existing resources provide limited or generalized data that fail to meet individual needs.

- To address this challenge, there is a need for a web-based application that provides users with instant and accurate nutritional information for various food items, powered by Gemini AI to deliver detailed, real-time data on macronutrients, micronutrients, and calorie content. This tool will empower individuals to make healthier, more informed dietary decisions, contributing to improved health outcomes and better overall well-being.

2. **Proposed Solution:**

- The proposed solution leverages the power of Gemini AI to advance nutrition science.It can be integrated with an image recognition system to analyze food items and provide detailed nutritional information, including calories and other key nutrients.
- The AI can estimate the total caloric value of the food based on its portion size and nutritional composition.It can also integrate the capability to estimate how many calories are burned based on activity levels, further enhancing its personalization features.

3. **Target Users:**
    - **Healthcare Providers: Medical professionals could use GEMINAI to recommend personalized nutrition interventions based on patient data**
    - **Food Manufacturers and Companies: Businesses in the food industry could use GEMINAI to design healthier food products, analyze consumer preferences, or optimize nutritional labels based on research.**

4. **Expected Outcome:**
   A proper Analysis of Nutrition Food like Amount of Calories burn,vitamins, carbohydrates, proteins.

Phase-2: Requirement Analysis

Objective:

Define the technical and functional requirements for the Advancing Nutrition.

Key Points:

1. **Technical Requirements:**
    - Programming Language: **Python, Streamlit**
    - Backend: **Hugging face APIs,Python**
    - Frontend: **Streamlit Web Framework**
    - Database: **Not required initially (API-based queries)**
2. **Functional Requirements:**
    - Ability to **connect and fetch data** from multiple nutrition-related APIs
    - The system must handle various data formats (CSV, JSON, XML, API responses) and integrate information from different databases such as food composition tables

- Implement machine learning models that can analyze complex datasets, detect patterns, and predict nutritional outcomes, such as the impact of specific foods on long-term health.
- Automatically analyze and summarize scientific literature to provide an up-to-date understanding of emerging trends and research in nutrition.

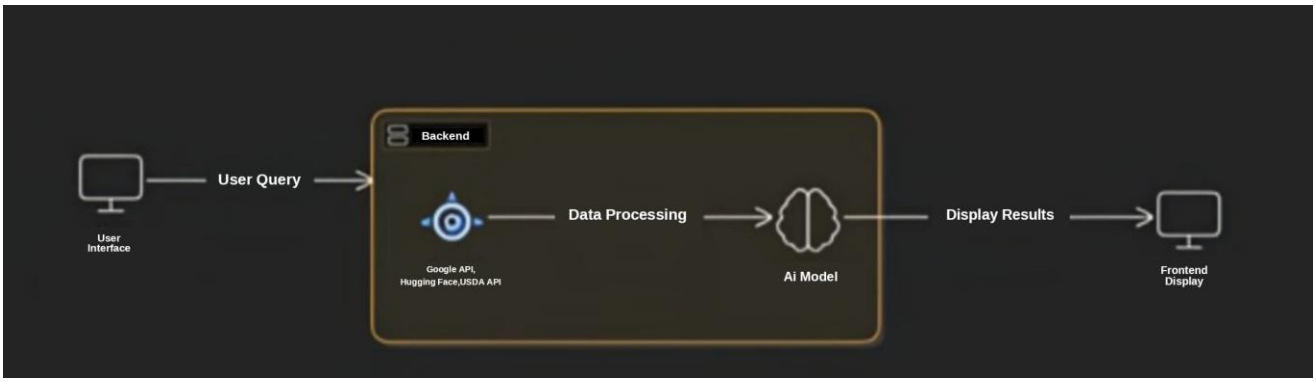
3. **Constraints & Challenges:**

    - **Data Gaps**: For AI models to make accurate predictions and recommendations, they require large, diverse datasets.
    - **Data Privacy**: When handling personal data such as genetic information, health records, and dietary habits, privacy concerns become a major issue.
    - **Long-Term Impact**: It is challenging to measure and predict the long-term effects of dietary changes, especially for chronic conditions.
    - **Adherence to Recommendations**: AI can generate personalized diet plans, but getting individuals to adhere to them is another challenge.

Phase-3: Project Design

Objective:

Develop the architecture and user flow of the application.



Key Points:

1. **System Architecture:**

    - User enters query via UI.
    - Query is processed using **Google Gemini API**.
    - AI model fetches and processes the data.
    - The frontend displays Macro **Nutrition Analysis, and diet plans**.

2. **User Flow:**

- Step 1: User enters a query (e.g., "A daily basis diet plan").
- Step 2: The backend **calls the Gemini Flash API** to retrieve Nutrition Analysis data.
- Step 3: The Website processes the data and **displays results** in an user-friendly manner.

3. **UI Considerations:**
   - **Minimalist, user-friendly interface** for seamless navigation.
   - **Dark mode** for better user experience.

Phase-4: Project Planning (Agile Methodologies)

Objective:

Break down development tasks for efficient completion.

Sprint	Task	Priority	Duration	Deadline	Assigned To	Dependencies	Expected Outcome
Sprint 1	Environment Setup & API Integration	🟢 High	5 hours (Day 1)	End of Day 1	Yaqub	Google API Key, Python, Streamlit setup	API connection established & working
Sprint 1	Frontend UI Development	🟡 Medium	3 hours (Day 1)	End of Day 1	Yaqub,Sruthi	API response format finalized	Basic UI with input fields
Sprint 1	Nutrition Analysis	🟢 High	3 hours (Day 1)	End of Day 1	Madhurima	API response, UI elements ready	Search functionality with filters
Sprint 1	Error Handling & Debugging	🟢 High	2.5 hours (Day 1)	End of Day 1	Harsha,Sathwik	API logs, UI inputs	Improved API stability
Sprint 2	Testing & UI Enhancements	🟡 Medium	3 hours (Day 2)	Mid-Day 2	Sruthi	API response, UI layout completed	Responsive UI, better user experience
Sprint 2	Final Presentation & Deployment	🟡 Low	2 hours (Day 2)	Mid-Day 2	Yaqub,Harsha	Working prototype	Demo-ready project

Sprint Planning with Priorities

Sprint 1 – Setup & Integration (Day 1)

(🟢 High Priority) Set up the **environment** & install dependencies.

(🟢 High Priority) Integrate **Google Gemini API**.

(🟡 Medium Priority) Build a **basic UI with input fields**.

Sprint 2 – Core Features & Debugging (Day 1)

(🟢 High Priority) Implement **search & comparison functionalities**. **(🟢 High Priority)** Debug API issues & handle **errors in queries**.

Sprint 3 – Testing, Enhancements & Submission (Day 2)

(🟡 Medium Priority) Test API responses, refine UI, & fix UI bugs. **(🟡 Low Priority)** Final **demo preparation & deployment**.

Phase-5: Project Development

Objective:

Implement core features of the Advancing Nutrition Science through Gemini AI

Key Points:

1. **Technology Stack Used:**

   - **Frontend:** Streamlit Web Framework
   - **Backend:** Hugging Face APIs,Python
   - **Programming Language:** Python,Streamlit

2.Development Process:

- Implement API key and Gemini API integration.
- Develop a Web Application to Analyze Individuals Health data(diet, activity level,medical History)
- Optimize the integration of real-time health metrics (e.g.calories burned) to provide up-to-date advice.

2. **Challenges & Fixes:**

   - **Challenge**: AI models may have biases in recommendations.
     Fix: Ensure diverse data representation, transparency, and ethical reviews.

   - Challenge: Complexity of Personal Nutrition Needs

Fix: Develop personalized models that incorporate factors like genetics, lifestyle, health conditions, and food preferences to provide tailored advice

- Challenge: Integration with External Tools (Wearables, Health Systems)
  Fix: Build standardized APIs to integrate with existing wearables, fitness apps, and healthcare systems, ensuring smooth data flow.

Phase-6: Functional & Performance Testing

Objective:

Ensure that the Advancing Nutrition Science through GeminiAI works as expected.

Test Case ID	Category	Test Scenario	Expected Outcome	Status	Tester
TC-001	Functional Testing	Query "Best diet for heart health".	AI should provide science-baked dietary recommendations.	☑ Passed	Nutrionist.
TC-002	Functional Testing	Query "Personalised meal plan for diabetics".	AI should generate a customised meal plan based on user input.	☑ Passed	Tester 1
TC-003	Performance Testing	AI response time under 700 ms for nutrition queries.	AI should return results quickly.	⚠ Needs Optimization	Tester 2
TC-004	Bug Fixes & Improvements	Fixed incorrect calorie count in meal recommendations.	Data accuracy should be improved.	☑ Fixed	Developer
TC-005	Final Validation	Ensure UI displays meal plans correctly across devices.	UI should work on mobile & desktop.	❌ Failed - UI broken on mobile	Tester 3
TC-006	Deployment Testing	Deploy AI-powered nutrition assistant on a web platform.	The assistant should be accessible online.	🚀 Deployed	DevOps

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Final Submission

1. **Project Report Based on the templates**
2. **GitHub/Code Repository Link**
3. **Presentation**