Nutrition App Using Gemini Pro : Your Comprehensive Guide To Healthy Eating And WellBeing Final Report

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Team member : Sarath Chander

1.Introduction

1.1 Project Overview

Nutritionist AI is an innovative mobile application designed to provide personalized dietary recommendations and nutritional advice using the advanced capabilities of the Gemini Pro model. The app leverages artificial intelligence to analyze user data, dietary preferences, and health goals, delivering tailored meal plans, nutritional insights, and wellness tips. The primary aim of Nutritionist AI is to promote healthier eating habits and improve overall well-being through intelligent and data-driven recommendations.

1.2 Objectives

The primary objective of this project is to develop and launch Nutritionist AI, a mobile application that utilizes machine learning to:

• Analyze user data, health goals, and dietary preferences.

• Generate personalized meal plans, nutritional insights, and wellness tips.

• Promote healthy eating habits and empower users to take control of their well-being.

2. Project Initialization and Planning Phase

2.1. Define Problem Statement

Many individuals struggle with maintaining healthy eating habits due to factors like lack of knowledge, conflicting information, and difficulty in creating personalized meal plans. This can lead to unhealthy dietary choices, nutritional deficiencies, and difficulty reaching weight management or fitness goals.

2.2. Project Proposal (Proposed Solution)

Nutritionist AI will address these challenges by employing machine learning to personalize the user experience. The app will collect user data such as dietary restrictions, allergies, activity levels, and health goals.

This data will be analyzed by the Gemini Pro model to generate:

• **Personalized Meal Plans:** Tailored meal plans that meet individual needs and preferences.

• **Nutritional Insights:** Detailed breakdowns of nutrient content in meals, highlighting potential deficiencies or areas for

improvement.

• **Wellness Tips:** Guidance onhealthy eating habits, food preparation techniques, and strategies for achieving lifestyle goals.

2.3. Initial Project Planning

Nutritionist AI initial conception came when there was a need by users for a app for comprehensive health guide for their overall health and nutition the initial project planning came with work being divided amongst team leader and members given below.

Requirement Specification: Naman Chadha, Sarath Chander

Initialization of Google API key: Naman Chadha, Sarath Chander

Interfacing with Pre Trained Model: Pritam Satpathy, Ana Singh

Model Deployment: Pritam Satpathy, Ana Singh

3. Data Collection and Preprocessing Phase

3.1. Data Collection Plan and Raw Data Sources Identified

Web framework like Streamlit, it might create a user interface with dropdowns, sliders, text input fields, and potentially an image upload option where users interact with these elements to provide their preferences or queries.

The core functionality comes from the google.generativeai library. This library provides methods to: Send the processed (or raw) user input to the Generative AI model. Receive the generated response from the mode.

3.1. Data Quality Report

Since we are using the Gemini-pro-vision model we were using the trained data in the gemini pro vision model .

3.1. Data Preprocessing

The user inputed data would be further used in the data preprocessing

4. Model Development Phase

4.1. Model Selection Report

- **Gemini Pro:** It is a powerful AI tool that can understand and work with various data types like text, images, and even code. This allows it to both analyze and create content in new and innovative ways.

- **Gemini Pro Vison:** It can analyze text and churn out new content, but the real magic lies in its ability to understand images and videos too. This lets it answer questions based on what it sees, describe visual content, and even create captions.

4.2. Initial Model Training Code and Model Validation and Evaluation Report

The initial model training code will be showcased in the future through a screenshot. The model validation and evaluation report will include classification reports, accuracy, and confusion matrices for multiple models, presented through respective screenshots.

CODE:

```
import streamlit as st
import google.generativeai as genai
from PIL import Image
from dotenv import load_dotenv
import io
import os

# Load environment variables from .env file
load_dotenv()

# Retrieve API key from environment variables
my_api_key = os.getenv('my_api_key')

# Configure Google Gemini API key
genai.configure(api_key=my_api_key)

# Set page configuration
st.set_page_config(page_title="Gemini Nutrition AI ")




## Function to load Google Gemini Pro Vision API And get response
def get_gemini_response(input, image, prompt):
    model = genai.GenerativeModel('gemini-pro-vision')
    response = model.generate_content([input, image[0], prompt])
    return response.text

def input_image_setup(uploaded_file):
    # Check if a file has been uploaded
    if uploaded_file is not None:
        # Read the file into bytes
        bytes_data = uploaded_file.getvalue()

        image_parts = [
            {
                "mime_type": uploaded_file.type,  # Get the mime type of the uploaded file
                "data": bytes_data
```

```
            }
        ]
        return image_parts
    else:
        raise FileNotFoundError("No file uploaded")

##initialize our streamlit app
st.title("Gemini Nutrition AI ")

input_text = st.text_input("Input Prompt: ", key="input")
uploaded_file = st.file_uploader("Choose an image...", type=["jpg", "jpeg", "png"])
image = ""
if uploaded_file is not None:
    image = Image.open(uploaded_file)
    st.image(image, caption="Uploaded Image.", use_column_width=True)

submit = st.button("Tell me the total calories")

input_prompt="""
You are an expert in nutritionist where you need to see the food items from the image
and calculate the total calories, also provide the details of every food items with calories intake
in the following format:

1. Item 1 - number of calories
2. Item 2 - number of calories
---
---
"""

## If submit button is clicked
if submit:
    image_data = input_image_setup(uploaded_file)
    response = get_gemini_response(input_prompt, image_data, input_text)
    st.subheader("The Response is")
    st.write(response)
```

5. Model Optimization and Tuning Phase

5.1. Tuning Documentation

- **Since we have used a llm based model for implementation of project the model learns and fine tunes itself as the user inputs images and gives prompts**

5.2. Final Model Selection Justification

The final model selected here is gemini pro vision which according to our varied calculations and metrics was the best suitied model for the given project and with it giving the desired outputs we can justify it for our selection.

5.3. Deployment Strategy

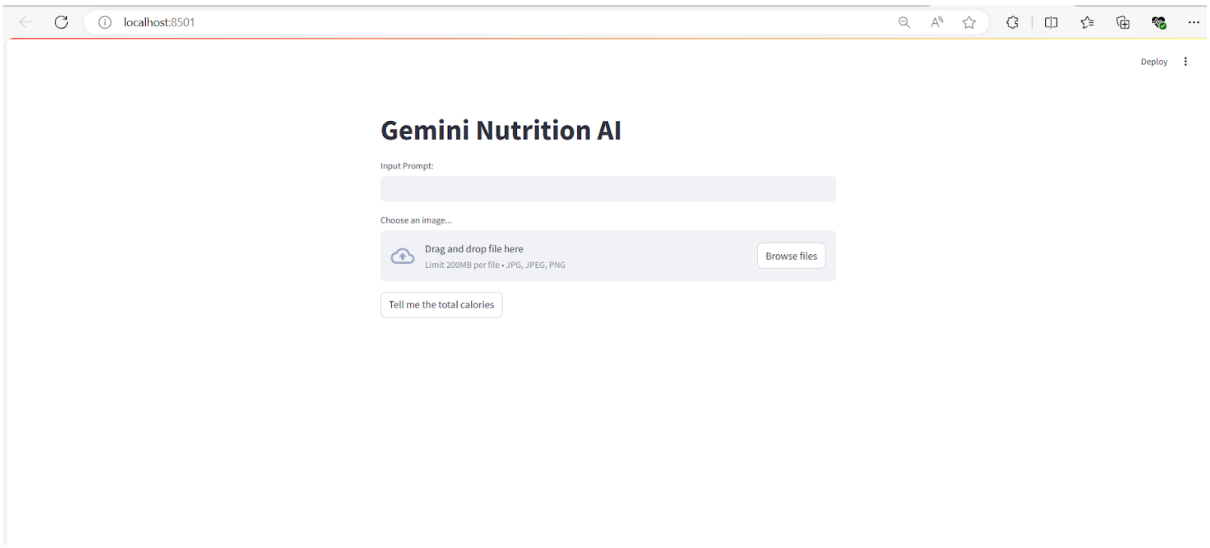
- **Infrastructure setup:** A Generative AI model, a server or cloud instance with sufficient processing power (CPU, GPU) and memory to handle model inference (text generation) requests.
- **Storage:** To s tore your project code, model weights (if not using a pre-trained model as a service), and any generated text logs Cloud storage options are ideal for scalability and accessibility.
- **Integration:** API Development , Front-End Integration, User Input Handling, Output Presentation.
- **Model Performance Monitoring:** Track key metrics like response time, and resource usage. Tools like TensorBoard or cloud monitoring services can be applied.
- **Error Handling and Logging:** Implement mechanisms to handle potential errors during text generation or user interaction. Log errors for troubleshooting and improvement.

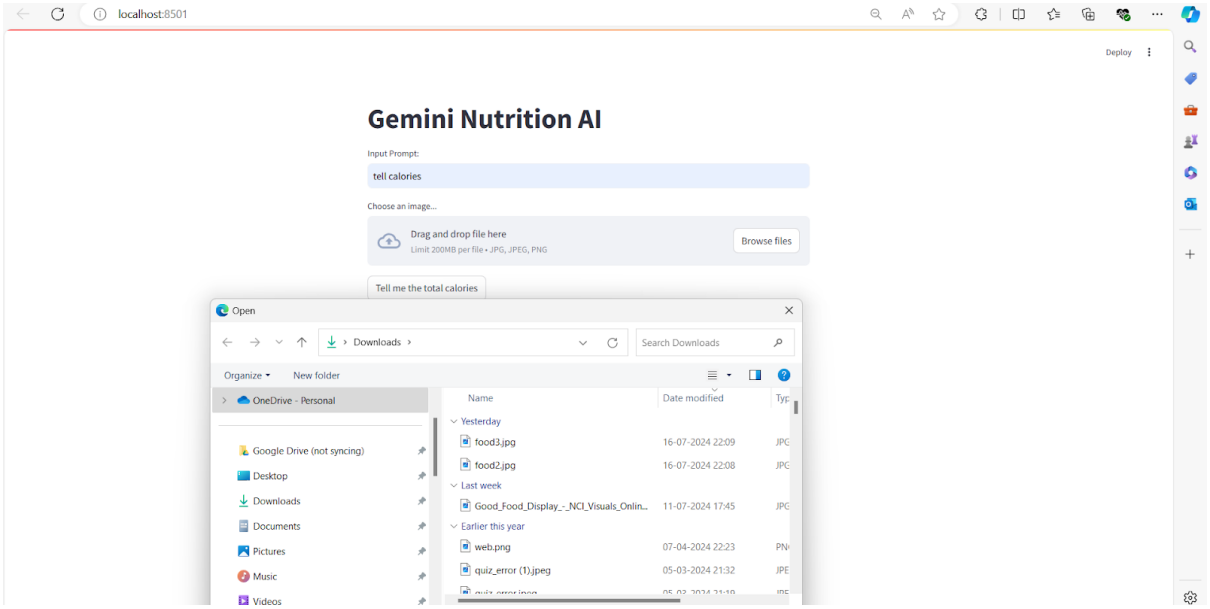
5.4. User Testing and Feedback

- **Beta Testing:** Evaluate the project in a more realistic setting with a wider range of users. Recruit a larger group of users representing your target audience. Ideally, these users haven't participated in previous testing phases. Allow users to interact with the project freely and report any issues they encounter.
- **Iterative Improvement:** Analyse all collected data to identify areas for improvement. Prioritize issues based on severity and user impact. Make necessary adjustments to the Generative AI model (e.g., fine-tuning parameters), user interface, or functionalities based on user feedback. Conduct additional rounds of testing if needed to validate the implemented changes.
- **Feedback:** Collect qualitative data through surveys, interviews, and user recordings (with consent) to understand user pain points, preferences, and suggestions for improvement.

6. Results

6.1. Output Screenshot


localhost:8501
Deploy
Gemini Nutrition AI
Input Prompt:
Choose an image...
Drag and drop file here
Limit 200MB per file • JPG, JPEG, PNG
Browse files
Tell me the total calories


localhost:8501
Deploy
Gemini Nutrition AI
Input Prompt:
tell calories
Choose an image...
Drag and drop file here
Limit 200MB per file • JPG, JPEG, PNG
Browse files
Tell me the total calories
Open
Downloads
Search Downloads
Organize
New folder
OneDrive - Personal
Google Drive (not syncing)
Desktop
Downloads
Documents
Pictures
Music
Videos
Name
Date modified
Yesterday
food3.jpg
16-07-2024 22:09
food2.jpg
16-07-2024 22:08
Last week
Good_Food_Display_-_NCI_Visuals_Onlin...
11-07-2024 17:45
Earlier this year
web.png
07-04-2024 22:23
quiz_error (1).jpeg
05-03-2024 21:32

Gemini Nutrition AI

Input Prompt:

tell calories

Choose an image...

Drag and drop file here
Limit 200MB per file • JPG, JPEG, PNG

Browse files

food3.jpg 17.6KB

Uploaded Image.

Tell me the total calories

Uploaded Image.

Tell me the total calories

The Response is

1. **Turkish breakfast**: 1,000 calories
2. **Menemen**: 300 calories
3. **Simit**: 250 calories
4. **Cheese**: 200 calories
5. **Olives**: 100 calories
6. **Honey**: 100 calories
7. **Yogurt**: 100 calories
8. **Cucumber**: 20 calories
9. **Tomato**: 20 calories
10. **Pepper**: 20 calories
11. **Egg**: 70 calories
12. **Bread**: 100 calories

7. Advantages & Disadvantages

7.1. Advantages

- **Combines Image Recognition and Text Generation:** This project leverages Google's Gemini Pro Vision API for a unique functionality. It combines image recognition to identify food items in an uploaded image with text generation to analyze the image and provide nutritional information.
- **User-Friendly Interface:**The Streamlit framework allows for a user-friendly interface with text input for additional information and image upload functionality
- **Potential for Personalized Nutrition Guidance:** By incorporating user input through the text prompt, the project could be extended to provide more personalized nutritional information based on dietary restrictions or preferences.

7.2. Disadvantages

- **Accuracy Dependence on Image Recognition:** The accuracy of the nutritional information hinges on the effectiveness of the image recognition component. Poor image quality or limitations in the image recognition model could lead to inaccurate results.
- **Dependence on Accurate Inputs**: The accuracy of the career recommendations heavily depends on the quality and accuracy of the user-provided data.

8. Conclusion

The potential of Generative AI for creating a user-friendly nutritional analysis tool. By combining image recognition with text generation, the project allows users to upload an image of their food and receive information about the total calorie content and individual food items with their estimated calorie intake. The Streamlit interface simplifies user interaction, making it accessible to a broader audience.

9. Future Scope

- **Portion Size Estimation:** Currently, the project estimates total calories. Integrating image recognition features to estimate portion sizes within the image would lead to more accurate and personalized calorie calculations. Techniques like object detection and image segmentation can be explored to identify and quantify individual food items.
- **Allergy and Intolerance Integration:** Incorporate functionalities to identify potential allergens or food intolerances based on recognized food items. This would offer valuable information for users with specific dietary needs.
- **Progress Tracking and Feedback:** Implement features to track user progress over time and provide personalized feedback based on their dietary goals. This could involve graphs or charts to visualize calorie intake and nutrient consumption trends.

10. Appendix

10.1. Source Code

The source code for the project nutrition app using Gemini AI is available in project's GitHub repository.

10.2. **GitHub & Project Demo Link**

- **GitHub Repository** : https://github.com/ps2181/Nutrition-App-Using-Gemini-Pro-

Project Demo: https://youtu.be/l3QV4HvJ9u8