
CAPSTONE PROJECT

THE SMARTEST AI NUTRITION ASSISTANT

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OUTLINE

- **Problem Statement**
- **Proposed System/Solution**
- **System Development Approach (Technology Used)**
- **Algorithm & Deployment**
- **Result (Output Image)**
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- **Future Scope**
- **References**

PROBLEM STATEMENT

- In an era where health awareness is growing, people seek personalized nutrition advice. However, current solutions offer generic plans, lack adaptability, and fail to consider personal lifestyle, allergies, cultural factors, and evolving health conditions.
- Dietitians face time/resource limits in scaling 1:1 consultations.
- Challenge: Create a scalable, adaptive, and intelligent virtual assistant for nutrition.

PROPOSED SOLUTION

- We propose the development of an AI-driven virtual nutrition assistant that acts as an agent to deliver highly personalized, adaptive, and interactive diet plans tailored to individual needs.
- The Solution Offers:
 - A chatbot-based assistant capable of understanding natural language input
 - Real-time personalized meal recommendations based on user health data and user measurements.
 - Adaptive suggestions that evolve with continuous feedback
 - Consideration of medical conditions, allergies, lifestyle, and cultural preferences

SYSTEM APPROACH

The System Approach outlines the overall strategy and methodology used to design, build, and deploy the Smart AI Nutrition Assistant.

- System Requirements:
- IBM Cloud Lite
- IBM Watsonx ai service and Watsonx ai Studio
- Libraries / Tools Used:
- LangGraph – to manage conversational flow with memory
- ReAct Architecture – for reasoning and acting through the model
- LLaMA-3-2-90B-Vision-Instruct – foundation LLM model

ALGORITHM & DEPLOYMENT

- **Algorithm Logic:**
 - Uses LLM-based reasoning (LLaMA 3 model) to process user inputs
 - Extracts context like:
 - Health goals (e.g., weight loss)
 - Lifestyle (e.g., active/sedentary)
 - Dietary restrictions and preferences
- **Deployment Strategy:**
 - Built and tested in Watsonx AI Studio using LLaMA-3-2-90B
 - Configured with a **token limit of 1000** to manage output length

RESULT

The Smart AI Nutrition Assistant was successfully developed and tested using with the following input:
“Give me a diet plan. I want to reduce 5kg in one month. My present weight is 80kg.”

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Build >

Agent preview

SR

You: 02:03 PM

give me diet plan i want to reduce 5kg in one month,my present weight is 80kg

Nutrition Agent 02:03 PM

Congratulations on taking the first step towards your weight loss journey! To help you achieve your goal of losing 5kg in one month, I'll provide you with a personalized diet plan. Please note that a safe and sustainable rate of weight loss is 0.5-1 kg per week, so we'll aim for a calorie deficit of 500-750 calories per day through a combination of diet and exercise.

Your Current Status:

- Weight: 80kg
- Height: (please provide your height in cm or feet and inches)
- Age: (please provide your age)
- Activity Level: (please provide your activity level, e.g., sedentary, lightly active, moderately active, very active)

Dietary Recommendations:

1. **Caloric Intake:** To create a calorie deficit, we'll aim for a daily caloric intake of 1800-2000 calories, considering your weight loss goal.
2. **Macronutrient Balance:** Aim for a balanced diet with the following macronutrient distribution:
 - Carbohydrates: 45-50% of total calories
 - Protein: 30-35% of total calories

RESULT

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Agent preview



- Carbohydrates: 45-50% of total calories
- Protein: 30-35% of total calories
- Fat: 20-25% of total calories

Meal Plan Adjustments:

Based on your height and age, I've made some adjustments to the meal plan to ensure you're getting the right amount of calories and nutrients. Here's an updated sample meal plan:

Breakfast

- Monday: Oatmeal with banana, almond milk, and walnuts (350 calories)
- Tuesday: Scrambled eggs with spinach, whole wheat toast, and avocado (300 calories)
- Wednesday: Greek yogurt with berries, honey, and chopped nuts (250 calories)
- Thursday: Smoothie bowl with protein powder, frozen berries, spinach, almond milk, and chia seeds (400 calories)
- Friday: Whole grain cereal with low-fat milk, sliced banana, and a sprinkle of cinnamon (300 calories)

Lunch

- Monday: Grilled chicken breast with roasted vegetables, quinoa, and a drizzle of olive oil (450 calories)
- Tuesday: Whole grain pita stuffed with roasted turkey breast, avocado, lettuce, and tomato (500 calories)
- Wednesday: Lentil soup with whole grain bread and a side salad (450 calories)
- Thursday: Grilled salmon with brown rice, steamed broccoli, and a squeeze of lemon (550 calories)

|type something...



RESULT

Lunch

- Monday: Grilled chicken breast with roasted vegetables, quinoa, and a drizzle of olive oil (450 calories)
- Tuesday: Whole grain pita stuffed with roasted turkey breast, avocado, lettuce, and tomato (500 calories)
- Wednesday: Lentil soup with whole grain bread and a side salad (450 calories)
- Thursday: Grilled salmon with brown rice, steamed broccoli, and a squeeze of lemon (550 calories)
- Friday: Chicken and vegetable stir-fry with brown rice and a small side of whole grain crackers (550 calories)

Dinner

- Monday: Grilled chicken breast with roasted sweet potatoes, green beans, and a drizzle of olive oil (450 calories)
- Tuesday: Slow cooker lentil curry with brown rice and a side of whole grain naan (550 calories)
- Wednesday: Baked salmon with quinoa, steamed asparagus, and a squeeze of lemon (500 calories)
- Thursday: Grilled turkey burger on a whole grain bun with roasted vegetables and a side salad (600 calories)
- Friday: Chicken and vegetable kebabs with quinoa and a side of whole grain pita (550 calories)

Snacks

- Fresh fruits and nuts (150-200 calories)
- Carrot sticks with hummus (150 calories)
- Protein smoothie with Greek yogurt, spinach, and banana (200 calories)

Remember:

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RESULT

Based on the user's details like height, age, weight, and activity level, the agent calculates the ideal daily calorie intake and generates a personalized meal plan tailored to their health goals, dietary preferences, and lifestyle."

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Build >

Agent preview

• Friday: Chicken and vegetable kebabs with quinoa and a side of whole grain pita (500 calories)

Snacks

- Fresh fruits and nuts (100-150 calories)
- Carrot sticks with hummus (100 calories)
- Protein smoothie with Greek yogurt, spinach, and banana (150 calories)

Remember:

- Eat mindfully and stop when you're satisfied, rather than stuffed.
- Incorporate physical activity, such as brisk walking, jogging, cycling, or weight training, for at least 150 minutes per week.
- Monitor your progress and adjust the diet plan as needed.

Please provide your height, age, and activity level to help me tailor the diet plan further. Also, let me know if you have any food preferences or allergies.

► How did I get this answer?

SR

You: 02:05 PM

height is 5'8 age is 22

Nutrition Agent 02:05 PM

Thank you for providing your height and age! Based on your input, I'll make some adjustments to the diet plan to ensure

Type something...

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foundation

Result


Github Repository Link: https://github.com/suneel960/Smart_AI_Nutrition_Assistant

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Agent preview

 Nutrition Agent 02:05 PM

Thank you for providing your height and age! Based on your input, I'll make some adjustments to the diet plan to ensure it's tailored to your specific needs.

Your Updated Status:

- Weight: 80kg
- Height: 5'8" (172 cm)
- Age: 22
- Activity Level: (please provide your activity level, e.g., sedentary, lightly active, moderately active, very active)

Daily Caloric Needs:

Based on your age, height, and weight, your daily caloric needs for weight loss are:

- Sedentary (little or no exercise): 1900-2100 calories
- Lightly active (light exercise/sports 1-3 days/week): 2000-2200 calories
- Moderately active (moderate exercise/sports 3-5 days/week): 2200-2400 calories
- Very active (hard exercise/sports 6-7 days a week): 2400-2600 calories

Macronutrient Balance:

To support your weight loss goal, we'll aim for a balanced diet with the following macronutrient distribution:

- Carbohydrates: 45-50% of total calories
- Protein: 30-35% of total calories

CONCLUSION

- This project demonstrates an Agent AI can:
 - - Deliver personalized, real-time dietary guidance
 - - Scale nutritional consulting via virtual assistants
 - - Integrate user feedback for dynamic improvement
- It bridges the gap between rigid diet apps and real consultations.

FUTURE SCOPE

- - Add image recognition for food and nutrition labels
- - Integrate wearable health data (e.g., Fitbit, Apple Health)
- - Expand multilingual and multicultural support
- - Include fitness routine tracking
- - Build a mobile version for wider accessibility

REFERENCES

- - IBM Watsonx Ai Documentation
- - IBM Cloud Lite Services
- - Research papers on AI in healthcare and nutrition

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