

---

# **CAPSTONE PROJECT**

# **NUTRITION AGENT**

**Presented By:**

**Student name : MAHAPRASAD SAHOO**

**College Name : GITA AUTONOMOUS COLLEGE, BHUBANESWAR**

**Department : Master in Computer Applications (MCA)**

# OUTLINE

- Problem Statement
- Technology used
- Wow factor
- End users
- Result
- Conclusion
- Git-hub Link
- Future scope
- IBM Certifications

# PROBLEM STATEMENT

In today's health-conscious world, individuals seek **personalized nutrition guidance** tailored to their goals, medical needs, and cultural preferences. However, most existing tools provide **generic diet plans** that fail to consider key factors like **food allergies, chronic conditions (e.g., diabetes, hypertension), regional eating habits, and evolving fitness goals**.

Moreover, these tools lack **real-time adaptability**, and users rarely receive **explanations or justifications** for the recommendations provided — making it difficult to trust or follow them consistently.

Meanwhile, **dieticians and nutritionists** face challenges in scaling personalized consultations due to **time and resource limitations**, leaving a large number of people underserved.

## **Proposed Solution:**

An **AI-powered Nutrition Agent** that uses **Natural Language Processing (NLP)** and **Generative AI** to interact with users via chat, understand their health profiles, preferences, and goals, and deliver **personalized meal plans, intelligent food swaps, and contextual nutritional explanations** — adapting dynamically to user feedback and daily needs.

# TECHNOLOGY USED

The **Nutrition Agent** leverages advanced AI technologies and IBM Cloud services to deliver real-time, personalized dietary guidance through a chat interface. The key technologies used are:

## 1. IBM Cloud Lite Services

IBM Cloud Lite provides the cloud infrastructure for deploying and hosting the Nutrition Agent. It offers:

- Scalable compute and storage resources
- Access to IBM's AI models and services
- Seamless integration with Watsonx and Granite foundation models

## 2. Natural Language Processing (NLP)

NLP is used to:

- Understand user queries in natural language
- Extract relevant information (e.g., dietary goals, food preferences, allergies)
- Enable smooth and contextual conversations between the user and the AI agent

## 3. Retrieval-Augmented Generation (RAG)

While this project does not use a vector database, the **RAG-inspired structure** helps the agent:

- Reason through multiple steps using structured flows
- Simulate grounded responses by referencing pre-modeled dietary logic and prompts
- Improve answer quality through task decomposition and response synthesis

#### 4. IBM Granite Model – granite-3-3-8b-instruct

This instruction-tuned large language model is the core engine powering the Nutrition Agent. It enables:

- High-quality, context-aware, and informative response generation
- Reasoning and decision-making using the ReAct (Reasoning + Acting) framework
- Support for diverse tasks like meal planning, food substitution, and fitness-related advice

# IBM CLOUD SERVICES USED

The Nutrition Agent project utilizes key IBM Cloud services to develop, deploy, and manage the AI assistant effectively. These services provide the foundation for building a robust, scalable, and intelligent system.

## 1. IBM Cloud Watsonx AI Studio

- Used to design and manage AI workflows
- Allows integration of the Granite foundation model within prompt flows
- Provides an interactive environment for experimentation, chaining, and testing of model outputs

## 2. IBM Cloud Watsonx AI Runtime

- Executes the deployed Granite models in a scalable environment
- Supports real-time inference of AI responses through APIs
- Ensures low-latency, secure, and high-availability access to the model

## 3. IBM Cloud Agent Lab

- Serves as the orchestration environment for deploying intelligent agents
- Provides tooling for managing agent behavior, conversation flow, and debugging
- Supports LangGraph integration for task-routing and logic chaining

## 4. IBM Granite Foundation Model (granite-3-3-8b-instruct)

- The central AI model used for generating personalized meal plans, food swaps, and explanations
- Trained and hosted within IBM's trusted AI environment
- Tuned for instruction-following, reasoning, and high-quality natural language generation

# WOW FACTORS

This agent significantly improves access to **personalized nutrition guidance**, enabling users to make healthier choices effortlessly. It eliminates the need for manual meal planning and generic advice by offering **intelligent, adaptive, and culturally relevant dietary suggestions**.

## Unique Features:

1. **Context-aware Meal Planning** : Generates daily meal plans tailored to user goals, medical conditions, and preferences.
2. **Interactive Food Swaps with Explanations** : Suggests healthier alternatives along with the reason behind each substitution.
3. **Natural Language Conversation** : Users can interact just like they would with a human dietician, using simple chat commands.
4. **Real-Time Personalization** : Adapts dynamically based on user feedback, likes/dislikes, and fitness goals.
5. **Goal-Oriented Guidance** : Supports use cases like weight loss, muscle gain, or lifestyle improvement with appropriate nutritional support.
6. **No Appointment Needed** : Offers 24/7 access to intelligent nutritional assistance — scalable and on-demand.

# END USERS

The Nutrition Agent is designed to serve a wide range of individuals and institutions seeking intelligent, personalized nutrition guidance. Its adaptability and accessibility make it valuable for both personal and professional use.

## 1. Health-Conscious Individuals

- People aiming to manage weight, improve fitness, or follow a healthier lifestyle
- Users with specific dietary restrictions or medical conditions like diabetes, PCOS, or hypertension

## 2. Healthcare & Nutrition Professionals

- Dietitians and nutritionists can use the agent as a support tool to scale personalized advice
- Wellness coaches, fitness trainers, and lifestyle consultants

## 3. Educational Institutions

- Schools and universities can integrate the agent into health awareness programs
- Students studying dietetics, healthcare, or AI applications in health

## 4. Corporate Wellness Programs

- HR departments can offer it as part of employee well-being initiatives
- Companies promoting healthy living through internal platforms



# RESULTS

IBM watsonx

Upgrade ? Mahaprasad Sahoo's Acco... Dallas MS

[Deployment spaces](#) / [Nutrition\\_Agent](#) / [Nutrition Agent](#) /

## Nutrition Agent ✔ Deployed Online


[API reference](#) [Test](#) [Preview](#)

New chat +

Nutrition Agent 02:29 PM

### Welcome to Nutrition Agent

A Nutrition Agent guides healthy eating by offering meal plans, tips, and tracking nutrition goals.



Type something...

# RESULTS

IBM watsonx

Upgrade ⓘ 🔔

Mahaprasad Sahoo's Acco... ▾

Dallas ▾

MS

Deployment spaces / Nutrition\_Agent / Nutrition Agent /

Nutrition Agent ✓ Deployed Online

API referenceTestPreview

New chat +

M

You 02:29 PM

hi

🤖

Nutrition Agent 02:29 PM

Hi there! I'm your Nutrition Agent. Tell me your fitness or diet goal, and I'll help you get started!

M

You 02:30 PM

give me some tips for reducing fats

🤖


Nutrition Agent 02:30 PM


Sure, here are some tips to help you reduce body fat:  
  
1. **Balanced Diet:** Focus on a balanced diet rich in lean proteins, whole grains, fruits, vegetables, and healthy fats. Limit your intake of processed foods, sugars, and saturated fats.  
  
2. **Portion Control:** Pay attention to portion sizes to avoid overeating. Even healthy foods can contribute to weight gain if you consume them in large quantities.

type something...

➤

# RESULTS

 IBM watsonx

Upgrade ?  Mahaprasad Sahoo's Acco... Dallas MS

Deployment spaces / Nutrition\_Agent / Nutrition Agent /

## Nutrition Agent Deployed Online

API reference Test **Preview**[New chat +](#)

 You 02:31 PM

Suggest me a step by step 3 months plan to reduce fat

 Nutrition Agent 02:31 PM

Here's a general step-by-step 3-month plan to help reduce body fat. Please consult with a healthcare professional or a certified nutritionist before starting any new diet or exercise program.

### Month 1: Foundation Building

**Diet:**

1. **Caloric Deficit:** Aim for a moderate caloric deficit of 250-500 calories per day. This can be achieved by reducing your daily intake by 250-500 calories or increasing your activity level.
2. **Balanced Macros:** Focus on a balanced diet with 40% carbohydrates, 30% protein, and 30% fats.
3. **Meal Frequency:** Eat 5-6 small meals throughout the day to keep your metabolism active and avoid hunger.
4. **Hydration:** Drink at least 8-10 glasses of water daily.

**Exercise:**

1. **Cardio:** Engage in 30 minutes of moderate-intensity cardio (like brisk walking, cycling, or swimming) 3-4 times a week.

# DEPLOYED AI AGENT

IBM watsonx

Upgrade ?

Mahaprasad Sahoo's Acco...

Dallas

MS

Deployment spaces / Nutrition\_Agent / Nutrition Agent /

Nutrition Agent Deployed Online

API reference Test Preview

Endpoints for inferencing ⓘ

Private endpoint

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/b77a06a3-85f7-473b-9de3-a95e3dbcb705/ai\_se

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/b77a06a3-85f7-473b-9de3-a95e3dbcb705/ai\_se

Public endpoint

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/b77a06a3-85f7-473b-9de3-a95e3dbcb705/ai\_se

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/b77a06a3-85f7-473b-9de3-a95e3dbcb705/ai\_se

[Learn more](#) about the 2021-05-01 version query parameter

Code snippets

cURL

Java

JavaScript

Python

Scala

# NOTE: you must set \$API\_KEY below using information retrieved from your IBM Cloud account (https://dataplatf

export API\_KEY=<your API key>

export IAM\_TOKEN=\$(curl --insecure -X POST --location "https://iam.cloud.ibm.com/identity/token" \

Bearer <token> ⓘ

IAM

About this deployment ×

Name

Nutrition Agent

Description

A Nutrition Agent guides healthy eating by offering meal plans, tips, and tracking nutrition goals.

Deployment Details

Deployment ID: b77a06a3-85f7-47...

Serving name: No serving name.

Software specification: runtime-24.1-py3.11 ⚙

Hardware specification: Extra extra small: 1 CPU and 2 GB RAM

Copies: 1

Tags

wx-agent

Associated asset

Nutrition Agent

46e5bbcb-5ebe-42d5-85f3-4257daa59038

Last modified

3 minutes ago

edunet  
foundation

## CONCLUSION

The **Nutrition Agent** demonstrates how generative AI can revolutionize the way individuals access and manage their nutritional health. By leveraging **Natural Language Processing**, **instruction-tuned LLMs**, and structured reasoning through **Langraph** and **ReAct**, the agent is capable of generating **dynamic meal plans**, **healthy food alternatives**, and **goal-aligned dietary recommendations**.

Unlike traditional diet applications, this system offers:

- **Personalized and adaptive responses** tailored to user health profiles
- **Contextual explanations** that help users understand *why* a suggestion is being made
- A **conversational, user-friendly experience** without the need for scheduled consultations

It significantly reduces the time and cognitive load associated with manual diet tracking, while promoting **healthy lifestyle choices** through intelligent automation.

In the long term, this approach can enhance **preventive healthcare**, support **chronic condition management**, and make **expert-level nutrition guidance accessible to all**—scaling far beyond what human professionals can deliver alone.

# FUTURE SCOPE

The Nutrition Agent can be further enhanced to support a wider range of user needs, technologies, and platforms. Potential future developments include:

1. **Multilingual Support** : Enable the agent to understand and respond in multiple regional and international languages to serve a broader audience.
2. **Voice-Activated Nutrition Assistant** : Integrate voice input/output to allow hands-free interaction, especially useful for visually impaired or busy users.
3. **Real-Time Collaboration with Healthcare Providers** : Enable data sharing with dietitians, fitness coaches, or doctors for integrated care and expert review.
4. **Advanced Nutrition Gap Detection** : Use AI to identify missing nutrients, unhealthy patterns, or risks in users' diets, and suggest focused improvements.
5. **Integration with Health and Fitness Platforms** : Sync with apps like Fitbit, Google Fit, or Apple Health to adjust recommendations based on activity, vitals, and real-time biometrics.
6. **AI-Assisted Diet Report Generation** : Automatically generate weekly nutrition reports, calorie breakdowns, and recommendations for improvement based on ongoing usage.

# IBM CERTIFICATIONS

## 1. GETTING STARTED WITH AI



## 2. RAG LAB CERTIFICATE

**IBM SkillsBuild**

Completion Certificate



This certificate is presented to  
**Mahaprasad Sahoo**

for the completion of  
**Lab: Retrieval Augmented Generation with  
LangChain**  
(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 19 Jul 2025 (GMT)

**Learning hours:** 20 mins



---

## GITHUB LINK

**GitHub Repo Link :** [https://github.com/mahaprasadsahoo12/Nutrition\\_Agent](https://github.com/mahaprasadsahoo12/Nutrition_Agent)



**THANK YOU**