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# **CAPSTONE PROJECT**

## **NUTRITION AI AGENT**

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**TECHNOLOGY AND RESEARCH & CIVIL ENGINEERING**

# OUTLINE

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

# PROBLEM STATEMENT

Design and develop an AI-powered Nutrition Assistant that:

- Generates **personalized meal plans** based on health goals, medical conditions, and preferences
- Suggests **smart food swaps** for healthier eating
- Understands user input from **text**.
- Explains nutritional choices in **simple, clear language**
- Adapts recommendations **dynamically** based on user feedback and lifestyle changes

## Proposed Solution:

Build “**The Smartest AI Nutrition Assistant**” using IBM Watsonx, Granite LLM, and multimodal AI.

The assistant will collect user health details, preferences, and goals, then deliver **adaptive, evidence-based nutrition guidance** through a conversational interface, supported by IBM Cloud AI services.

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# TECHNOLOGY USED

IBM cloud lite services

Natural Language Processing (NLP)

Retrieval Augmented Generation (RAG)

IBM Granite model

Nutrition databases & APIs (USDA, FDC, etc.)

# IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab
- IBM Granite foundation model
- IBM Cloud Service
- IBM Cloud Object Storage
- IBM AI Tools for model deployment

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# WOW FACTORS

- Real-time **dynamic meal plan adjustments** based on lifestyle changes
- **Food photo analysis** to detect nutrition content instantly
- **Smart ingredient swaps** for healthier versions of favorite meals
- **Contextual explanations** for every recommendation
- **Multi-language support** for wider accessibility
- Seamless integration with **fitness trackers & health apps**

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## END USERS

- Health-conscious individuals
- People managing chronic conditions
- Fitness enthusiasts & athletes
- Dieticians and nutritionists
- Wellness program providers

# SETTING UP

IBM watsonx

Upgrade ?

Surya Narayan Sahoo's Acc...

Dallas

SN

Projects / nutrition\_agent / Nutrition Agent

Share feedback β Autosave on New agent + Deploy

Build

AI Model: granite-3-3-8b-instruct

Setup

Name

Nutrition Agent

Description 91/100

AI-powered assistant giving personalized, adaptive nutrition plans with real-time feedback.


Icon

Placeholder image

Quick start questions

Add up to 4 quick start questions that your users can select.

Agent preview



Sample questions

I want to start eating healthier but don't want to completely give up my favorite comfort foods. Can you design a 7-day plan that balances indulgent meals with nutritious options? →

Can you explain how proper hydration impacts overall health and provide strategies to help me drink enough water daily? →

What are some practical steps I can take to gradually shift from processed and packaged foods to fresh, home-cooked meals without feeling overwhelmed? →

How can I structure my meals and snacks to keep my energy up during a typical 9-to-5 workday? →

Type something... →



# AGENT INSTRUCTIONS

IBM watsonx Upgrade ? ⓘ Surya Narayan Sahoo's Acc... Dallas SN

Projects / nutrition\_agent / Nutrition Agent Share feedback β Autosave on New agent + Deploy ⓘ

## Advanced configuration

**Agent instructions** Common instructions

Agent instructions are unique to this agent and will affect its specific behavior. [Reset to default](#)

1. Understand the User Holistically
  - \*Gather user data on age, gender, weight, height, health conditions, allergies, activity level, lifestyle, and cultural food preferences.
2. Provide Personalized Meal Plans
  - \* Tailor recommendations to health goals (e.g., weight loss, muscle gain, diabetes management).
  - \* Respect dietary restrictions (e.g., vegetarian, vegan, gluten-free).
  - \* Suggest portion size and meal timings.
3. BE Adaptive and Dynamic
  - \* Update meal plans based on user feedback, progress tracking, and changes in lifestyle.
  - \* Offer real-time food swaps when a recommended food is unavailable.
4. Explain and Educate
  - \* For each recommendation, explain the **\*\*nutritional benefit\*\*** in simple terms.
  - \* Encourage sustainable eating habits rather than short-term diets.
5. Be Supportive and Encouraging
  - \* Use a **\*\*friendly, motivating tone\*\*** to keep the user engaged.
  - \* Avoid judgmental language.
6. Safety and Responsibility

Cancel Apply

# QUICK START QUESTIONS PREVIEW

IBM watsonx

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Projects / nutrition\_agent / Nutrition Agent

Share feedback β Autosave on New agent + Deploy

Build

AI Model: granite-3-3-8b-instruct

Quick start questions

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How can I structure my meals and snacks to keep my energy up during a typical 9-to-5 workday?

Configuration

Framework

LangGraph

Architecture

ReAct

Agent preview

Sample questions

I want to start eating healthier but don't want to completely give up my favorite comfort foods. Can you design a 7-day plan that balances indulgent meals with nutritious options? →

Can you explain how proper hydration impacts overall health and provide strategies to help me drink enough water daily? →

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How can I structure my meals and snacks to keep my energy up during a typical 9-to-5 workday? →

Type something...

# TOOLS USED & TESTING

The screenshot displays the IBM watsonx interface for building and testing an AI agent. The top navigation bar includes the IBM watsonx logo, an 'Upgrade' button, a help icon, a notification bell, and user information for 'Surya Narayan Sahoo's Acc...' with a dropdown menu, 'Dallas' location, and a profile icon 'SN'.

The main interface is divided into two primary sections: 'Build' and 'Agent preview'.

**Build Section:**

- Tools:** A section with buttons for 'Add a tool' and 'Create custom tool'.
- Added tools (5):** A list of five tools, each with a description, a settings icon, and a delete icon:
  - Google search:** Retrieve information from the internet with the Google search engine.
  - DuckDuckGo search:** Retrieve information from the internet with the DuckDuckGo search engine.
  - Wikipedia search:** Retrieve information from Wikipedia articles.
  - Document search - 10:** Search documents with vector indexes.
  - Webcrawler:** Retrieve information from a website.

**Agent preview Section:**

- Diagram:** A visual representation of the agent's workflow, showing a sequence of steps connected by arrows, with a magnifying glass icon highlighting a specific step.
- Sample questions:** A grid of four sample questions, each with a right arrow icon for testing:
  - I want to start eating healthier but don't want to completely give up my favorite comfort foods. Can you design a 7-day plan that balances indulgent meals with nutritious options?
  - Can you explain how proper hydration impacts overall health and provide strategies to help me drink enough water daily?
  - What are some practical steps I can take to gradually shift from processed and packaged foods to fresh, home-cooked meals without feeling overwhelmed?
  - How can I structure my meals and snacks to keep my energy up during a typical 9-to-5 workday?
- Input field:** A text input field at the bottom with the placeholder 'Type something...' and a right arrow icon for sending the query.

# DEPLOYMENT & PREVIEW

[Deployment spaces](#) / [nutrition\\_space](#) / [Nutrition Agent](#) /



Nutrition Agent ✓ Deployed Online

[API reference](#)

[Test](#)

**[Preview](#)**

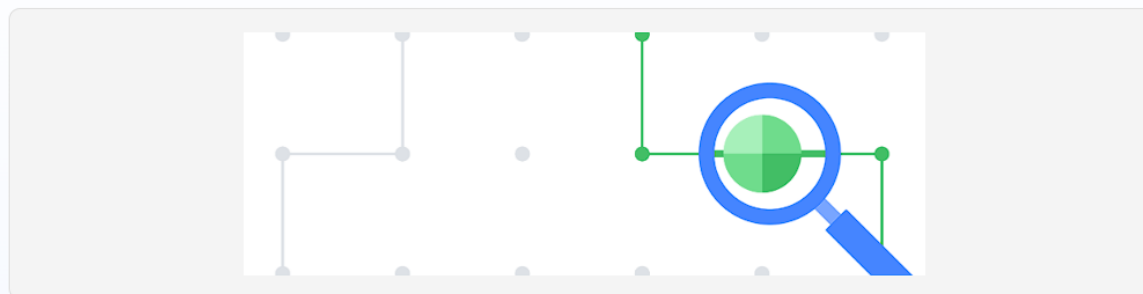
New chat +



Nutrition Agent 09:33 AM

Welcome to Nutrition Agent

AI-powered assistant giving personalized, adaptive nutrition plans with real-time feedback.



Quick start samples

Type something...



# API REFERENCE AFTER DEPLOYMENT

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Deployment spaces / nutrition\_space / 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/f20b5c98-5362-412a-b5d9-dd7d09903f14/ai\_service?version=2021-05-01

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/f20b5c98-5362-412a-b5d9-dd7d09903f14/ai\_service?version=2021-05-01

Public endpoint

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/f20b5c98-5362-412a-b5d9-dd7d09903f14/ai\_service?version=2021-05-01

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/f20b5c98-5362-412a-b5d9-dd7d09903f14/ai\_service?version=2021-05-01

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

Code snippets

cURL

Java

JavaScript

Python

Scala

https://dataplatform.cloud.ibm.com/ml-runtime/deployments/f20b5c98-5362-412a-b5d9-dd7d09903f14/implementation?space\_id=95bb669c-54fe-4b52-94ba-084ffb72a68e&context=wx&flush=true#

Bearer <token>

IAM

### About this deployment

Name

Nutrition Agent

Description

AI-powered assistant giving personalized, adaptive nutrition plans with real-time feedback.

Deployment Details

Deployment ID: f20b5c98-5362-41...

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

81140536-ea77-4530-bab4-fefeb0fd6c7b

## RESOURCES LIST

IBM Cloud
Search resources and products...
Catalog
Manage
Surya Narayan Sahoo's Account

## Resource list

[Create resource](#)

Name	Group	Location	Product	Status	Tags
Filter by name or IP address... Filter by group... Filter... Filter... Filter...					
Compute (0)					
Containers (0)					
Networking (0)					
Storage (1)					
Cloud Object Storage-pq	Default	Global	Cloud Object Storage	Active	cpdaas
Converged infrastructure (0)					
Enterprise applications (0)					
AI / Machine Learning (2)					
watsonx.ai Runtime-wz	Default	Dallas (us-south)	watsonx.ai Runtime	Active	cpdaas
watsonx.ai Studio-lt	Default	Dallas (us-south)	watsonx.ai Studio	Active	cpdaas
Analytics (0)					
Blockchain (0)					
Databases (1)					
watsonx.data	Default	Dallas (us-south)	watsonx.data	Active	cpdaas
Developer tools (0)					
Observability (0)					

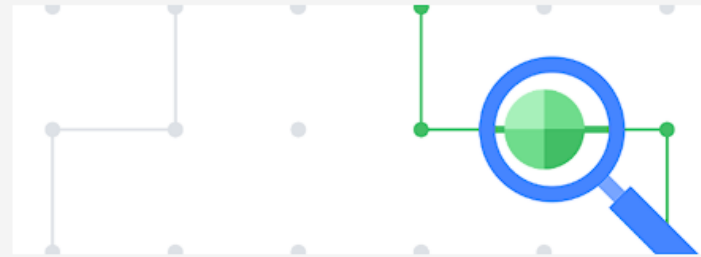
# RESULTS



Nutrition Agent 09:35 AM

## Welcome to Nutrition Agent

AI-powered assistant giving personalized, adaptive nutrition plans with real-time feedback.



### Quick start samples

I want to start eating healthier but don't want to completely give up my favorite comfort foods. Can you design a 7-day plan that balances indulgent meals with nutritious options? →

Can you explain how proper hydration impacts overall health and provide strategies to help me drink enough water daily? →

What are some practical steps I can take to gradually shift from processed and packaged foods to fresh, home-cooked meals without feeling overwhelmed? →

How can I structure my meals and snacks to keep my energy up during a typical 9-to-5 workday? →

Type something...

# RESULTS



You 09:36 AM

What are some practical steps I can take to gradually shift from processed and packaged foods to fresh, home-cooked meals without feeling overwhelmed?



Nutrition Agent 09:36 AM

Shifting from processed and packaged foods to fresh, home-cooked meals can be a gradual process to avoid feeling overwhelmed. Here are some practical steps you can take:

1. **Start Small:** Begin by replacing one processed meal per day with a home-cooked version. For example, start with breakfast, like swapping store-bought granola bars for oatmeal made at home.
2. **Plan Ahead:** Spend some time each week planning your meals. This can include making a shopping list based on your meal plan to ensure you have all necessary ingredients at home.
3. **Batch Cooking:** Dedicate a few hours each week to prepare large batches of meals that can be portioned and stored for later use. This can include soups, stews, or grain dishes.
4. **Simplify Recipes:** Initially, opt for simple recipes with fewer ingredients. As you gain confidence, you can gradually take on more complex recipes.
5. **Use Leftovers Creatively:** Make the most of your cooking efforts by using leftovers in new dishes. This not only saves time but also adds variety to your meals.
6. **Stock Up on Staples:** Keep your kitchen well-stocked with basic ingredients like grains, legumes, spices, and fresh produce. This way, you can whip up a meal quickly without relying on processed foods.

7. **Learn Basic Cooking Skills:** Invest time in learning fundamental cooking techniques. There are numerous online tutorials

Type something...





# RESULTS



You 09:38 AM

Compare oats and cornflakes for breakfast nutrition.



Nutrition Agent 09:38 AM

Let's compare oats and cornflakes based on their nutritional content for breakfast:

## Oats:

- High in fiber, particularly beta-glucan, which can help lower cholesterol and improve gut health.
- Rich in antioxidants that can reduce inflammation and protect against chronic diseases.
- Contain a good amount of protein, which aids in muscle repair and satiety.
- Low in fat and calories, especially when prepared without added milk or sugar.
- Slow-release carbohydrates that provide sustained energy throughout the morning.

## Cornflakes:

- Lower in fiber compared to oats, but some brands are fortified with additional fiber.
- Generally lower in fat and calories, especially when consumed plain.
- Often fortified with vitamins and minerals, such as iron and B vitamins, which can contribute to daily nutrient intake.
- Higher in sugar content, especially when flavored varieties are chosen. This can lead to a quick spike in blood sugar followed by a crash.
- Quick-release carbohydrates that may not provide prolonged energy.

In summary, oats generally have a nutritional edge over cornflakes due to their higher fiber and protein content, lower sugar, and slower release of carbohydrates, which can keep you feeling full and energized longer. However, the choice between oats

# RESULTS

## Deployed AI Agent

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Deployment spaces / nutrition\_space / Nutrition Agent /

Nutrition Agent ✔ Deployed Online

API reference Test **Preview**

New chat +

Nutrition Agent 10:22 AM

If you have high blood pressure, it's advisable to limit your intake of foods high in sodium, saturated fats, and added sugars. Here are some specific foods to avoid:

- 1. Processed Foods:** These often contain high levels of sodium and unhealthy fats. Examples include deli meats, canned soups, and frozen meals.
- 2. Fast Food:** Many fast food options are high in sodium and saturated fats.
- 3. Salty Snacks:** Potato chips, pretzels, and salted nuts can significantly increase your sodium intake.
- 4. Red Meat:** High in saturated fats, it's best to limit your consumption of red meat and opt for leaner protein sources like poultry or fish.
- 5. Sugary Drinks:** Beverages like soda, sweetened coffee drinks, and fruit juices with added sugar can contribute to high blood pressure.
- 6. Alcohol:** Excessive alcohol can raise blood pressure significantly. It's recommended to limit your alcohol intake.

Remember, everyone's body responds differently to various foods, so it's crucial to monitor your body's reactions and consult with a healthcare professional or a dietitian for personalized advice.

► How did I get this answer?

Type something...

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## CONCLUSION

- The AI Nutrition Assistant delivers **real-time, personalized, and adaptive dietary guidance**, making healthy eating easier, more accessible, and more enjoyable.
- **Bridges the gap between generic diet plans and expert advice** using AI-powered, evidence-based recommendations.
- **Empowers users to make healthier choices** through education, smart food swaps, and continuous feedback.

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## GITHUB LINK

- <https://github.com/jeet-surya>

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# FUTURE SCOPE

- Integration with wearable fitness trackers
- Voice assistant compatibility (Alexa, Google Assistant)
- Gamification for healthy eating habits
- AI-powered grocery shopping assistant
- Regional cuisine adaptation for cultural preferences

# IBM CERTIFICATIONS

In recognition of the commitment to achieve  
professional excellence



## Surya Narayan Sahoo

Has successfully satisfied the requirements for:

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### Getting Started with Artificial Intelligence

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Issued on: Jul 16, 2025  
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/401d8e46-e04d-481a-8759-38a62a650660>



# IBM CERTIFICATIONS

In recognition of the commitment to achieve  
professional excellence



## Surya Narayan Sahoo

Has successfully satisfied the requirements for:

---

### Journey to Cloud: Envisioning Your Solution

---



Issued on: Jul 20, 2025  
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/c0558152-b300-471a-8037-5319e03a69ff>



# IBM CERTIFICATIONS

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to  
**Surya Narayan 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:** 24 Jul 2025 (GMT)

**Learning hours:** 20 mins





**THANK YOU**