
CAPSTONE PROJECT

NUTRITION AGENT

Presented By:

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OUTLINE

- Problem Statement
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PROBLEM STATEMENT

In an era where health awareness is growing, individuals increasingly seek personalized nutrition guidance. However, most existing tools provide generic diet plans, lack real-time adaptability, and fail to consider a person's holistic lifestyle, cultural preferences, allergies, and evolving health conditions. Furthermore, dietitians and nutritionists face limitations in scaling personalized consultations due to time and resource constraints. Generative AI presents a groundbreaking opportunity to revolutionize this space by enabling an intelligent, interactive, and adaptive virtual nutrition assistant. By leveraging natural language processing (NLP), multimodal understanding, and large-scale dietary databases, an AI-powered assistant can generate dynamic meal plans, recommend smart food swaps, and explain nutritional choices—all tailored to the individual.

This project aims to develop “The Smartest AI Nutrition Assistant” using state-of-the-art generative AI models that:

- Understand user inputs via text, voice, or image (e.g., food photos, grocery labels)
- Generate personalized meal plans based on health goals, medical conditions, fitness routines, and preferences
- Offer contextual explanations (e.g., “Why is this food better?”)
- Adapt suggestions dynamically with continuous feedback

By integrating health data, food databases, and LLM-powered reasoning, the solution will bridge the gap between one-size-fits-all diet apps and in-person nutrition counselling—delivering an AI that thinks, learns, and cares like a real nutrition expert.

PROPOSED SOLUTION

- We propose NutriMind, a virtual AI nutrition assistant that:
- Understands user input via text, voice, and images
- Generates dynamic, personalized meal plans Offers contextual nutritional explanations
- Adapts over time through feedback
- Built using: Granite 3-3-8B-Instruct model LangGraph framework ReAct reasoning architecture
- Tools: Google, DuckDuckGo, Wikipedia, web crawlers

SYSTEM APPROACH

- System Requirements: IBM watsonx environment
- IBM Cloud Lite account
- GitHub integration for CI/CD
- Required Libraries & Tools: LangGraph for orchestrating multi-step reasoning transformers, torch, langchain, watsonx-api
- Web crawlers and APIs (Google Search, DuckDuckGo, Wikipedia scraping)

ALGORITHM & DEPLOYMENT

- Algorithm Selection: Granite 3-3-8B-Instruct (LLM by IBM)
- Chosen for its: Instruction-following ability Adaptability via feedback loops Support for multimodal understanding
Data Input: Health profile: age, weight, allergies, goals
- Real-time user queries (text, voice, image) Web data (recipes, food labels, product facts) Fitness routines, medical conditions
- Training Process: No local training uses pretrained Granite model Prompt engineering in LangGraph Fine-tuned workflows using ReAct (Reasoning + Acting)
- Prediction Process: AI interprets user intent Fetches real-time nutrition info via web Builds meal plans dynamically Responds with food suggestions + justifications

RESULT

The screenshot displays the IBM watsonx AI interface. The top navigation bar includes the IBM watsonx logo, an 'Upgrade' button, a help icon, a notification bell, and user information for 'Divakar Pandey's Account' in 'Dallas'. Below the navigation bar, the breadcrumb trail shows 'Projects / AI_Nutrition_Assistant / watsonx Agent'. The main interface is split into two panels. The left panel, titled 'Build', shows a list of 'Added tools (5)': 'Google search', 'DuckDuckGo search', 'Wikipedia search', 'Webcrawler', and 'Weather'. Each tool has a brief description and a trash icon. The right panel, titled 'Agent preview', shows a conversation log. The user's input is 'Plan a weekly nutritious meal for me'. The watsonx Agent's response is: 'I apologize for the inconvenience. It seems there's an issue with the DuckDuckGo tool. I'll adjust the plan by using GoogleSearch instead. Here's a simple, nutritious weekly meal plan for you: Day 1: Breakfast: Greek yogurt with mixed berries and a drizzle of honey. Lunch: Grilled chicken salad with lots of veggies (tomatoes, cucumbers, bell peppers) and olive oil dressing. Dinner: Baked salmon with quinoa and steamed broccoli. Day 2: Breakfast: Scrambled eggs with spinach and whole grain toast. Lunch: Quinoa salad with chickpeas, cherry tomatoes, feta cheese, and a lemon vinaigrette. Dinner: Grilled turkey breast with sweet potato and green beans.' At the bottom of the right panel is a text input field with the placeholder 'Type something...' and a send button.

IBM watsonx Upgrade ? Bell Divakar Pandey's Account Dallas DP

Projects / AI_Nutrition_Assistant / watsonx Agent Share feedback β Autosaved 9:54 PM New agent + Deploy

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

Added tools (5)

- 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.
- Webcrawler**
Retrieve information from a website.
- Weather**
Retrieve the weather of a city.

Agent preview

You: 09:52 PM
Plan a weekly nutritious meal for me

watsonx Agent: 09:52 PM
I apologize for the inconvenience. It seems there's an issue with the DuckDuckGo tool. I'll adjust the plan by using GoogleSearch instead. Here's a simple, nutritious weekly meal plan for you:

Day 1:

- Breakfast: Greek yogurt with mixed berries and a drizzle of honey.
- Lunch: Grilled chicken salad with lots of veggies (tomatoes, cucumbers, bell peppers) and olive oil dressing.
- Dinner: Baked salmon with quinoa and steamed broccoli.

Day 2:

- Breakfast: Scrambled eggs with spinach and whole grain toast.
- Lunch: Quinoa salad with chickpeas, cherry tomatoes, feta cheese, and a lemon vinaigrette.
- Dinner: Grilled turkey breast with sweet potato and green beans.

Type something...

Picture of the nutrition agent giving response to questions

RESULT

The screenshot displays the IBM watsonx AI Nutrition Assistant interface. The top navigation bar includes the IBM watsonx logo, an Upgrade button, a help icon, a notification bell, and user account information (Divakar Pandey's Account, Dallas, DP). Below the navigation bar, the breadcrumb trail shows Projects / AI_Nutrition_Assistant / watsonx Agent. The main interface is divided into two sections: Build and Agent preview.

Build Section: This section shows a list of added tools (5) used for information retrieval:

- 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.
- Webcrawler:** Retrieve information from a website.
- Weather:** Retrieve the weather of a city.

Agent preview Section: This section shows the chat history and the current response from the watsonx Agent. The chat history includes a user message: "i follow Keto diet have allergies with peanut and soy". The agent's response is: "I understand. Given your keto diet and allergies to peanuts and soy, here's a revised meal plan:"

Day 1:

- Breakfast: Avocado and egg scramble.
- Lunch: Chicken Caesar salad (ensure the dressing doesn't contain soy).
- Dinner: Grilled pork chops with a side of sautéed spinach and a small portion of blueberries for dessert.

Day 2:

- Breakfast: Smoothie with spinach, avocado, unsweetened almond milk, and a handful of raspberries.
- Lunch: Shrimp salad with a vinaigrette dressing, using olive oil and lemon juice.
- Dinner: Baked salmon with a side of asparagus spears.

Day 3:

The interface also features a text input field at the bottom of the chat window with the placeholder text "Type something...".

Picture of the nutrition agent giving response to questions

RESULT

NutriMind



Overview


Assets





Deployments

Jobs

Manage

  Search



Name	↑↓	Type	Status	Asset	Asset type	Tags	Last modified	↓
 watsonx Agent		Online	 Deployed	watsonx Agent	Ai service	<div>wx-agent</div> 	1 day ago Divakar Pandey (You)	

Deployment Done

CONCLUSION

- NutriMind provides personalized, explainable, and scalable nutrition recommendations.
- Uses LLM reasoning and LangGraph orchestration for adaptive planning.
- Supports multimodal inputs and learns from user feedback.
- Can replace static diet apps with a human-like AI consultation experience.

FUTURE SCOPE

- Add wearable integration (Fitbit, Apple Health)
- Support for multilingual meal planning
- Integrate with grocery APIs (e.g., Instacart)
- Enable offline support via edge deployment
- Expand to physical nutrition kiosks in clinics or stores

REFERENCES

- IBM Watsonx Documentation – <https://www.ibm.com/watsonx>
- LangGraph – <https://github.com/langchain-ai/langgraph> Granite Models –
- IBM Research ReAct Paper – Yao et al., 2022 (Reasoning and Acting with Language Models)
- USDA Food Data Central – <https://fdc.nal.usda.gov>
- GitHub:IBM watsonx Agent Deployment Guide

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In recognition of the commitment to achieve
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Has successfully satisfied the requirements for:

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Completion Certificate



This certificate is presented to

Divakar Pandey

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 25 Jul 2025 (GMT)

Learning hours: 20 mins



THANK YOU