CAPSTONE PROJECT

Nutrition Agent

Presented By:

Vivek Kumar

National Institute Of Technology Manipur

Computer Science Engineering

Email-patelvivek8874@gmail.com

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PROBLEM STATEMENT

Nutrition Agent -

In today's health-conscious world, individuals seek personalized nutrition guidance that aligns with their unique lifestyle, cultural habits, medical conditions, and evolving fitness goals. However, most available nutrition tools offer generic diet plans and lack the intelligence to adapt in real-time. Traditional diet consultations are time-consuming, limited in scalability, and inaccessible to many.

There is a pressing need for an intelligent, adaptive AI-driven Nutrition Assistant that can understand diverse user inputs—text, voice, or image—and provide dynamic meal plans, smart food swaps, and contextual nutritional advice. Such a solution must bridge the gap between rigid diet apps and human consultation by delivering real-time, personalized, and explainable recommendations powered by generative AI and large-scale food databases.

PROPOSED SOLUTION

We propose developing an **AI-powered Nutrition Agent** that acts as a personalized virtual dietitian, capable of understanding user needs and delivering tailored nutritional guidance in real time.

Key components of the solution:

1. **Multimodal Input Understanding**
   - Accepts **text**, **voice**, and **image inputs** (e.g., food photos, grocery labels).
   - Uses NLP and computer vision to analyze and interpret user data.
2. **Personalized Meal Planning**
   - Generates dynamic meal plans based on **user health goals**, **medical conditions**, **fitness routines**, **allergies**, and **cultural preferences**.
   - Offers **real-time food swaps** and meal alternatives.
3. **Contextual Explanations**
   - Explains **nutritional decisions**, like *"Why this food is better for you?"*, to improve user awareness and trust.
4. **Continuous Adaptation**
   - Learns from **user feedback**, evolving needs, and behavior to refine suggestions.
   - Integrates with **wearables** or **health apps** (if available) for deeper insights.
5. **Technology Stack**
   - Powered by **IBM Granite** for generative AI capabilities and **IBM Cloud Lite** for scalable, secure deployment.
   - Uses dietary databases and health APIs for accurate recommendations.

TECHNOLOGY USED

- IBM cloud lite services
- Natural Language Processing (NLP)
- Retrieval Augmented Generation (RAG)
- IBM Granite model

IBM CLOUD SERVICES USED

IBM Cloud Watsonx AI Studio

- Used to **build, train, and evaluate** generative AI models (like IBM Granite)
- Offers a collaborative, no-code/low-code environment for experimenting with LLMs
- Enables rapid prototyping of NLP workflows and agentic behavior

IBM Cloud Watsonx AI Runtime

- **Deployment environment** for running and scaling AI models
- Supports **inference of foundation models** like Granite
- Manages performance, latency, and version control for production-ready models

IBM Cloud Agent Lab

- A specialized workspace for creating **Agentic AI systems**
- Helps integrate **tools, memory, planning, and action-taking** capabilities in your Nutrition Agent
- Supports **Retrieval-Augmented Generation (RAG)** pipelines and multimodal workflows

IBM Granite Foundation Model

- Large-scale pre-trained language model fine-tuned for enterprise AI
- Powers the core capabilities of the Nutrition Agent:
  - **Understanding natural language**
  - **Generating contextual meal plans**
  - **Explaining food recommendations**

WOW FACTORS

Truly Personalized Nutrition – Not One-Size-Fits-All

- Unlike generic diet apps, the agent **dynamically adapts** meal plans based on real-time feedback, lifestyle changes, and health conditions.
- Supports **custom plans for diabetics, athletes, weight loss, allergy sufferers**, and more.

Multimodal Interaction (Text + Voice + Image)

- Users can speak naturally, type, or upload food photos/grocery labels.
- AI interprets these inputs and instantly suggests **smart food swaps**, portion control tips, or full meal ideas.

Cultural and Regional Food Intelligence

- Supports **Indian food diversity**, taking into account **regional cuisines, fasting practices**, and cultural eating habits.
- Makes the agent **truly inclusive and relatable** across different communities.

Contextual Explanations Like a Real Dietitian

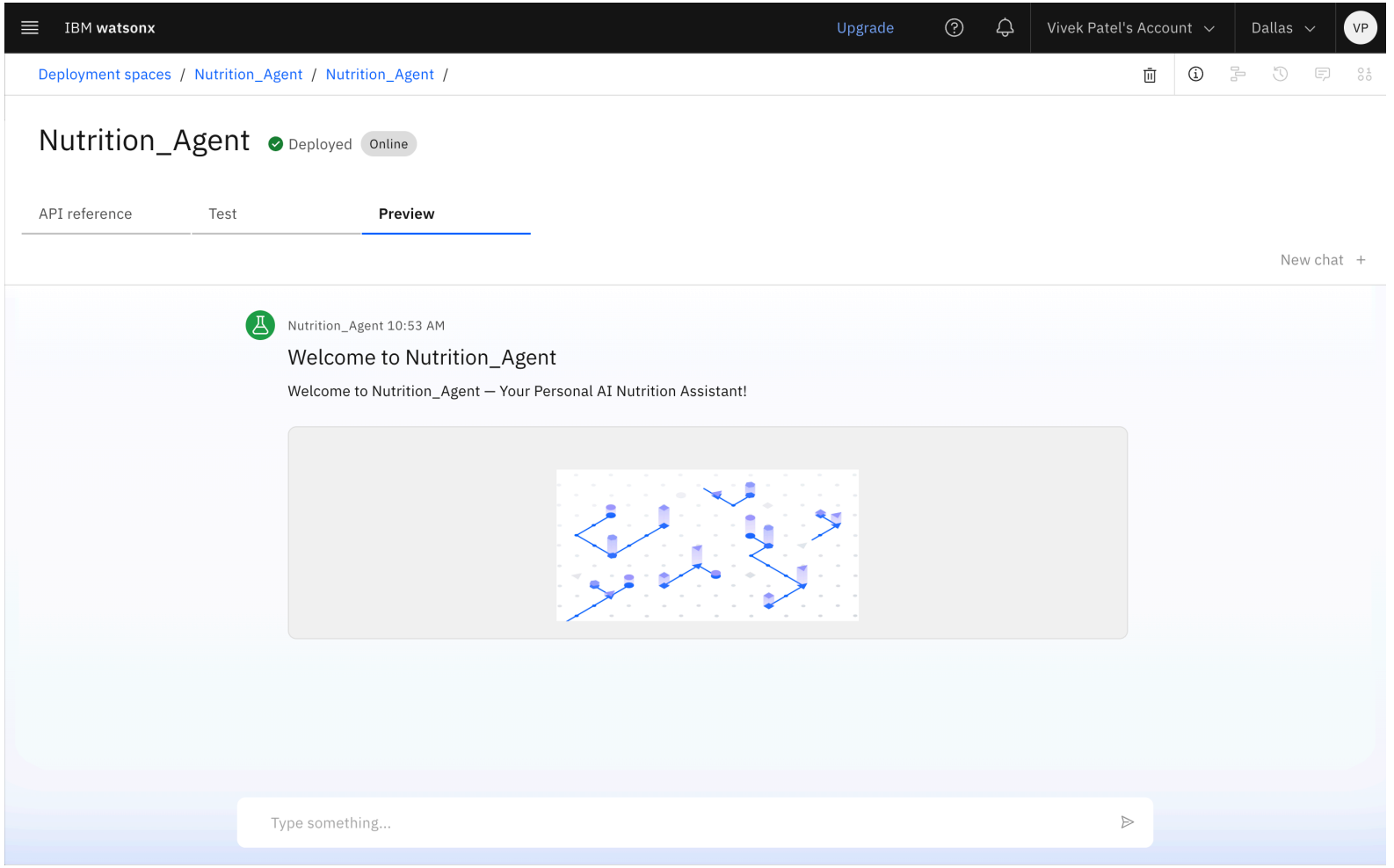
- "Why is this food better?"
- "How does this help my blood pressure?"
- Empowers users with **nutritional literacy**, not just instructions.

END USERS

- General Public
- Fitness Enthusiasts & Athletes
- Elderly & Patients with Medical Conditions
- People with Food Allergies or Dietary Restrictions
- Culturally Diverse Communities
- Tech-Savvy Youth & Students

RESULTS

✓Deployed AI Agent



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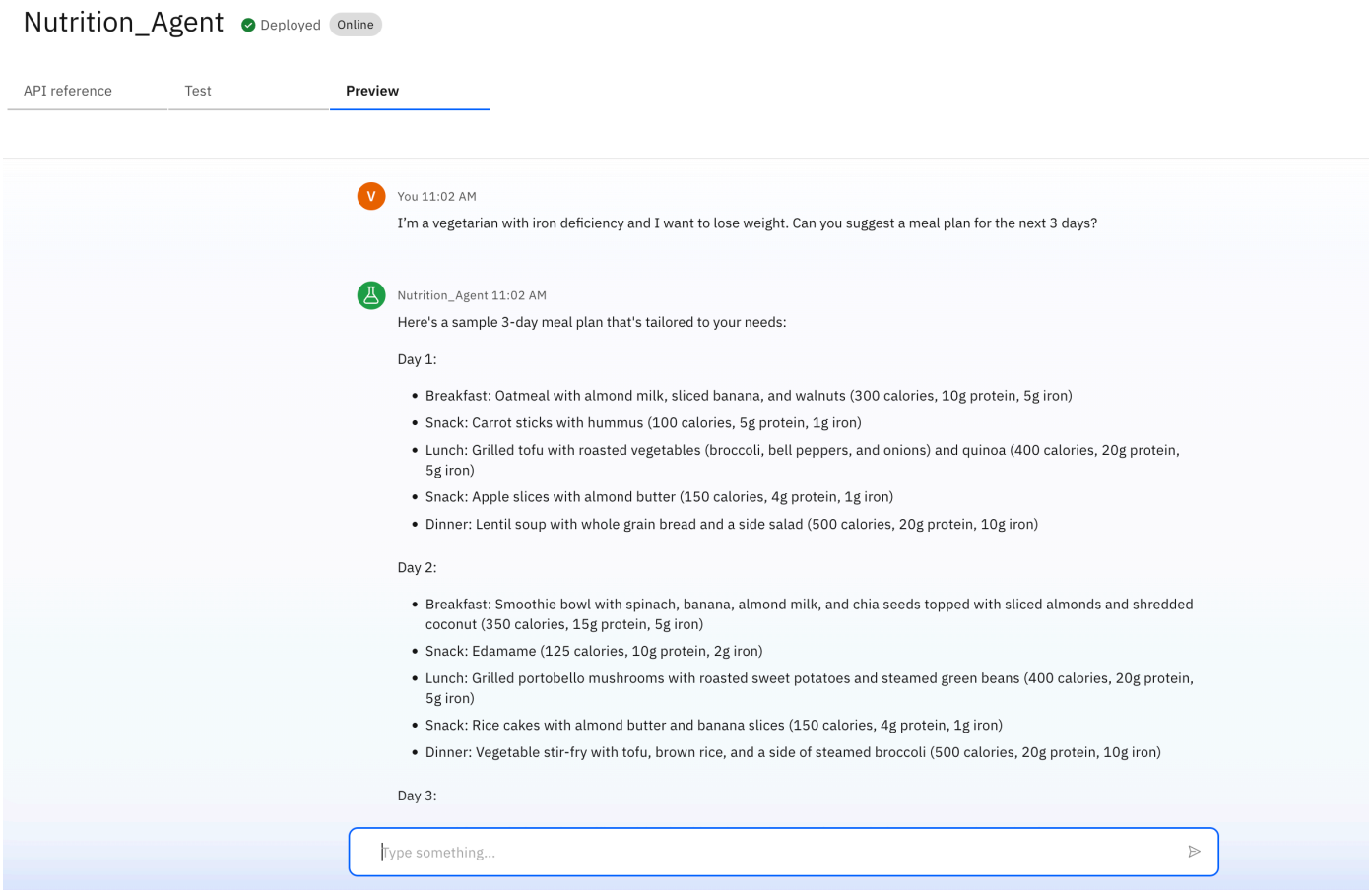
RESULTS

- Shows **personalization** (vegetarian + medical condition + goal).
- Triggers **diet planning**, **nutritional reasoning**, and **adaptation**.
- Great for showcasing your AI's ability to **think like a dietitian**.



CONCLUSION

The AI-powered **Nutrition Agent** is a transformative step toward personalized, accessible, and intelligent dietary guidance. By leveraging **IBM Granite**, **Watsonx**, and **Agent Lab**, the system goes beyond generic diet plans to deliver:

- **Culturally-aware, health-conscious meal suggestions**
- **Multimodal interaction** (text, voice, image)
- **Contextual explanations** that educate users
- **Continuous adaptation** based on feedback and health progress

This solution not only bridges the gap between one-size-fits-all apps and professional consultations but also empowers users to make **informed, sustainable** lifestyle choices—anytime, anywhere.

GITHUB LINK

https://github.com/Vivek-kumar-v/Nutrition-Agent

FUTURE SCOPE

- **Integration with Wearable Devices**
  Sync with smartwatches and fitness trackers to monitor real-time health metrics (e.g., steps, heart rate, calorie burn).
- **Mobile App Deployment**
  Build a user-friendly mobile app for iOS and Android with offline capabilities and push notifications.
- **Deeper Health Data Integration**
  Incorporate user's **blood reports, BMI, medical history**, and prescription data for ultra-personalized recommendations.
- **AI-Powered Virtual Dietitian Chatbot**
  Enable 24/7 **conversational guidance** for real-time dietary doubts, motivation, and meal suggestions.
- **Recipe Generator with Grocery List**
  Generate healthy recipes and create **auto-generated grocery lists** for weekly planning.
- **B2B Use Cases**
  Offer the platform to **dietitians, hospitals, gyms**, and wellness centers to scale personalized care.
- **Smart Kitchen Integration (IoT)**
  Connect with **smart fridges or kitchen scales** to suggest recipes based on what's available at home.

IBM CERTIFICATIONS

- Getting started with AI)

IBM CERTIFICATIONS

- Retrieval Augmented Generation with LangChain

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Vivek Kumar

for the completion of

Lab: Retrieval Augmented Generation with LangChain

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 17 Jul 2025 (GMT) **Learning hours:** 20 mins

IBM CERTIFICATIONS

- Journey to Cloud

THANK YOU

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