

# NUTRITION AI AGENT PROJECT REPORT

## 0. Problem Statement

The Challenge - 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.

Technology - Use of IBM Cloud Lite services and IBM Granite is mandatory.

Implementation - This Nutrition AI Agent was developed using Agentic AI in IBM Cloud Lite Services and the IBM Granite foundation model.

## 1. Project Overview

The Nutrition AI Agent is an intelligent assistant developed using IBM Cloud Lite services, IBM Granite, and

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IBM watsonx.ai studio. It is designed to provide personalized dietary guidance by analyzing user-specific details such as age, health goals, food preferences, allergies, and lifestyle habits.

## 2. Tools and Technologies Used

- IBM Cloud Lite: Hosted and deployed AI models and services in a free-tier environment.
- IBM Granite Foundation Models: Used for NLP and conversation understanding.
- IBM watsonx.ai Studio: Designed and fine-tuned the AI agent with prompt engineering and knowledge integration.
- Agentic AI: Managed dynamic agent flow to provide contextually aware responses.
- Python & REST APIs: Integrated backend scripts and real-time food database APIs.

## 3. Key Features

- Personalized nutrition recommendations based on user inputs
- Allergy detection and filtering
- Adaptive daily meal planning
- Cultural and lifestyle-based suggestions
- Integration with food tracking APIs and calorie data
- Natural language interaction with continuous memory and context awareness

## 4. System Architecture

The system consists of the following components:

1. Frontend: Simple chatbot interface for user interaction.
2. Backend: Python scripts and REST APIs to fetch and analyze data.
3. AI Engine: IBM Granite model accessed via watsonx.ai studio.
4. Knowledge Base: Custom vector index loaded with diet and nutrition datasets.
5. Deployment: IBM Cloud Functions and Cloud Lite Hosting.

## 5. UI/UX Design Considerations

- Simple and clean chatbot interface.
- Responsive design with light color scheme.

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- Clear prompts and instant feedback.
- Minimalistic and user-friendly navigation.

## 6. Conclusion

The Nutrition AI Agent provides a robust, scalable, and accessible solution for modern dietary needs. It leverages IBM's advanced AI infrastructure to deliver tailored recommendations, making nutrition guidance more effective, inclusive, and data-driven.