CAPSTONE PROJECT

NUTRITION AGENT

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OUTLINE

- Problem Statement
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- System Development Approach
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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, dieticians 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 Al Nutrition Assistant" using state-of-the-art generative Al 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 Al that thinks, learns, and cares like a real nutrition expert.



PROPOSED SOLUTION

- We propose NutriMind, a virtual Al 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)

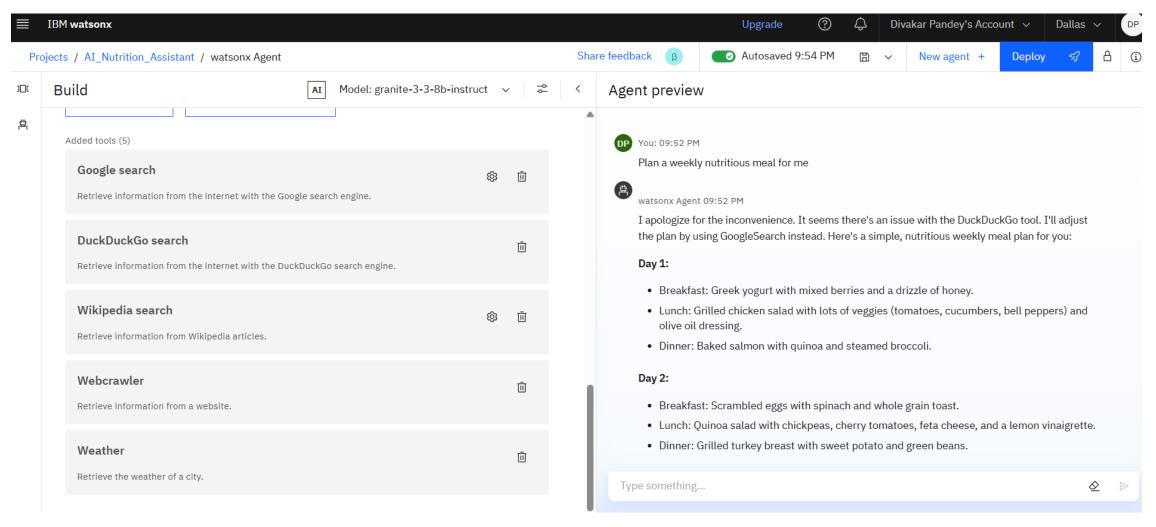


ALGORITHM & DEPLOYMENT

- 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: Al interprets user intent Fetches real-time nutrition info via web Builds meal plans dynamically Responds with food suggestions + justifications



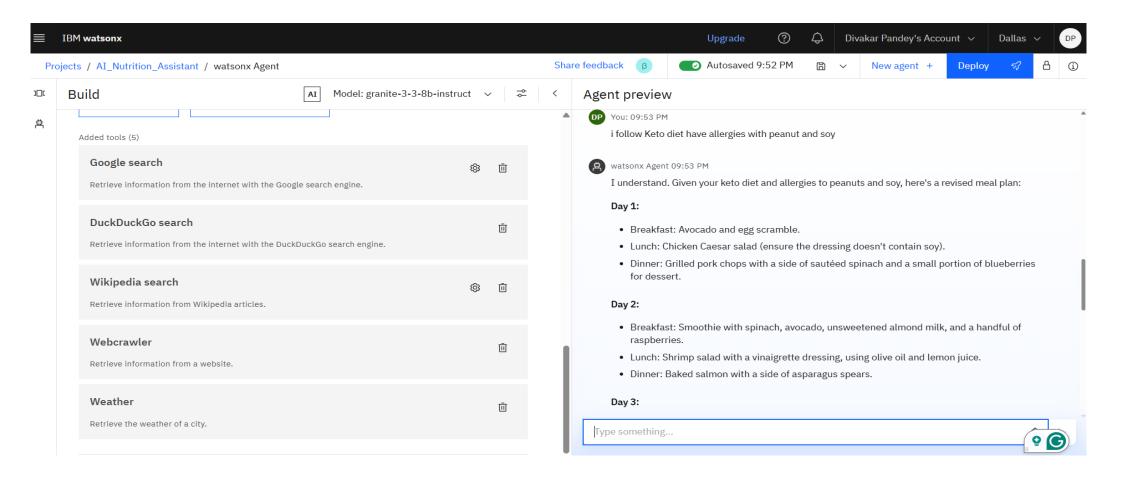
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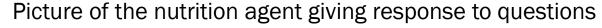






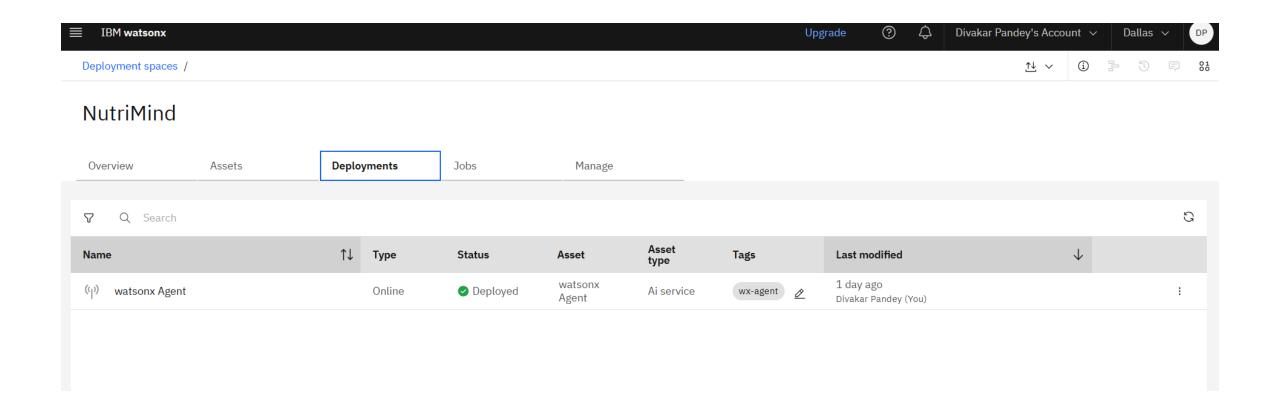
RESULT







RESULT





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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This certificate is presented to

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for the completion of

Lab: Retrieval Augmented Generation with LangChain

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According to the Adobe Learning Manager system of record

Completion date: 25 Jul 2025 (GMT)

Learning hours: 20 mins



THANK YOU

