CAPSTONE PROJECT

NUTRITION AGENT

Presented By:

- 1. Student Name- Shakiba Fatima
- 2. College Name- Siksha 'O' Anusandhan (ITER)
- 3. Department- CSE



OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach
- Algorithm & Deployment
- Result (Output Image)
- Conclusion
- Future Scope
- References



PROBLEM STATEMENT

- In today's world, people are becoming increasingly health-conscious and aware of the impact of diet on their overall well-being. However, most existing nutrition tools fail to meet individual needs because:
- They provide generic meal plans without considering unique health goals or medical backgrounds.
- They lack adaptability, offering static suggestions that do not evolve with the user's lifestyle or conditions.
- They ignore cultural and dietary restrictions, making them less relevant to diverse populations.
- They do not process real-world input such as food images or grocery labels for analysis.
- Dieticians and nutritionists face constraints in time and resources, limiting their ability to deliver personalized guidance to a large population.
- This gap between generic digital tools and personalized in-person consultation creates a significant challenge in delivering effective nutrition solutions at scale.



PROPOSED SOLUTION

• The proposed system aims to deliver real-time, personalized nutrition advice using generative AI, NLP, and multimodal input processing. It creates adaptive, health-specific meal plans while considering user preferences and medical needs. The solution includes the following components:

Multimodal Input Understanding:

Accept and interpret inputs via text, voice, and images.

Analyze food photos and dietary queries using NLP and image recognition to extract nutritional context.

User Profiling and Personalization:

Manage user data like health goals, conditions, allergies, and dietary restrictions.

Use this information to generate relevant and culturally appropriate meal plans.

Meal Plan Generation and Smart Recommendations:

Generate daily or weekly meal plans using Al tailored to user needs.

Include nutrient-balanced suggestions and offer smart food swaps.

Contextual Reasoning and Explanation:

Provide Al-generated explanations for all suggestions.

Allow users to query the system for deeper understanding and rationale.

Adaptive Feedback and Learning Loop:

Collect feedback to refine future recommendations.

Update meal plans based on evolving health and preference data.

Deployment:

Develop a web-based assistant using Watsonx.ai on IBM Cloud Lite.

Use IBM Granity for managing AI workflows and model logic.

Evaluation:

Assess accuracy and relevance of suggestions using performance metrics.

Incorporate user feedback to improve the system continuously.



SYSTEM APPROACH

- Development Tools & Stack:
- Watsonx.ai: For building intelligent agents capable of understanding and generating language, analyzing images, and learning from interaction.
- IBM Cloud Lite: For hosting APIs, managing backend services, and storing user sessions securely.
- IBM Granity: For managing workflows and model orchestration.
- Python + Flask API: Backend handling for model requests and user input.
- Multimodal Input: Integration of NLP (text), voice recognition, and image classification models.
- Databases Used:
 - USDA Food & Nutrition Database
 - Indian Food Composition Tables (IFCT)
 - Custom datasets on allergies, food labels, and recipes
- Architecture follows a modular pipeline:
- User Input → Preprocessing → Intent Recognition → Meal Planning Engine → Feedback Loop → Output Delivery

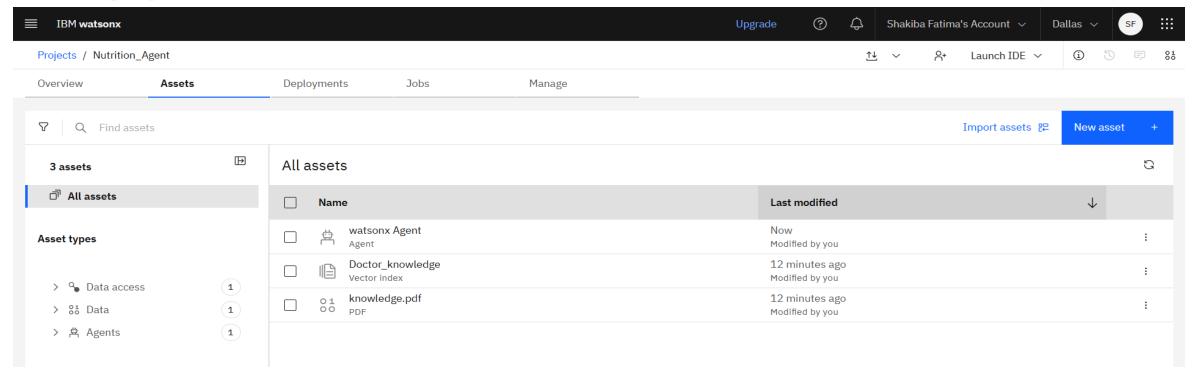


ALGORITHM & DEPLOYMENT

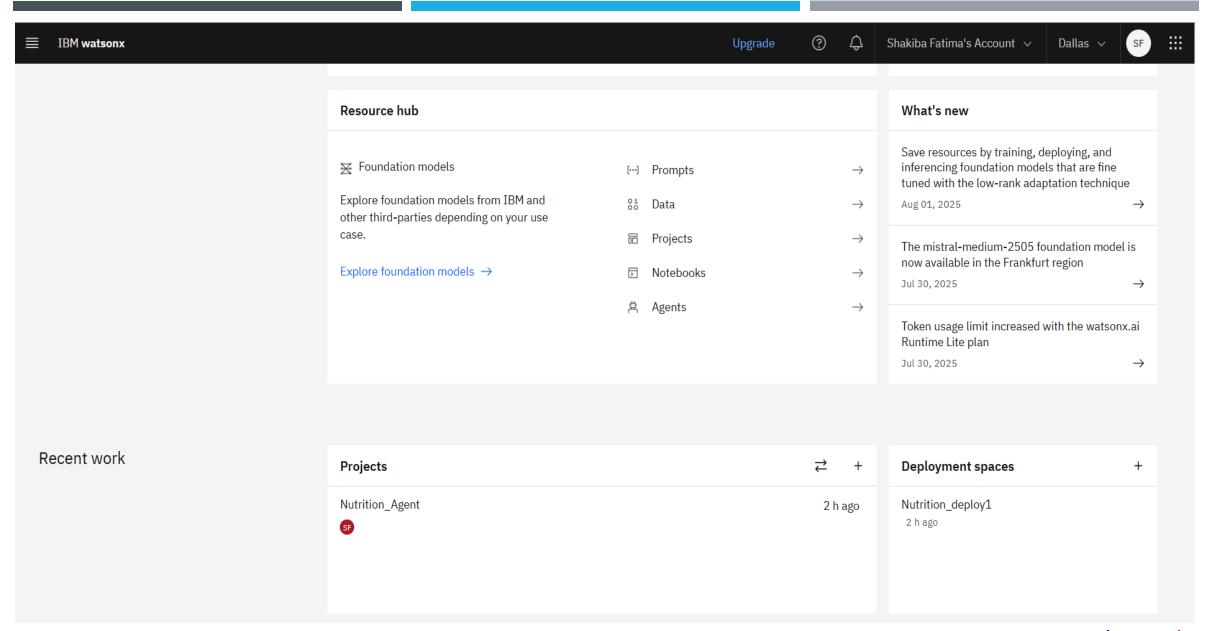
- Al Components and Workflow:
- Input Analysis:
- a) Text: Tokenization, Named Entity Recognition (e.g., diet type, allergies)
- b) Image: Food classification using pre-trained CNNs or IBM Visual Recognition
- c) Voice: Converted to text using speech-to-text APIs
- Recommendation Logic:
- a) GPT-based or fine-tuned LLMs for meal generation and reasoning
- b) Rule-based filters for allergies and restrictions
- c) Calorie balancing using nutrition databases
- Deployment on IBM Cloud Lite:
- a) REST API endpoints for all interaction modes
- b) Granity to manage session state, history, and feedback loop
- c) Secure data storage and user profile management
- Feedback Adaptation:
- a) Tracks user choices and satisfaction ratings
- b) Adjusts future meal plans accordingly



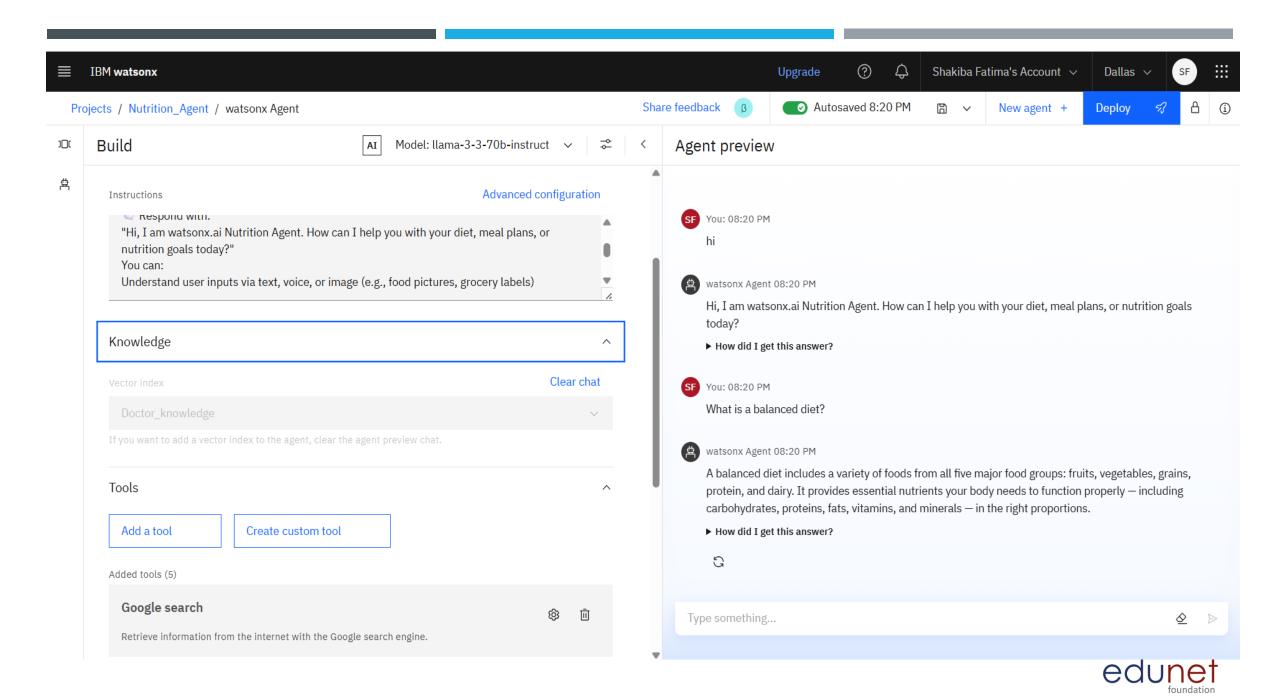
RESULT

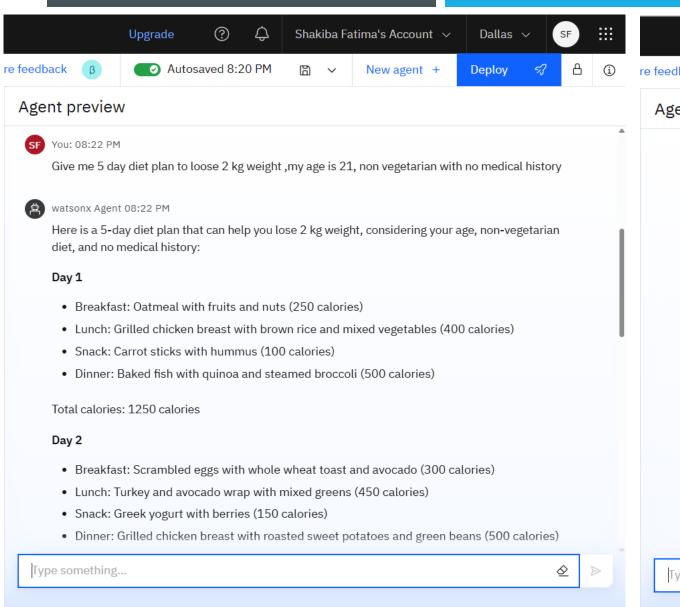


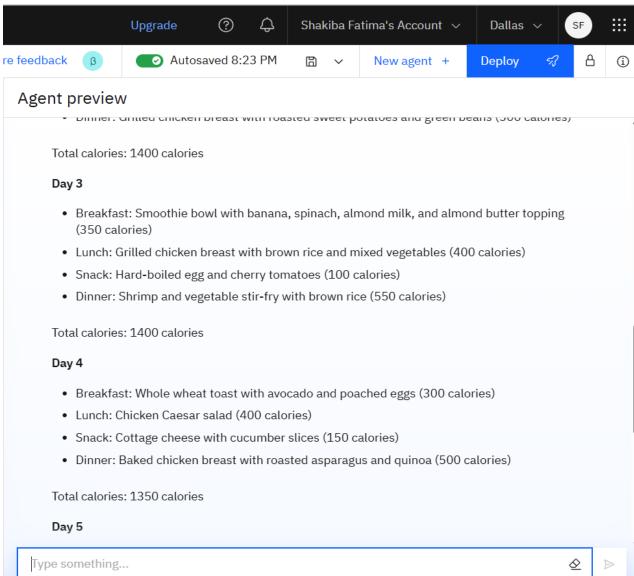














CONCLUSION

This project demonstrates the potential of generative AI to act as a scalable, intelligent, and empathetic nutrition advisor.

Achievements:

- Delivered personalized, culturally sensitive meal plans
- Enabled users to interact naturally using voice, text, or image
- Offered context-based food suggestions and swaps
- Adapted to users' evolving preferences and medical needs

The system effectively **bridges the gap** between one-size-fits-all apps and time-intensive dietician consultations.



FUTURE SCOPE

Next Steps for Enhancement:

- Integrate with wearable fitness and health devices (e.g., Fitbit, Apple Watch)
- Add voice response generation to complete multimodal interaction
- Implement multilingual support (e.g., Hindi, Spanish, Tamil)
- Enable offline meal planning mode with caching
- Extend to other domains: maternal nutrition, child nutrition, sports nutrition

Research Expansion:

- Fine-tune on clinical datasets for disease-specific diets
- Introduce emotional tone analysis for user engagement
- Incorporate real-time grocery price and availability



REFERENCES

- IBM Cloud Documentation: https://cloud.ibm.com/docs
- Watsonx.ai Developer Portal: https://dataplatform.cloud.ibm.com
- USDA Food & Nutrient Database
- Indian Food Composition Tables (IFCT)
- WHO Guidelines on Healthy Eating
- Research Paper: "Personalized Nutrition via AI Trends and Technologies" (Springer, 2023)
- Al in Healthcare Journal, IEEE 2022



IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence



Shakiba Fatima

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



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

Verify: https://www.credly.com/badges/86608827-85fb-4aec-8740-40a107faecb7





IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence



Shakiba Fatima

Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution



Issued on: Jul 19, 2025 Issued by: IBM SkillsBuild

Verify: https://www.credly.com/badges/40792505-456f-4434-9f66-0691c79ef788





IBM CERTIFICATIONS

IBM SkillsBuild

Completion Certificate



This certificate is presented to

Shakiba Fatima

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

