CAPSTONE PROJECT

NUTRITIONAL AGENT

Presented By:
1. Eshal Fathima – SRM Institute of Science and Technology – Big Data Analytics

edunet
foundation

OUTLINE

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

PROBLEM STATEMENT

Despite increasing health consciousness, individuals struggle to access truly personalized nutrition guidance. Existing diet tools often offer generic plans, ignoring cultural preferences, allergies, and changing health conditions. Human dieticians can't scale effectively due to time and resource constraints. There's a clear gap between one-size-fits-all apps and tailored consultations. This project aims to bridge that gap using an intelligent, AI-powered virtual nutrition assistant.

PROPOSED SOLUTION

- The proposed system aims to address the challenge of delivering truly personalized nutrition guidance using generative AI. It will understand individual goals, health conditions, and preferences to generate dynamic, adaptive meal plans. The assistant will provide real-time suggestions, food explanations, and smart swaps through natural interactions. The solution will consist of the following components::
- Data Collection:
  - Collect user-specific data such as age, weight, health conditions, fitness goals, allergies, and dietary preferences.
  - Integrate external sources like food databases, nutrition labels, and real-time health tracker inputs (e.g., wearables).
- Data Preprocessing:
  - Clean and standardize input data, handle missing or inconsistent entries, and encode categorical inputs like food preferences or restrictions.
  - Use NLP and image recognition models to extract insights from user queries, food photos, or scanned grocery items..
- Machine Learning Algorithm:
  - Leverage IBM Watson Studio to train and deploy generative AI models for personalized nutrition planning.
  - Use IBM Auto AI or custom models to incorporate user feedback, health data, and context-aware meal recommendations.
- Deployment:
  - Deploy the solution on IBM Cloud using IBM Cloud Functions or Kubernetes for scalability.
  - Utilize Watson Assistant for conversational interaction and ensure data is stored securely with IBM Cloud Object Storage.
- Evaluation:
  - Monitor model performance using IBM Watson OpenScale with metrics like user engagement, plan adherence, and feedback.
  - Continuously retrain and improve the model using Watson Machine Learning pipelines integrated with monitoring tools.

SYSTEM APPROACH

This section outlines the overall strategy and methodology for developing and implementing the AI-powered nutritional assistant.

◆ System Requirements

- IBM Cloud account (Lite/free tier)
- IBM Watson Studio (Lite) for model development and training
- IBM Watson Assistant (Lite) for conversational interface
- IBM Cloud Functions for lightweight backend logic
- IBM Cloud Object Storage or Cloudant DB (Lite) for storing user data

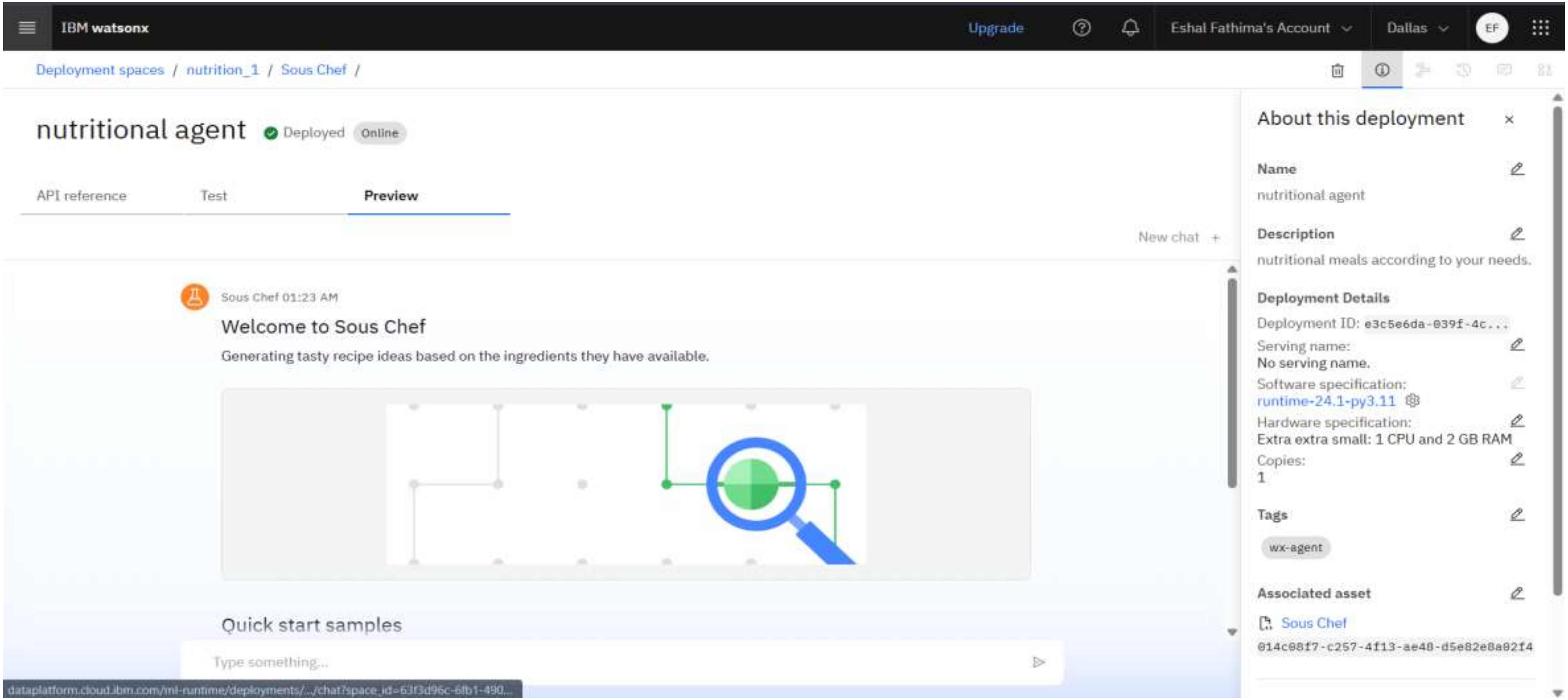
◆ Libraries Required to Build the Model

- Python (via Watson Studio Notebooks)
- Scikit-learn for preprocessing and logic-based filtering
- Transformers (lightweight usage) for generative model capabilities
- Pandas and NumPy for data manipulation
- Requests and JSON for API integrations

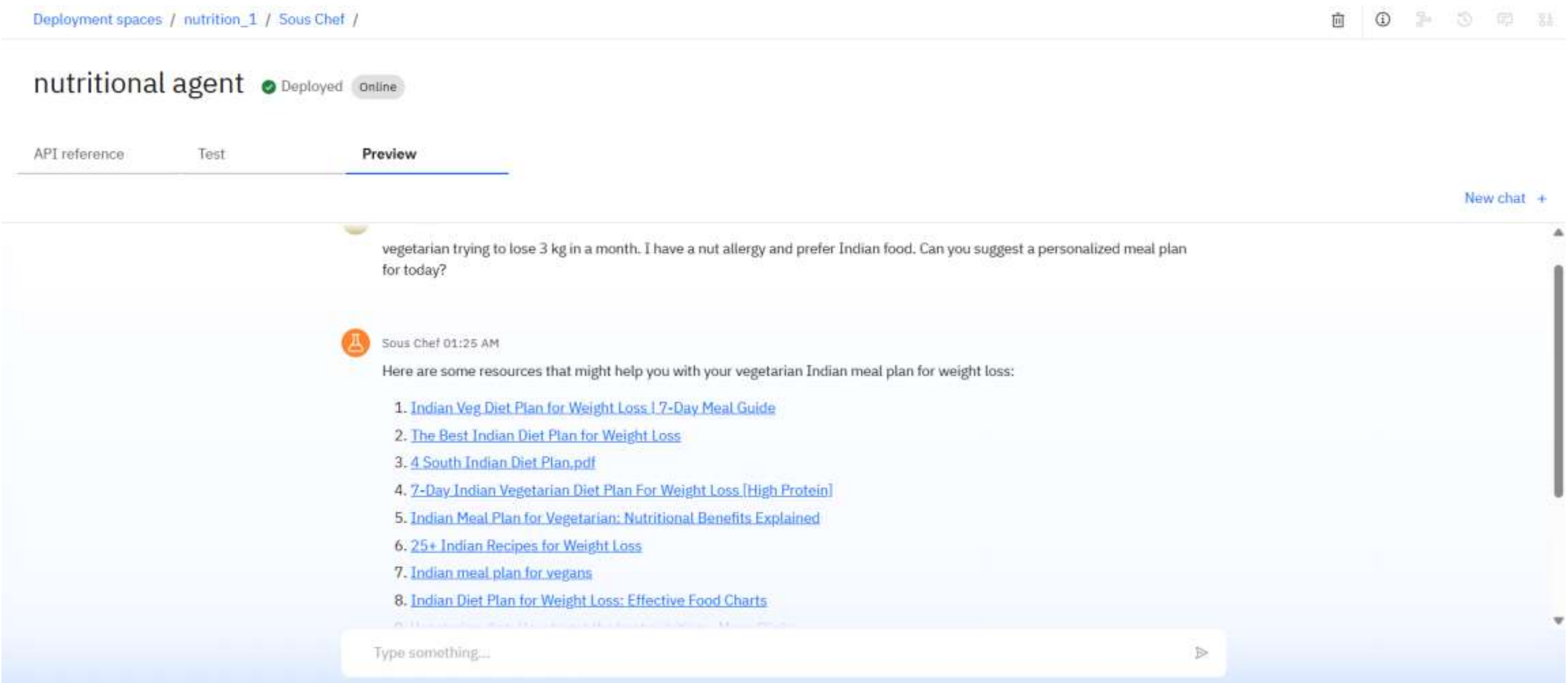
ALGORITHM & DEPLOYMENT

- In the Algorithm section, describe the machine learning algorithm chosen for predicting nutritional diets. Here's an example structure for this section:
- **Algorithm Selection:**
  - A lightweight generative model paired with rule-based filtering is used for creating personalized nutrition plans. It is deployed using IBM Watson Machine Learning (Lite) for efficient, context-aware recommendations.(eg: model: llama-3-3-70b-instruct)
- **Data Input:**
  - The algorithm takes inputs such as user age, weight, dietary preferences, allergies, health goals (e.g., weight loss, muscle gain), activity level, and optionally, weather or location data. Additional context like meal timing, food availability, and cultural preferences further guides the generation process.
- **Training Process:**
  - The system uses pre-trained language models enhanced with curated nutritional datasets and user interaction data. It is fine-tuned on IBM Watson Studio (Lite) using custom datasets aligned with dietary standards. The training involves basic cross-validation to ensure relevance, with limited tuning due to resource constraints of the free tier.
- **Prediction Process:**
  - Once deployed via IBM Watson Machine Learning, the model dynamically generates meal plans or suggestions in response to real-time user input.

RESULT


IBM watsonx
Upgrade
Eshal Fathima's Account
Dallas
EF
Deployment spaces / nutrition_1 / Sous Chef /
nutritional agent
Deployed
Online
API reference
Test
Preview
New chat +
Sous Chef 01:23 AM
Welcome to Sous Chef
Generating tasty recipe ideas based on the ingredients they have available.
Quick start samples
Type something...
dataplatform.cloud.ibm.com/ml-runtime/deployments/.../chat?space_id=63f3d96c-6fb1-490...
About this deployment
Name
nutritional agent
Description
nutritional meals according to your needs.
Deployment Details
Deployment ID: e3c5e6da-039f-4c...
Serving name:
No serving name.
Software specification:
runtime-24.1-py3.11
Hardware specification:
Extra extra small: 1 CPU and 2 GB RAM
Copies:
1
Tags
wx-agent
Associated asset
Sous Chef
014c08f7-c257-4f13-ae48-d5e82e8a02f4

RESULT



Deployment spaces / nutrition_1 / Sous Chef /
nutritional agent
Deployed
Online
API reference
Test
Preview
New chat +
vegetarian trying to lose 3 kg in a month. I have a nut allergy and prefer Indian food. Can you suggest a personalized meal plan for today?
Sous Chef 01:25 AM
Here are some resources that might help you with your vegetarian Indian meal plan for weight loss:
1. Indian Veg Diet Plan for Weight Loss | 7-Day Meal Guide
2. The Best Indian Diet Plan for Weight Loss
3. 4 South Indian Diet Plan.pdf
4. 7-Day Indian Vegetarian Diet Plan For Weight Loss [High Protein]
5. Indian Meal Plan for Vegetarian: Nutritional Benefits Explained
6. 25+ Indian Recipes for Weight Loss
7. Indian meal plan for vegans
8. Indian Diet Plan for Weight Loss: Effective Food Charts
Type something...

CONCLUSION

- The rise in health awareness demands smarter, more personalized nutrition solutions. Traditional tools and human consultations fall short in scalability and adaptability. By leveraging generative AI, we can create a virtual assistant that understands, learns, and evolves with users' needs. This solution bridges the gap between generic apps and expert advice. It marks a step toward truly intelligent and compassionate dietary support.

FUTURE SCOPE

- The AI nutrition assistant can integrate with wearable devices to track vitals and activity in real time. It can expand support for regional cuisines, languages, and cultural preferences to serve a global user base. Partnerships with grocery apps and meal delivery services could streamline diet implementation. Future versions may use medical records and genomic data for hyper-personalized plans. Integration with fitness apps can enable holistic health guidance.
  The assistant can learn from user behavior to improve over time through continuous feedback.
  Voice and image-based interaction can be enhanced for more intuitive communication.
  Eventually, it can evolve into a comprehensive AI health coach, not just a diet planner.

REFERENCES

- World Health Organization. *Healthy Diet*. Retrieved from: https://www.who.int/news-room/fact-sheets/detail/healthy-diet
- NIH. *Personalized Nutrition Research*. Retrieved from: https://www.nih.gov/news-events/news-releases/nih-funds-research-personalized-nutrition
- OpenAI. *GPT-4 Technical Capabilities*. Retrieved from: https://openai.com/gpt-4
- PubMed. *Artificial Intelligence and Personalized Nutrition*. Retrieved from: https://pubmed.ncbi.nlm.nih.gov/33995579/
- Stanford Medicine. *AI Transforming Healthcare*. Retrieved from: https://med.stanford.edu/news/all-news/2022/05/artificial-intelligence-health-care.html

IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence

Getting Started with Artificial Intelligence

Eshal Fathima

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence

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

Verify: https://www.credly.com/badges/f806266b-2221-4398-91a6-6ed00b7a4627

IBM

IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence

Journey to Cloud: Envisioning Your Solution
IBM SkillsBuild

Eshal Fathima

Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution

Issued on: Jul 20, 2025
Issued by: IBM SkillsBuild

Verify: https://www.credly.com/badges/828ce8ce-7f75-40ad-9920-7069fb497996

IBM

IBM CERTIFICATIONS

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Eshal Fathima

for the completion of

Lab: Retrieval Augmented Generation with LangChain

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 04 Aug 2025 (GMT)

Learning hours: 20 mins

THANK YOU