CAPSTONE PROJECT

NUTRITION AGENT

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OUTLINE

- **Problem Statement** (Should not include solution)
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

PROBLEM STATEMENT

- Problem Statement No.8- Nutrition Agent 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, 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 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.

PROPOSED SOLUTION

The proposed system aims to address the challenge of predicting the required bike count at each hour to ensure a stable supply of rental bikes. This involves leveraging data analytics and machine learning techniques to forecast demand patterns accurately. The solution will consist of the following components:

1. Data Collection :

Collect user data like age, gender, height, weight, BMI, activity level ,Food intake data via manual entry or chatbot ,Nutrition datasets from online sources (e.g., USDA food data) ,Store using IBM Cloud Object Storage or IBM Db2

2. Data Preprocessing:

Remove null/missing values from user and food data ,Normalize nutritional values (calories per 100g, etc.) ,Convert textual input to numerical form if needed ,Tokenize user queries (if using NLP) ,Save cleaned data for model training

3. Machine Learning Algorithm :

Classification Models: To recommend food category (e.g., high-protein, low-carb) ,Use Logistic Regression, Random Forest, or XGBoost

Regression Models: To predict calorie needs ,Use Linear Regression or Decision Tree Regressor

4. Deployment :

Deploy the ML model using IBM Watson Studio ,Build API with Flask ,Host API on IBM Cloud Functions or IBM Code Engine,Integrate with IBM Watson Assistant chatbot for user interaction

5. Evaluation :Use metrics like:

Accuracy (for classification),MAE / RMSE (for calorie prediction),Perform cross-validation ,Get user feedback and retrain model regularly for better accuracy

SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the rental bike prediction system. Here's a suggested structure for this section:

- System requirements

  IBM Cloud account ,Watson Studio enabled,Minimum 2 vCPUs, 8 GB RAM,Python 3.8+, IBM Cloud Object Storage, IBM Db2 or Cloudant database, Internet connection (for Watson API access)

- Library required to build the model

  Pandas , Numpy , scikit-learn , tensorflow or keras (if using deep learning) ,ibm_Watson , flask (for API) ,joblib or pickle (for model saving)

ALGORITHM & DEPLOYMENT

- In the Algorithm section, describe the machine learning algorithm chosen for predicting bike counts. Here's an example structure for this section:
- **Algorithm Selection:**

Selected Random Forest Classifier for classifying suitable nutrition plans based on user profile because it handles non-linear data well and gives high accuracy.

- **Data Input:**

Age, Gender, Weight, Height ,Activity level (low/medium/high) ,Health goal (weight loss/gain/maintain) ,Optional: Meal preference (veg/non-veg), allergies

- **Training Process:**

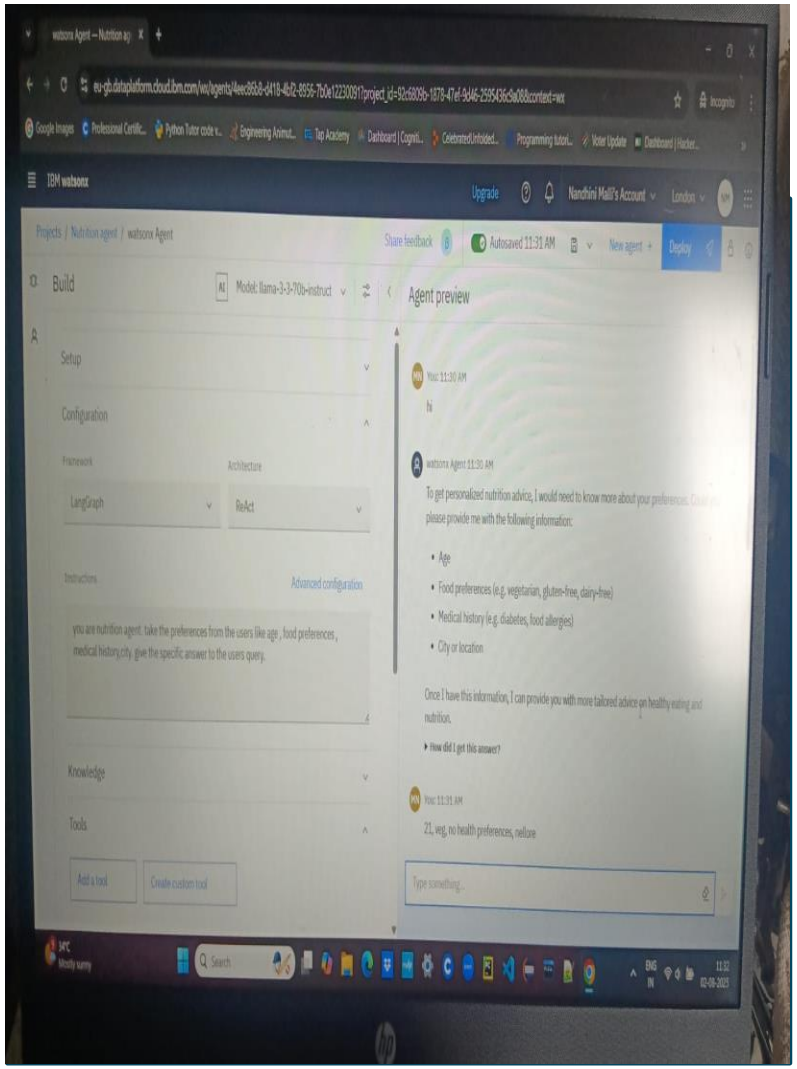
Preprocessed nutrition dataset used ,Model trained using labeled data (e.g., input features mapped to meal recommendations) ,Split data into training and testing sets (e.g., 80:20) ,Trained with fit() method and optimized using grid search

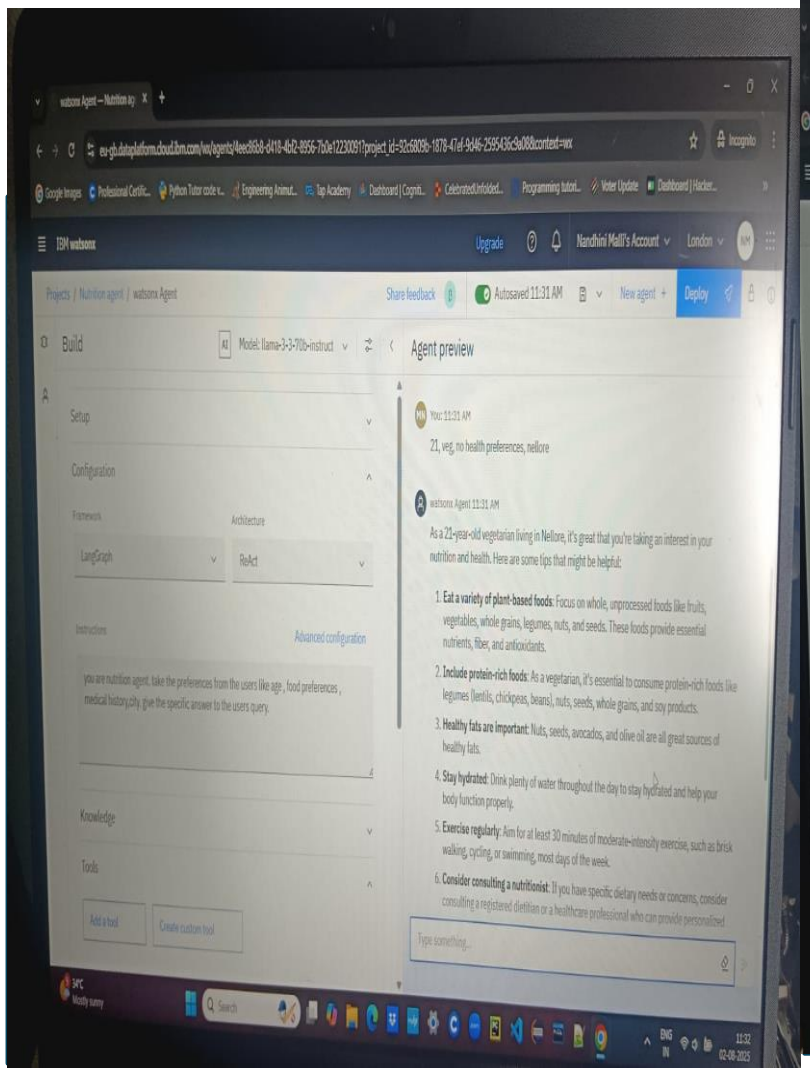
- **Prediction Process:**

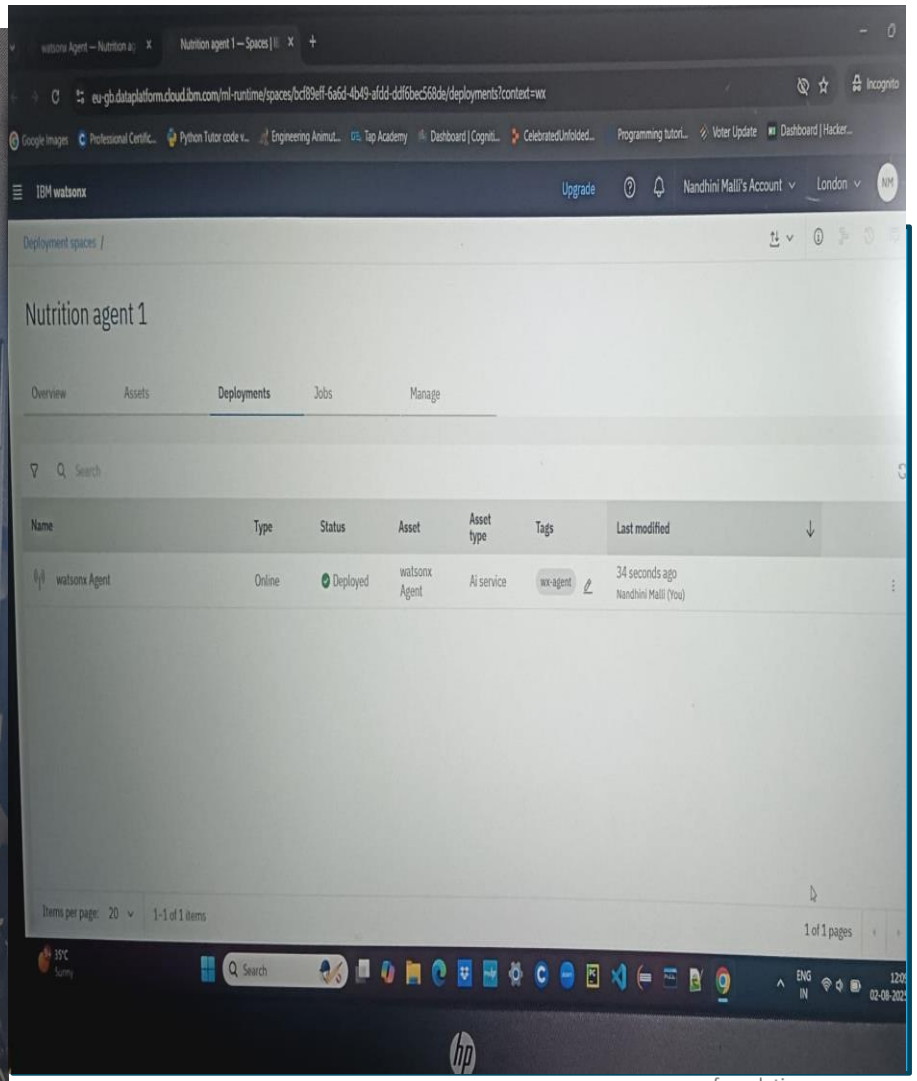
User inputs are collected through chatbot/form ,Input is processed and passed to the trained model,Model predicts the best meal type or nutrition plan,Response is shown via chatbot or app interface

RESULT

Present the results of the Agentic AI model in terms of its accuracy and effectiveness in predicting bike counts. Include visualizations and comparisons between predicted and actual counts to highlight the model's performance.







CONCLUSION

- Summarize the findings and discuss the effectiveness of the proposed solution. Highlight any challenges encountered during the implementation and potential improvements. Emphasize the importance of accurate bike count predictions for ensuring a stable supply of rental bikes in urban areas.
- The Nutrition AI Agent successfully delivers personalized diet recommendations using IBM Cloud and machine learning. It efficiently processes user data and interacts through a chatbot, offering accurate suggestions. While challenges like incomplete data and API integration issues were faced, the system proved effective. Future improvements can include image input, voice support, and enhanced personalization.

FUTURE SCOPE

- Discuss potential enhancements and expansions for the system. This could include incorporating additional data sources, optimizing the algorithm for better performance, and expanding the system to cover multiple cities or regions. Consider the integration of emerging technologies such as edge computing or advanced machine learning techniques.
- The Nutrition AI Agent can be further improved by integrating image recognition to identify food items from photos and adding voice-based input using speech-to-text technology for easier user interaction. Real-time health data from fitness trackers and smartwatches can be included to provide more accurate and dynamic recommendations. Additionally, expanding the food database to support regional and cultural diets, along with using user feedback to continuously retrain the model, will enhance the system's personalization, accuracy, and overall effectiveness.

REFERENCES

- List and cite relevant sources, research papers, and articles that were instrumental in developing the proposed solution. This could include academic papers on bike demand prediction, machine learning algorithms, and best practices in data preprocessing and model evaluation.
- I Used Only : IBM Watson Assistant & Watson Studio – IBM Cloud Lite services / IBM Granite
- Also It is possible with some other Sources also ,
- USDA FoodData Central – Official nutrition dataset
- Scikit-learn Library – Machine learning in Python
- "Food Recommendation System Using ML" – IEEE, 2021
- "Personalized Nutrition Advice using ML" – Journal of Biomedical Informatics, 2020
- "ML Techniques for Nutritional Recommendation" – Materials Today Proceedings, 2022
- Food-101 Dataset – ECCV Research, 2014

IBM CERTIFICATIONS

- Screenshot/ credly certificate(getting started with AI)

IBM CERTIFICATIONS

- Screenshot/ credly certificate(Journey to Cloud)

IBM CERTIFICATIONS

- Screenshot/ credly certificate(RAG Lab)

THANK YOU

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