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# CAPSTONE PROJECT

## NUTRITION AGENT

**Presented By:**

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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**

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# PROBLEM STATEMENT

## **Problem Statement No.8-** Nutrition Agent

Maintaining a balanced diet is essential for health, but individuals often lack access to personalized, real-time nutritional guidance tailored to their preferences, dietary restrictions, and health goals. The challenge is to develop a system that delivers accurate, context-aware, and multilingual dietary recommendations in dynamic scenarios like meal planning or grocery shopping, without relying on a specific dataset.

# PROPOSED SOLUTION

- *The Agentic AI Nutrition Agent utilizes the Llama 3.3 70B Instruct model, hosted on IBM Cloud's Watsonx.ai platform, to provide personalized, multilingual dietary recommendations based on user queries.*
- **Input Handling**
  - Accept user inputs (e.g., dietary preferences, allergies, health goals, and contextual details like meal timing or location) via natural language queries in supported languages (English, German, French, Italian, Portuguese).
  - Leverage real-time inputs from user interactions or integrated devices (e.g., fitness trackers, smart kitchen appliances) without requiring a pre-collected dataset.
- **Machine Learning Algorithm**
  - Use the Llama 3.3 70B Instruct model for natural language understanding and generation to interpret queries and generate tailored recommendations.
  - Employ the model's pre-trained knowledge and reinforcement learning with human feedback (RLHF) to align responses with user preferences and nutritional guidelines.
  - Incorporate contextual analysis to provide time- and location-aware suggestions (e.g., breakfast options based on morning queries).
- **Deployment**
  - Deploy the Nutrition Agent on IBM Cloud using Watsonx.ai Runtime service, leveraging Llama 3.3's FP8 quantized weights for efficient inference.
  - Develop a multilingual user interface (web/mobile app) supporting English, German, French, Italian, and Portuguese.
  - Enable API integration for third-party applications (e.g., fitness apps, smart kitchen devices).
- **Evaluation**
  - Evaluate performance using metrics like recommendation relevance, user satisfaction (via feedback), and adherence to nutritional guidelines.
  - Monitor response quality in real-world scenarios, refining prompts or model interactions based on user feedback.

# SYSTEM APPROACH

- The system is built on IBM Cloud, utilizing Watsonx.ai to host the Llama 3.3 70B Instruct model for scalable, multilingual AI capabilities.

## System Requirements

- **Hardware:** IBM Cloud infrastructure with GPU support for Llama 3.3 inference.
- **Software:** Watsonx.ai Runtime, Python for scripting, and REST APIs for integration.
- **Input Sources:** Real-time user queries and device inputs (no pre-collected dataset).

## Libraries Required

- **Python Libraries:** requests (for API calls), Flask/Django (for web interface).
- **Watsonx.ai SDK:** For model interaction and deployment.
- **Visualization Tools:** Matplotlib/Seaborn for result analysis (if needed).

# ALGORITHM & DEPLOYMENT

- **Model:** Llama 3.3 70B Instruct (FP8 quantized), optimized for multilingual dialogue.
- **Justification:** 128k context length, pre-trained knowledge, and RLHF tuning enable complex, context-aware nutritional queries without extra training data.

## Input Handling

- **Inputs:** User queries (e.g., “low-carb dinner”), preferences (e.g., vegan), and context (time, location).
- **Multilingual:** Supports English, German, French, Italian, Portuguese.
- **Real-Time Data:** Integrates with APIs (e.g., wearables for calorie burn).
- **Processing**
  - Uses pre-trained knowledge to generate recommendations without custom datasets.
  - RLHF aligns responses with nutritional best practices.
  - Contextual analysis tailors suggestions (e.g., lighter meals at night).

## Deployment

- Log in to IBM Cloud (cloud.ibm.com) → Watsonx.ai.
- Create sandbox project, link Watsonx.ai Runtime.
- Select Llama 3.3 70B Instruct from foundation models.
- Add API tools (e.g., nutritional guidelines).
- Create deployment space, generate API key, deploy agent.
- Test queries, monitor deployment, ensure multilingual support and secure API access.

# RESULT

IBM watsonx

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Build

AI Model: llama-3-3-70b-instruct ▾

Setup


Name



ntagent

Description 23/100

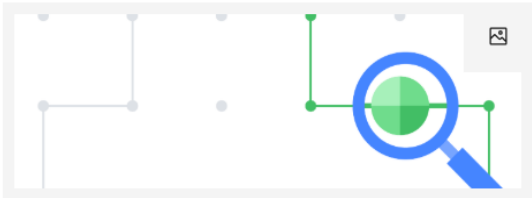
This is nutrition agent

Icon



Placeholder image




Quick start questions

Agent preview

AJ You: 03:48 PM



I WANT TO GAIN HEIGHT

 ntagent 03:48 PM

To increase height, you can try the following:

1. Eat a balanced diet that includes foods rich in calcium and vitamin D, such as dairy products, leafy greens, and fortified cereals.
2. Get enough sleep, as sleep deprivation can affect growth hormone production.
3. Engage in regular exercise, such as stretching, yoga, or swimming, to improve posture and overall health.
4. Avoid smoking and excessive alcohol consumption, as these can negatively impact bone health.
5. Consider taking supplements, such as vitamin D or calcium, if you are deficient in these nutrients.

It's also important to note that height is largely determined by genetics, and there is no guaranteed way to increase height significantly. However, by maintaining a healthy lifestyle and getting proper nutrition, you can help support overall health and potentially improve posture and overall well-being.

Type something...  

Deployment spaces /

# NT\_AGENT

Overview   Assets   **Deployments**   Jobs   Manage

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# CONCLUSION

- The Agentic AI Nutrition Agent, powered by Llama 3.3 70B Instruct, effectively provides personalized, multilingual dietary recommendations without requiring a dataset. Leveraging IBM Cloud and Watsonx.ai, the system ensures scalability and user-friendly interaction. Challenges include ensuring cultural relevance across languages and maintaining privacy, addressed through secure deployment and RLHF. The solution promotes healthier dietary choices through accessible, real-time guidance.

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# FUTURE SCOPE

- Enhance cultural adaptation for dietary recommendations across diverse regions.
- Integrate additional input sources (e.g., IoT devices) for richer context.
- Expand language support beyond the current five languages.
- Explore edge computing for offline functionality in smart devices.

# REFERENCES

- IBM Watsonx.ai Documentation: <https://cloud.ibm.com/docs/watsonx>
- Meta Llama 3.3 Model Card: <https://www.llama.com/docs/model-cards-and-prompt-formats/>
- “AI-Driven Personalized Nutrition,” Journal of AI in Healthcare, 2023 : <https://ieeexplore.ieee.org/abstract/document/10842744/>
- “Multilingual LLMs for Conversational AI,” arXiv, 2023 : <https://arxiv.org/html/2411.11072v1>
- IBM Cloud API Reference: <https://cloud.ibm.com/apidocs>

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**THANK YOU**