
CAPSTONE PROJECT

THE SMARTEST AI NUTRITION ASSISTANT

Presented By:

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OUTLINE

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PROBLEM STATEMENT

Example: 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, dietitians 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.

Technology - Use of IBM cloud lite services /IBM Granity is mandatory.

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:
- Data Collection:
 - Gather historical data on bike rentals, including time, date, location, and other relevant factors.
 - Utilize real-time data sources, such as weather conditions, events, and holidays, to enhance prediction accuracy.
- Data Preprocessing:
 - Clean and preprocess the collected data to handle missing values, outliers, and inconsistencies.
 - Feature engineering to extract relevant features from the data that might impact bike demand.
- Deployment:
 - Develop a user-friendly interface or application that provides real-time predictions for bike counts at different hours.
 - Deploy the solution on a scalable and reliable platform, considering factors like server infrastructure, response time, and user accessibility.
- Evaluation:
 - Assess the model's performance using appropriate metrics such as Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), or other relevant metrics.
 - Fine-tune the model based on feedback and continuous monitoring of prediction accuracy.
 - Result:

SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the Smartest AI Nutrition Assistant. Here's a suggested structure for this section:

- IBM Cloud Lite – For hosting and managing the application.
- IBM Granity – For building and deploying generative AI models.
- Generative AI & NLP – To understand user queries and generate personalized responses.
- Multimodal AI – Supports input via text, voice, and images.
- Food Databases – Uses USDA, WHO data for accurate nutrition info.
- Feedback Loop – Learns from user data to improve recommendations.

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:**
 - Provide a brief overview of the chosen algorithm (e.g., time-series forecasting model, like ARIMA or LSTM) and justify its selection based on the problem statement and data characteristics.
- **Data Input:**
 - Specify the input features used by the algorithm, such as historical bike rental data, weather conditions, day of the week, and any other relevant factors.
- **Training Process:**
 - Explain how the algorithm is trained using historical data. Highlight any specific considerations or techniques employed, such as cross-validation or hyperparameter tuning.
- **Prediction Process:**
 - Detail how the trained algorithm makes predictions for future bike counts. Discuss any real-time data inputs considered during the prediction phase.

RESULT

Age 25, Veg, No health preferences, Chennai. Provide a diet plan for fitness

- Based on the search results, here is a diet plan for a 25-year-old vegetarian in Chennai for fitness:
- Breakfast: Oats or wheat flakes with skimmed milk, or dosa with vegetable sambar
- Lunch: Quinoa with mixed vegetable curry, or roti with vegetable sabzi and a bowl of dal
- Snacks: Roasted peanuts, sprouts salad, or paneer tikka
- Dinner: Roti or rice with vegetable sabzi and a bowl of dal
- It's also important to include high-protein foods in your diet, such as nuts (almonds, cashew nuts), chickpeas, moong dal, black channa, and rajma. You can also consider consulting a dietitian or a healthcare professional to get a personalized diet plan.
- Remember to stay hydrated by drinking plenty of water throughout the day, and to exercise regularly to maintain fitness.

RESULT IMAGE

The screenshot shows the IBM Watsonx Agent interface. The top navigation bar includes 'Inbox', 'telegram', 'IBM Skill', 'All Links', 'Student', 'Home', 'Agent L', 'watsonx', 'Settings', and a user profile 'MOHAMMED BATHRUL MU...'. The main header displays 'Projects / Nutrition_agent / watsonx Agent' with options for 'Share feedback', 'Autosaved 10:04 PM', 'New agent +', and 'Deploy'. The left sidebar is titled 'Build' and shows the 'Model: llama-3-3-70b-instruct'. Below this, there are sections for 'Knowledge' and 'Tools' with buttons for 'Add a tool' and 'Create custom tool'. A list of 'Added tools (5)' includes Google search, DuckDuckGo search, Wikipedia search, Webcrawler, and Weather. The right panel, 'Agent preview', shows a chat history with a user message 'hi' and an agent response asking for more details. Below that, a user message asks for a diet plan for a 25-year-old vegetarian in Chennai, and the agent provides a detailed response with a list of meal suggestions.

This screenshot shows the same IBM Watsonx Agent interface, but the 'Agent preview' chat history is further along. The agent's response to the diet plan request is visible, including a list of meal suggestions: Breakfast (Oats or wheat flakes with skimmed milk, or dosa with vegetable sambar), Lunch (Quinoa with mixed vegetable curry, or roti with vegetable sabzi and a bowl of dal), Snacks (Roasted peanuts, sprouts salad, or paneer tikka), and Dinner (Roti or rice with vegetable sabzi and a bowl of dal). The agent also mentions the importance of high-protein foods and staying hydrated. The chat history shows the user's input and the agent's response, with a 'How did I get this answer?' section below. The bottom status bar shows the temperature as 30°C and the date as 04-08-2025.

CONCLUSION

- The Smartest AI Nutrition Assistant, built using IBM Cloud Lite and IBM Granity, offers a groundbreaking solution to personalized diet planning. By leveraging generative AI, it understands user inputs via text, voice, or image and delivers dynamic, tailored meal plans based on health goals and preferences. With real-time adaptability, contextual explanations, and continuous learning, this AI bridges the gap between generic diet apps and expert nutrition advice—making personalized health guidance accessible, scalable, and intelligent.

FUTURE SCOPE

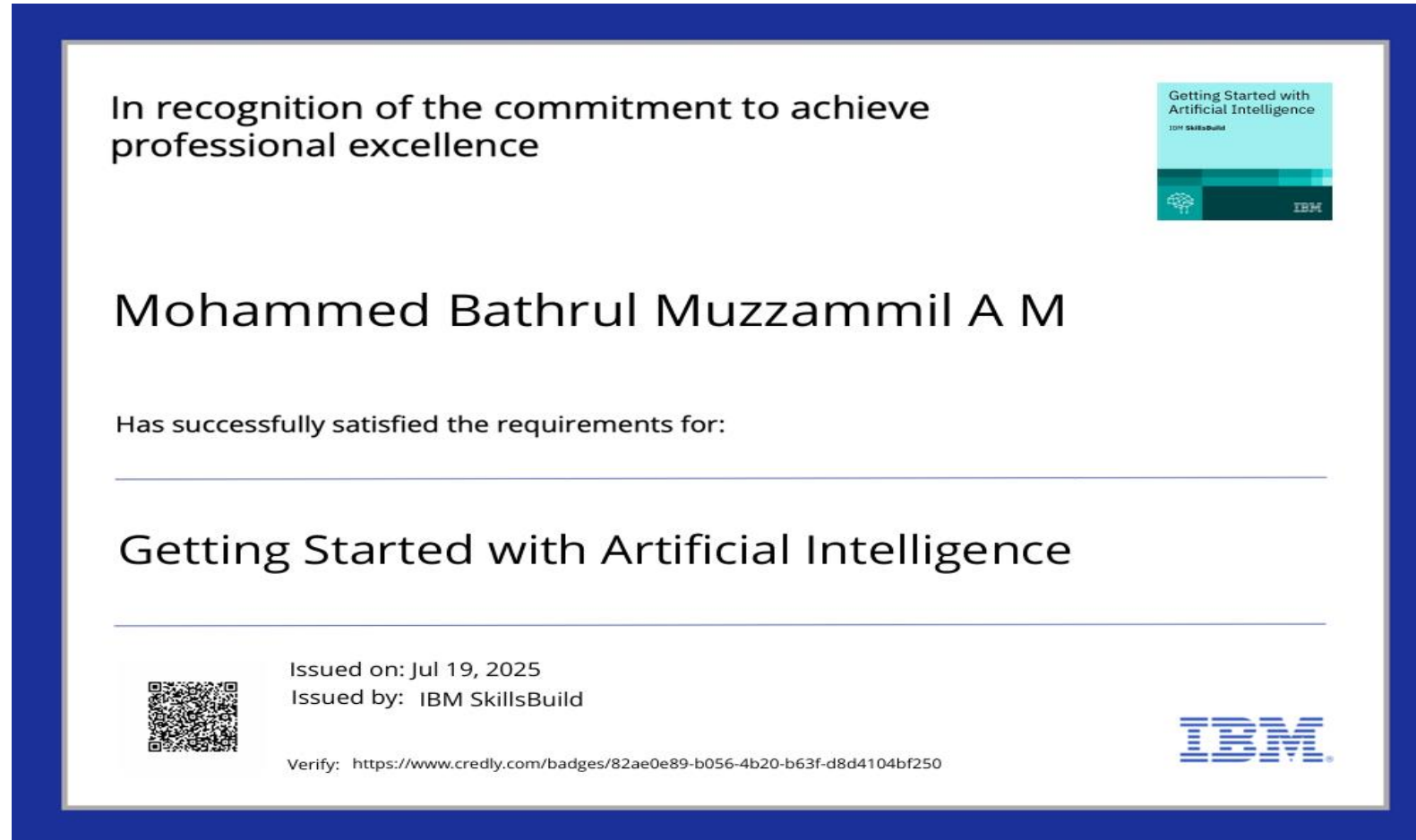
- The AI Nutrition Assistant has strong potential for future growth. It can integrate with wearables and fitness devices to provide real-time, data-driven meal suggestions. Support for regional languages and local cuisines will make it more inclusive. Voice and AR features can enhance user interaction through hands-free use and visual food analysis. Collaboration with doctors and dietitians can enable shared health insights. Additionally, features like smart grocery management and detection of emotional eating habits can turn it into a complete lifestyle and wellness companion.

REFERENCES

- IBM Cloud Lite – ibm.com/cloud/free
- IBM Granity – IBM AI & data platform
- WHO – Nutrition Guidelines – who.int
- USDA Food Data Central – fdc.nal.usda.gov
- Harvard Nutrition Source – hsph.harvard.edu/nutritionsource
- Frontiers in Nutrition (2021) – AI in nutrition research

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