

RECIPE PREPARATION AGENT PROJECT

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

Problem Statement

1

In today's fast-paced world, individuals often struggle to plan meals based on the limited ingredients available at home.

2

This can lead to unnecessary grocery shopping, increased food waste, and inefficient use of time.

3

There is a clear need for a system that can assist users in preparing meals using only what they already have, while also accommodating dietary restrictions and personal preferences.

Proposed Solution

- The proposed system is an **AI-powered Recipe Preparation Agent** designed to assist users in preparing meals using only the ingredients they currently have available. At its core, the system leverages a **Retrieval-Augmented Generation (RAG)** approach, combining traditional information retrieval techniques with a powerful generative language model to produce intelligent, personalized recipe recommendations.

Core Functionality:

1. Ingredient-Based Recipe Retrieval:

- Users input a list of available ingredients via a simple interface.
- The system uses semantic search techniques to query a pre-built recipe database and retrieve the most relevant recipes that match the ingredients.
- Recipes are scored based on relevance, ingredient match percentage, and user preferences.

2. Dynamic Recipe Generation:

- The RAG model refines the retrieved recipes to suit the specific ingredients the user has.
- It generates personalized, step-by-step cooking instructions that either omit unavailable ingredients or provide appropriate substitutions.
- Instructions are written in natural language for clarity and simplicity.

3. Substitutions and Tips:

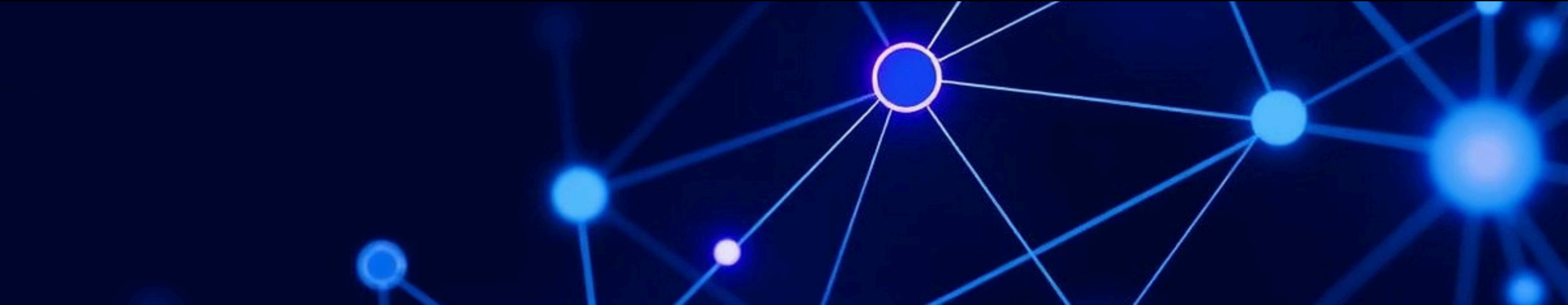
- If certain ingredients are missing or insufficient, the system suggests smart substitutions (e.g., Greek yogurt instead of sour cream).
- Cooking tips and variations are provided (e.g., "Add lemon juice for extra tanginess" or "Can be made vegan by replacing butter with olive oil").

4. Dietary Preferences and Filters:

- Users can set dietary preferences (e.g., vegetarian, gluten-free, keto).
- The agent filters recipes accordingly and adjusts instructions to accommodate allergies or restrictions.

5. User Interaction and Feedback Loop:

- The system allows users to rate recipes and provide feedback.
- This feedback is used to improve future recipe recommendations and personalize suggestions further.



System Requirements

Local Development:

- **CPU:** Intel i5 or better
- **RAM:** 8 GB (16 GB recommended)
- **Storage:** 50+ GB SSD
- **Optional:** GPU (for training models)

IBM Cloud Services:

- **Compute:** IBM Cloud Code Engine or Kubernetes
- **Storage:** IBM Cloudant & IBM Cloud Object Storage
- **AI Services:** watsonx.ai, Watson Discovery, Watson NLU

Algorithm & Deployment

Algorithm

1. **User Input:**
User enters available ingredients and dietary preferences.
2. **Ingredient Processing:**
Use NLP (IBM Watson NLU) to extract key ingredients and preferences.
3. **Recipe Retrieval:**
Search recipes using semantic search with IBM Watson Discovery to find matches based on input ingredients.
4. **Recipe Adaptation:**
Use watsonx.ai (RAG model) to generate personalized step-by-step instructions, adjusting for missing ingredients with substitutions.
5. **Output:**
Display adapted recipe, cooking tips, and substitutions to the user.
6. **Feedback Loop (Optional):**
Collect user ratings to improve future recommendations.

Deployment

- **Backend APIs:** Deploy on IBM Cloud Code Engine or Kubernetes cluster for scalability.
- **AI Services:** Hosted via IBM watsonx.ai and Watson Discovery managed services.
- **Storage:** Use IBM Cloudant (NoSQL) for user data and IBM Cloud Object Storage for recipe assets.
- **Frontend:** Hosted on IBM Cloud or any static hosting service (e.g., IBM Cloud Object Storage static website).
- **Monitoring:** IBM Cloud Monitoring (Sysdig) and LogDNA for logging and performance tracking.
- **Security:** API keys and secrets managed via IBM Key Protect.

Result

IBM watsonx

Upgrade

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Deployment spaces / AgenticAI_1 / Sous Chef /

Sous Chef

Deployed

Online

API reference

Test

Preview

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muri mixture

Sous Chef 10:30 PM

Here are some recipes for Muri Mixture:

1. Street Style Mixture | Muri Mixture Recipe | Indian Street Food | Puffed Rice Mixture |Snacks Recipe

• **Description:** A popular Indian street food made with puffed rice, roasted peanuts, onion, tomato, green chili, coriander leaves, salt, chili powder, chaat masala, and lemon juice.

• **URL:** [YouTube](#)

Type something...

Deployment Details

Deployment ID: 0fe7b23f-f482-48...

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

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Last modified

3 minutes ago

Created on

Aug 3, 2025

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Sous Chef ✔ Deployed Online

API reference Test **Preview**

New chat +

2. Jhal Muri Recipe (Jhalmuri) - Swasthi's Recipes

- **Description:** A simple and healthy snack made with tomatoes, cucumber, onions, potatoes, coriander leaves, green chilies, salt, and red chili powder.
- **URL:** [Swasthi's Recipes](#)

3. Quick & Easy Snack Recipe - Muri Mixture - Puffed Rice Mixture

- **Description:** A quick and easy snack recipe made with puffed rice, peanuts, curry leaves, sliced onion, cashew nuts, turmeric, crushed garlic, salt, oil, and chili powder.
- **URL:** [YouTube](#)

4. Murri Mixture - Andhra Bhel Puri

- **Description:** A typical Andhra street food fare made with puffed rice, onions, tomato, peanuts, lemon juice, and fresh

Type something...




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Conclusion

- The Recipe Preparation Agent effectively simplifies everyday cooking by using AI to generate personalized recipes based on the ingredients users already have. By integrating IBM Cloud services such as Watson Discovery and watsonx.ai, the system intelligently retrieves and adapts recipes, suggests ingredient substitutions, and accommodates dietary preferences. This not only saves time and effort but also helps reduce food waste, making cooking more sustainable and efficient. The project demonstrates how cloud-based AI solutions can transform routine tasks into smart, user-friendly experiences.

Future scope

Future Scope



Voice Assistant Integration:

Add support for IBM Watson Assistant or Alexa/Google Assistant for hands-free cooking.



Smart Kitchen Integration:

Connect with IoT-enabled appliances (fridges, ovens) to auto-detect available ingredients.



Mobile App Development:

Create a mobile version with barcode scanning and real-time recipe suggestions.



Multilingual Support:

Enable recipe generation and instructions in multiple languages for wider accessibility.



Meal Planning & Shopping List:

Suggest weekly meal plans and generate smart shopping lists based on missing ingredients.



Nutritional Analysis:

Integrate calorie and nutritional value estimation using AI.



User Personalization with AI:

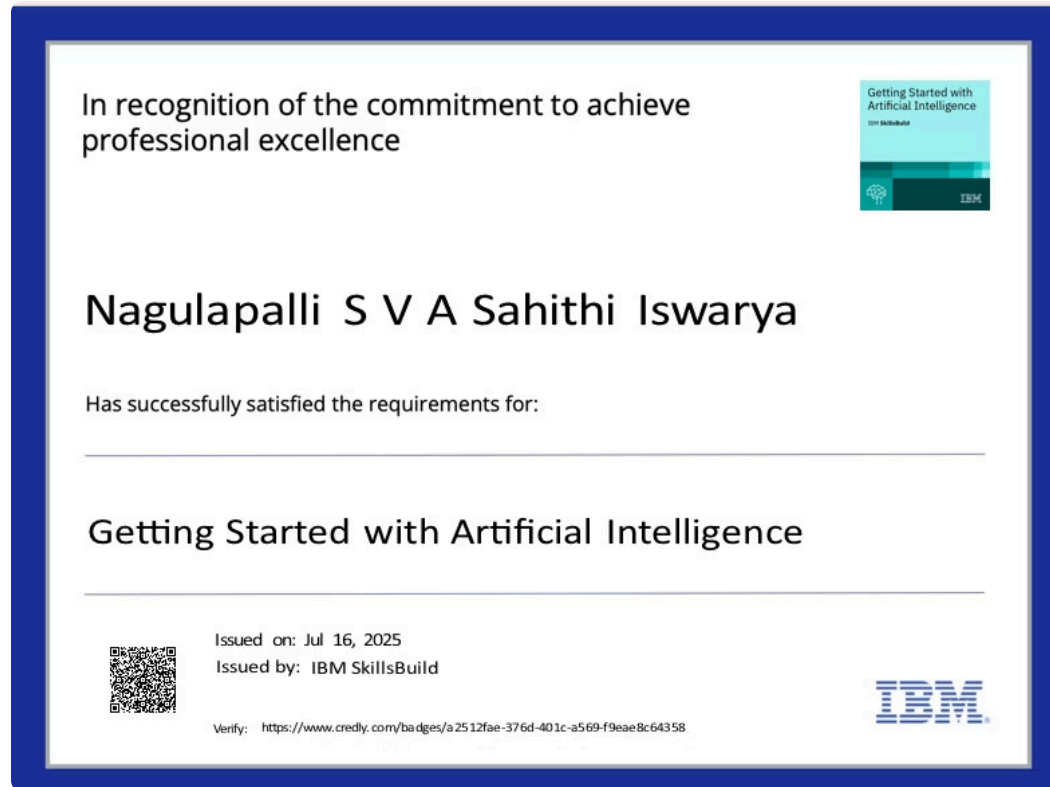
Use machine learning to learn user preferences over time and recommend recipes accordingly

References

- **Vaswani et al. (2017)** – *Attention Is All You Need*
<https://arxiv.org/abs/1706.03762>
- **Lewis et al. (2020)** – *Retrieval-Augmented Generation for Knowledge-Intensive NLP Tasks*
<https://arxiv.org/abs/2005.11401>
- **IBM watsonx.ai Documentation**
<https://www.ibm.com/products/watsonx-ai>
- **IBM Watson Discovery**
<https://www.ibm.com/cloud/watson-discovery>
- **IBM Cloudant** – Managed NoSQL database
<https://www.ibm.com/cloud/cloudant>
- **Kaggle Recipe Datasets** – Public datasets used for training and testing
<https://www.kaggle.com/datasets>
- **Hugging Face Transformers Library**
<https://huggingface.co/transformers>
- **IBM Cloud Documentation**
<https://cloud.ibm.com/docs>

IBM Certifications

- Screenshot/ credly certificate(getting started with AI)



IBM Certifications

- Screenshot/ credly certificate(Journey to Cloud)



IBM Certifications

- Screenshot/ credly certificate(RAG Lab)



GITHUB REPOSITORY

LINK:<https://github.com/iswaryanagulapalli/RecipeagentIBM>

THANK YOU