
IBM PROJECT

RECIPE PREPARATION AGENT

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OUTLINE

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

PROBLEM STATEMENT

Example: Cooking at home with limited ingredients can be challenging, often leading to food waste or repetitive meals. Users lack a smart assistant that can help them utilize available groceries effectively. There is a need for a system that provides recipe suggestions based on available ingredients while considering user dietary preferences.

PROPOSED SOLUTION

- The proposed system aims to help users generate recipe suggestions based on the ingredients they already have. It leverages AI and natural language processing (NLP) techniques through a RAG (Retrieval-Augmented Generation) model to generate adaptive and personalized recipes. The system is designed to reduce food waste and assist users with dietary needs or limited pantry options.
- **Data Collection:** Include user input (real-time), such as: List of available ingredients, Dietary preferences or restrictions.
- **Data Preprocessing:**
 - Normalize ingredient names (e.g., “tomatoes” vs “tomato”), Filter duplicates, handle missing fields (like missing instructions), and remove invalid recipes.
 - Perform ingredient-to-recipe mapping and categorize recipes for faster lookup.
 - Apply NLP techniques to enhance keyword tagging and ingredient similarity detection.
- **RAG-Based AI Model:**
 - Use Retrieval-Augmented Generation (RAG) model to fetch and adapt recipes:
 - Retrieve top-matching recipes using cosine similarity or semantic search.
 - Use a generative model (e.g., fine-tuned transformer) to adapt instructions based on missing or extra ingredients.
 - Provide substitutions if any ingredient is missing, based on a substitution dataset.
 - Generate a final recipe combining retrieved knowledge and user constraints.
- **Deployment:**
 - Deploy the agent using IBM Watson Assistant or IBM Granite on IBM Cloud Lite.
 - Integrate real-time recipe generation with a chat-style interfaces.
- **Evaluation:**
 - Continuously monitor API performance and user feedback for iterative improvements.

SYSTEM APPROACH

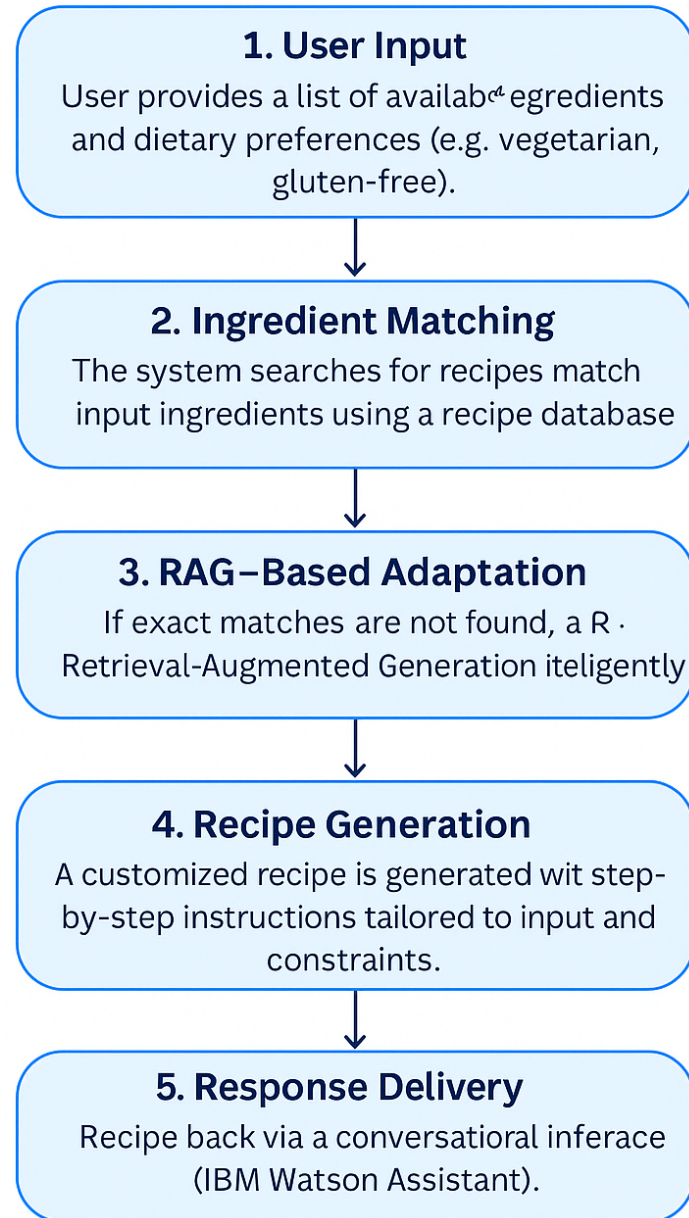
System Requirements:

- IBM Cloud Lite Account
- IBM Watson Assistant or Granity
- Node.js or Python backend
- Visual UI for chat

Libraries/Technologies:

- Python
- IBM Watson APIs
- RAG-based logic for dynamic response generation

ALGORITHM & DEPLOYMENT



RESULT

Home page of Recipe Agent

IBM watsonx

Upgrade ? Bell


Lavanya Pundir's Account

Deployment spaces / recipe agent model / Recipe Agent /

Recipe Agent ✓ Deployed Online

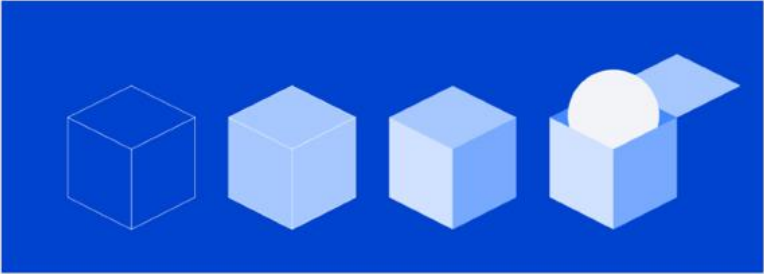
API reference Test **Preview**


New chat +

 Recipe Agent 01:22 AM

Welcome to Recipe Agent

Change this description to reflect your particular agent



Type something... 


About this de

Name
Recipe Agent

Description
Change this descr
particular agent

Deployment Deta
Deployment ID: 5
Serving name:
No serving name.
Software specifica
[runtime-24.1-py3](#)
Hardware specific
Extra extra small:
Copies:
1

Tags
wx-agent

Associated asset
 [Recipe Agent](#)
bb2b3e9a-36e5-4

RESULT

Recipe Agent ✓ Deployed Online

API reference

Test

Preview

In this I have asked for recipe by listing my ingredients I have



You 01:23 AM

I have tomatoes, pasta, onions, and a little cheese. I'm vegetarian. Can you suggest something quick?



Recipe Agent 01:23 AM

Absolutely! With those ingredients, you can make a simple Tomato Pasta Sauce with Pasta. Here's a quick recipe for you:

Simple Tomato Pasta Sauce

Ingredients:

- 2 medium tomatoes
- 1 small onion
- 1 clove of garlic (optional, if you have it)
- Pasta (as per your preference)
- Olive oil

Type something...



RESULT

In this the agent responded me with the instructions to cook the food with limited ingredients

Recipe Agent ✓ Deployed Online

API reference

Test

Preview

Instructions:

1. Prepare the sauce:

- Dice the tomatoes and the onion. If you have garlic, finely chop it.
- Heat a tablespoon of olive oil in a pan over medium heat.
- Add the onion to the pan and sauté until it becomes translucent.
- If using garlic, add it now and cook for another minute until fragrant.
- Add the diced tomatoes to the pan. Season with a pinch of salt and pepper. Let it simmer for about 10-15 minutes, stirring occasionally, until the sauce thickens.

2. Cook the pasta:

- While the sauce is simmering, cook the pasta according to the package instructions until al dente. Reserve some pasta water before draining.

3. Combine and serve:

Type something...



RESULT

At last the
agent
responded with
the expected
prep and
cooking time !!

My github link for
whole project:

[https://
github.com/
Lavanya-pundir/
Recipe-Agent-.git](https://github.com/Lavanya-pundir/Recipe-Agent-.git)

The screenshot shows the IBM Watsonx interface. At the top, there's a navigation bar with 'IBM watsonx', 'Upgrade', a help icon, a notification bell, and a user profile 'Lavanya Pundir's Account'. Below this is a breadcrumb trail: 'Deployment spaces / recipe agent model / Recipe Agent /'. The main content area is titled 'Recipe Agent' with a green checkmark and 'Deployed' status, and a grey 'Online' button. There are three tabs: 'API reference', 'Test', and 'Preview', with 'Preview' being the active tab. The preview content shows a recipe step: '3. Combine and serve:' followed by a bulleted list of instructions. Below the list, it states 'Expected Prep Time: 10 minutes' and 'Expected Cooking Time: 20 minutes'. A message says 'This recipe should take you less than 30 minutes from start to finish. Enjoy your meal!'. There's a section '► How did I get this answer?' with a refresh icon. At the bottom, there's a text input field with the placeholder 'Type something...' and a send button.

IBM watsonx Upgrade ? 🔔 Lavanya Pundir's Account

Deployment spaces / recipe agent model / Recipe Agent /

Recipe Agent ✓ Deployed Online

API reference Test **Preview**

3. Combine and serve:

- Once the pasta is cooked, add it directly to the pan with the sauce. Toss well to coat the pasta. If needed, add a bit of the reserved pasta water to adjust the consistency of the sauce.
- Turn off the heat and mix in the cheese. The heat of the pasta will help melt it slightly.
- Serve hot, garnished with a sprinkle of additional cheese if you have it.

Expected Prep Time: 10 minutes
Expected Cooking Time: 20 minutes

This recipe should take you less than 30 minutes from start to finish. Enjoy your meal!

► How did I get this answer?

🔄

Type something... ➤

CONCLUSION

The **Recipe Preparation Agent** effectively addresses the challenge of cooking with limited ingredients by using a RAG-based AI system to deliver smart, adaptable recipes. The system generates **step-by-step instructions**, suggests **ingredient substitutions**, and supports **dietary preferences**, offering a personalised cooking experience.

Effectiveness:

- Reduced food waste by utilizing available pantry items.
- Enhanced user convenience and time-saving in daily meal planning.
- Real-time interaction via IBM Watson ensures accessibility and usability.

Challenges Encountered:

- Handling vague or incomplete user input (e.g., "some veggies").
- Ensuring response accuracy and natural language quality from the RAG model.

Potential Improvements:

- Improve substitution logic with deeper nutritional and culinary data.
- Add voice, image, and regional language support for inclusivity.

FUTURE SCOPE

Data Expansion: Include nutrition info, seasonal ingredients, and grocery APIs for smarter suggestions.

Algorithm Optimization: Improve speed and accuracy using advanced ML techniques and caching.

Localization: Support regional cuisines, local ingredients, and multilingual recipes.

Emerging Tech: Integrate edge computing, voice/image recognition, and IoT kitchen devices.

App & Community: Launch a mobile app, enable offline access, and allow users to share and rate recipes.

REFERENCES

- [1] **Liu, H., et al. (2020)** – *RecipeGPT: Generating Cooking Recipes from Ingredients* : <https://arxiv.org/abs/2010.04894>
- [2] **Kandpal, A., et al. (2022)** – *Retrieval-Augmented Generation for Knowledge-Intensive NLP Tasks* : <https://arxiv.org/abs/2005.11401>
- [3] **IBM Watson Assistant Documentation** – <https://cloud.ibm.com/docs/watson-assistant>
- [4] **IBM Granity Overview** – <https://www.ibm.com/products/granity>
- [5] **Spoonacular API** – Food and Recipe Dataset & API : <https://spoonacular.com/food-api>
- [6] **Jain, A. et al. (2021)** – *FoodAI: Applying AI in the Kitchen* Published in IEEE Xplore. DOI: 10.1109/ACCESS.2021.3064291
- [7] **Kaggle – Recipe Ingredients Dataset** : <https://www.kaggle.com/kaggle/recipe-ingredients-dataset>

IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence



Lavanya Pundir

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



Issued on: Jul 15, 2025
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/1d715f55-1216-4de6-becf-b118b22f1ca5>



Getting Started with AI certification

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Journey to cloud
certification

IBM CERTIFICATIONS

IBM SkillsBuild

Completion Certificate



This certificate is presented to

Lavanya Pundir

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 24 Jul 2025 (GMT)

Learning hours: 20 mins

RAG Lab
certification

THANK YOU !!