
IBM SKILLSBUILD INTERNSHIP PROJECT

AI AGENT FOR SMART FARMING ADVICE

Presented By:

Student name : Madhurya Batabyal

College Name & Department : Jain Deemed-to-be University

OUTLINE

- Problem Statement
- Technology used
- Wow factor
- End users
- Result
- Conclusion
- Git-hub Link
- Future scope
- IBM Certifications

PROBLEM STATEMENT

- Small-scale farmers often face challenges accessing timely, accurate, and localized agricultural information needed to make informed decisions about crop selection, pest control, soil management, and market prices. This knowledge gap, coupled with limited digital literacy and language barriers, leads to increased risk, lower yields, and reduced income.
- The challenge is to develop an AI-powered Smart Farming Advice agent, leveraging Retrieval-Augmented Generation (RAG) techniques and IBM Cloud Lite services including IBM Granite models, to provide real-time, trusted, and context-aware agricultural guidance. This AI agent should understand and respond to farmer queries in their local language, retrieving up-to-date data from sources such as weather forecasts, soil conditions, crop advisories, pest control measures, and mandi market prices.
- By delivering actionable, localized advice and bridging the knowledge gap at the grassroots level, this AI agent will empower small-scale farmers to make better decisions, optimize yields, reduce risks, and improve their income.

TECHNOLOGY USED

IBM cloud lite services

Natural Language Processing (NLP)

Retrieval Augmented Generation (RAG)

IBM Granite model

IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab
- IBM Granite foundation model

WOW FACTORS

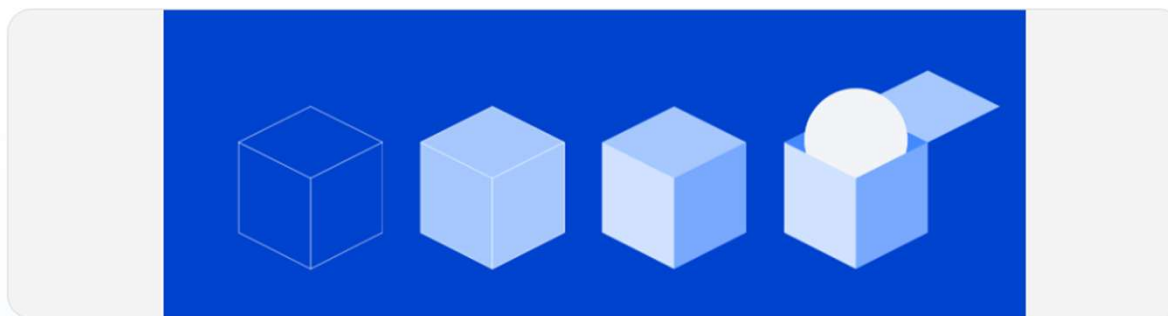
- **Real-time, localized agricultural guidance:** The agent delivers precise advice tailored to the farmer's specific location, soil type, and season, supporting critical decisions such as crop selection and pest control.
- **Retrieval-Augmented Generation (RAG) for trusted accuracy:** Unlike generic AI models, this agent grounds its answers in up-to-date, trusted data sources (weather, soil, market rates), significantly reducing misinformation or hallucination risks.
- **Multilingual support with local language interaction:** Farmers can communicate naturally in their native language, breaking down digital literacy and language barriers common in grassroots farming communities.
- **Multi-source integration and agentic multi-step workflows:** The AI autonomously fetches and combines data from diverse APIs (meteorological, agri departments, market databases), enabling complex, context-aware responses.
- **Enhanced decision-making that improves yield and income:** By providing timely, relevant insights—such as optimal planting times, pest outbreak warnings, or current mandi prices—the agent reduces risk and boosts profitability for small-scale farmers.
- **Cost-efficient, scalable deployment with IBM Cloud Lite:** IBM's free-tier services enable affordable and scalable hosting, suitable for social-impact projects in developing agricultural regions.
- **Explainability and transparency via IBM Granite models:** The AI can cite data sources and provide reasoning for its recommendations, increasing farmer trust and adoption.
- **Bridging knowledge gaps and digital divides:** Targeting hard-to-reach smallholders, the agent democratizes access to advanced agronomy knowledge traditionally limited by geography or expertise.

END USERS

- Small-Scale Farmers
- Agricultural Extension Officers
- Farmer Cooperatives and Self-Help Groups
- Agri-Entrepreneurs and Input Suppliers
- Local Governments and Policy Makers

RESULTS

Agent preview



Sample questions

What is the best crop for my region this season?



When should I irrigate my wheat crop?



What should I do about pest attacks on brinjal?



What is today's market price for tomatoes in my location?



Type something...



RESULTS

Agent preview



You: 10:48 PM

What should I do about pest attacks on brinjal?



Smart Farming RAG Agent 10:48 PM

Here are some resources that might help you with pest attacks on brinjal:

1. [Eggplant Insect Pests & Diseases | Home & Garden Information Center](#)
2. [Brinjal – Pests](#)
3. [False Potato Beetle: An Overlooked, Destructive Pest of Eggplant ...](#)
4. [Pests of Eggplant | NC State Extension Publications](#)
5. [What are these small yellow bugs that are attacking my eggplant ...](#)
6. [Eggplant Disease Recognition Dataset - Mendeley Data](#)
7. [INSECT PESTS OF BRINJAL / EGG PLANT AND THEIR ...](#)
8. [BRINJAL ::MAJOR PESTS:: SHOOT AND FRUIT BORER](#)
9. [1+ Thousand Pest On Eggplant Royalty-Free Images, Stock Photos ...](#)
10. [Eggplant vs long beans pest attack rate in Guam/CNMI?](#)

These resources provide information on the types of pests that attack brinjal, the damage they cause, and how to control them.

Type something...



RESULTS

Agent preview



You: 10:49 PM

cud u give me basic overview next to the resources



Smart Farming RAG Agent 10:49 PM

Sure, here's a basic overview of pest attacks on brinjal (eggplant):

Brinjal, also known as eggplant, is a popular vegetable crop that is susceptible to various pest attacks. Some of the common pests that attack brinjal include:

1. **Shoot and Fruit Borer:** This is one of the most destructive pests of brinjal. The larvae bore into the shoots and fruits, causing them to wilt and rot.
2. **Epilachna Beetle:** Both the adult and larvae of this beetle feed on the leaves, causing significant damage.
3. **Aphids:** These small, soft-bodied insects suck the sap from the plant, causing the leaves to curl and the plant to become stunted.
4. **Whiteflies:** Similar to aphids, whiteflies also suck the sap from the plant and can transmit viruses.
5. **Spider Mites:** These tiny pests feed on the underside of the leaves, causing them to turn yellow and drop off.

To control these pests, a combination of cultural, biological, and chemical methods can be used. Cultural methods include crop rotation, intercropping, and maintaining good sanitation in the field. Biological control involves the use of natural predators and parasites to control the pest population. Chemical control should be used as a last resort and involves the use of insecticides.

RESULTS

Deployed AI Agent

The screenshot displays the IBM watsonx user interface. At the top, there is a navigation bar with the IBM watsonx logo on the left and an 'Upgrade' button on the right. Below the navigation bar, a breadcrumb trail reads 'Deployment spaces / Deployment / Smart Farming RAG Agent /'. The main heading is 'Smart Farming RAG Agent', followed by a green checkmark icon and the text 'Deployed', and a grey button labeled 'Online'. Below this, there are three tabs: 'API reference', 'Test', and 'Preview', with 'Preview' being the active tab. The chat interface shows a user message at 10:53 PM: 'When should I irrigate my wheat crop?'. The agent's response, also at 10:53 PM, begins with 'Hi, I am Smart Farming RAG Agent. How can I help you?' and 'Here are some resources that might help you with wheat crop irrigation:'. It then lists two resources: 1. 'Wheat Irrigation - MSU Extension Water Quality | Montana State ...' with a description: 'For instance, if plant available soil moisture is 6 inches, rainfall is 3 inches, and irrigation is 6 inches, estimated yield in bushels/acre is = 5.8 (6 + 3 + ...)', and 2. 'Development of crop water stress index of wheat crop for scheduling ...'. At the bottom, there is a text input field with the placeholder 'Type something...' and a send button.

IBM watsonx Upgrade

Deployment spaces / Deployment / Smart Farming RAG Agent /

Smart Farming RAG Agent ✓ Deployed Online

API reference Test **Preview**

M You 10:53 PM
When should I irrigate my wheat crop?

S Smart Farming RAG Agent 10:53 PM
Hi, I am Smart Farming RAG Agent. How can I help you?
Here are some resources that might help you with wheat crop irrigation:

1. [Wheat Irrigation - MSU Extension Water Quality | Montana State ...](#)
 - Description: For instance, if plant available soil moisture is 6 inches, rainfall is 3 inches, and irrigation is 6 inches, estimated yield in bushels/acre is = 5.8 (6 + 3 + ...)
2. [Development of crop water stress index of wheat crop for scheduling ...](#)

Type something...

CONCLUSION

- The AI agent delivers real-time, localized agricultural guidance in native languages, bridging knowledge gaps for small-scale farmers.
- By integrating trusted data on weather, soil, pests, and market prices, it provides accurate, actionable advice that improves crop yields and income.
- Built with IBM Cloud Lite and Granite models, the platform is scalable, cost-effective, explainable, and suitable for resource-constrained communities.
- This solution promotes digital inclusion and smart farming, empowering farmers with advanced tools that drive sustainable agricultural development.

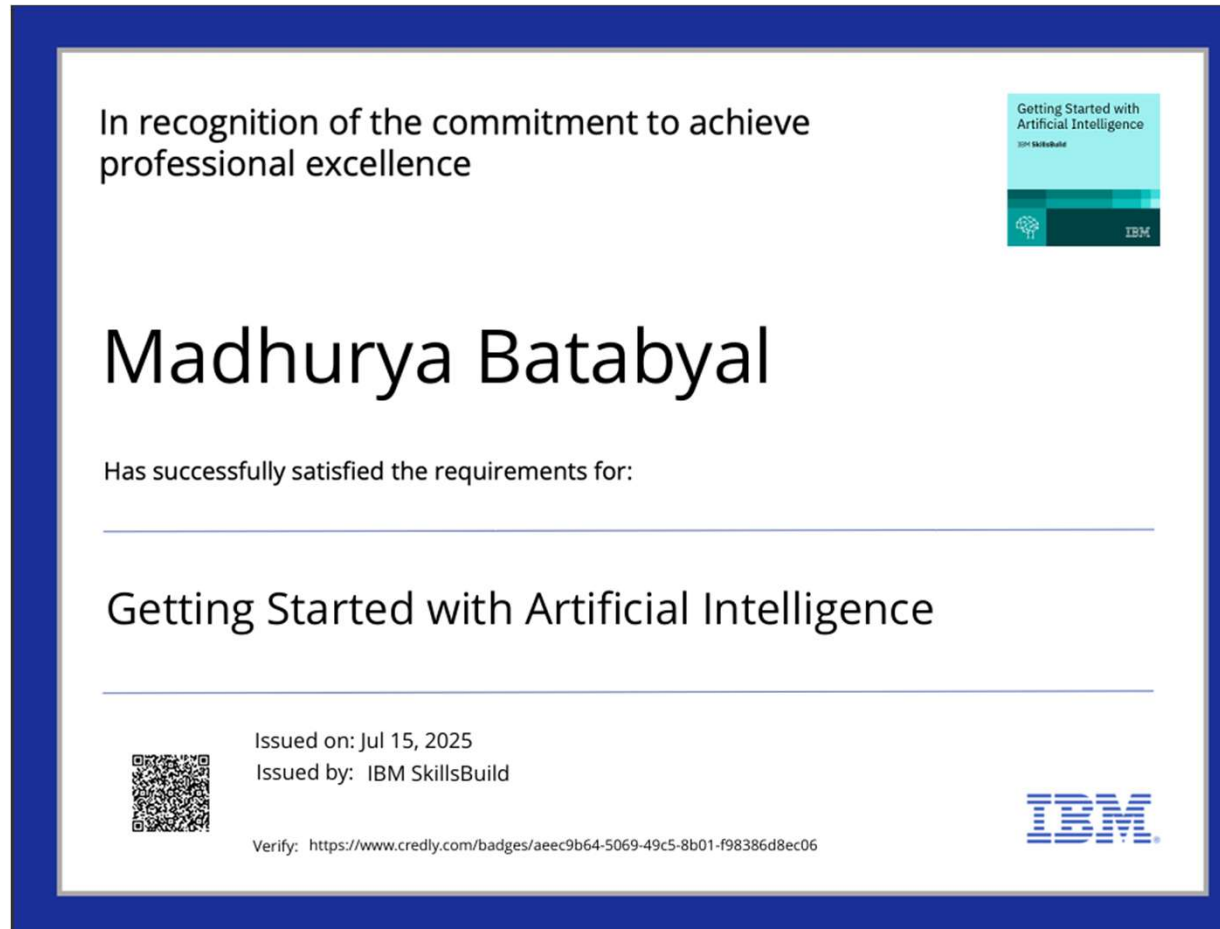
GITHUB LINK

- <https://github.com/MadhuryaBatabyal/smart-farming-ai-agent.git>

FUTURE SCOPE

- **IoT Sensor Integration**
Expand functionality to ingest real-time data directly from field sensors (e.g., for soil moisture, temperature, rainfall, pest detection) to provide even more precise and proactive recommendations.
- **Predictive & Prescriptive Analytics**
Add advanced analytics and forecasting capabilities for early warnings about pest outbreaks, weather extremes, or crop diseases, and recommend preventive or remedial actions.
- **Expanded Language and Regional Support**
Continuously add more local languages, dialects, and region-specific agricultural datasets so the agent can serve diverse communities across different geographies.
- **Marketplace/Community Platform Integration**
Allow farmers to access e-marketplace features, connect with buyers, suppliers, and other farmers, and enable peer-to-peer knowledge sharing through the platform.
- **Government and Policy Integration**
Interface with government advisory systems to distribute official advisories, subsidy notifications, or crop insurance schemes directly to eligible farmers.
- **Continuous Learning and Model Improvement**
Use feedback from users and outcomes to fine-tune AI models and retrieval workflows, increasing accuracy, trust, and adaptability over time.
- **Sustainability and Environmental Monitoring**
Integrate recommendations for sustainable practices (e.g., water conservation, organic inputs) and track environmental impact, helping promote climate-resilient agriculture.

IBM CERTIFICATIONS



IBM CERTIFICATIONS

In recognition of the commitment to achieve
professional excellence



Madhurya Batabyal

Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution




Issued on: Jul 16, 2025

Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/7588b8b2-4891-48e1-9107-390af3a370c1>



IBM CERTIFICATIONS

IBM SkillsBuild	Completion Certificate
	<p>This certificate is presented to</p> <p>Madhurya Batabyal</p> <p>for the completion of</p> <p>Lab: Retrieval Augmented Generation with LangChain</p> <p>(ALM-COURSE_3824998)</p> <p>According to the Adobe Learning Manager system of record</p>
Completion date: 16 Jul 2025 (GMT)	Learning hours: 20 mins



THANK YOU