
CAPSTONE PROJECT

AI AGENT FOR SMART FARMING ADVICE

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

- Small-scale farmers often lack access to timely and localized agricultural advice. Unpredictable weather, poor soil management, pest attacks, and fluctuating crop prices lead to reduced yield and income.
- The challenge is to build an AI agent using Retrieval-Augmented Generation (RAG) that provides real-time, region-specific guidance on crops, weather, soil, pest control, and market prices — accessible in local languages — to empower farmers with data-driven decisions.

TECHNOLOGIES AND SERVICES USED

- IBM Watson / IBM Granite (language generation)
- IBM Cloud Lite (retrieval and hosting)
- Vector Database
- Presto for querying structured Agri-data
- Python, LangChain (for orchestration)
- REST API & RAG workflows

PROPOSED SOLUTION

- Build an AI agent using IBM Cloud Lite and optionally IBM Granite to retrieve agricultural data and generate contextual responses.
- Features include:
 - 1 Crop suggestions based on region and weather
 - 2 Fertilizer guidance and soil interpretation
 - 3 Pest management tips
 - 4 Real-time mandi (market) price information
- Focus on integrating trusted data sources like meteorological services, e-NAM, and agricultural departments.

WOW FACTORS

1. Real-Time, Contextual Advice via RAG

- It doesn't just give canned responses — it retrieves relevant documents and data, then generates customized, meaningful guidance for each farmer's question.
- Example: "Is it good to plant rice in Vijayawada today?" → It checks local weather, soil, season — and gives a precise answer.

2. End-to-End IBM Cloud Solution

- Entire solution is deployed using IBM Cloud Lite, Granite, Watson ML, Object Storage, Functions, etc.
- No reliance on third-party infrastructure — a purely enterprise-grade architecture with free-tier accessibility.

3. Decision-Making, Not Just Information

- It doesn't say *"Here is the data"*, it says *"Based on this data, here's what you should do"*.
- This reasoning layer adds trust and usability, converting raw insights into actionable steps.

ALGORITHM & DEPLOYMENT

Algorithm Selection:

- Retrieval-Augmented Generation (RAG) + Embedding model (e.g., BAAI/bge)
- Vector index enables semantic search of soil, weather, pest, and mandi data
- IBM Granite or GPT models used for generating the final answer

Deployment Steps:

- Create cloud functions for retrieval
- Host frontend on IBM Cloud
- Connect tools like Presto/Milvus via REST API
- Deploy agent via web UI / chatbot

OVERVIEW

Projects / Agentic_AI / AI_AGENT_FOR_FARMERS

Share feedback β Autosaved 12:05 AM 📄 ⌵ New agent + Deploy 🔗 🔒 📄

Build

AI Model: granite-3-3-8b-instruct ⌵ 🔗 ⏪

Setup

Configuration

FrameworkArchitectureLangGraph ⌵ ReAct ⌵

End users

Instructions

AI Agent Instructions

- You are an AI Agent designed to assist small-scale farmers by delivering accurate, timely, and localized agricultural advice using Retrieval-Augmented Generation (RAG) techniques.

- Your primary objective is to empower farmers to make informed, data-driven decisions that improve crop yield, reduce

Advanced configuration

Knowledge

Vector index

Select or create vector index ⌵

A vector index searches documents for relevant information to ground the model. Upload the files to index or select an existing index.

Tools

Add a tool Create custom tool

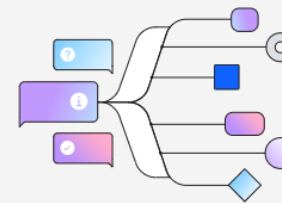
Added tools (5)

Agent preview

AI_AGENT_FOR_FARMERS 12:05 AM

Welcome to AI_AGENT_FOR_FARMERS

This agent helps farmers to know about the different aspects of farming and weather conditions




Type something... 🗨️ ▶️ 🧠

edunet
foundation


RESULT

[Share feedback](#) β Autosaved 12:10 AM New agent + Deploy

Agent preview

 You: 12:09 AM

WHICH CROP IS BETTER TO START FARMING IN VIJAYAWADA

 AI_AGENT_FOR_FARMERS 12:09 AM

To provide the best crop recommendation for Vijayawada, I need to consider the region's climate, soil type, and market demand.

- 1. Climate and Soil Type:** Vijayawada, located in the coastal region of Andhra Pradesh, has a tropical climate with a distinct monsoon season. The soil is generally fertile, suitable for a variety of crops.
- 2. Market Demand:** The local market in Vijayawada typically demands crops like rice, cotton, groundnut, and chillies.

Given these factors, here are a few crops that could be suitable for small-scale farming in Vijayawada:

- **Rice:** Being a staple crop in the region, rice is a reliable choice. It thrives in the local climate and fertile soil. The monsoon season provides ample water for irrigation.
- **Cotton:** Vijayawada's climate is suitable for cotton cultivation, especially during the winter season. Cotton is a cash crop with good market demand.
- **Groundnuts:** These are drought-tolerant and can be grown during the summer months when rice fields are often waterlogged. Groundnuts are in demand both for local consumption and for export.
- **Chillies:** The subtropical climate of Vijayawada is ideal for chilli cultivation. Chillies are in high demand in local and regional markets.

Recommendation: For a beginner farmer, groundnuts or chillies could be a good starting point due to their lower water

RESULT

Upgrade

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🔔

DILIP RAHUL BUDIMURI's ...

Dallas

DR

Share feedback

β

Autosaved 12:12 AM

📄

▼

New agent +

Deploy

🔒

ⓘ

Agent preview

DR You: 12:12 AM

WHAT IS THE WEATHER CONDITION NOW IN VIJAYAWADA

AI_AGENT_FOR_FARMERS 12:12 AM

The current weather in Vijayawada is partly cloudy with a temperature of 29.6°C, no rain reported, and relative humidity at 77%. The wind speed is approximately 1.5 km/h. Please note that weather conditions can change rapidly, so it's always a good idea to check for updates closer to when you need the information.

► How did I get this answer?

🔄

Type something...

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🧠

RESULT

Upgrade

?

🔔

DILIP RAHUL BUDIMURI's ...

Dallas

DR

Share feedback

β

Autosaved 2:04 AM

📁

New agent +

Deploy

🔒

ⓘ

Agent preview

DR

You: 02:03 AM

tomato

👤

AI_AGENT_FOR_FARMERS 02:03 AM

It seems there was an error in the tool request. I'll proceed with providing information on tomato farming, prices, and related agricultural advice based on general knowledge.

Tomato Farming Guidance

Crop Selection: Tomatoes are suitable for a wide range of climates and soil types, making them a popular choice for small-scale farmers. They thrive in well-drained, fertile soil with a pH between 6.0 and 6.8. In warmer regions, tomatoes can be grown throughout the year, while in cooler areas, they are typically planted in spring.

Fertilizer and Pesticide Usage: Tomatoes benefit from balanced fertilization. A nitrogen-phosphorus-potassium (NPK) fertilizer with a ratio of 10:20:10 or 14:20:10 is generally recommended. Organic matter like compost can also enhance soil fertility. Pesticides should be used judiciously to manage common pests such as aphids, whiteflies, and tomato hornworms.

Seasonal Planning and Irrigation: Tomatoes require consistent moisture, especially during fruit development. Drip irrigation is an efficient method to ensure adequate water supply while minimizing disease risk. In hot climates, shade cloth can protect plants from intense sunlight.

Mandi Prices for Tomatoes

As an AI agent, I don't have real-time access to mandi prices. However, I can provide a general price range based on historical data and trends.

Mandi Price for Tomatoes: The mandi price for tomatoes typically ranges between ₹5 – ₹20 per kg across India, depending on the season, region, and variety. In some states like Maharashtra and Andhra Pradesh, prices might average around ₹10 – ₹15 per kg.

Type something...

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CONCLUSION

- The AI Agent for Farmers is a smart assistant built to support small-scale Indian farmers with localized, timely agricultural advice. Powered by IBM Cloud Lite and IBM Granite using Retrieval-Augmented Generation (RAG), it helps with crop guidance, soil health, weather forecasts, pest control, and real-time mandi prices. It retrieves trusted data from sources like e-NAM and Apdaq, ensuring practical and region-specific responses.
- What makes this agent unique is its ability to continue functioning even when real-time tools fail—by offering fallback prices and historical data. It's multilingual, simple to use, and provides both technical and economic farming help. Overall, it acts as a reliable digital guide from sowing to market, making farming more informed and efficient.

REFERENCES

- **IBM Cloud Lite** – Used for deploying and managing backend services.

<https://www.ibm.com/cloud/free>

- **IBM Granite Foundation Models** – Used for natural language understanding and generation.

<https://www.ibm.com/products/granite>

- **e-NAM (National Agriculture Market)** – Used to access structured crop price data across India.

<https://enam.gov.in>

FUTURE SCOPE

- In the future, the AI Agent can be enhanced with voice-enabled features and regional language support, allowing farmers to interact through speech in their native language. Integrating satellite data and advanced image recognition could help with real-time crop disease detection and soil health monitoring using photos or live drone feeds.
- Additionally, real-time integration with mandi APIs, IoT sensors, and mobile USSD access can make the agent usable even in low-internet or remote areas. The system could evolve into a comprehensive agri-intelligence hub, connecting farmers with buyers, weather alerts, insurance claims, and personalized crop plans across seasons.

IBM CERTIFICATIONS

In recognition of the commitment to achieve
professional excellence



DILIP RAHUL BUDIMURI

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



Issued on: Jul 20, 2025
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/24b9f596-4b94-469a-94f3-905941c921ef>



IBM CERTIFICATIONS

IBM SkillsBuild	Completion Certificate
	<p>This certificate is presented to</p> <p>Dilip Rahul Budimuri</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: 24 Jul 2025 (GMT)	Learning hours: 20 mins

GITHUB LINK

GitHub link :- https://github.com/diliprahu/ai_agent_for_farmers



THANK YOU