
CAPSTONE PROJECT

SMART FARMING AGENT

Presented By:

Student name : Shivraj Nalawade

College Name : MIT Academy of Engineering, Alandi, Pune

Department : Electronics Engineering

OUTLINE

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PROBLEM STATEMENT

AI Agent for Smart Farming Advice

Small-scale farmers often struggle with timely access to **accurate agricultural advice** related to crop planning, pest management, weather forecasts, and market prices. They rely on scattered sources or local agents, leading to **delays, low productivity, and financial losses**.

- **Proposed Solution:**

An **AI-powered Smart Farming Agent** using **Retrieval-Augmented Generation (RAG)** and **IBM Granite models** that delivers **real-time, localized, and language-friendly farming advice** on weather, soil, crops, pest management, and mandi prices through a simple conversational interface.

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

This Agent will:

- Empower farmers with **real-time, localized agricultural advice**.
- Reduce dependency on multiple sources for farming information.
- Improve decision-making for **crop planning, pest control, and market sales**.


Unique features:



- **Natural language Q&A** on crops, soil, weather, pests, and mandi prices.
- **Personalized crop recommendations** based on season, region, and soil type.
- **Step-by-step pest and disease management** using ICAR guidelines.
- **Integrated weather and mandi price updates** for better planning and sales.
- **Simple, farmer-friendly conversational interface** for quick answers.

END USERS

- Small and medium-scale farmers
- Agricultural extension officers
- Agri-tech startups
- State agriculture departments & cooperatives

RESULTS

 IBM watsonx

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[Deployment spaces](#) / [farming_agent](#) / [watsonx Agent](#) / watsonx Agent  Deployed Online[API reference](#) [Test](#) [Preview](#)

 You 11:06 PM

Which crops are suitable to grow in Maharashtra during Kharif season?

 watsonx Agent 11:06 PM

The crops suitable to grow in Maharashtra during Kharif season are:

1. Onion - Varieties such as Bhima Super are suitable for kharif season and can be cultivated during late kharif cultivation in the states of Maharashtra, Karnataka, and Gujarat.
2. Paddy (Rice) - The Kharif Staple, suitable for cultivation in Kharif season in Maharashtra.
3. Soybean - Kharif soybean followed by rabi sorghum is ideal when soil is deep.
4. Chickpea - Recommended for Kharif and pre-Rabi seasons, moderately resistant to wilt and SMD.
5. Moong dal - Good for monsoon season and as a green manure, but may not be suitable for waterlogged soils.

It's important to note that the suitability of crops for a particular region and season can depend on various factors such as climate, soil type, and water availability. It's always a good idea to consult with local agricultural experts or check with the relevant authorities for the most up-to-date and accurate information.

RESULTS

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API reference

Test

Preview



You 11:07 PM

Suggest drought-resistant crops for low rainfall areas.




watsonx Agent 11:07 PM




Based on the search results, some drought-resistant crops for low rainfall areas include:


1. Oats
2. Agave
3. Drought-tolerant corn
4. Chicory
5. Sesame
6. Dryland crops such as sorghum, millet, and cowpeas


It's important to note that the suitability of crops for a particular region and season can depend on various factors such as climate, soil type, and water availability. It's always a good idea to consult with local agricultural experts or check with the relevant authorities for the most up-to-date and accurate information.

RESULTS


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API referenceTestPreview

 You 11:09 PM
What is the recommended NPK ratio for paddy crops?

 watsonx Agent 11:09 PM
The recommended NPK ratio for paddy crops is 4:2:1. However, this ratio may vary depending on the location, soil type, and other factors. It's important to consult with local agricultural experts or check with the relevant authorities for the most up-to-date and accurate information. Additionally, it's recommended to use a balanced fertilizer that contains all three macronutrients (N, P, and K) in the appropriate ratio.


 You 11:09 PM
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 watsonx Agent 11:09 PM
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Type something... 

RESULTS

Deployed AI Agent

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 You 11:10 PM

How do I calculate the cost of cultivation for sugarcane?

 watsonx Agent 11:10 PM

The cost of cultivation for sugarcane can be calculated by considering various factors such as manures, weeding, plant protection, harvesting, and other expenses. The total cost of cultivation can be estimated by adding up these expenses. For example, according to the Tamil Nadu Agricultural University, the cost of cultivation for sugarcane is as follows:

- Manures & Manuring: 5000
- Weeding after cultivation & Irrigation: 5000
- Plant protection: 1000
- Harvest and other Expenses: 9000
- Total: 28500

It's important to note that these costs may vary depending on the location, soil type, and other factors. Therefore, it's recommended to consult with local agricultural experts or check with the relevant authorities for the most up-to-date and accurate information.

 How did I get this answer?

Type something... 

CONCLUSION

- **Bridges the knowledge gap:** Provides farmers with **real-time, reliable, and localized agricultural advice** on crops, weather, pests, and market prices.
- **Empowers decision-making:** Helps farmers **plan better, reduce risks, and improve productivity** through actionable, AI-driven insights.
- **Enhances accessibility:** Offers **multilingual, easy-to-use interaction**, making advanced agricultural guidance accessible even to grassroots farmers.

FUTURE SCOPE

- Voice-based interaction for illiterate farmers
- Integration with IoT (soil sensors, weather stations)
- Mobile app deployment for easy accessibility
- Expanded multilingual support (regional dialects)
- Partnership with agri-markets for live trading prices

IBM CERTIFICATIONS

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This certificate is presented to
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for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 25 Jul 2025 (GMT)

Learning hours: 20 mins

GITHUB LINK

- <https://github.com/shivraj-nalawade/smart-farming-agent.git>



THANK YOU