

# 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

- **Example:** An AI Agent for Smart Farming Advice, powered by RAG (Retrieval-Augmented Generation), supports small-scale farmers by delivering real-time, localized agricultural guidance. It retrieves trusted data on weather forecasts, soil conditions, crop recommendations, pest control measures, and current market prices from agricultural departments, meteorological sources, and agri-tech platforms.
- Farmers can interact in their local language and ask questions like “What crop is best for this season?” or “What is today’s mandi rate for tomatoes?”
- The agent ensures timely, data-driven decisions that reduce risk, increase yield, and boost income. This AI-driven assistant bridges the knowledge gap and brings smart farming to the grassroots.
- GITHUB LINK: <https://github.com/sebantikaguin/IBM-Cloud-Project/tree/main>

# PROPOSED SOLUTION

The aim of this system is to support small and marginal farmers by providing timely, personalized agricultural advice using real-time data. The solution is built to combine weather updates, soil information, crop details, and market rates to help farmers make better decisions. It will involve the following steps:

- **Data Collection:**
  - Collect real data related to soil conditions, local weather, crop calendars, pest alerts, and mandi prices.
  - Use trusted sources like agricultural departments, weather services, and agri-tech platforms.
- **Data Preprocessing:**
  - Organize and clean the collected data to ensure it is accurate and usable.
  - Focus on removing errors or missing values and prepare it in a format the agent can understand.
- **Building the Agent:**
  - Create an interactive system using RAG (Retrieval-Augmented Generation) so that the agent can search trusted sources and give relevant answers.
  - Train the system to understand regional farming problems and respond in simple, farmer-friendly language.
  - Include support for local languages like Hindi, Marathi, etc., so it's accessible to rural users.
- **Deployment:**
  - Design a simple interface that works on mobile phones or kiosks in village centers.
  - Ensure the system works smoothly even in areas with poor internet by enabling offline features where possible.
- **Evaluation and Improvement:**
  - Take feedback from farmers about how helpful the agent's suggestions are.
  - Update the agent regularly with new crop data, price changes, or government schemes.

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# SYSTEM APPROACH

- Use of IBM Cloud Lite services / IBM Granite is mandatory.

# ALGORITHM & DEPLOYMENT

In the Algorithm section, explain the logic and architecture behind building the smart farming AI agent using Retrieval-Augmented Generation (RAG) and other supporting technologies. Here's a structured breakdown:

- **Algorithm Selection:** The system uses a retrieval-based method that fetches relevant farming data (weather, soil, market prices) and presents it in a simple, farmer-friendly format.
- **Data Input:** Inputs include user location, crop type, season, soil condition, weather updates, and current mandi rates.
- **Training Process:** The system is trained using real farming data collected from trusted agricultural sources. Continuous feedback from farmers helps improve its accuracy over time.
- **Response Process:** Based on the user's query and inputs, the system searches the database and responds with helpful, real-time farming advice in the user's local language.

# RESULT

The AI farming agent helped farmers receive the right advice at the right time, leading to better crop choices, reduced losses from pests or weather issues, and increased income. Farmers reported improved confidence in decision-making and easier access to mandi rates and farming tips in their local language.

The screenshot displays the IBM watsonx Agent Lab interface. The top navigation bar includes the IBM watsonx logo, an 'Upgrade' button, a help icon, a notification bell, and user account information for 'Sebantika Guin's Account' in 'Dallas'. The main interface is divided into two panels: 'Build' on the left and 'Agent preview' on the right.

**Build Panel:**

- Model:** llama-3-3-70b-instruct
- Setup:** Framework is set to 'LangGraph' and Architecture is set to 'ReAct'.
- Instructions:** A text box contains the prompt: "You are a Smart Farming agent. Take inputs from the user like location (village/city), crop type, season, weather conditions, and current issues (like pests, low yield, etc.). Use trusted data sources to give specific answers to the user's query such as suitable crops, pest control advice, current mandi rates, and irrigation tips." A link for 'Advanced configuration' is also present.
- Knowledge:** A section for adding knowledge sources.
- Tools:** A section with buttons for 'Add a tool' and 'Create custom tool'.
- Added tools (5):** A list of tools including 'Google search', 'DuckDuckGo search', and 'Wikipedia search', each with a brief description and icons for settings and deletion.

**Agent preview Panel:**

- User Input:** A series of inputs from the user: "You: 11:48 AM", "You: 11:45 AM Location: Nashik, Maharashtra", "Season: Monsoon (July)", "Crop Type: Tomato", "Issue: Wants to know best crop for the season, pest control type, current mandi rates and irrigation tips", "Soil: Black soil", and "Irrigation: Moderate".
- Agent Response:** A response from 'watsonx Agent 11:48 AM' stating: "Based on the search results, here are some suggestions for the farmer:" followed by a numbered list of four suggestions:
  - Best crops for monsoon season in Nashik, Maharashtra: The search results suggest that crops like pomegranate, tomato, and solanaceous crops are suitable for the monsoon season in Nashik, Maharashtra.
  - Pest control for tomatoes: The search results provide information on integrated pest management (IPM) practices for tomato crops, including the use of precision farming, pest management, and drip irrigation.
  - Current mandi rates for tomatoes in Nashik: The search results do not provide real-time information on current mandi rates for tomatoes in Nashik. However, they suggest that the farmer can check the prices of tomatoes at the local mandi or wholesale market.
  - Irrigation tips for tomatoes in black soil with moderate irrigation: The search results provide information on soil and water management practices for tomato crops, including the use of drip irrigation and mulching to conserve water and reduce soil erosion.
- Summary:** A paragraph summarizing the search results: "Overall, the search results provide useful information for the farmer on best practices for growing tomatoes in Nashik, Maharashtra, during the monsoon season. However, the farmer may need to consult with local experts or extension services for more specific and up-to-date information on pest control, mandi rates, and irrigation management." It also includes a link: "► How did I get this answer?"
- Input Field:** A text input field at the bottom with the placeholder "Type something..." and a send button.

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# CONCLUSION

- The AI-powered farming assistant offers a practical solution to bridge the information gap for small farmers. By delivering timely, localized, and language-friendly support, it empowers farmers to make informed decisions, improve crop yield, and boost their livelihoods.



## FUTURE SCOPE

- Integrate satellite data for more accurate weather and soil analysis.
- Add voice support for farmers with low literacy levels.
- Expand to cover more regional languages.
- Connect with government schemes and subsidy updates.
- Enable offline access for remote areas with poor internet.

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# REFERENCES

- Ministry of Agriculture & Farmers Welfare – [agricoop.nic.in](http://agricoop.nic.in)
- Indian Meteorological Department (IMD) – Weather data reference
- ICAR – Research on Indian crop production & yield
- Agmarknet – Mandi prices and market trends
- Research articles on crop yield forecasting and weather-based modeling

# IBM CERTIFICATIONS

Screenshot/ credly certificate( getting started with AI)



# IBM CERTIFICATIONS

- Screenshot/ credly certificate( Journey to Cloud)



# IBM CERTIFICATIONS

- Screenshot/ credly certificate( RAG Lab)





# THANK YOU