Presentation on :

“AI Agent for Smart Farming Advice”

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

School of Engineering & Technology

Sanjivani University

Semester-V, Academic Year 2025-2026

Presented By:

Gayatri Jagtap (2124UMLF2061)
Sanket Parjane (2124UMLM2044)
Soham Wadale (2124UMLM2081)
Sakshi Abak (2124UMLF2019)

Guided by

Prof: Raz Sir

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Problem Statement

Small-scale farmers play a vital role in the agricultural sector, yet they face several challenges that affect their productivity and income. One of the major issues is the lack of access to real-time and reliable information about weather conditions, soil health, crop suitability, pest control, and market prices. Due to limited digital literacy and infrastructure, farmers often rely on outdated or inaccurate advice, leading to poor decision-making. Additionally, most agricultural information available online is in English, creating a language barrier for farmers who primarily communicate in their local languages. The absence of personalized and data-driven guidance makes it difficult for farmers to plan effectively, resulting in reduced crop yields, financial losses, and increased risk. Therefore, there is a strong need for an intelligent system that can provide localized, accurate, and easily understandable agricultural advice to empower small-scale farmers and support sustainable farming practices.

Proposed Solution

The proposed system introduces an AI Agent for Smart Farming Advice powered by Retrieval-Augmented Generation (RAG). This intelligent agent retrieves and generates real-time, localized agricultural information to support farmers in their decision-making. It accesses trusted data sources such as meteorological departments, soil condition databases, and agricultural market platforms. Farmers can interact with the system in their local language to ask questions like “Which crop should I grow this season?” or “What is today’s market rate for tomatoes?”. The system combines retrieved factual data with the generative power of AI to provide accurate, context-specific, and easily understandable responses. By doing so, it bridges the knowledge gap and empowers small-scale farmers to improve crop yield and income.

System Approach

1. System Requirements

- Hardware Requirements:

Minimum 4 GB RAM and dual-core CPU

IBM Cloud account with provisioned cloud runtime

Secure internet connection for real-time data streaming

- **Software Requirements:**

Operating System: Windows

Python

Cloud Platform: IBM Cloud (Watson Studio, Cloud Functions)

Model Serving: Flask/ FastAPI for REST API deployment

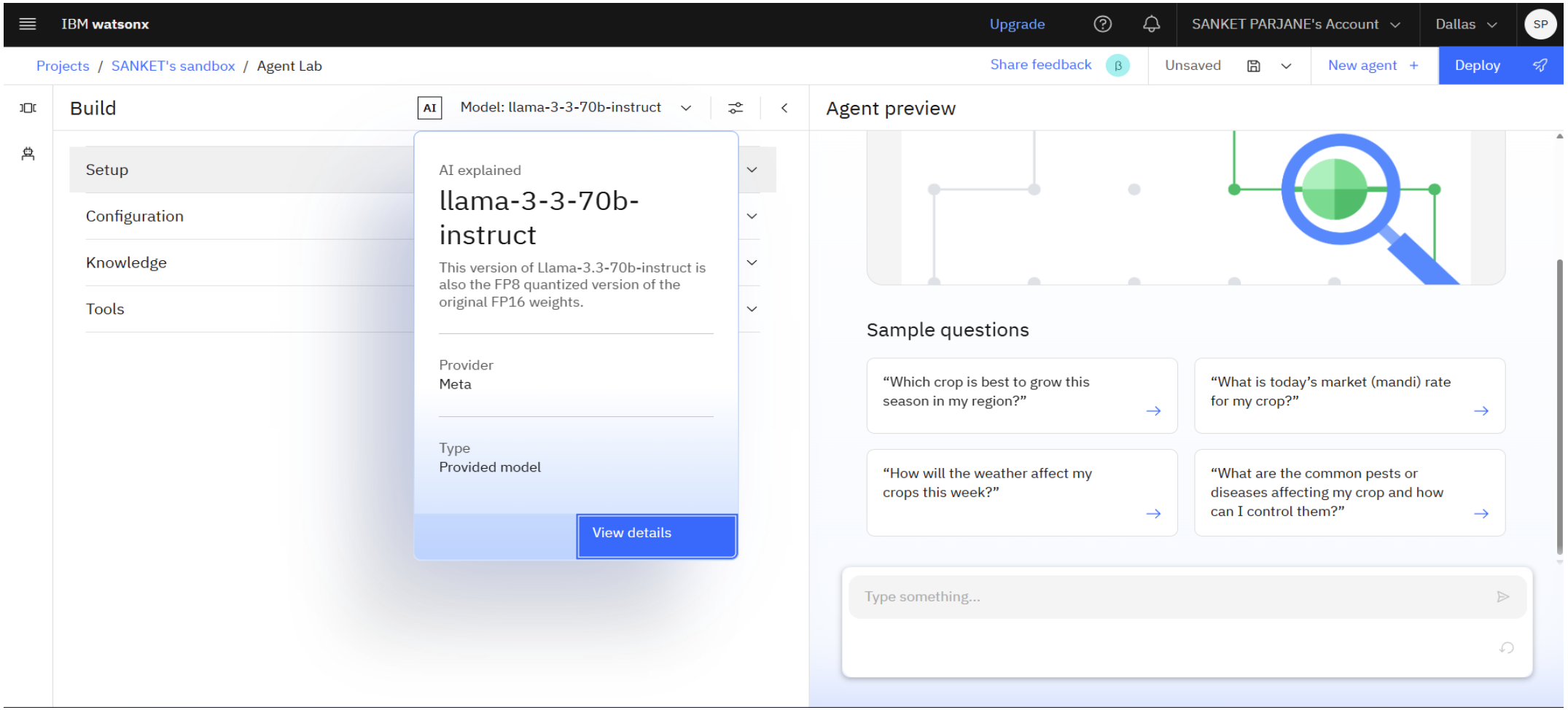
Algorithm & Deployment

The RAG model forms the foundation of the system. It operates in two main stages: retrieval and generation. In the retrieval stage, the system searches a document or database repository for the most relevant information related to the farmer's query. In the generation stage, the AI model (IBM Granite) synthesizes this retrieved information to produce a meaningful and precise answer. The algorithm ensures factual accuracy and contextual understanding. For deployment, the system utilizes IBM Cloud Lite services, where the backend RAG model, API endpoints, and user interface are hosted. This allows real-time access to data and scalable deployment for multiple users across regions.

Result

The output of the system displays a simple, user-friendly chat interface where farmers can type or speak their questions in their local language. The AI agent responds with accurate and context-based answers retrieved from verified agricultural data sources. For example, when a user asks, “Which crop should I grow this season in Maharashtra?”, the system displays the best-suited crops based on weather conditions, soil type, and market trends. Similarly, for “What is today’s mandi rate for tomatoes?”, it provides real-time price updates. The results demonstrate that the system effectively delivers localized and reliable agricultural guidance in an accessible format.

Result


IBM watsonx
Upgrade
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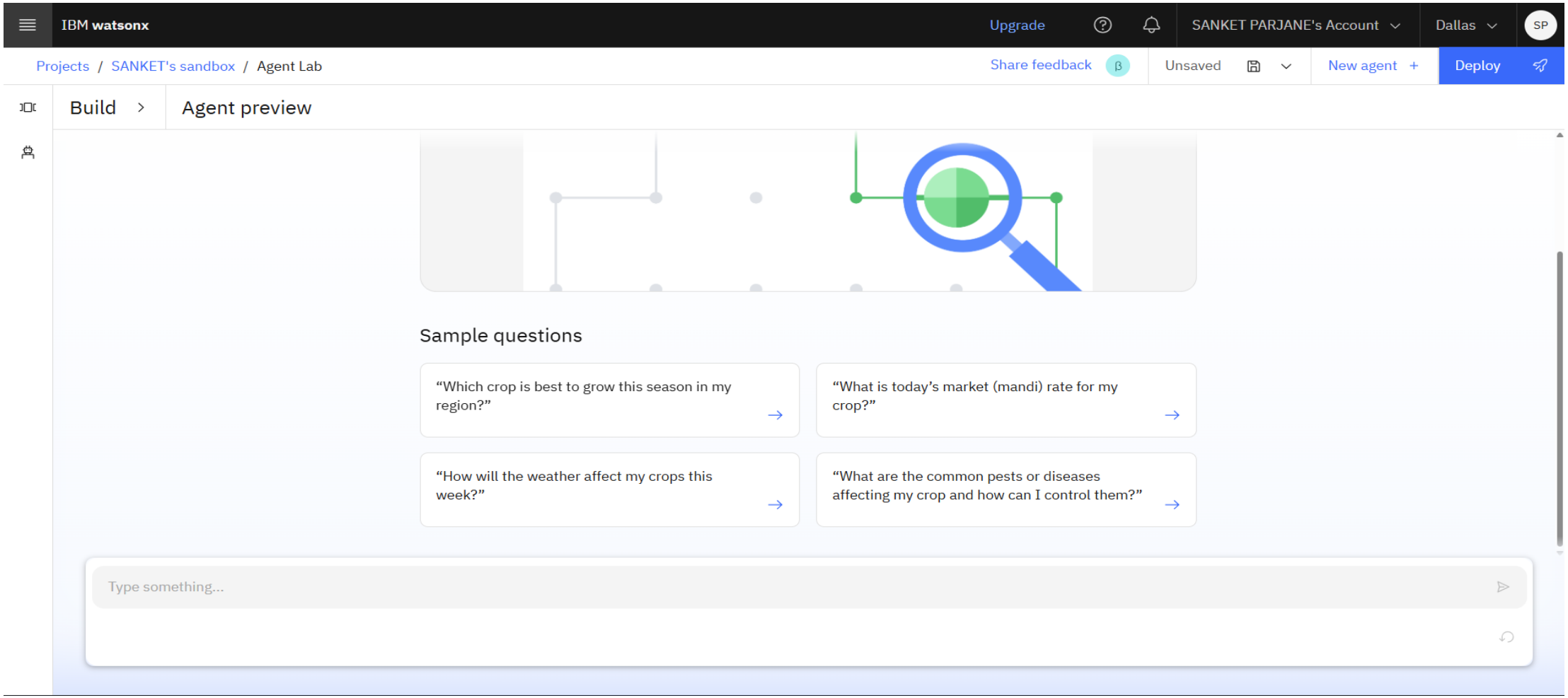
Projects / SANKET's sandbox / Agent Lab
Share feedback
Unsaved
New agent +
Deploy
Build
Model: llama-3-3-70b-instruct
Agent preview
Setup
Configuration
Knowledge
Tools
AI explained
llama-3-3-70b-instruct
This version of Llama-3.3-70b-instruct is also the FP8 quantized version of the original FP16 weights.
Provider
Meta
Type
Provided model
View details
Sample questions
“Which crop is best to grow this season in my region?”
“What is today’s market (mandi) rate for my crop?”
“How will the weather affect my crops this week?”
“What are the common pests or diseases affecting my crop and how can I control them?”
Type something...

Result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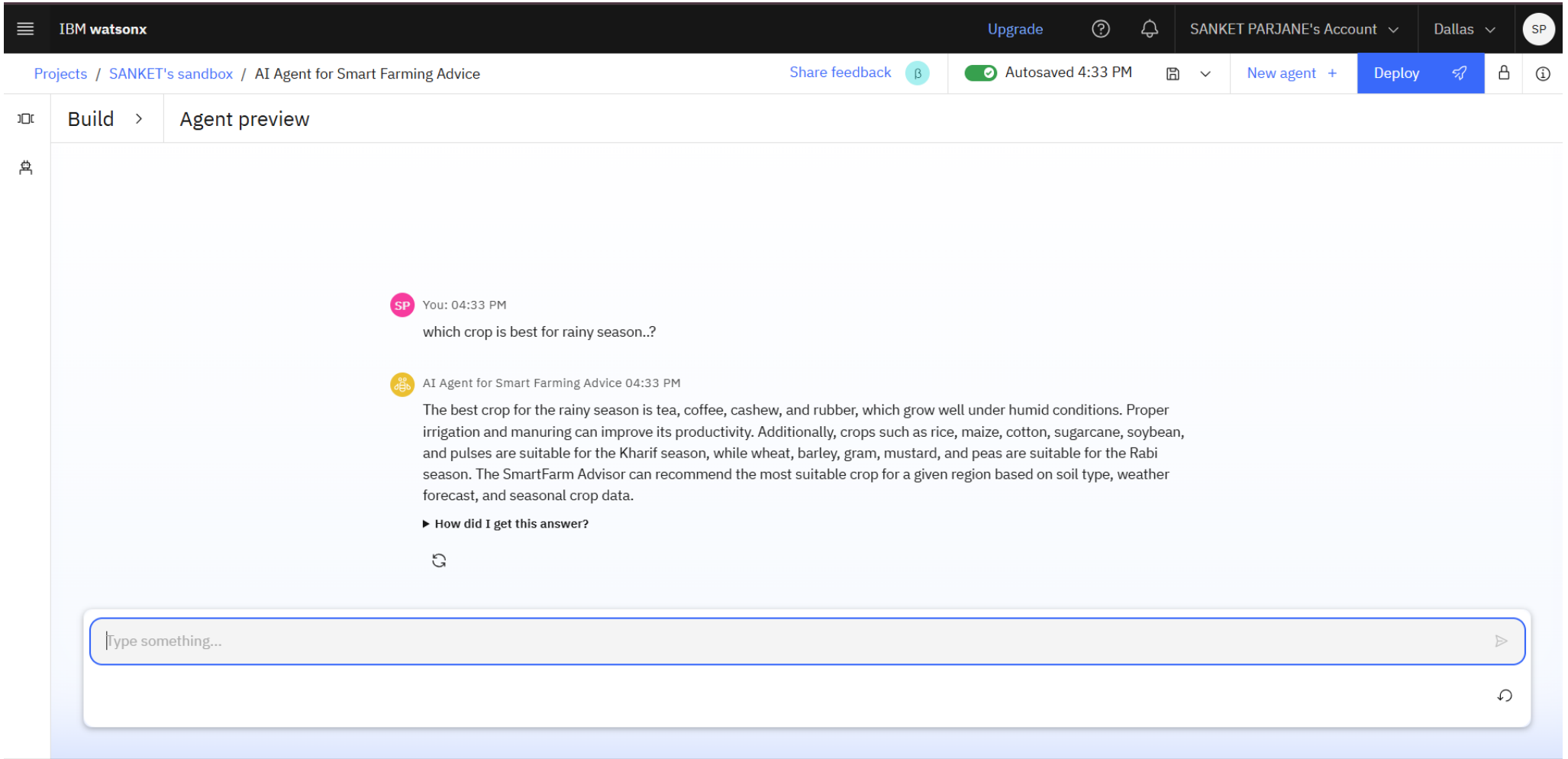
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Upgrade
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SP
Projects / SANKET's sandbox / AI Agent for Smart Farming Advice
Share feedback
Autosaved 4:33 PM
New agent +
Deploy
Build
Agent preview
SP
You: 04:33 PM
which crop is best for rainy season..?
AI Agent for Smart Farming Advice 04:33 PM
The best crop for the rainy season is tea, coffee, cashew, and rubber, which grow well under humid conditions. Proper irrigation and manuring can improve its productivity. Additionally, crops such as rice, maize, cotton, sugarcane, soybean, and pulses are suitable for the Kharif season, while wheat, barley, gram, mustard, and peas are suitable for the Rabi season. The SmartFarm Advisor can recommend the most suitable crop for a given region based on soil type, weather forecast, and seasonal crop data.
How did I get this answer?
Type something...

Conclusion

The AI Agent for Smart Farming Advice successfully addresses the challenges faced by small-scale farmers by providing them with accurate, real-time, and localized agricultural insights. By leveraging Retrieval-Augmented Generation and IBM’s cloud-based AI services, the system bridges the information gap between farmers and expert agricultural knowledge. It enhances decision-making related to crop selection, pest management, and market selling, ultimately improving productivity and profitability. The project demonstrates how AI can play a transformative role in sustainable and smart agriculture at the grassroots level.

Future Scope

In the future, the system can be expanded to include IoT-based sensor integration for real-time soil and crop monitoring, image recognition for pest and disease detection, and multilingual voice assistants to support a wider range of local languages. Integration with blockchain technology can ensure data transparency and traceability in crop supply chains. The system can also be connected with government agricultural schemes and subsidy information to provide farmers with complete financial and technical support. Continuous improvement of the RAG model with domain-specific datasets can further enhance the accuracy and personalization of advice.

References

References

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4.National Agriculture Market (eNAM) – https://www.enam.gov.in
5.Food and Agriculture Organization (FAO) Reports on Smart Farming – https://www.fao.org

THANK YOU