CAPSTONE PROJECT

AI AGENT FOR SMART FARMING

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OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach
- Algorithm & Deployment
- Result (Output Image)
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PROBLEM STATEMENT

An Al agent is needed to provide small-scale farmers with real-time, localized agricultural advice. This agent would help bridge the knowledge gap and bring smart farming to a grassroots level. The goal is to deliver timely, data-driven decisions that can reduce risk, increase crop yield, also provide rates of crops in local & national markets and boost income for farmers.



PROPOSED SOLUTION

The proposed system is an AI agent for smart farming advice that uses Retrieval-Augmented Generation (RAG). This agent will provide real-time, localized guidance to small-scale farmers. The solution will retrieve trusted data from various sources, including agricultural departments, meteorological services, and agri-tech platforms. Farmers will be able to interact with the agent in their local language, asking questions such as "What crop is best for this season?" or "What is today's mandi rate for tomatoes?". The solution will consist of the following components:

Data Collection:

Gather trusted data on weather forecasts, soil conditions, crop recommendations, pest control measures, and current market prices.

Data Preprocessing:

Clean and preprocess the collected data to handle inconsistencies and missing values.

Machine Learning Algorithm:

Implement an machine learning model llama-3-3-70-instruct that can understand and respond to farmer queries in their local language. The
system will use the retrieved data to generate accurate and relevant advice.

Deployment:

 Develop a user-friendly interface or application for farmers to interact with the agent. The solution will be deployed on a scalable platform to ensure reliability and accessibility.

Evaluation:

Assess the agent's effectiveness and accuracy in providing helpful advice.



SYSTEM APPROACH

The overall strategy for developing the AI agent will follow these steps:

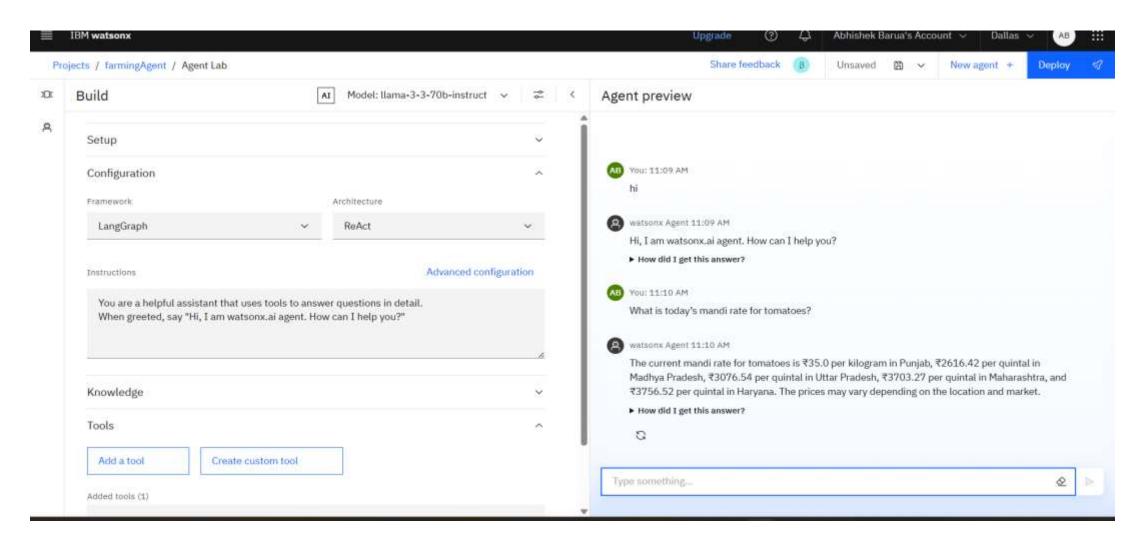
- System requirements: Define the necessary hardware, software, and data requirements for the system.
- **Library required to build the model:** Identify and list the necessary libraries for building the llama-3-3-70-instruct model and the Al agent.
- Watsonx.ai studio : IBM cloud service.
- Object Storage : IBM cloud service.



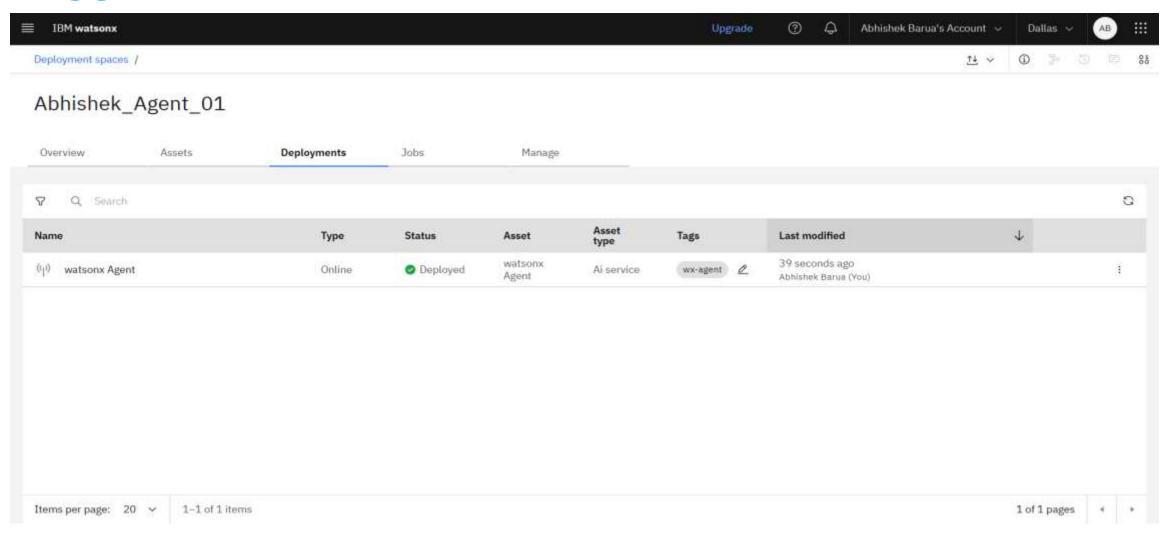
ALGORITHM & DEPLOYMENT

- Here's an example structure for this section:
- Algorithm Selection:
- The chosen algorithm will be a Retrieval-Augmented Generation (RAG) model, which is well-suited for providing specific, data-driven advice by combining a retrieval component with a generative model.
- Data Input:
- The algorithm will use various input features, including farmer queries in their local language and retrieved data from trusted sources (e.g., weather, soil, and market price information).
- Training Process:
- The model will be trained on a diverse dataset to improve its understanding of agricultural queries and its ability to generate accurate and context-aware responses.
- Prediction Process:
- When a farmer asks a question, the agent will first retrieve relevant information from its knowledge base and then use this information to generate a precise answer.

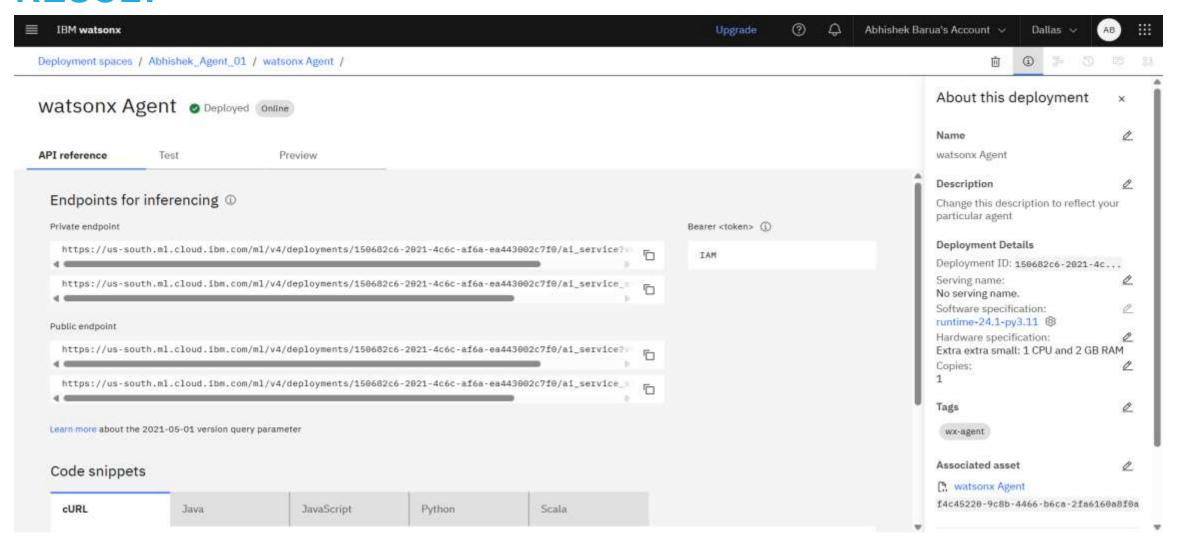




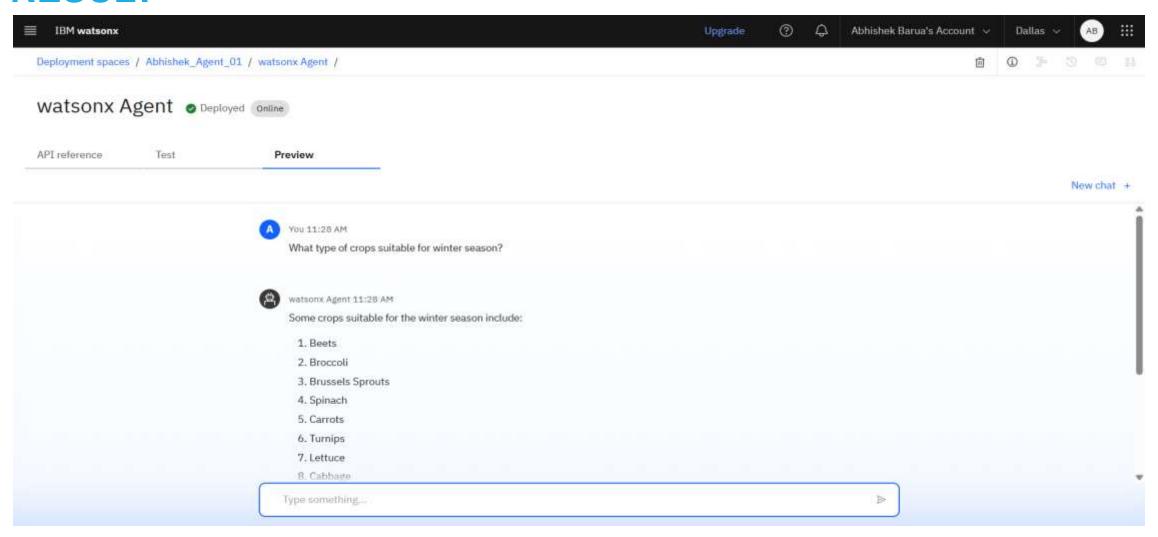














CONCLUSION

The RAG-powered AI agent for smart farming advice effectively provides small-scale farmers with timely and localized agricultural guidance. The solution successfully retrieves trusted data from various sources to deliver accurate recommendations, bridging the knowledge gap and empowering farmers with data-driven decision-making.



FUTURE SCOPE

- Incorporate additional data sources, such as real-time satellite imagery for crop health monitoring.
- Optimize the RAG algorithm to provide faster and even more precise advice.
- Expand the system to cover more languages, crops, and regions to assist a wider range of farmers.
- Consider integrating emerging technologies like edge computing for offline access in remote areas.



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