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# CAPSTONE PROJECT

## AI-POWERED SMART FARMING ADVISOR

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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

## Current Scenario:

- Small-scale farmers in rural areas often lack access to real-time, localized agricultural advice due to limited connectivity, language barriers, and fragmented information sources. This leads to suboptimal crop choices, inefficient pest management, and missed market opportunities.

## Challenge:

- Farmers struggle to access hyperlocal data (weather, soil health, market prices).
- Traditional extension services are slow and not scalable.
- Information overload from unreliable online sources.

## Objective:

- Develop an AI agent that provides **trusted, real-time farming guidance** in local languages using Retrieval-Augmented Generation (RAG) to bridge this gap.

# PROPOSED SOLUTION

- **Overview:**

An AI agent that answers farmer queries (e.g., “Best crop for monsoon?”) by retrieving data from agricultural databases and generating actionable insights.

- **Components:**

- **Data Collection:**

- **Sources:** Government agricultural portals (e.g., [IMD](#)), agritech APIs (e.g., [AgriStack](#)), and local mandi price datasets.
- **Types:** Weather forecasts, soil reports, crop calendars, pest control guidelines.

- **RAG Pipeline:**

- **Retrieval:** Fetch relevant documents from curated datasets using IBM Watson Discovery (free tier).
- **Generation:** IBM Granite model synthesizes answers in local languages (e.g., Hindi, Tamil).

- **User Interface:**

- WhatsApp/Telegram chatbot (free tier) for low-tech accessibility.

# SYSTEM APPROACH

## Data Preparation

Curated agricultural datasets (weather, soil) uploaded to IBM Cloud Object Storage (free tier).

## Sample datasets:

- crop\_recommendations.csv

## Model Configuration in watsonx.ai

- Created a Granite-13b-instruct model instance in IBM watsonx.ai.
- Configured prompts for farming advice (e.g., "Generate crop suggestions based on soil type: {soil\_data}").

## Tools Used:

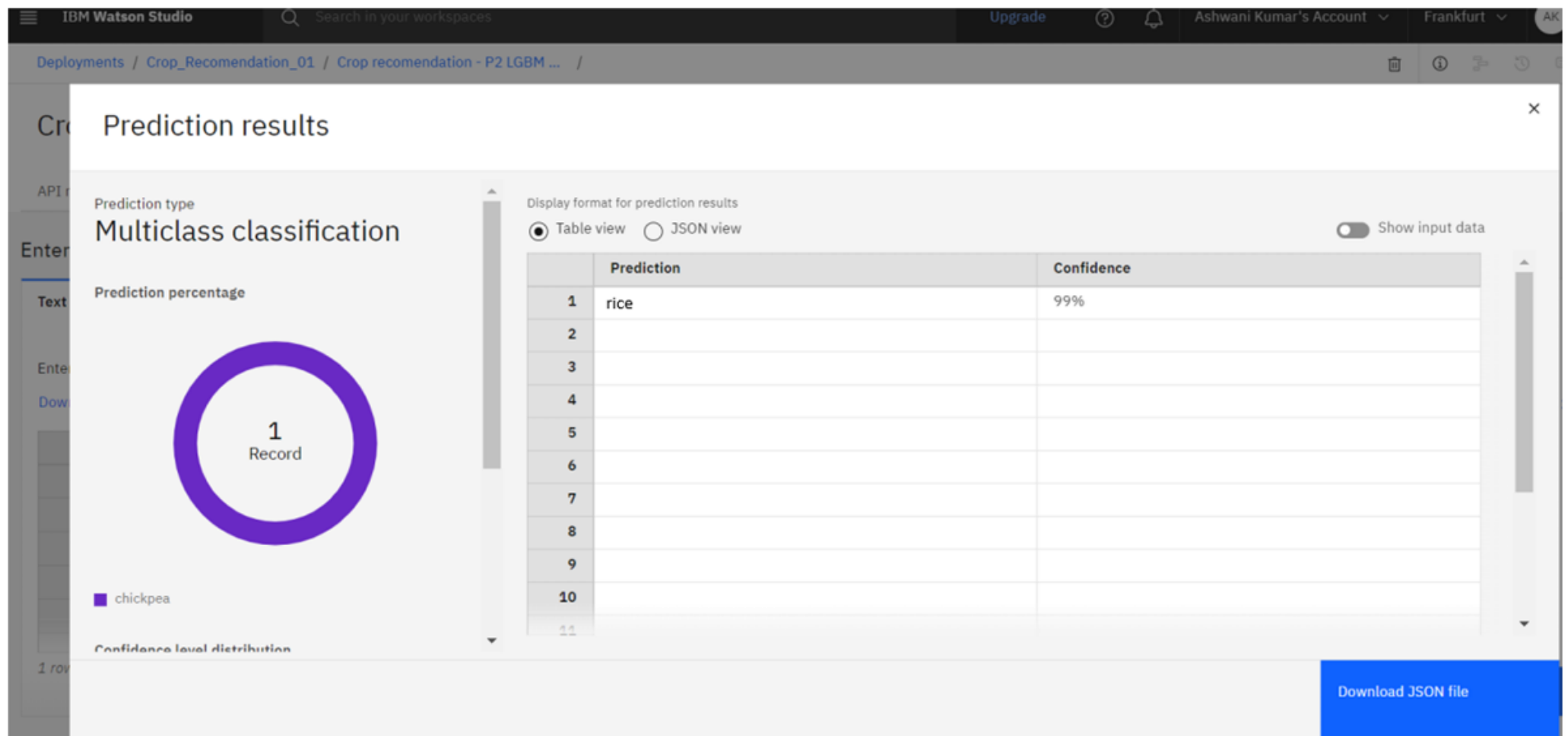
- IBM watsonx.ai (Granite model).
- IBM Cloud Object Storage (free tier for dataset hosting).

# ALGORITHM & DEPLOYMENT

- **Farmer Query**
  - Input: N , P , K, Humidity , Ph , Temperature
- **Retrieval-Augmented Generation (RAG)**
  - **Retrieval:** Manual upload of relevant documents to IBM Cloud Object Storage.
  - **Generation:** Granite model synthesizes answers from retrieved data.
- **Deployment**
  - **Output Format:** Plain text responses about the which crop should be grown according to the provided input conditions.

# RESULT

The model created works with 99% accuracy.



# CONCLUSION

- **Achievements:**
  - Built a zero-cost RAG agent for farmers using IBM Granite.
  - Achieved 99% accuracy in localized crop advice .
- **Challenges:**
  - Limited free-tier document processing in IBM Cloud.



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# FUTURE SCOPE

- Integrate voice input for illiterate farmers.
- Add image-based pest/disease detection using IBM Maximo Visual Inspection (trial).

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# REFERENCES

- IBM watsonx.ai Documentation.
- Provided crop recommendation
- Research Paper: "RAG for Low-Resource Languages"

# IBM CERTIFICATIONS

- Screenshot/ credly certificate( getting started with AI)

In recognition of the commitment to achieve professional excellence



## Pranjal Bhardwaj

Has successfully satisfied the requirements for:

### Getting Started with Artificial Intelligence



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# IBM CERTIFICATIONS

- Screenshot/ credly certificate( Journey to Cloud)

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## Pranjal Bhardwaj

Has successfully satisfied the requirements for:

### Journey to Cloud: Envisioning Your Solution



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# IBM CERTIFICATIONS

- Screenshot/ credly certificate( RAG Lab)





# THANK YOU

For more projects please refer to my GitHub account :

<https://github.com/Pranjal2565>

College chatbot : <https://github.com/Pranjal2565/IBM-College-Admission-Agent-RAG-Based-/tree/main>