कृषि एवं किसान कल्याण मंत्रालय
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
सत्यमेव जयते

NABARD
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AGRISURE GREENATHON

Team Details

- Team Name: SarvSustain
- Team Members: Sushil Krishnan, Rajendran K, Yogeshwaran V N, Dr. Sujatha R
- Problem Statement: Track 1: Smart Agriculture on a Budget

Brief about the idea

- SarvSustain is an innovative agricultural platform that combines sensor-based data collection, IoT, machine learning, and deep learning to empower farmers with hyper-local, data-driven decision making.
- Our platform provides farmers with real-time insights on soil moisture, temperature, and plant health, enabling them to optimize resource allocation, predict crop yields, and reduce pesticide dependence.
- Our platform utilizes Large Language Models (LLM) and Retrieval-Augmented Generative (RAG) models for prescriptive analysis and suggestions.
- Demand-supply forecasting, leveraging historical sales and price data to enable farmers to make informed decisions on crop selection and pricing.
- Additionally, SarvSustain's data-driven insights can also assist policymakers in making informed decisions on agricultural policies, subsidies, and regulations, enabling them to create a more supportive ecosystem for sustainable agriculture and drive positive impact at scale.

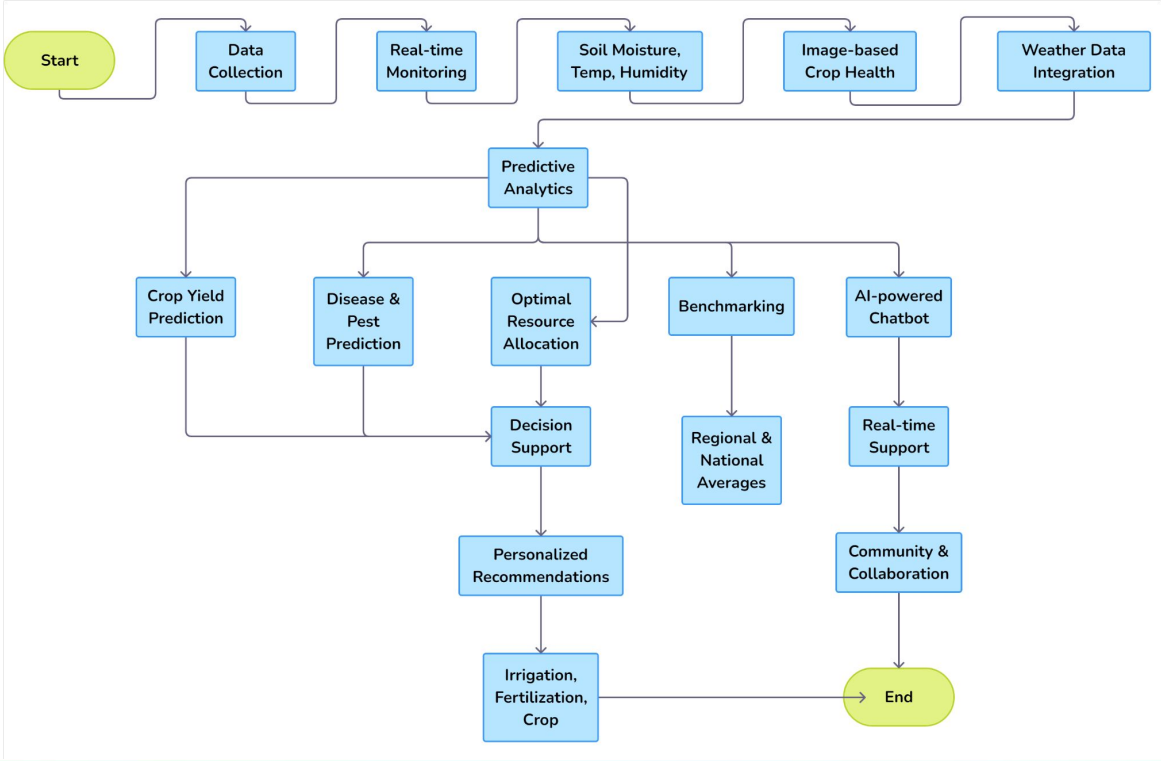
Opportunities

- How different is it from any of the other existing ideas?
  - SarvSustain stands out by combining hyper-local sensor data, advanced AI models (LLM, RAG), and a strong focus on community and policy impact. Unlike other solutions, it offers real-time, personalized insights, fosters collaboration, and contributes to broader ecosystem improvement.
- How will it be able to solve the problem?
  - By providing farmers with data-driven recommendations, SarvSustain helps optimize resource usage, predict challenges, and increase yields. It also supports policy-makers in creating a supportive agricultural environment.
- USP of the proposed solution
  - SarvSustain's unique value proposition lies in its comprehensive approach: hyper-local precision, AI-powered insights, community engagement, and policy influence. It empowers farmers, enhances sustainability, and drives positive change in the agricultural sector.

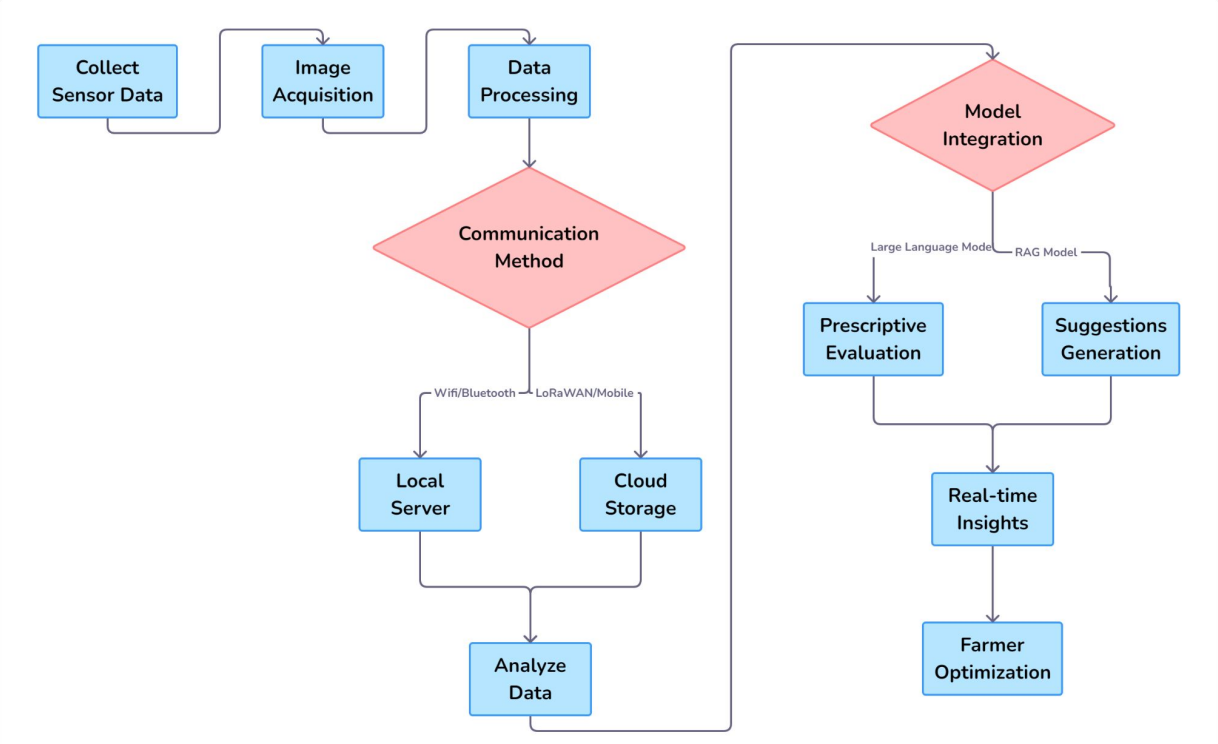
List of features offered by the solution

- Implemented
  - Personalized recommendations for irrigation, fertilization, and crop selection
  - Crop yield prediction
  - Image-based crop health assessment
- Proposed
  - Weather data integration and analysis
  - Real-time monitoring
  - Optimal resource allocation recommendations
  - AI-powered chatbot for real-time support
  - Farmer-to-farmer knowledge sharing platform
  - Data-driven insights for policymakers
  - Mobile app for on-the-go monitoring and management

Process flow diagram or Use-case diagram



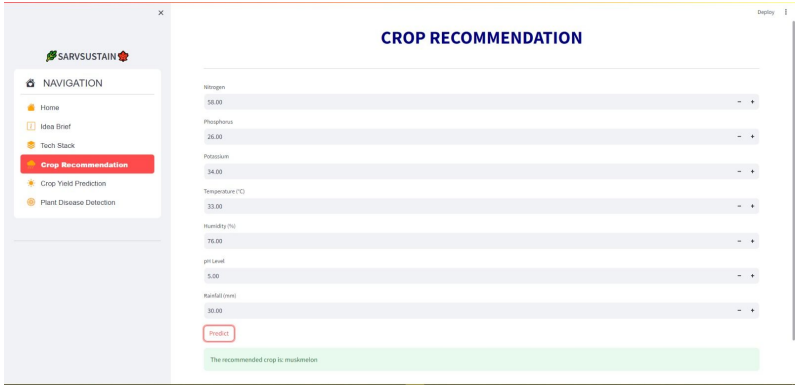
Architecture diagram of the proposed solution

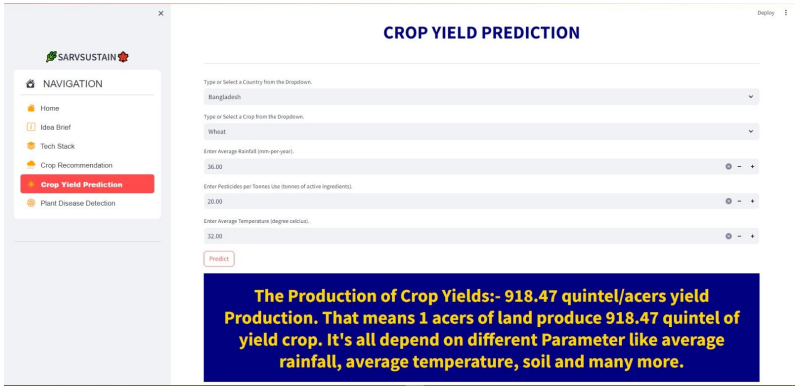


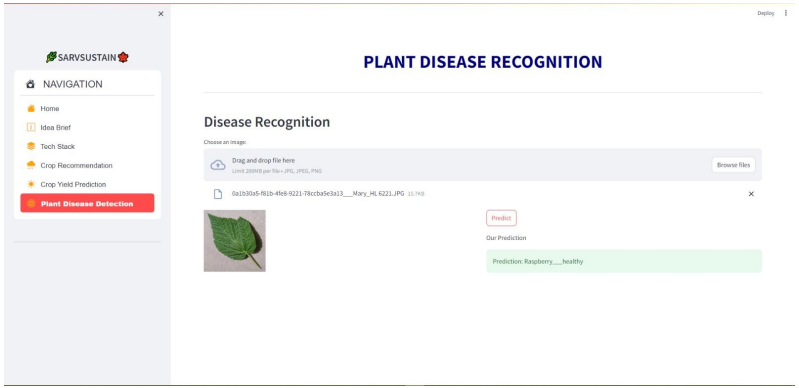
Technologies to be used in the solution

- IoT sensors like soil moisture, temperature, humidity sensors and other essential measures with image acquisition capabilities.
- Communication through wifi, Bluetooth, LoRaWAN or mobile networks
- Large language model (LLM) and Retrieval-Augmented Generative (RAG)
- Cloud-based databases for storage
- Machine learning and deep learning frameworks (TensorFlow, PyTorch, Keras) and libraries (scikit-learn, OpenCV, Pillow)
- Data visualization tools for dashboarding and business intelligence
- Containerization and serverless computing
- Front-end and user interface are built with React,
- Mobile app development on iOS, Android and React native
- Security features include SSL/TLS encryption, firewalls, and intrusion detection systems, with compliance for data protection and regulatory requirements.

Snapshots of the prototype







Prototype Performance report/benchmarking

- Prototype developed using Streamlit Python Framework.
- Crop Recommendation
  - Random Forest Model (accuracy=99.54%)
- Crop Yield Prediction
  - Stochastic Gradient Descent Regression Model (accuracy=94%)
- Plant Disease Detection
  - Custom Convolutional Neural Network (accuracy=88%)

Additional Details/Future Developments

- Weather data integration and analysis
- Real-time monitoring
- Optimal resource allocation recommendations
- AI-powered chatbot for real-time support
- Farmer-to-farmer knowledge sharing platform
- Data-driven insights for policymakers
- Mobile app for on-the-go monitoring and management

GitHub Public Repository Link & Demo Video Link

- GitHub Repository
  - https://github.com/K-Rajendran/SarvSustain_AgriSURE_Greenathon_2024
- Demo Video Link
  - https://drive.google.com/file/d/1YK5saqRsOA682UlFGcZv1FDm2Q---klK/view?usp=sharing

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