PARSHWANATH CHARITABLE TRUST'S
A.P. SHAH INSTITUTE OF TECHNOLOGY
Department of Computer Science and Engineering
Data Science

AGROSMART: ML DRIVEN CROP RECOMMENDER

Annsh Yadav - (22107012)
Diya Thakkar - (22107040)
Rahul Zore - (22107008)
Soham Shigvan - (22107001)

Project Guide
Ms. Richa Singh

Outline

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Introduction

Farmers face challenges in choosing the right crops due to unpredictable weather, market shifts, and outdated methods. While advisory apps offer general guidance, they often lack precision. AgroSmart uses machine learning to analyze local soil, climate, and crop data, delivering personalized recommendations that boost yield, profitability, and sustainability—making it essential for modern agriculture.

Motivation

AgroSmart aims to equip farmers with precise, data-driven tools for crop selection in the face of climate change, resource scarcity, and market volatility. Traditional methods often result in poor yields and losses. By using machine learning, AgroSmart provides personalized recommendations tailored to specific farm conditions, boosting productivity, sustainability, and agricultural resilience.

Objectives

1. Yield Prediction Optimization: Create precise yield prediction models to help farmers estimate potential harvests based on current conditions, aiding in effective planning and resource management.

2. Fertilizer Recommendations: Develop a system for personalized fertilizer recommendations considering soil health, crop type, and environmental conditions, aimed at enhancing crop growth and minimizing environmental impact.

3. Crop Recommendations: Provide data-driven crop selection advice based on local soil properties, weather patterns, and market trends, ensuring optimal crop choices for each farm.

4. Integrated Decision Support: Build a user-friendly platform integrating weather forecasts, yield predictions, and fertilizer recommendations to support comprehensive decision-making for farmers.

Literature Survey of the existing system

SR. NO	TITLE	AUTHOR	YEAR	OUTCOMES	METHODOLOGY	RESULT
1.	Crop Recommendation System for Precision Agriculture [1]	S.Pudumalar, E.Ramanujam, R.Harinerajashree, C.Kavya, T.Kiruthika, J.Nisha	2016	The project developed a crop recommendation system with 88% accuracy using an ensemble model for precise crop suggestions.	Soil data from Madurai was analyzed using an ensemble of Random Tree, CHAID, KNN, and Naive Bayes models with majority voting.	The model's rules were implemented in a web-based tool, offering accurate crop recommendations tailored to specific soil conditions(pudumalar2017(1)).

Literature Survey of the existing system

SR. NO	TITLE	AUTHOR	YEAR	OUTCOMES	METHODOLOGY	RESULT
2.	AgroConsultant: Intelligent Crop Recommendation System Using Machine Learning Algorithms [2]	Zeel Doshi, Subhash Nadkarni, Rashi Agrawal, Prof. Neepa Shah	2018	An intelligent system assists Indian farmers in crop selection based on environmental and soil factors, achieving 91% accuracy with Neural Networks.	The system uses decision trees, K-NN, Random Forest, and Neural Networks, processing soil, weather data, and a rainfall predictor to suggest the most suitable crops per region and season.	Crop Suitability Predictor: Neural Network model achieved the highest accuracy at 91%, outperforming Decision Tree (90.20%), K-NN (89.78%), and Random Forest (90.43%).

Literature Survey of the existing system

SR. NO	TITLE	AUTHOR	YEAR	OUTCOMES	METHODOLOGY	RESULT
3.	Crop Recommender System using machine learning approach [3]	Shilpa Mangesh Pande, Dr. Prem Kumar Ramesh , Anmol , B.R Aishwarya , Karuna Rohilla , Kumar Shaurya	2021	A mobile-based system predicts crop yield and suggests profitable crops using machine learning, achieving 95% accuracy with Random Forest.	Historical data from Maharashtra and Karnataka were used, applying algorithms like Random Forest, ANN, SVM, KNN, and MLR for yield prediction via a user-friendly mobile app.	Random Forest outperformed other algorithms with 95% accuracy, and the system successfully recommended crops and optimal fertilizer usage timing.

Limitations of existing systems

1. Generalized Recommendations: Existing systems often provide broad, region-wide advice that doesn’t account for the specific conditions of individual farms, leading to suboptimal crop choices.

2. Lack of Real-Time Adaptability: Traditional systems may not update recommendations in real-time based on changing weather conditions or new data inputs, making them less responsive and reliable for farmers.

3. Complex User Interfaces: Some existing tools have complex interfaces that are not user-friendly, especially for farmers with limited technical expertise, hindering widespread adoption and effective use.

Problem statement

1. Farmers struggle with crop selection due to unpredictable weather, variable soil conditions, and market fluctuations, leading to suboptimal yields and financial instability.

2. Traditional farming methods rely on intuition or generalized advice, which often fails to consider the unique conditions of individual farms.

3. There is a critical need for a system that provides tailored, data-driven recommendations to enhance agricultural productivity and sustainability, addressing the specific needs of each farm.

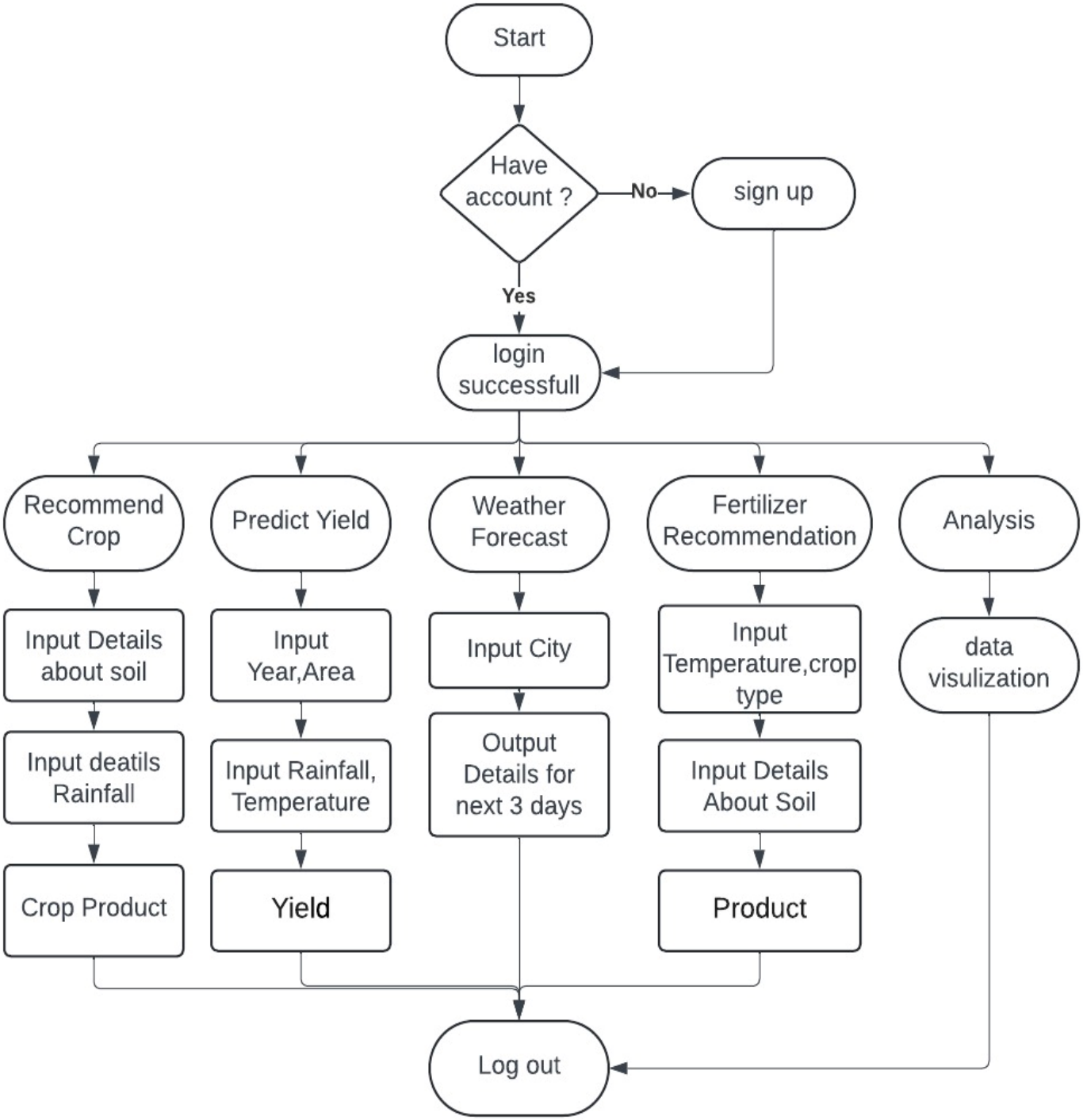
System Design

1. Weather Forecasting Module: Collect weather data that forecast weather using API from openweathernap and informing fertilizer recommendations.

2. Yield Prediction Module: Use soil, weather, and historical yield data to estimate potential crop yields, helping farmers plan and optimize their farming practices.

3. Fertilizer Recommendation Module: Analyze soil health and crop requirements to provide personalized fertilizer suggestions that maximize growth and minimize environmental impact.

4. Crop Recommendation Module: Leverage integrated data (soil, weather, yield predictions) to recommend the most suitable crops for each farm, ensuring optimal productivity and sustainability.


Start
Have account ?
No
sign up
Yes
login successfull
Recommend Crop
Predict Yield
Weather Forecast
Fertilizer Recommendation
Analysis
Input Details about soil
Input deatils Rainfall
Crop Product
Input Year,Area
Input Rainfall, Temperature
Yield
Input City
Output Details for next 3 days
Input Temperature,crop type
Input Details About Soil
Product
data visulization
Log out

Technologies and methodologies

Front-End:

- HTML
- CSS
- JavaScript
- Bootstrap

Back-End:

- Python
- Flask
- MySQL(phpMyAdmin)

Algorithm:

- Random Forest(Crop Recommendation)
- Decision Tree(Yield Prediction)

Implementation

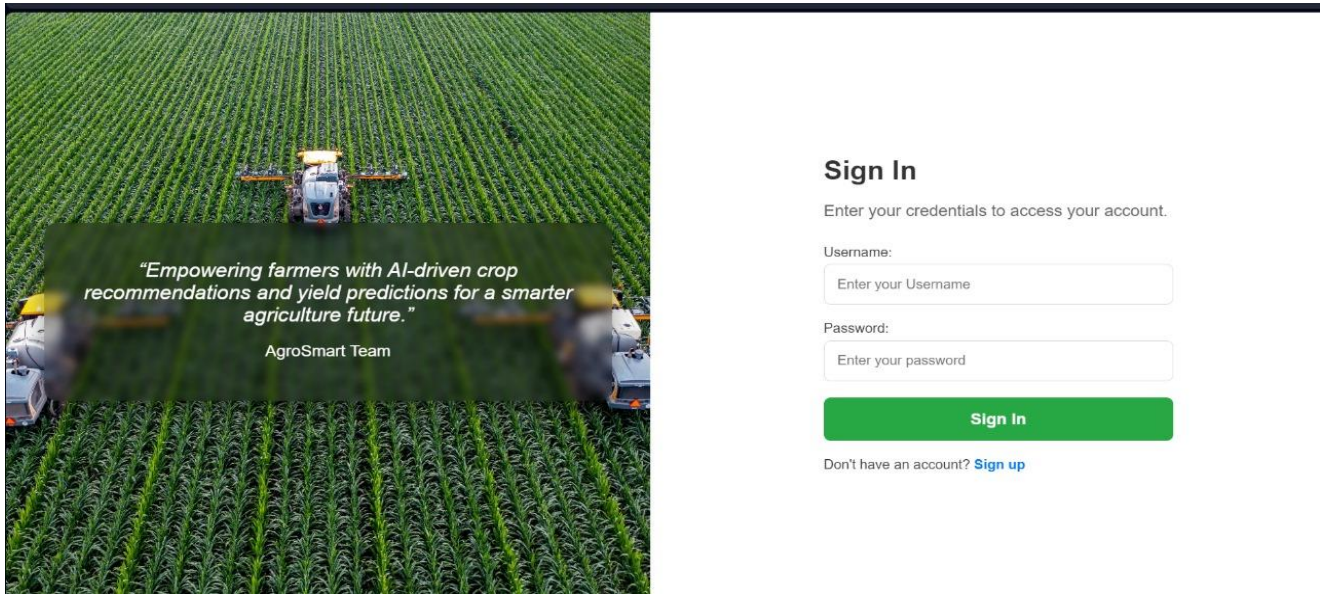


Fig. 1: (Sign In Page)

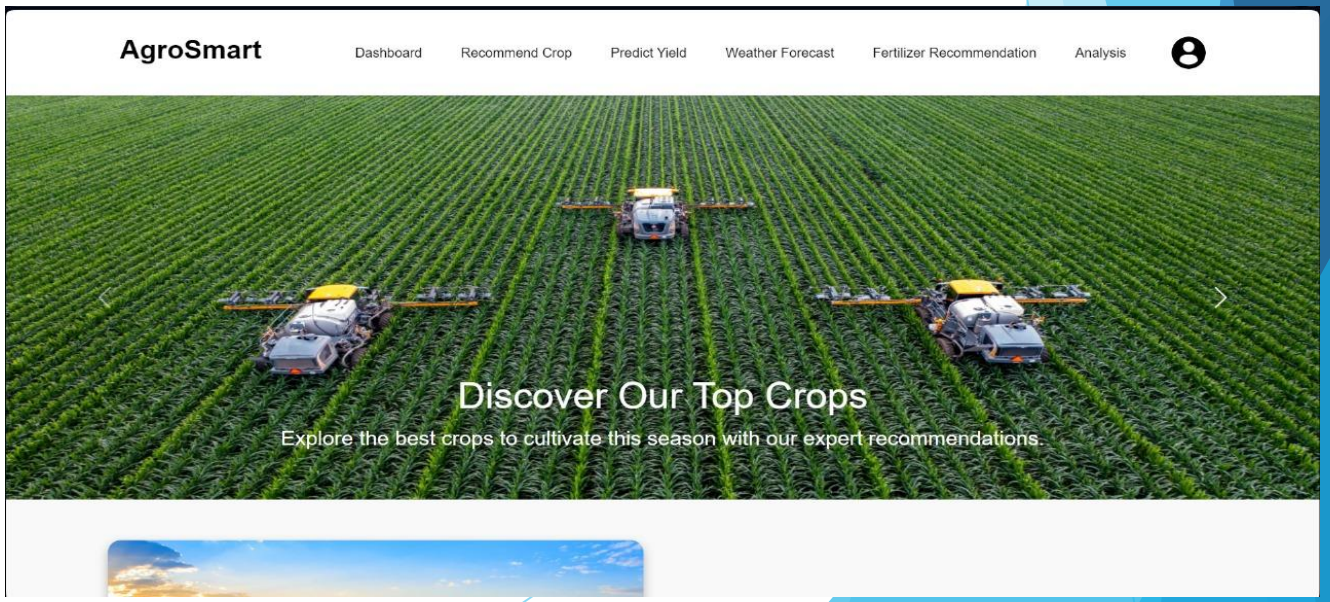


Fig. 2: (Home Page)

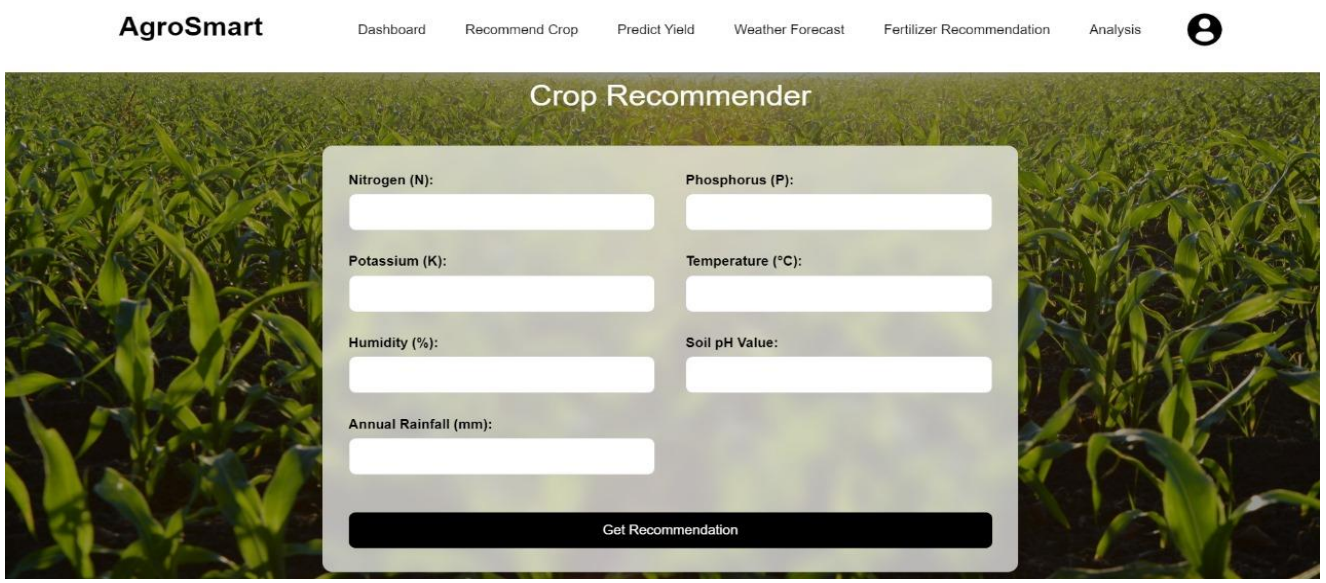


Fig. 3:
(Crop Recommendation Page)

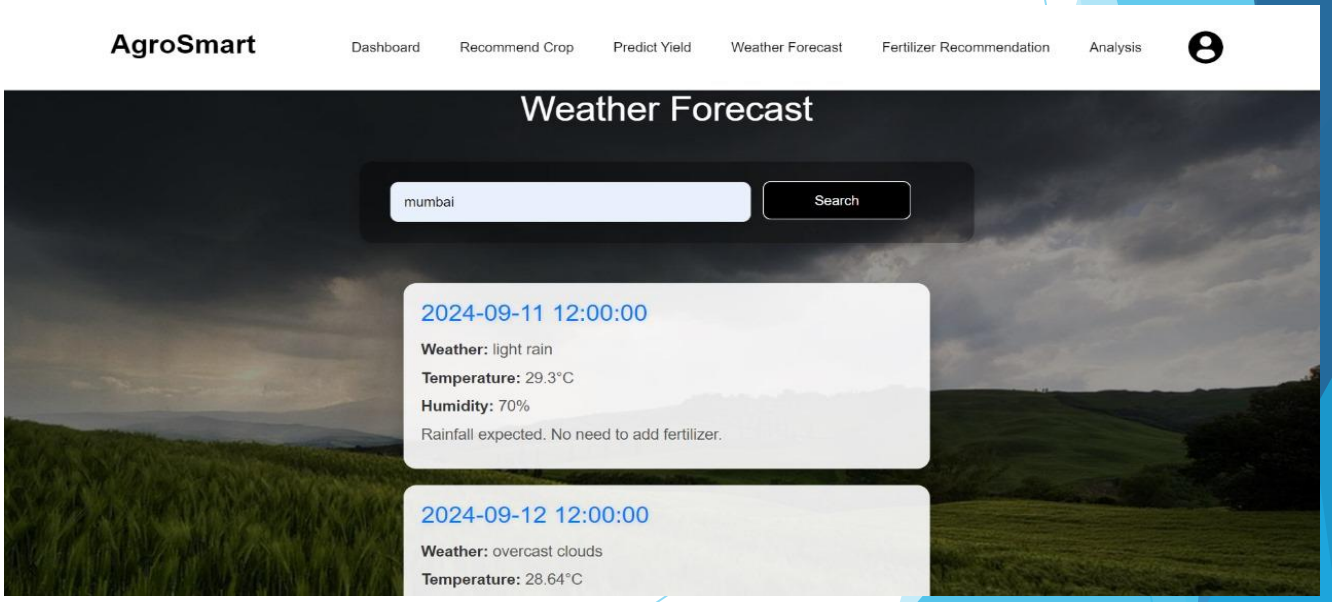


Fig. 4:
(Weather Forecast Page)

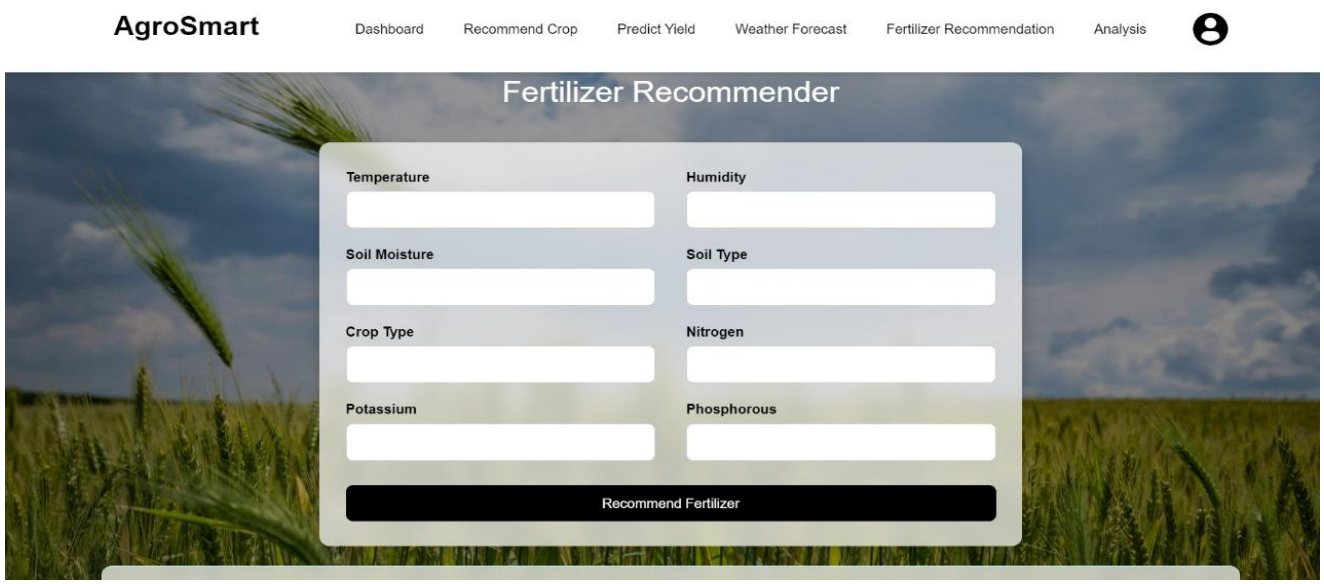
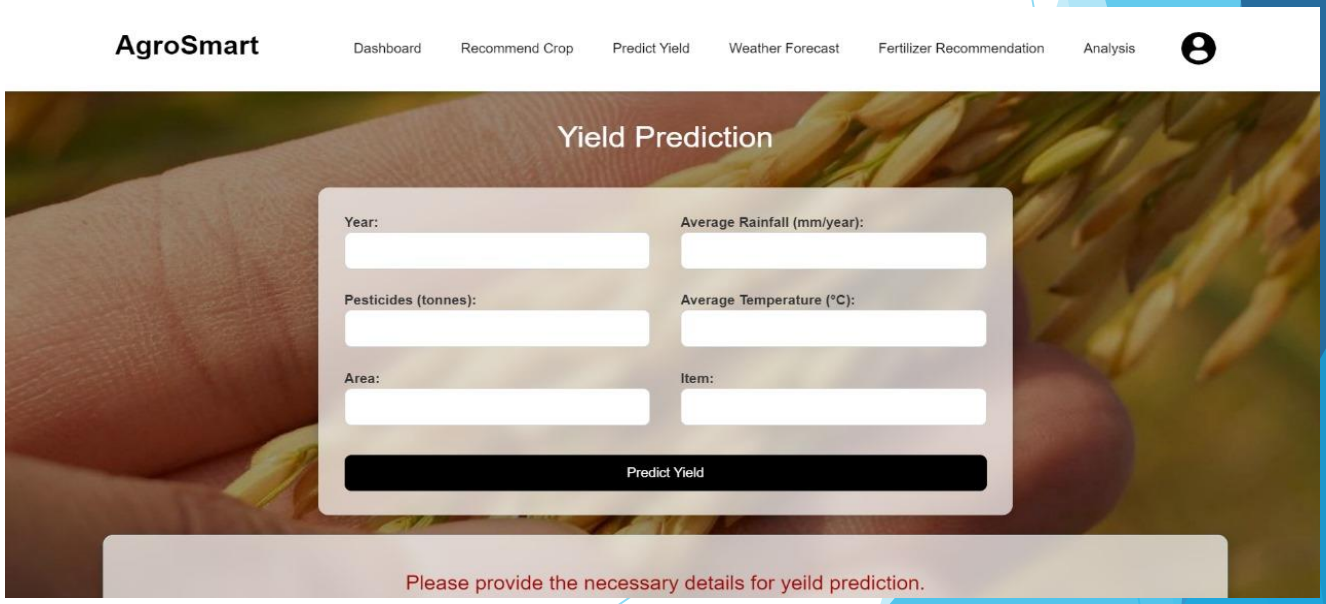


Fig. 5:
(Fertilizer Recommendation Page)

Fig. 6:
(Yield Prediction Page)



Conclusion

1. The AgroSmart ML-driven Crop Recommender offers precise, data-driven recommendations for crop selection, yield prediction, and resource management, addressing the limitations of traditional farming methods.

2. By integrating real-time weather data, soil analysis, and market trends, AgroSmart empowers farmers to make informed decisions, enhancing productivity, sustainability, and resilience in agriculture.

References

[1] S.Pudumalar, E.Ramanujam, R.Harine rajashree, C.Kavya, T.Kiruthika, J.Nisha, Crop Recommendation System for Precision Agriculture, January 2016

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[2]Zeel Doshi, Subhash Nadkarni, Rashi Agrawal, Prof. Neepa Shah, AgroConsultant: Intelligent Crop Recommendation System Using Machine Learning Algorithms, August 2018

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[3]Shilpa Mangesh Pande , Dr. Prem Kumar Ramesh , Anmol , B.R Aishwarya , Karuna Rohilla , Kumar Shaurya, Crop Recommender System Using Machine Learning Approach, IEEE Xplore Part Number: CFP21K25-ART, June 2021

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Thank You...!!