Agri Comprehensive Management Platform Using AI

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Abstract

This research paper presents an innovative crop prediction and disease detection system that leverages machine learning techniques to improve agricultural productivity. The proposed system allows farmers to input sensor data to predict crop yields and receive tailored fertilizer recommendations, thereby optimizing resource usage. Through advanced image analysis, the system detects crop diseases and provides actionable insights on suitable pesticides, enhancing crop health management. Additionally, the platform delivers real-time agricultural updates via a news API and offers multi-language support, making it accessible to a diverse user base. A vendor-farmer communication feature is also included, promoting transparent sharing of crop prices and market trends. This comprehensive approach aims to empower farmers with the tools necessary for informed decision-making, ultimately fostering sustainable agricultural practices and improved economic outcomes.

Keywords: Crop Prediction, Disease Detection, Machine Learning, Agricultural Productivity, Sensor Data, Real-Time Updates, Multi-Language Support

INTRODUCTION

The agricultural sector is pivotal to the global economy, providing food security and livelihoods for millions of people. However, farmers face numerous challenges, including unpredictable weather patterns, pest infestations, and diseases that threaten crop yields. To address these challenges, the integration of technology in agriculture has become essential. This paper introduces an advanced crop prediction and disease detection system that utilizes machine learning algorithms to enhance agricultural productivity.

The system empowers farmers by allowing them to input real-time sensor data to predict crop yields accurately. By analyzing this data, the platform provides tailored fertilizer recommendations, optimizing resource use and improving crop health. Furthermore, the system incorporates image-based analysis to detect crop diseases, offering timely insights on appropriate pesticides to mitigate potential losses.

In addition to its predictive capabilities, the application features a news API that delivers real- time agricultural updates, keeping farmers informed about market trends and best practices. The multi-language support ensures accessibility for a diverse range of users, breaking down communication barriers. A unique vendor-farmer communication feature fosters transparency, enabling farmers to stay informed about crop prices and market fluctuations.

This research aims to provide a comprehensive solution that not only enhances decision-making for farmers but also promotes sustainable agricultural practices, ultimately contributing to the broader goal of food security and economic stability

LITERATURE SURVEY

[1] Pallavi Saindane SwasthPhasal: An E-farming Web Portal, 2022 Second International Conference on Advanced Technologies in Intelligent Control, Environment, Computing & Communication Engineering (ICATIECE Description: - Agriculture has been India's main profession for centuries. According to the Indian Agricultural Research Institute, the need for edible grains will increase to 345 million tones in the next decade, however its role in India's GDP has recently declined. The current situation of farmers is disappointing as most of them live in severe poverty Limitations: Digital Divide: Not all farmers in India have easy access to the internet and the required digital devices. Infrastructure Challenges: In many rural areas, there are infrastructure challenges such as electricity shortages and poor road networks.

[2] K P K Devan; B Swetha , Crop Yield Prediction and Fertilizer Recommendation System Using Hybrid Machine Learning AlgorithmsDescription: - Progressions in machine learning and crop simulation techniques have created new opportunities for improving agro-based prediction. In crop yield analysis, machine learning is a rapidly expanding research area. Limitations: Generalization: Machine learning models may struggle to generalize well across different regions and agricultural practices.

[3] Anuja Nanda; Sangam Nayak Dept. of EEE, ITER, S‘O’A University, Odisha, INDIA, Crop Disease Prediction by Using Machine Learning 2023 International Conference in Advances in Power, Signal, and Information Technology (APSIT)

Description: - Food is a basic need for every living being. With the increasing population, it has become necessary to yield enough amount of crops to satiate their hunger. In the mean while we face a lot of problems while considering the needs of such a huge population. Limitations: Data Availability and Quality: The success of machine learning models for disease detection relies on the availability of high-quality training data

METHODOLOGY

- Gather historical data on crop yields, weather conditions, soil characteristics, and disease incidence. This data can be sourced from agricultural databases, government reports, and field surveys.
- Use IoT sensors to collect real-time data on soil moisture, temperature, humidity, and nutrient levels. This information will help in predicting crop yields and providing fertilizer recommendations.
- Implement image acquisition techniques using cameras or drones to capture images of crops. Utilize computer vision algorithms to preprocess these images for further analysis.
- Employ various machine learning techniques, such as regression analysis for yield prediction and classification algorithms (like SVM, Random Forest, or CNN) for disease detection. Train these models on the collected data to enhance accuracy.
- Develop image analysis models to identify signs of crop diseases. This includes analyzing color patterns, shapes, and textures in the images to classify diseases and recommend suitable pesticides.
- Create a predictive model using historical data and real-time sensor input to forecast crop yields. This model will help farmers make informed decisions about planting and resource allocation.

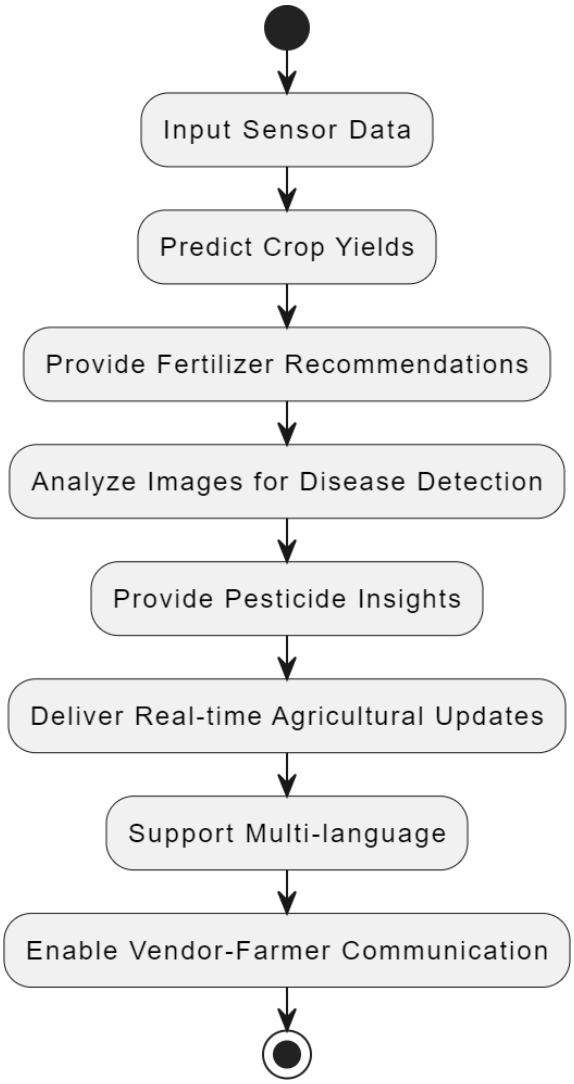
OBJECTIVE

- To develop a machine learning-based system that accurately predicts crop yields and recommends fertilizers, thus optimizing resource allocation and increasing overall productivity.
- To implement image processing techniques for real-time detection of crop diseases, enabling timely

interventions and reducing crop losses.

- To integrate IoT sensors for collecting real- time agricultural data, ensuring that farmers receive up-to-date information on soil and environmental conditions affecting crop growth.
- To create a user-friendly interface that supports multiple languages, making the system accessible to a diverse range of farmers and agricultural stakeholders.
- To facilitate communication between farmers and vendors regarding crop prices and market trends, promoting transparency and informed decision-making.
- To offer real-time agricultural updates via a news API, ensuring that users are informed about relevant agricultural developments, weather forecasts, and market conditions.

FLOW CHART



RESULT

Fig: registration page

Fig: Login page

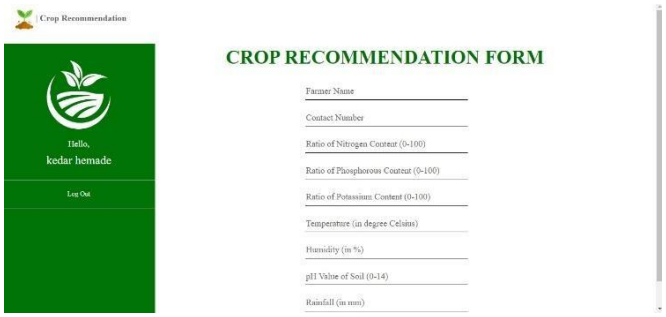


Fig: Dashboard page

Fig: Dashboard page

Fig: Home page

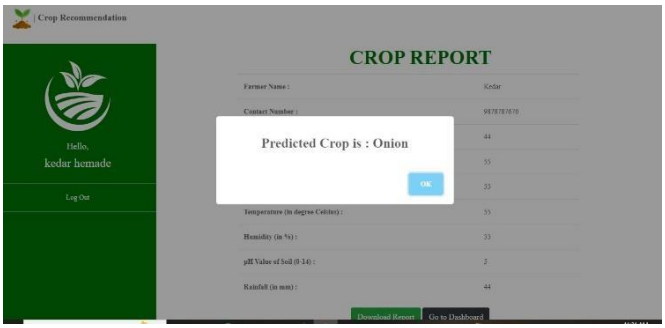


Fig: result page

CONCLUSION

The proposed advanced crop prediction and disease detection system harnesses the power of machine learning to significantly improve agricultural productivity and sustainability. By enabling farmers to input sensor data and receive accurate yield predictions along with tailored fertilizer recommendations, the system empowers them to make informed decisions that enhance crop performance. The inclusion of image-based disease detection further enhances its utility, allowing for timely interventions that can mitigate potential losses. Additionally, the real-time agricultural updates and vendor-farmer communication features foster transparency and collaboration within the agricultural community. Overall, this system not only facilitates a more efficient farming process but also promotes the adoption of technology in agriculture, ultimately contributing to food security and economic growth.

REFERENCES

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