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AgriCare: An AI-Driven Integrated Platform for Smart Farming and Real-Time Weather Intelligence

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AgriCare is an innovative digital solution designed to revolutionize the agricultural sector in India and similar developing nations. Despite agriculture supporting over 60% of the population, the sector remains fragmented, with low technological adoption. AgriCare is a multi-functional platform that leverages Artificial Intelligence (AI), the Internet of Things (IoT), and modern web technologies to solve persistent issues such as poor disease detection, lack of real-time crop insights, and inefficient market access. The platform provides features such as disease detection via image upload, a live auction system, AI-based negotiation, smart crop planning, region-specific land preparation guidance, and soil report interpretation, and real-time weather advisory via Weather API integration. This paper describes the architecture, features, implementation, and impact of the AgriCare platform.

Keywords — Agriculture, Disease Detection, AI, Auction System, Crop Rotation, IoT, Soil Report, Smart Farming, Land Preparation, Bargain Chat

I. INTRODUCTION

India's agricultural backbone supports a significant part of its economy and population, yet technological integration into daily farming practices remains minimal. The major issues farmers face include lack of market access, exploitation by intermediaries, inadequate understanding of soil health, absence of scientific crop planning, and inability to detect diseases early.

To tackle these issues, we developed AgriCare—an intelligent, user-centric platform tailored to provide farmers with real-time assistance, decision-making tools, and a digital marketplace. The platform is designed with a mobile-first and multilingual approach, enabling even digitally unskilled farmers to benefit from AI-driven features.

AgriCare empowers farmers by providing customized recommendations based on soil data, crop health analysis through AI-driven disease detection, and region-specific planting schedules. With integrated weather forecasts and market price trends, farmers can make informed decisions and plan their activities efficiently. Additionally, the platform bridges the gap between farmers and buyers, reducing reliance on middlemen and enhancing profitability through direct market access. Through these features, AgriCare envisions a future where every farmer, regardless of background or education, can harness technology to improve their productivity and livelihood.

II. LITERATURE REVIEW

Several recent platforms and applications have attempted to bring technology to the agricultural space: Krishi Vigyan Kendra (KVK) models offer offline guidance but suffer from accessibility and scalability issues. AI-based crop detection models, such as PlantVillage [(Hughes et al., 2015)], help detect diseases but lack regional customization and full-cycle assistance. Government mandi portals

offer live pricing but without direct bidding or negotiation tools for farmers.

AgriCare builds upon these concepts and integrates them into a holistic, interactive, and localized digital ecosystem tailored to both modern and traditional farming practices. Designed with a mobile-first and multilingual approach, AgriCare aims to bridge the digital divide and empower even digitally unskilled farmers. Through features like real-time disease detection, region-specific crop planning, and AI-based soil health analysis, the platform offers personalized recommendations that align with each farmer's unique needs. The system also incorporates advanced weather forecasting, live market price tracking, and dynamic bidding options, allowing farmers to negotiate prices directly with buyers and bypass intermediaries.

Moreover, the AgriCare platform features an interactive digital marketplace, connecting farmers to local and regional buyers, thereby increasing market access and profitability. With its focus on farmer-friendly design, AgriCare ensures ease of use and accessibility, even for those with minimal technological exposure. By combining scientific crop planning, AI-powered disease detection, real-time weather updates, and market integration, AgriCare envisions transforming agriculture from a subsistence activity to a profitable, sustainable venture.

An AI-driven feature within AgriCare allows for continuous learning, where data from farmers' interactions—such as soil test results, crop yields, and disease patterns—are analyzed and used to refine recommendations further. By leveraging the latest in artificial intelligence and machine learning, AgriCare aspires to become a trusted companion for farmers, offering them the guidance and support they need to thrive in an ever-changing agricultural landscape.

III. EXISTING SYSTEM

Several recent platforms and applications have attempted to bring technology to the agricultural space: Krishi Vigyan Kendra (KVK) models offer offline guidance but suffer from accessibility and scalability issues. AI-based crop detection models, such as PlantVillage [(Hughes et al., 2015)], help detect diseases but lack regional customization and full-cycle assistance. Government mandi portals offer live pricing but without direct bidding or negotiation tools for farmers.

IV. PROPOSED SYSTEM

AgriCare addresses these problems via a single-window intelligent farming platform featuring a range of integrated tools designed to enhance every stage of farming.

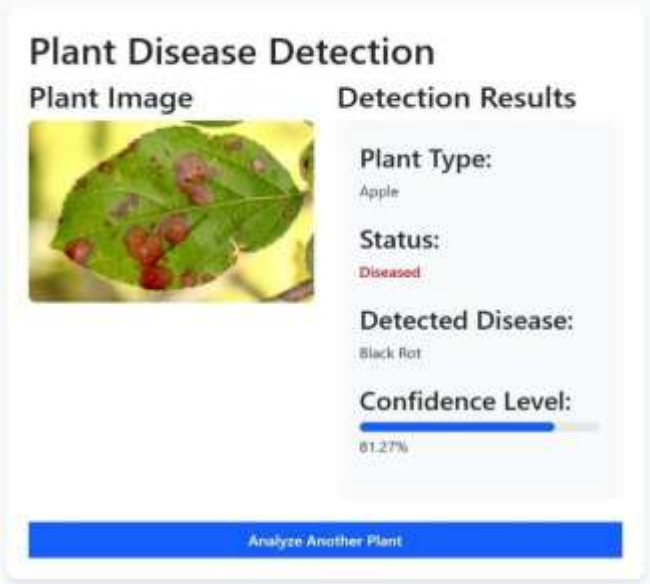

Fig.(a) AI Plant disease detection

The **AI-based Disease Detection (a)** module allows farmers to upload a photo of a diseased leaf and receive an instant diagnosis along with recommended treatments.

Fig.(b) Online Bargain box

A **Live Bargaining Chatbot (b)** enables real-time price negotiation between farmers and buyers, ensuring fair value for the produce.

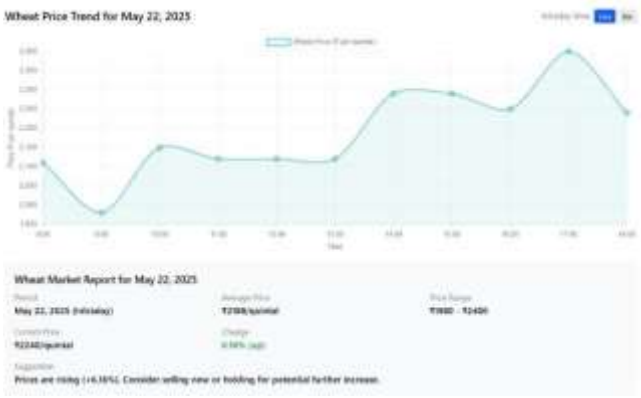

Fig.(c) Live Auction System

Complementing this is a **Live Auction System (c)** that lets farmers participate in real-time bidding to secure the highest possible prices. For land preparation, the **Interactive Land Preparation Guide** offers step-by-step, crop- and region- specific instructions to help farmers optimize soil management practices.

Fig.(d) Land Preparation

The **Smart Soil Report Analyzer** interprets lab results or farmer-provided data to generate personalized fertilizer and crop recommendations, while the **Crop Rotation Planner** uses AI to suggest the most beneficial crop rotations for maintaining soil health and maximizing yields. To make all

these features accessible, AgriCare offers a **Multilingual UI**, allowing farmers to seamlessly toggle between English and Marathi, ensuring inclusivity and usability for all.

Fig.(e) Weather Advisory

The **AgriCast System** acts as the farmer's personalized weather guide, offering both real-time conditions and a vital 3-Day Forecast. We use data directly from **WeatherAPI.com** to feed this module. Crucially, AgriCast doesn't just show data; it instantly interprets it using the **Smart Advisory** feature to generate clear, actionable steps—such as ideal times for spraying or necessary post-rain soil care. This seamless integration ensures the guidance farmers receive is precisely localized and instantly relevant, enabling them to make smarter, faster decisions to protect their crops and boost efficiency.

V. METHODOLOGY

A. Frontend

- Built with **React.js** and **Tailwind CSS** for modular, responsive UI
- Language toggle system via i18n libraries

B. Backend

- Node.js + Express for API services
- Python (Flask) for disease detection and crop recommendation using ML models
- MongoDB for database storage.

C. Machine Learning

- Disease detection model trained on Kaggle's PlantVillage dataset
- Crop suggestion based on soil parameters using a Decision Tree classifier
- Bargaining chatbot powered by OpenAI API (chat completion model with prompt tuning)

D. Auction System

- Real-time bidding using Socket.IO
- Countdown timers for auction duration
- SMS and email notifications for high bids and winners

Working

Once a user logs into the AgriCare platform, they can easily upload an image of a crop leaf that shows signs of disease. The platform's backend leverages advanced AI-based image recognition and machine learning algorithms to analyze the leaf and instantly predict the disease's name along with tailored treatment recommendations. This empowers farmers to take immediate and informed action, reducing crop losses and improving yields. Additionally, for scientific crop planning, the user can input critical soil health parameters such as pH, nitrogen, and potassium levels. The system then processes this data and suggests the most suitable crops for the upcoming season, taking into account regional and environmental factors, ensuring that the farmer maximizes productivity and maintains soil health over the long term.

AgriCare also provides a dynamic and interactive marketplace that revolutionizes the way farmers sell their produce. A **Live Auction System** allows farmers to list their produce in real time, enabling buyers to place bids instantly. Once the auction concludes, the winning bidder is automatically notified via SMS or email, ensuring smooth and efficient transactions. Complementing this, the platform's **Bargain Chat** feature initiates negotiation using pre-trained AI negotiation prompts, dynamically accepting, rejecting, or countering bids based on market trends and buyer offers. For land preparation, AgriCare fetches step-by-step guides tailored to the selected crop, season, and region, ensuring that farmers have the right information at their fingertips to prepare their land

optimally. By integrating these features, AgriCare transforms traditional farming into a streamlined, intelligent, and farmer-friendly experience.

VI. RESULTS AND DISCUSSIONS

The AgriCare platform has demonstrated significant positive outcomes through testing and initial deployments. Each feature was designed to address a critical farming need and was evaluated for its functionality, ease of use, and impact. The **Disease Detection** module provided instant diagnosis by analyzing leaf images, offering farmers the disease name, its cause, recommended cure, and appropriate fertilizers—all presented in a clear, actionable format. The **Live Bargaining** feature enabled dynamic price setting, generating a detailed chat transcript along with the final agreed-upon price, empowering farmers to negotiate directly with buyers. The **Auction** system allowed farmers to list their produce for competitive bidding, ensuring that the highest bidder won within a set timeframe; results were shared as winner details and the final price achieved. The **Soil Report** feature analyzed key soil parameters to recommend fertilizers and suitable crops, outputting the results in an easy-to-understand tabular and textual format. For **Land Preparation**, a comprehensive guide was provided with visual and stepwise instructions tailored to the chosen crop, region, and season, helping farmers prepare their land optimally. The **Multilingual Toggle** ensured inclusive accessibility, allowing the entire user interface to switch seamlessly between English and Marathi to cater to diverse farmer demographics.

Positive feedback from farmers who tested the system emphasized the platform's intuitive navigation, real-time updates, and particularly effective disease prediction module as standout features. They appreciated the personalized recommendations, the easy-to-follow guides, and the ability to connect with buyers without intermediaries, which significantly improved their market access and profitability. Overall,

AgriCare's integrated approach demonstrated its potential to revolutionize traditional farming practices by providing a seamless, intelligent, and farmer-centric digital ecosystem.

VII. FUTURE SCOPE

The AgriCare platform is designed to continually evolve by integrating cutting-edge technologies that enhance the farming experience and empower farmers. One of the key additions is **Drone Integration** for live crop surveillance and yield estimation, allowing farmers to monitor crop health, identify stress zones, and accurately predict harvest yields in real time. This feature not only improves productivity but also helps in timely intervention and decision-making. For inclusivity, especially catering to visually impaired or non-literate users, AgriCare offers **Voice-based Commands**, enabling farmers to interact with the platform and receive essential updates through spoken instructions. In the interest of fair pricing and transparency, the platform incorporates **Blockchain-Based Crop Certification**, which prevents price exploitation by verifying produce authenticity and ensuring farmers receive a fair value for their crops. Recognizing the risks posed by pests and diseases, the platform also includes **Insurance Recommendations**, where AI analyzes disease and infection patterns to suggest appropriate insurance products, thus safeguarding farmers' incomes. Additionally, **AI-based Yield Forecasting** leverages historical and real-time data to predict crop yields, enabling farmers to plan their cultivation cycles and financial decisions with greater confidence. Through these advanced features, AgriCare aims to revolutionize the agricultural landscape by fostering sustainability, profitability, and resilience.

VIII. CONCLUSION

AgriCare is a comprehensive, AI-integrated farming platform that empowers farmers with tools and insights previously unavailable to them. It bridges the technological gap through its modular,

accessible, and multilingual system. Features like disease detection, real-time auctions, and soil- based crop planning ensure the farmer remains in control—scientifically and economically.

AgriCare has the potential to transform India's agriculture sector by increasing profitability, sustainability, and digital inclusiveness. It also lays the

foundation for future enhancements in agri-tech powered by AI and IoT.

IX. ACKNOWLEDGMENT

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