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AgriSense: An AI-Based Smart Agriculture Web Platform for Crop Disease Analysis and Decision Support

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Abstract.

Farming has always been faces challenges, and things like sudden weather changes and quickly spreading crop diseases just make it worse and cause farmers to lose. These problems directly affect how much farmers are able to produce. This paper talks about AgriSense, a web platform that helps in detecting crop diseases and supports better farming decisions. At the center, the system uses a deep learning model that looks at images of plant leaves to find diseases. It uses IOT Data instead of real sensors and hardware. The platform is built using Java and is kept simple, so farmers can check crop conditions easily and get useful suggestions which makes our user friendly. During the testing, the model performed well in to identifying diseases under controlled conditions. Along with detection, AgriSense also provides suggestions for irrigation and pesticide use, which helps in reducing waste and time and using resources more effectively. This platform is made for smart farming where cost is low and scaling up matters. In the future, the real-time IoT hardware can be added to improve automation.

Keywords. Artificial Intelligence; Smart Agriculture; Crop Disease Detection; Machine Learning; Web Application; Precision Farming.

1. INTRODUCTION

Farming is a vital sector of the Indian economy, with a large population depending on agriculture. However, farmers face challenges such as changing weather, resource wastage, and unexpected crop diseases. AI-based image analysis can help detect crop diseases, while IoT technologies monitor temperature, soil moisture, and humidity [1], [2], [3]. However, many existing solutions require costly hardware and focus on specific problems. AgriSense addresses this gap through a simple web-based platform that allows farmers to upload crop images, receive disease analysis, and get practical recommendations for irrigation and crop care without expensive hardware. The platform, developed using Java, provides a user-friendly interface requiring minimal technical knowledge. Although it is currently a working prototype, its design allows future integration of IoT devices without major system changes.

2. LITERATURE SURVEY

Quite a few researchers have looked into using AI and IoT for smarter agriculture. Some of that work [1] and [2], for example, deals with automating the irrigation and spotting crop diseases using machine learning. Others, like [3] and [4], bring in cloud systems and physical sensors to track field conditions and help farmers to decide what to do next. Good work, but a lot of these setups need serious hardware on the ground, which makes it costly and complex to actually run. Later, things are shifting now. More research is now going towards web-based platforms: nothing fancy, no heavy equipment, just something that opens in a browser and works.

TABLE I: Literature Survey on Smart Agriculture Systems

No.	Title	Key Contribution
5	Low Power IoT Networks for Agricultural Monitoring Using LoRaWAN	Uses LoRaWAN protocol for long-range, low-power communication suitable for large-scale and remote farms.
6	Hybrid AI Models for Crop Disease Classification	Combines CNN and SVM to improve classification accuracy and processing speed over traditional models.
7	Java-Based Middleware for IoT Data Management in Agriculture	Middleware platform enhancing IoT data interoperability, scalability, and real-time analytics for decision support.
8	IoT-based Crop Monitoring and Disease Detection	Low-cost IoT system with sensors and ESP32-CAM for monitoring crops and performing ML-based disease detection.
9	AI and IoT-powered Edge Device for Crop Pest and Disease Detection	Portable edge device using lightweight CNN (Tiny-LiteNet) for real-time disease detection with high accuracy.
10	AI and IoT for Plant Disease Identification (Survey)	Survey of AI and IoT approaches including ML, CNN, datasets, and challenges in real-world deployment.

3. PROBLEM STATEMENT

Farmers often face crop diseases, changing weather, and costly farming technologies. Existing solutions are expensive or focus on only one problem.

4. PROPOSED SOLUTION

AgriSense is a web-based platform where farmers upload crop images for disease detection and receive treatment and irrigation recommendations. It uses simulated environmental data such as temperature, humidity, soil moisture, and pH, with real IoT sensors planned for future integration.



Figure 4.1. System architecture of the AgriSense platform showing input layer (leaf images and simulated environmental data), AI-based processing, backend system, and user interface.

5. METHODOLOGY, EXPERIMENTS AND RESULTS

This section describes a how the working of the proposed AgriSense system is also including the method used for the crop disease analysis, the experimental setup, and the observed results.

5.1. Methodology

AgriSense is a web-based smart agriculture system that combines AI-based crop disease detection with environmental data. Farmers upload crop images and provide temperature, humidity, soil moisture, and pH values. The AI analyzes leaf patterns to identify possible diseases, while the Java backend processes the results. The system then provides simple recommendations for irrigation, crop care, and disease management through an easy-to-use web interface.

5.2. Experimental Setup

The system was tested in the prototype setup using the sample crop leaf images and a simulated environmental data. testing was done to check the how well the AI-based disease detection will works and how the web platform will performs. Different leaf images is showing both healthy and the diseased crops were used as the inputs to check the system's ability to analyze and the classify crop conditions. Environmental values were changed using a simulated inputs to see how they affect the suggestions given by the system.

5.3. Results and Discussion

The system showed that it can be analyze crop leaf images and give the useful results through the web app. The AI part was able to find the disease patterns in a controlled testing and give the proper suggestions. The web platform is worked smoothly with quick response while processing a images and handling the data. Users could upload a images, get the results, and see how suggestions without any delay. The results show that the system can help in detecting diseases at an early stage and support the better decisions in farming.

TABLE II: System Performance Evaluation

Metric	Observation
Response Time	Fast
System Accuracy	Effective classification
Usability	High

TABLE III: Comparison with Existing Systems

Metric	Existing Systems	AgriSense
Hardware Dependency	High	None
Cost	High	Low
Accessibility	Moderate	High

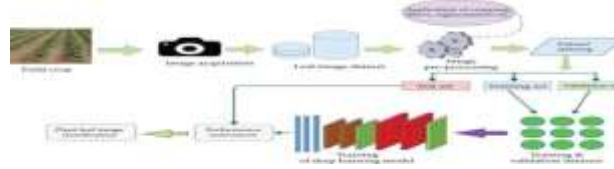


Fig. 5.3.1: Flowchart of the AgriSense system showing step-by-step processing

6. COMPETITIVE ANALYSIS

Smart farming has developed to a great extent through AI and IoT technology for monitoring crops and detecting diseases. IoT technology collects data in real time regarding the temperature, humidity, and soil moisture levels; however, it needs expensive hardware, maintenance, and continuous connectivity. On the other hand, AI technology is capable of disease detection in crops but lacks environmental data.

TABLE IV: Comparison of Existing Systems and AgriSense

Feature	Existing Systems	AgriSense
Hardware Requirement	Required	Not Required
Cost	High	Low
Disease Detection	Available	Available
Decision Support	Limited	Integrated
Accessibility	Moderate	High

7. CONCLUSION

In this paper, AgriSense is proposed as an online application based on artificial intelligence for crop diseases' detection and management. This system will detect diseases by analyzing the images and simulating environmental conditions without the need for any IoT devices. This system is designed in a way that even non-technical people can use it easily.

8. REFERENCES

- [1] S. Patel and R. Mehta, —IoT Based Smart Irrigation System for Sustainable Agriculture,|| IEEE Access, vol. 11, pp. 14520–14530, 2023.
- [2] L. Zhang and Y. Chen, —Plant Disease Detection Using Deep Learning Techniques,|| Computers and Electronics in Agriculture, vol. 196, 106879, 2022.
- [3] M. Sharma and A. Singh, —Cloud Integrated Smart Farming System Using IoT and AI,|| IEEE Transactions on Industrial Informatics, vol. 19, no. 6, pp. 5521–5532, 2023.
- [4] N. Kumar and S. Gupta, —AI-Driven Crop Health Monitoring Using Edge IoT Devices,|| in Proc. ACM IoT Conference, 2024, pp. 233–240.

- [5] R. Reddy et al., —Low Power IoT Networks for Agricultural Monitoring Using LoRaWAN,|| IEEE Sensors Journal, vol. 24, no. 3, pp. 3210–3220, 2024.
- [6] A. Das and R. Saini, —Hybrid AI Models for Crop Disease Classification,|| Computers and Electronics in Agriculture, vol. 214, 108312, 2023.
- [7] P. Rao and M. Kale, —Java-Based Middleware for IoT Data Management in Agriculture,|| IEEE Internet of Things Journal, vol. 10, no. 5, pp. 9872–9883, 2024.
- [8] S. N. Mohtasim et al., —IoT-based Crop Monitoring and Disease Detection,|| in Proc. IEEE Conference, 2023.
- [9] J. P. Nyakuri et al., —AI and IoT-powered Edge Device for Crop Pest and Disease Detection,|| Scientific Reports, vol. 15, 2025.
- [10] H. Orchi and A. Sadik, —On Using Artificial Intelligence and the Internet of Things for Plant Disease Identification,|| Agriculture, vol. 11, no. 9, 2021.

Biographies



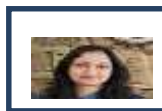
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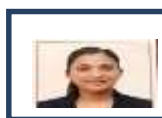
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