

ARGOSCAN: An Intelligent Agent Framework for Smart Crop Disease Detection and Treatment Recommendation

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Abstract:

Plant diseases have a major impact on agricultural output, especially in areas where prompt expert consultation is scarce. This study introduces Argo Scan, an intelligent web-based infrastructure for advising support and real-time crop disease detection. To help farmers effectively identify crop illnesses, the technology combines multilingual communication, vision-based artificial intelligence, and environmental awareness. A cloud-based vision model is used for image processing, and additional features like voice help, geolocation, and weather insights improve usability. The system is available to a wider range of users because it supports Telugu, Hindi, and English. The system maintains effective response times and makes accurate predictions in real-world circumstances, according to experimental evaluation.

Keywords: Crop Disease Detection, Smart Agriculture, Artificial Intelligence, Computer Vision, Multilingual System, Web-Based Application, Precision Farming, Plant Disease Identification, Real-Time Advisory System, Agricultural Technology.

1. INTRODUCTION:

Farmers frequently struggle to identify crop illnesses in their early stages, despite agriculture's continued importance in developing countries. Conventional approaches depend on expert consultation and manual inspection, which are not always available or in a timely manner.

Automated plant disease identification has been made possible by recent developments in artificial intelligence, especially in computer vision. However, a lot of current solutions lack real-time adaptation, language support, and usability.

This article suggests Argo Scan, a lightweight and intelligent system that integrates voice-enabled interaction, real-time environmental data, and AI-based picture analysis, to fill these gaps. The goal is to give farmers an easy-to-use yet efficient tool for identifying diseases and suggesting treatments.

2. RELATEDWORK:

Plant disease identification utilizing machine learning and deep learning techniques, specifically Convolutional Neural Networks (CNNs) like ResNet and VGG, has been the subject of numerous studies. By learning intricate visual characteristics from photos of plants, these models have proven to be highly accurate in controlled settings. However, a lot of these methods are computationally

demanding and frequently not suited for practical implementation, particularly in agricultural environments with limited resources.

Additionally, recent research has concentrated on enhancing accessibility through the creation of mobile and web-based illness detection programs. Although these systems improve usability, they frequently lack crucial characteristics like real-time environmental awareness, multilingual interaction, and user-friendly interfaces that are appropriate for non-technical users.

The suggested Argo Scan system incorporates several features into a single framework, in contrast to current systems. It integrates voice-based support, multilingual support, weather-aware suggestions, and cloud-based visual AI for disease diagnosis. Enhancing usability, accessibility, and practical applicability in actual agricultural settings is the goal of this comprehensive approach.

3. PROPOSED SYSTEM:

System Overview:

Argo Scan is a multi-layered intelligent technology that allows users to upload crop photos and get actionable advice and disease forecasts. The technology enhances agricultural practice decision-making by integrating contextual environmental data with image-based analysis.

Three essential elements are integrated into the proposed framework: multilingual advising help, weather-based contextual insights, and image-based disease diagnosis. This connection guarantees that the system not only recognizes illnesses but also gives users timely, pertinent advice.

ARCHITECTURE:

The overall architecture of the Argo Scan system illustrates the interaction between different system components involved in crop disease detection and advisory generation.

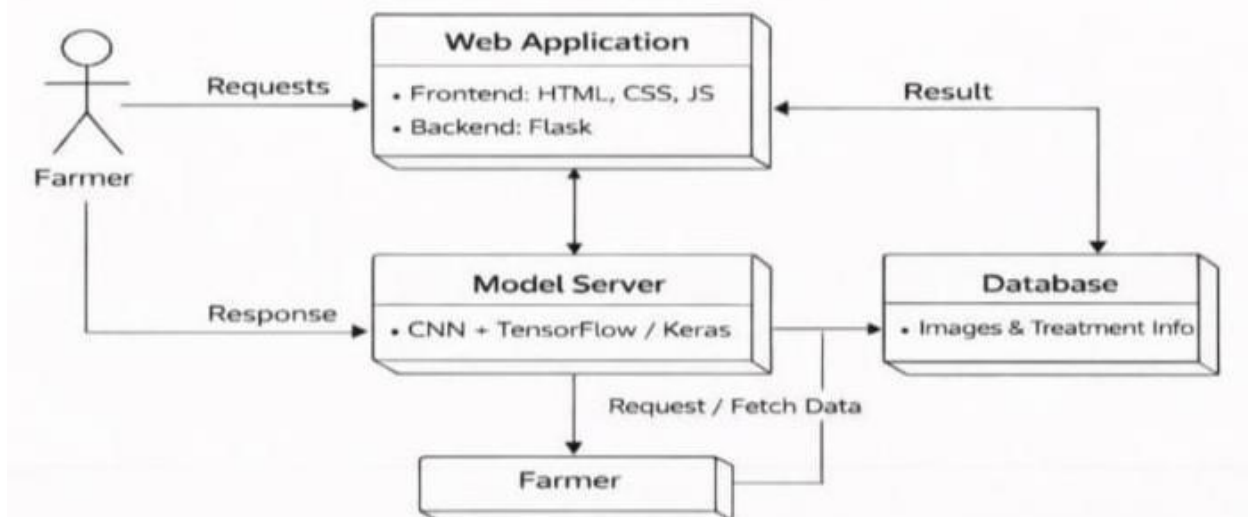


Fig. (1) System Architecture

The frontend, backend, and AI & data processing layers make up the three-tiered architecture of the Argo Scan system. Modularity, scalability, and effective communication between system components are all guaranteed by this layered design.

The frontend layer oversees user communication. It offers an interface for choosing languages, uploading cropped photos, and seeing the outcomes. Additionally, voice output is supported to improve accessibility for users who prefer various languages.

Between the frontend and external services, the backend layer serves as a bridge. In addition to managing API communication and processing incoming queries, it interfaces with external data sources, including geolocation and weather APIs and AI-based picture analysis services. The system's fundamental operations are carried out by the AI and data layer. To identify crop diseases, it examines the supplied photos and obtains pertinent data, such as potential causes and suggested treatments. This layer guarantees that the user receives correct and significant results.

4. TECHNOLOGIES USED:

Frontend

The Argo Scan system's frontend is created with HTML5, CSS3, and Vanilla JavaScript to guarantee cross-platform compatibility and lightweight performance. Users may effectively interact with the system on a variety of devices because of the interface's responsiveness and usability. To improve the user experience and visual clarity, contemporary layout and typographic techniques are used.

Artificial Intelligence Module:

To detect agricultural diseases, the system uses a hybrid technique. Accurate analysis of plant photos is made possible by the principal detection method, which makes use of a vision-based artificial intelligence model that is implemented via a cloud inference service. From a conceptual standpoint, the system is in line with deep learning architectures like Convolutional Neural Networks (CNNs), which include popular picture categorization models like ResNet50. Additionally, in the event that AI services are not available, a fallback mechanism based on rule-based keyword matching is put in place to guarantee basic functionality.

APIs and External Services:

Argo Scan enhances system functionality by integrating several external services. To offer environmental backgrounds that may affect the occurrence of disease, weather data is integrated. The user's location is determined, and location-specific insights are provided by geolocation services. Additionally, multilingual audio output is produced by text-to-speech services, increasing user accessibility.

Browser APIs:

To enable interactive features, the system makes use of contemporary browser APIs. While the FileReader API allows image processing for uploaded files, the Geolocation API is utilized to determine the location of the user. Voice-based communication is made possible with the Speech Synthesis API and drag-and-drop capability is used to make uploading images easy.

Backend:

Node.js is used to create the backend, which controls communication between the frontend and outside services. It processes data, manages API calls, and guarantees safe communication with third-party services and the AI model. This architecture allows for scalable systems and effective data flow.

5. METHODOLOGY:

The Argo Scan technology detects diseases and generates recommendations using a systematic process. The user first uses the web portal to upload a picture of the impacted crop. After

processing, the image is sent to the AI model for examination. The system determines the potential crop disease based on visual characteristics.

To deliver contextual insights, the system simultaneously obtains environmental data, including geographic information and weather conditions. The system creates suitable recommendations for managing the condition using the collected data. To improve accessibility and usability, voice assistance is offered, and the final result is displayed to the user in the language of their choice.

6. ALGORITHM:

The working of the Argo Scan system can be described through the following steps: Step 1: Initialize the system.

Step 2: Accept the input image from the user (crop leaf image).

Step 3: Perform preprocessing, including resizing, normalization, and noise reduction. Step 4: Forward the processed image to the AI model for analysis.

Step 5: Extract relevant features using a vision-based model. Step 6: Classify the image to identify the type of crop disease.

Step 7: Retrieve disease-related information and recommended treatments from the database. Step 8: Generate the prediction result, including disease name and confidence level.

Step 9: Display the results to the user through the web interface. Step 10: Store the image and prediction details for future reference. Step 11: Terminate the process.

7. RESULTS AND ANALYSIS:

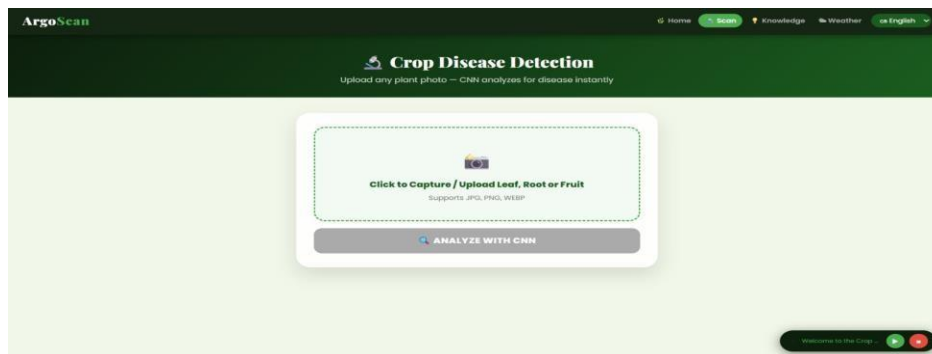


Fig. (2): Identifies crop diseases using photos of plants.

A crop disease detection web interface that lets users upload photos of plants and use a CNN model to rapidly analyze them.

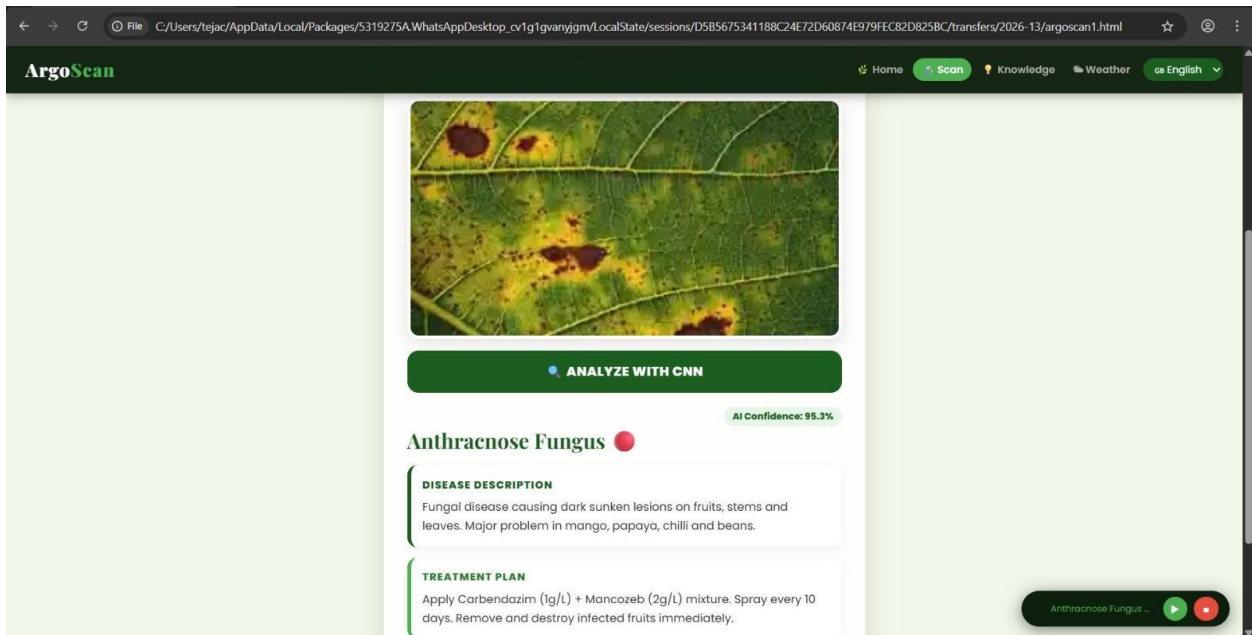


Fig. (3): CNN-Based Anthracnose Fungus Identification

To assist farmers in acting promptly and preventing crop damage, it also offers a confidence score and recommends suitable treatment techniques.

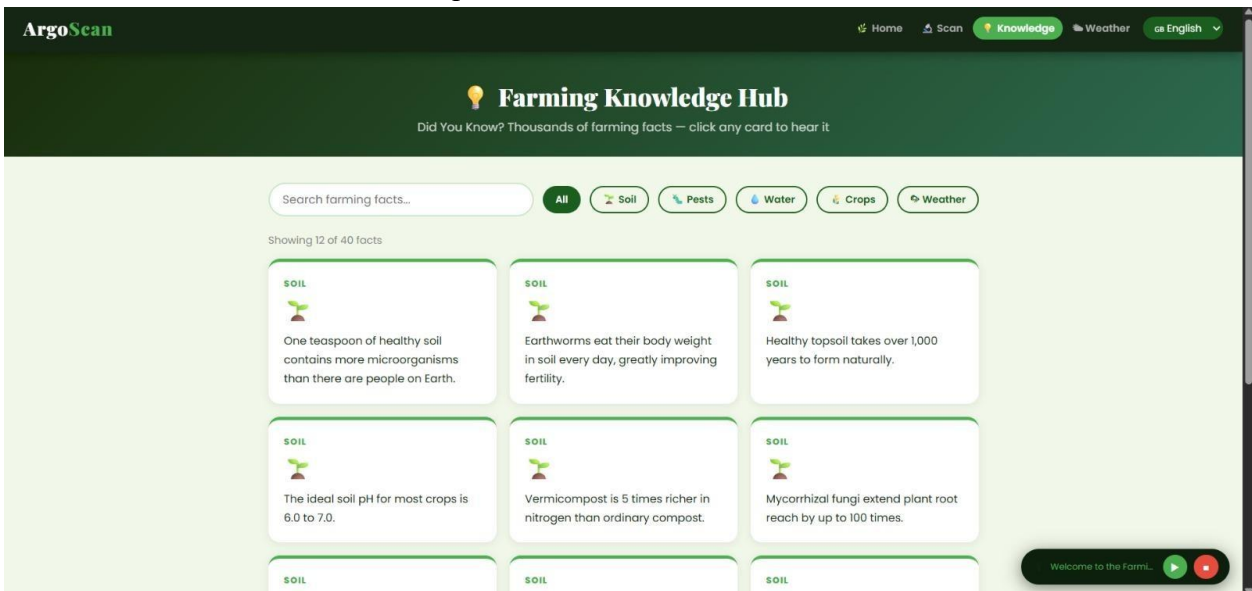


Fig. (4). Farming Knowledge Hub

To give farmers practical insights, the diagram depicts a Farming Knowledge Hub interface that offers categorized agricultural statistics on soil, crops, pests, and weather.

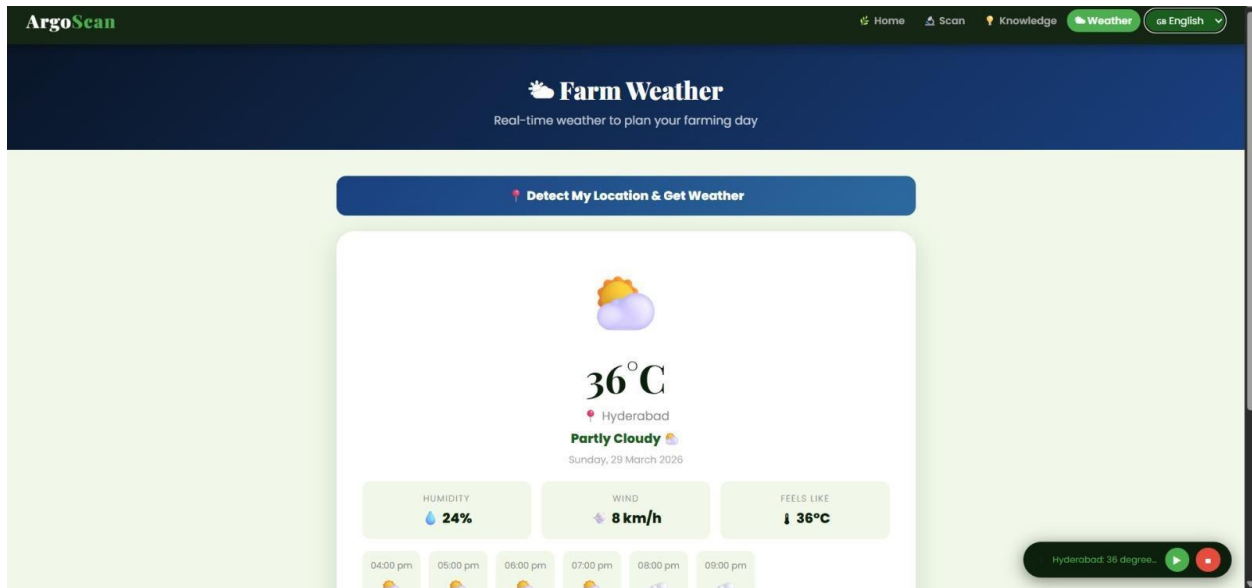


Fig. (5) Farm Weather

This page displays the Argo Scan system's Farm Climate dashboard, which gives farmers access to current weather information. It shows Hyderabad's current temperature (36°C) as well as meteorological parameters like wind speed, humidity, partly overcast weather, and feels-like temperature. To make better agricultural decisions, the interface also could automatically detect location and display weather updates.

FUTURE SCOPE:

Custom-trained deep learning models can be added to the system to increase detection accuracy. Wider applicability will be made possible by growing the crop and disease dataset. Future advancements could include mobile application distribution for greater accessibility and offline functionality utilizing edge AI approaches. Furthermore, long-term agricultural planning and crop yield prediction can be supported by the integration of advanced analytics.

CONCLUSION:

By combining artificial intelligence, real-time environmental data, and user-centric design, Argo Scan offers a workable and scalable crop disease detection system. The system shows how combining several technologies can help farmers make well-informed decisions. It can develop into a thorough agricultural advising platform with additional enhancements, supporting effective and sustainable farming methods.

REFERENCES:

1. Saini, A., Gill, N.S., Gulia, P. et al. Smart crop disease monitoring system in IoT using an optimization-enabled deep residual network. *Sci Rep* 15, 1456 (2025). <https://doi.org/10.1038/s41598-025-85486-1>.
2. G, Srinivasa Rao and Harnath, T, Smart Crop Care AI Driven Plant Disease Detection with Cloud Intelligence (April 25, 2025).
3. S. Savary, L. Well-cut, S. J. Peth Bridge, P. Esker, N. McRoberts, and A. Nelson, "The Global Burden of Pathogens and Pests on Major Food Crops," *Nature Ecology & Evolution*, vol. 3, no. 3, pp. 430–439, Feb. 2019.
4. SMART AGRICULTURAL ROBOT FOR AUTOMATIC CROP DISEASE DETECTION

- USING ARTIFICIAL INTELLIGENCE. (2026). International Journal of Engineering Research and Science & Technology, 22(1), 1399-1404.
5. Balram, G., & Kiran Kumar, K. (2018). Smart farming: disease detection in crops. International Journal of Engineering and Technology, 7(2.7), 36. <https://doi.org/10.14419/ijet.v7i2.7.10252>.
 6. Amanullah Ansari, Shrejal Singh, and Dr. Nikhat Akhtar, trans. 2025. "AI-Driven Crop Disease Detection and Management in Smart Agriculture". International Journal of Scientific Research in Science and Technology 12 (3): 309-19. <https://doi.org/10.32628/IJSRST2512341>.
 7. Javaid M, Haleem A, Singh RP, Suman R. Enhancing smart farming through the applications of agriculture 4.0 technologies. Int J Intell Networks. 2022; 3:150–64.
 8. Suraj Savji, Tushar Pawar, Gokul Borade, Avishkar Khude, Harish Ghodke. "Smart Harvesting Application for Crop Recommendation and Disease Detection". INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT ISSN:2456-4184, Vol.9, Issue 5, pp.h128-h132, URL :<https://ijnrd.org/papers/IJNRD2405733.pdf>.
 9. Kaushik, Priyanka, Narendra B. Mustari, S. Anup Kant, and Anandakumar Haldorai. "Machine Learning for Accurate Crop Disease Identification and Diagnosis." In 2025 7th International Conference on Information Systems and Computer Networks (ISCON), pp. 1-7. IEEE, 2025.
 10. Ramesh, Dhara Vath, and B. Vishnu Vardhan. "Analysis of crop yield prediction using data mining techniques." International Journal of Research in Engineering and Technology 4, no. 1 (2015): 47-473.
 11. Noor, Noshin Un, and Faria Solaiman. 2025. "CNN-Based Crop Disease and Pest Detection Systems: Enhancing Accuracy and Efficiency in Agricultural Sustainability". Journal of Bangladesh Academy of Sciences 49 (1): 73-85. <https://doi.org/10.3329/jbas.v49i1.78209>.
 12. Abdul Ridha J, Amperozides Y, Kakarla SC, Roberts P (2019) Detection of target spot and bacterial spot diseases in tomato using UAV-based and benchtop-based hyperspectral imaging techniques. Precis Agric 21:955–978.