

Farmers Disease Diagnostic / Reporting Portal: An AI – Based Mobile Portal

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Abstract: Farmers Disease Diagnostic/Reporting Portal is an AI-based mobile portal designed to help farmers identify and report crop diseases in an easy, fast, and accessible manner. Crop diseases can significantly affect agricultural production and may cause financial losses when they are not identified and managed at an early stage. Farmers, especially in rural areas, may face difficulties in obtaining timely information about crop diseases and appropriate management practices.

The proposed system allows farmers to upload or capture an image of an affected crop or plant through a mobile portal. The uploaded image is processed using image processing and Artificial Intelligence techniques to identify possible crop diseases. Based on the analysis, the system provides the predicted disease along with relevant information and recommended management measures. The portal also provides a disease reporting facility through which farmers can submit details about affected crops, disease symptoms, location, and other relevant information.

The collected reports can be stored in a centralized database and accessed by authorized administrators or agricultural experts for monitoring and analysis. The system aims to create a digital connection between farmers, disease information, and agricultural support services. By integrating AI-based disease detection with mobile-based reporting, the proposed portal can support early identification of crop diseases, improve access to agricultural information, and assist in better crop disease management.

Keywords: Artificial Intelligence, Crop Disease Detection, Farmers, Mobile Portal, Disease Diagnosis, Image Processing, Machine Learning, Crop Health, Disease Reporting, Agricultural Technology, Digital Agriculture, Plant Disease Management.

INTRODUCTION

Agriculture is an important sector that provides livelihood to a large number of farmers. Crop diseases are one of the major problems in agriculture because they can reduce crop quality, productivity, and farmers' income. Early identification of crop diseases is therefore essential for proper crop management.

Traditional disease identification mainly depends on manual observation and consultation with agricultural experts. However, farmers may not always have immediate access to experts, especially in rural areas. This can delay disease identification and treatment.

The Farmers Disease Diagnostic/Reporting Portal is an AI-based mobile portal designed to help farmers identify and report crop diseases. Farmers can capture or upload an image of an affected crop through the mobile portal. The system analyzes the image using Artificial Intelligence and Image Processing techniques and provides information about the possible disease.

The portal also allows farmers to submit disease reports containing crop and disease-related information. These reports can be stored in a centralized database and accessed by authorized administrators or agricultural experts for monitoring and analysis. The main aim of the proposed system is to combine AI-based disease detection, mobile accessibility, and digital disease reporting in a single platform. The system can support early disease identification and improve farmers' access to crop disease information.

LITERATURE REVIEW

Agricultural disease detection has been an important area of research because crop diseases can affect productivity and the quality of agricultural products. Researchers and developers have explored image processing, machine learning, deep learning, mobile applications, and digital reporting systems to support farmers.

A. Image-Based Crop Disease Detection

Image-based disease detection uses photographs of crop leaves, fruits, stems, or other affected plant parts. The image can contain visible symptoms such as spots, discoloration, lesions, or changes in texture. Image processing techniques can be used to improve image quality and prepare the image for further analysis. This approach provides a digital method for preliminary identification of crop diseases and reduces the dependency on completely manual observation.

B. Machine Learning for Disease Classification

Machine Learning techniques can learn patterns from previously collected crop disease images. After training, the model can analyze a new image and predict the disease category based on learned patterns. Machine learning-based classification can support faster preliminary diagnosis and can be integrated with a mobile or web-based application.

C. Deep Learning for Plant Disease Recognition

Deep Learning techniques are useful for image classification because they can automatically learn important features from images. Neural network-based models can be trained using datasets containing healthy and diseased crop images. In the proposed system, AI-based image analysis can be used to identify possible diseases from images submitted by farmers.

D. Crop Disease Image Datasets

Disease detection systems require suitable image data for training and testing. Crop disease datasets generally contain images of healthy and diseased plants belonging to different crop and disease categories. The quality, quantity, and variety of images can influence the performance of an AI- based disease detection system. Images collected from different conditions can help in developing a more practical system.

E. Research Gap

The review indicates that crop disease detection, mobile agricultural services, AI-based image classification, and digital reporting have been studied as separate areas. However, there is a need for an integrated platform that brings these functions together for farmers. The proposed system attempts to address this gap by combining AI-based crop disease diagnosis, mobile image submission, disease information, digital reporting, and centralized data management in one portal.

F. Synthesis of the Literature**S. P. Mohanty, D. P. Hughes, and M. Salathé (2016) – Using Deep Learning for Image- Based Plant Disease Detection.**

Their work demonstrated the use of deep learning for identifying plant diseases from crop images. The study provides a foundation for using image-based AI techniques for automated crop disease diagnosis.

K. P. Ferentinos (2018) – Deep Learning Models for Plant Disease Detection and Diagnosis.

The study investigated deep learning models for plant disease detection and diagnosis. It showed how deep learning can be applied to classify different plant diseases from images.

E. C. Too, L. Yujian, S. Njuki, and L. Yingchun (2019) – Fine-Tuning Deep Learning Models for Plant Disease Identification.

Their research compared different fine-tuned deep learning models for plant disease identification. The work highlights the importance of selecting suitable deep learning architectures for effective disease classification.

D. P. Hughes and M. Salathé (2015) – Plant Health Image Repository for Mobile Disease Diagnostics.

They developed an open-access repository of plant health images to support machine-learning- based disease diagnostics. This work emphasizes the importance of image datasets for developing automated disease detection systems.

M. Brahimi, K. Boukhalfa, and A. Moussaoui (2017) – Deep Learning for Tomato Diseases.

Their study focused on tomato disease classification and visualization of disease symptoms. The work demonstrates how visual symptoms in crop images can be used for disease recognition.

A. Fuentes, S. Yoon, S. C. Kim, and D. S. Park (2017) – Real-Time Tomato Disease and Pest

Recognition.

They developed a deep-learning-based approach for real-time recognition of tomato diseases and pests. Their work demonstrates the application of computer vision and deep learning in agricultural monitoring.

A. Ramcharan et al. (2017) – Image-Based Cassava Disease Detection.

Their research applied deep learning to detect diseases in cassava plants using images. The study demonstrates that AI-based image analysis can be applied to different important crops.

S. Sladojevic, M. Arsenovic, A. Anderla, D. Culibrk, and D. Stefanovic (2016) – Plant Disease Recognition by Leaf Image Classification.

They proposed a deep neural network approach for recognizing plant diseases from leaf images.

Their work supports the use of neural networks for automated plant disease identification.

P. S. Thakur, S. Khare, and A. K. Singh (2018) – Plant Disease Detection Using Image Processing and Machine Learning.

Their study explored the combination of image processing and machine learning for plant disease detection. The work shows how image features can be processed and classified to identify crop diseases.

M. P. R. Kumar, A. Kumar, and S. S. Reddy (2020) – Artificial Intelligence and Machine Learning Applications in Agriculture.

Their work discussed the applications of AI and machine learning in agriculture. It highlights the potential of intelligent technologies for crop monitoring, disease management, and other agricultural activities.

TABLE I. SUMMARY OF THE REVIEWED STUDIES

Stud y	Main Method	Main Contribution	Relevance to Farmers Disease Diagnostic/Reporting Portal
Mohanty et al (2016) [1]	Deep Learning + Image Classification	Automated plant disease detection from crop images	Provides the foundation for AI- based crop disease diagnosis
Ferentinos (2018) [2]	Deep Learning Models	Plant disease detection and diagnosis using images	Supports deep learning-based disease prediction
Too et al. (2019) [3]	Fine-Tuned Deep Learning Models	Comparative evaluation of deep learning models	Helps in selecting suitable models for disease classification
Hughes & Salathé (2015) [4]	Plant Image Dataset + Machine Learning	Open-access plant health image repository	Supports collection and use of crop disease images for AI training
Brahimi et al (2017) [5]	Deep Learning + Image Analysis	Tomato disease classification and symptom visualization	Supports visual symptom-based crop disease identification
Fuentes et al (2017) [6]	Deep Learning + Computer Vision	Real-time tomato disease and pest recognition	Relevant to real-time disease detection through mobile images
Ramcharan et al (2017) [7]	Deep Learning + Image-Based Detection	Cassava disease detection from images	Shows applicability of AI disease detection to different crops
Sladojevic et al (2016) [8]	Deep Neural Networks + Leaf Images	Plant disease recognition through leaf image classification	Supports leaf-image-based disease prediction in the proposed portal

Thakur et al. (2018) [9]	Image Processing + Machine Learning	Disease detection using image processing techniques	Supports image preprocessing and machine-learning-based classification
Kumar et al. (2020) [10]	Artificial Intelligence + Machine Learning	Applications of AI/ML in agriculture	Supports the broader use of AI for crop monitoring and disease management

METHODOLOGY

The research follows an experimental and applied design to develop and evaluate a prototype for AI- based crop disease diagnosis and digital disease reporting. The methodology consists of five main stages.

- 1. Data Collection and Preprocessing:** Crop disease images will be collected from available agricultural datasets and suitable sources. The collected images will be organized according to crop and disease categories. Image preprocessing will include resizing, normalization, noise reduction, and data augmentation to prepare suitable images for AI model training and testing.
- 2. Feature Extraction and Disease Classification:** Important visual features from crop images will be extracted using image processing and deep learning techniques. The system will analyze characteristics such as leaf color, spots, lesions, texture, and other visible disease symptoms. These features will be used to classify the uploaded crop image into a possible disease category.
- 3. Machine Learning / Deep Learning Model:** An AI-based classification model will be trained using the prepared crop disease dataset. Training and testing data will be separated, with validation data used to evaluate model performance and select suitable model settings. The trained model will be integrated with the mobile portal for disease prediction.
- 4. Disease Diagnosis and Reporting Output:** For each uploaded crop image, the system will generate a preliminary disease prediction and display relevant disease information. The farmer can also submit a digital disease report containing crop details, symptoms, image, location, and other relevant information. The submitted report will be stored for further monitoring and analysis by authorized users.
- 5. Evaluation and Tools:** Accuracy, precision, recall, F1-score, confusion matrix, prediction time, and system performance will be evaluated. Python, image processing and machine learning/deep learning libraries, a database such as MySQL or SQLite, and a mobile application development framework can be used for developing the proposed system. The final system will be tested for disease prediction, image upload, reporting, database operations, and overall usability.

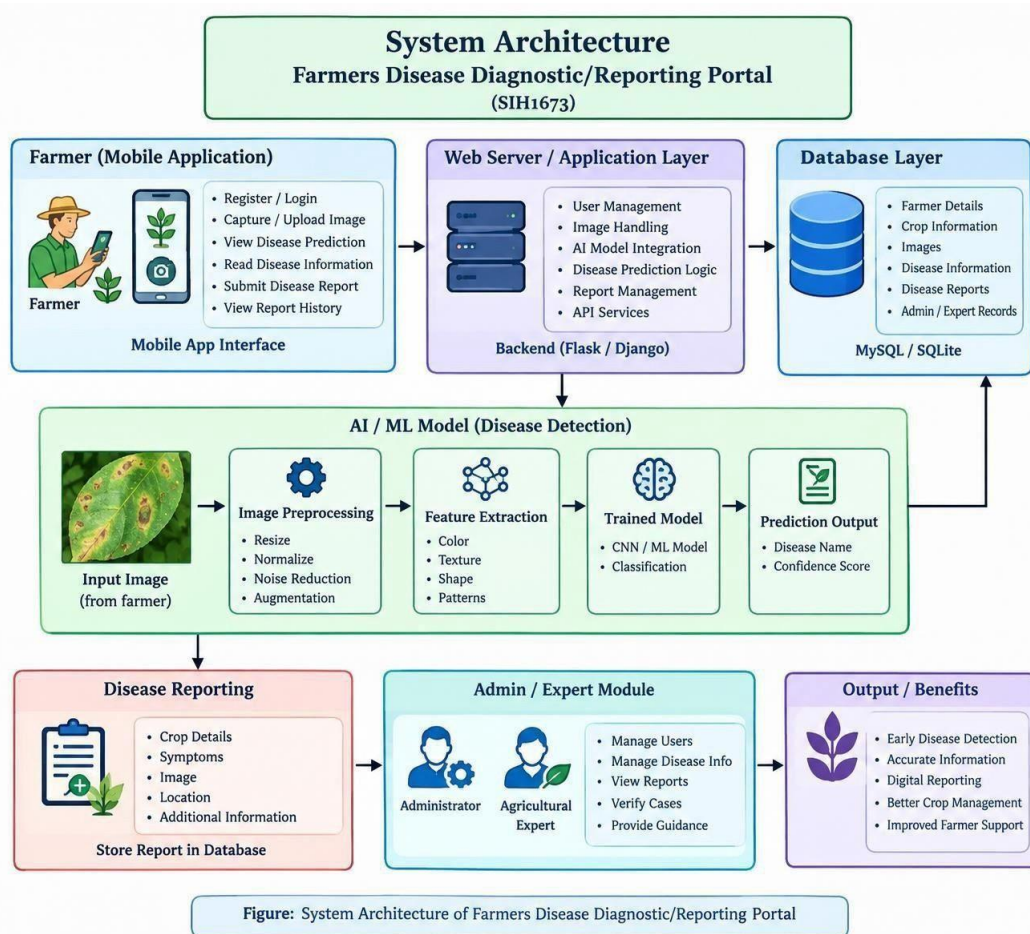


Fig. 1. System architecture of the proposed Farmers Disease Diagnostic/Reporting Portal.

RESULTS

The proposed system is designed to provide results that can be directly interpreted by farmers, administrators, and agricultural experts. The result analysis focuses on crop image processing, AI- based disease prediction, disease information, digital reporting, database storage, and verification support. Since the final numerical performance depends on the actual dataset and model testing, numerical values are not assumed in advance.

TABLE II. EVALUATION ASPECTS AND EXPECTED OUTPUT

Evaluation Aspect	Measure / Output	Purpose
Disease Detection	Predicted disease, disease class, confidence score	Measures whether the system can identify the possible disease from the uploaded crop image.
Image Processing	Preprocessed and enhanced crop image	Improves image quality and prepares the image for AI-based analysis.
Disease Information	Disease name, symptoms, causes, and basic management information	Provides useful information to the farmer after disease identification.
Reporting	Crop details, disease details, image, location, and report date	Allows farmers to digitally submit crop disease reports.
Database Storage	Farmer reports, crop information, images, and prediction results	Maintains a centralized record of reported crop diseases.

Verification Support	Prediction result, uploaded image, and report details	Provides supporting information for administrator or agricultural expert verification.
System Efficiency	Prediction time and response time	Evaluates how quickly the portal can provide results.

The primary result will be the predicted crop disease along with relevant disease information. The system performance will be evaluated using accuracy, precision, recall, and F1-score.

The system will also generate a digital disease report containing crop details, image, predicted disease, and location.

The reports will be stored in the database for administrator or expert verification.

Overall, the results will demonstrate the working of AI-based disease detection, digital reporting, and centralized disease management.

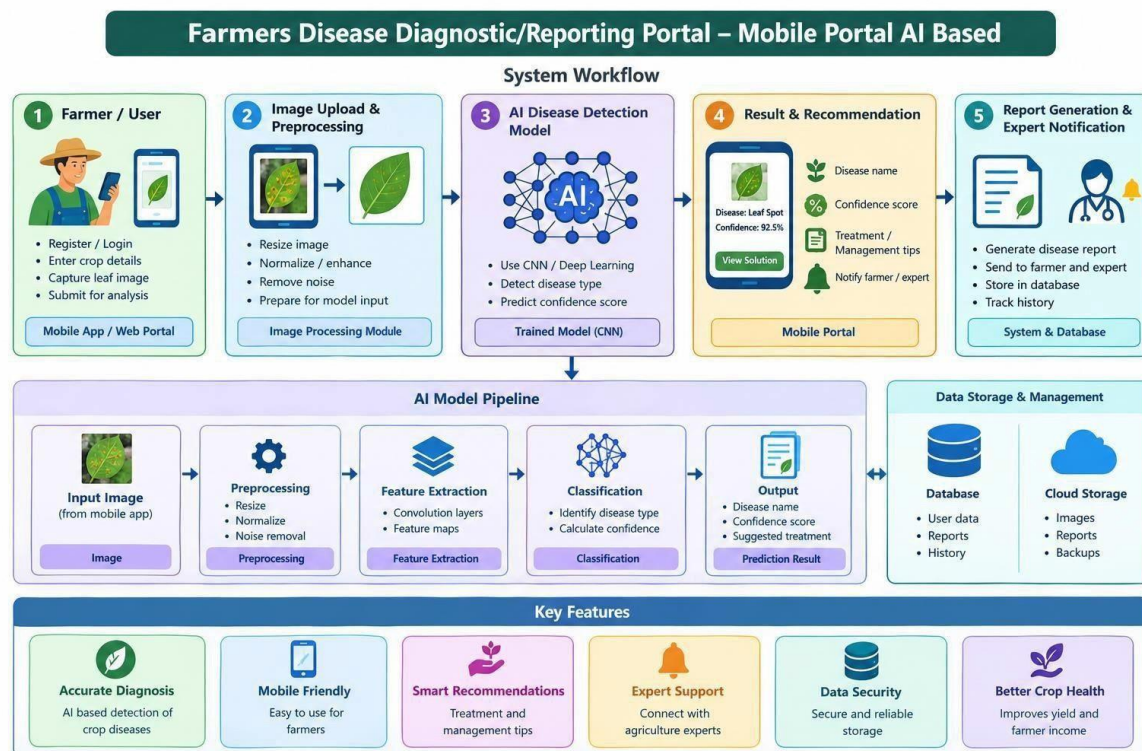


Fig. 2. Overall workflow of the Farmers Disease Diagnostic/Reporting Portal.

Discussion

The proposed Farmers Disease Diagnostic/Reporting Portal combines AI-based crop disease detection with a mobile-based reporting system. The system allows farmers to upload or capture crop images and receive preliminary information about possible diseases.

The use of image processing and AI can reduce the dependence on manual identification and provide faster access to preliminary disease information. The digital reporting feature also allows crop disease cases to be recorded systematically for further review.

The centralized database provides a structured record of reported cases, while administrator or agricultural expert verification can support the review of AI-generated predictions. This combination makes the system useful not only for disease identification but also for digital crop disease monitoring.

However, the effectiveness of the system depends on the quality and diversity of the crop disease dataset, image quality, and model performance. Actual accuracy and other performance values should be determined after testing the developed system with the selected dataset.

CONCLUSION

The Farmers Disease Diagnostic/Reporting Portal provides an integrated approach for AI-based crop disease detection and digital disease reporting. The proposed system combines crop image processing, AI-based disease prediction, disease information, mobile accessibility, and centralized database storage.

The portal can help farmers obtain preliminary information about crop diseases and digitally report affected crops.

Administrator or agricultural expert verification can further support the reliability and management of reported cases.

Overall, the proposed system demonstrates the potential of combining Artificial Intelligence and mobile technology to support crop disease diagnosis, reporting, and monitoring. Future improvements can include a larger and more diverse dataset, improved AI models, support for more crops and diseases, and additional expert-based agricultural services.

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