



AI Based Portal for Farmers to Diagnose Plant Disease

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Abstract

This proposal focuses on the automatic detection of plant diseases and the identification of affected regions on crop leaves, aiming to support agricultural productivity through advancements in computational technology. Despite existing efforts, challenges such as low detection accuracy and limitations in current neural network methodologies—such as Support Vector Machines (SVM) persist. This research explores the strengths and limitations of various plant disease prediction techniques and introduces a novel detection algorithm designed to enhance accuracy. The proposed framework and detailed methodology are outlined in this proposal, highlighting its potential to improve disease diagnosis and support smart farming practices.

Keywords: AI, Plant Disease Detection, Agriculture, Mobile App, Rural Development, CNN, Sustainable Farming

I. INTRODUCTION

Agriculture is critical in supporting economies and feeding populations, particularly in rural communities where much of the population depends on agriculture for sustenance. Nevertheless, one of the significant issues farmers are dealing with is the timely and accurate detection of crop diseases, which, if not treated, will result in considerable loss of crops and low yield. Traditional disease diagnostic practices usually involve specialized interventions that might not be readily available in remote areas. With technological progress, mobile applications and Artificial Intelligence (AI) provide innovative solutions to overcome this problem. The Farmers Disease Diagnostic/Reporting Portal plans to offer an AI-powered mobile application through which farmers can take pictures of infected crops, obtain disease diagnosis immediately, and receive customized advice on treatment. This project aims at empowering farmers with an easy-to-use, real-time, and offline-enabled application that can accommodate multiple regional languages, thus improving agricultural productivity, encouraging sustainable farming practices, and supporting rural development

II. LITERATURE REVIEW

Some research has been done on AI uses in agriculture, specifically in the detection of diseases. Mohanty et al. (2016) applied CNNs to diagnose plant diseases from leaf images with great accuracy, showing the potential of AI in this field. Ferentinos (2018) built on this with deeper networks, enhancing diagnostic performance across a variety of crop species. While mobile apps such as Plantix have simplified disease diagnosis but still lack internet connectivity and support for local languages, the FAO stresses that digital agriculture technologies should prioritize ease of use, local context relevance, and offline access in order to effectively cater to rural users.

Moreover, Barbedo (2013) discussed methods of digital image processing in plant disease diagnosis and reported that early diagnosis by image-based analysis could improve the efficacy of treatment procedures by a large margin. Kamilaris and Prenafeta-Boldú (2018) performed a systematic review of deep learning for agriculture and reported that AI tools have been growing very rapidly and positively affecting yield prediction, disease diagnosis, and precision agriculture. In addition, Sladojevic et al. (2016) illustrated the effectiveness of deep neural networks in distinguishing between 13 various plant diseases and presented real-world applicability.

These results collectively highlight the increasing significance and trustworthiness of AI-driven systems in precision agriculture. Yet, they also expose limitations, most notably in scalability and rural compatibility of current solutions. This paper extends earlier work by combining an offline-capable AI model within a localized mobile platform that prioritizes user accessibility, regional language support, and diagnostic accuracy under actual field conditions.

III. PROPOSED SYSTEM

The proposed system is a mobile AI-enabled portal especially designed to aid farmers in diagnosing crop diseases and receiving timely, actionable advice. The basic concept is to make available a user-friendly, real-time, and offline-accessible solution that fills the gap between the latest in agricultural technology and rural farming requirements.

At its core is a Convolutional Neural Network (CNN) trained on a comprehensive dataset of crop disease images. Farmers can upload or capture images of affected plants through the mobile app, which then employs the trained AI model to identify the disease based on the symptoms. The system gives immediate feedback, the name of the disease, the severity, and scientifically backed treatment suggestions.

For increased usability, the mobile application is coded using Flutter for compatibility with Android and iOS platforms. The app user interface is created with simplicity and ease of use in mind, with support for multiple languages to accommodate users from different locations. For regions with poor or no internet coverage, the app is designed for offline inference with the inclusion of the AI model via TensorFlow Lite, enabling farmers to receive disease diagnoses even in rural areas.

Aside from disease detection, the system also features a reporting functionality that allows farmers to record instances of disease occurrence, monitor past records, and report to agricultural specialists or local governments. A cloud-based backend infrastructure is utilized to securely store user information and handle updates on the disease database.

In general, the proposed system merges AI, mobile technology, and agricultural expertise into one platform that promises to enhance crop health monitoring, minimize losses, and enhance rural communities with affordable, evidence-based farming tools.

IV. PROBLEM STATEMENT

Rural farmers experience difficulties in promptly diagnosing crops' diseases due to insufficient accessibility to agriculture professionals, technological bases, and minimal digital literacy levels. The manual process of identification necessitates experienced inspection, making it often untimely and inaccessible, resulting in enormous losses of crops as well as heavy economic pressure. Furthermore, most current digital solutions are not ruralized—always needing to be online, they are typically limited to English or large languages, and they take for granted a degree of technical knowledge that much of the agricultural population lacks. These shortfalls impact not only individual livelihoods but also limit progress toward national food security. Therefore, an intuitive, offline, AI-driven mobile solution that can offer real-time disease detection via image analysis, present actionable treatment suggestions, and enable farmers to raise issues or receive information from farming experts in their own languages is urgently needed. The system needs to be scalable, affordable, and flexible across various farming ecosystems and cultures to support large-scale adoption and sustainability.

V. METHODOLOGY

The development of the Farmers Disease Diagnostic/Reporting Portal employed a structured approach integrating AI model training, user-centric design, and mobile technology integration. A thorough requirement analysis was initially performed through consultations with farmers and agriculture specialists to identify the real-world issues they encounter while diagnosing plant diseases. Subsequently, an assorted dataset of crop images covering multiple diseases was gathered from open sources and field surveys. These pictures were annotated, preprocessed and employed to train a Convolutional Neural Network (CNN) with TensorFlow to achieve accurate disease classification of major crop diseases. To make it easily accessible in real-time, the model was converted with TensorFlow Lite and integrated into a cross-platform mobile app based on Flutter. The application is equipped with image taking, immediate diagnosis, therapy suggestions, and offline capabilities. A cloud-based backend system was also used to handle user data and allow report storage. Thorough testing was conducted with end-users to assess usability and prediction accuracy, and the system was iteratively improved based on their feedback to make it suitable for farmers in rural areas

VI. RESULTS AND DISCUSSION

The AI model had a rate of more than 90% in the identification of typical plant diseases like blight, rust, and mildew. The mobile app received a good response during pilot trials, and farmers found the simplicity of use, real-time feedback, and multi-language availability convenient. Offline support was particularly useful in remote locations. Features of community reporting allowed sharing of knowledge and established a support network among users. Weaknesses included difficulties in detecting early infections and inconsistencies in image quality.

Further observations while deployed showed that the app enhanced decision-making time for farmers, with a mean response time of less than 3 seconds for disease detection. Feedback gathered through user surveys showed that 85% of farmers reported the app to be useful in enhancing crop yield results. The multilingual interface was a major driver of adoption among rural communities where English literacy levels were low, and more than 70% of users wanted to use the app in their local language.

In addition, the reporting module permitted agro-officers to access up-to-date disease outbreak data in real-time, allowing timely intervention and resource deployment. This also provided opportunities for policy-level monitoring of regional disease trends. A key takeaway was the need for strong preprocessing filters for coping with noisy, low-resolution images captured in adverse lighting conditions, which tended to impair prediction quality. Current research is aimed at strengthening the model's resilience and incorporating edge AI methods to enhance device-side processing capability.



Figure 1 depicting Home page of the portal.



Figure 2 shows portal page to upload plant leave for disease detection.



Figure 3 shows result of apple image uploaded predicts healthy fruit.

VII. CONCLUSION

The Farmers Disease Diagnostic/Reporting Portal is a practical and impactful deployment of AI in agriculture. By empowering farmers with real-time disease diagnosis and collaboration platform, the system increases productivity, decreases crop loss, and aids rural development. The future will see increased efforts to expand the database for diseases, voice-based assistance integration, and enabling the integration of IoT sensors for complete crop monitoring.

Apart from its technological advancement, the portal has great promise as an educational tool for the promotion of agricultural education and sustainable farming techniques. By bridging the space between scientific research and grassroots application, it is an agent of digital change in rural communities. The system also facilitates data-driven policymaking through aggregated information on disease trends, enabling governments and NGOs to develop timely interventions.

In addition, the project also showcases the strength of interdisciplinary collaboration, bringing together AI, mobile app development, and agricultural science. The farmer participatory approach in design and testing ensured that the end product was user-focused and contextually appropriate. Finally, the portal is aligned with larger objectives of digital inclusion, food security, and rural empowerment, showing that technology can be both transformative and inclusive.

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