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Leafscan: AI Assistant for Farmers

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Abstract

LeafScan: AI Assistant for Farmers is a groundbreaking project aimed at revolutionizing agriculture by empowering farmers with advanced technology. This project combines a web application and a chatbot, termed "Farmers Assistant," to provide farmers with a comprehensive solution for identifying and managing plant diseases. Utilizing Python, LeafScan employs a deep learning model tailored for classifying plant diseases based on user-uploaded images. The model, derived from deep learning techniques, preprocesses images and offers the top five predictions with associated class labels, probabilities, and confidence scores, ensuring accurate disease identification. LeafScan also aims to enhance disease detection capabilities through the development of a Convolutional Neural Network (CNN) model. Additionally, the project emphasizes the importance of a user-friendly interface, utilizing HTML, CSS, and JavaScript, to facilitate seamless interaction for farmers. Furthermore, the Farmer's Assistant chatbot is poised to provide holistic support beyond disease identification, catering to farmer queries and offering comprehensive agricultural assistance. LeafScan stands at the forefront of leveraging AI to address real-world challenges in agriculture, promising significant advancements in crop management and sustainable farming practices.

Keywords: *LeafScan, AI Assistant, Plant Diseases, Deep Learning Model, Farmers Assistant*

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INTRODUCTION

LeafScan: AI Assistant for Farmers represents a significant leap in agricultural technology, bridging the gap between traditional farming practices and cutting-edge artificial intelligence. By amalgamating a web application and a chatbot, namely the Farmers Assistant, this projectaims to provide farmers with a robust platform for tackling the challenges of plant disease identification and management. Built upon the Python programming language, LeafScan harnesses the power of deep learning models tailored to classify plant diseases accurately. Through a user-friendly interface crafted with HTML, CSS, and JavaScript, farmers can seamlessly upload images of their crops, allowing the deep learning model to preprocess and deliver precise diagnoses. Beyond mere identification, LeafScan seeks to bolster disease detection capabilities by developing a Convolutional Neural Network (CNN) model, promising comprehensive and efficient solutions to safeguard agricultural yields. Furthermore, LeafScan's ambition extends beyond its technological prowess; it aspires to cultivate a supportive ecosystem for farmers through the Farmer's Assistant chatbot. By leveraging natural language processing and AI capabilities, the chatbot goes beyond providing diagnoses, offering personalized guidance and answering farmer inquiries. This holistic approach not only addresses immediate concerns but also aims to enhance farmers' understanding of crop health and agricultural practices. With LeafScan, farmers gain access to a transformative tool that not only revolutionizes disease management but also fosters a community-driven approach to sustainable farming. As agriculture embraces the digital age, LeafScan stands at the forefront, poised to empower farmers and propel agricultural innovation into the future.

RELATED WORK

Architecture Design:-

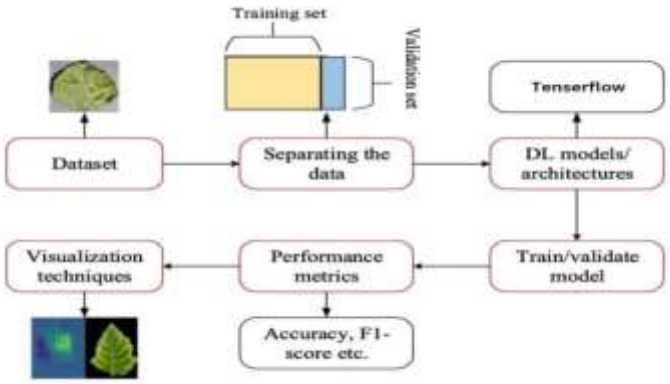


Fig. 1: Block diagram of LeafScan's ML Model

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Algorithm Description:-

LeafScan employs a sophisticated algorithmic approach to plant disease identification, leveraging deep learning techniques for accurate and efficient classification. At its core, the algorithm begins by preprocessing user-uploaded images of plant leaves, ensuring uniformity and enhancing feature extraction. Subsequently, the preprocessed images are fed into a deep learning model, which is primarily based on convolutional neural networks (CNNs). These CNNs are trained on extensive datasets of labeled plant images, allowing them to learn discriminative features associated with various plant diseases.

During the inference phase, the deep learning model analyzes the input images and generates predictions regarding the presence of plant diseases. The model outputs the top five predictions along with corresponding class labels, probabilities, and confidence scores, providing farmers with actionable insights into the health status of their crops. Moreover, LeafScan employs transfer learning techniques to fine-tune the pre-trained CNN model on domain-specific datasets, thereby enhancing its performance and adaptability to diverse agricultural environments.

Additionally, LeafScan is committed to continuous improvement and refinement of its algorithmic approach. Ongoing research and development efforts focus on expanding the dataset, improving model architecture, and incorporating feedback mechanisms to enhance the accuracy and reliability of disease identification. By combining state-of-the-art algorithms with domain expertise, LeafScan strives to deliver a robust and effective solution that empowers farmers with actionable information for proactive crop management and disease prevention.

METHODOLOGY

Method and analysis which is performed in our research work:

1. Problem Definition and Scope:

Problem Description and Scope Identify the specific virus problem that "LeafScan" will solve. Determine the target plants and the area where the project will be carried out.

2. Data Collection:

Data Collection Collect different data on quality images of healthy plants and diseased crops.

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3. Data Pre-processing:

Data Pre-cleaning and pre-processing of data, including developing images and descriptions.

4. AI Model Development:

Artificial Intelligence Model Development Develop a deep learning model for disease detection using neural network (CNN).

5. Model Training and Validation:

Model Training and Validation Use preset data to train the AI model. Use validation techniques such as crossvalidation to evaluate model performance.

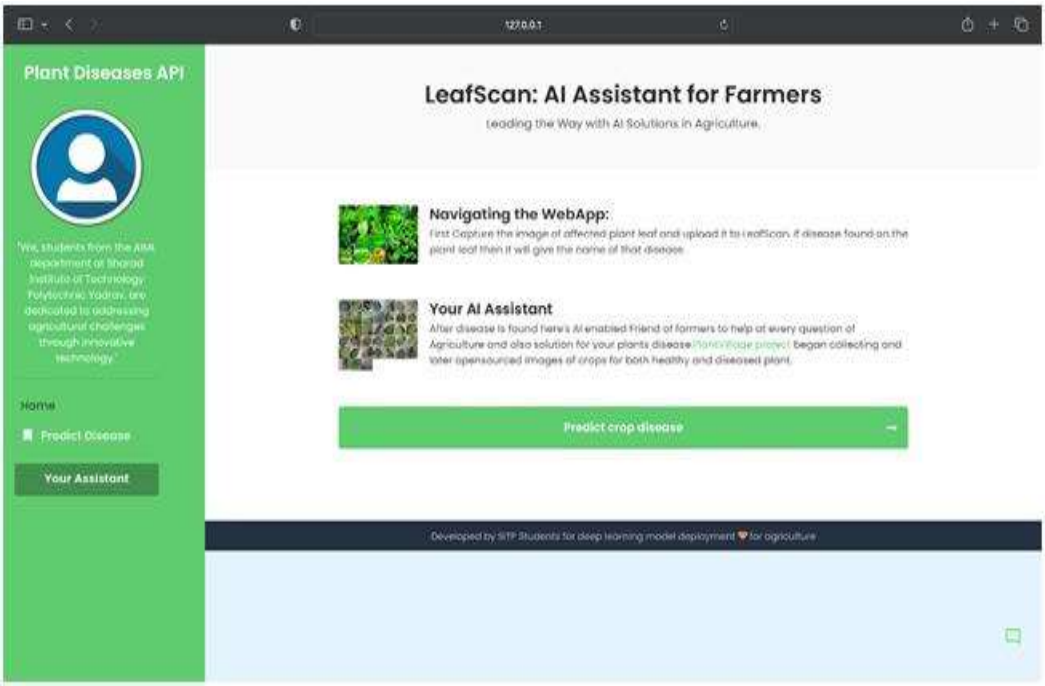
6. Disease Diagnosis and Recommendation:

Diagnostic and recommendation engine integrates the learned artificial intelligence models into the "LeafScan" platform to perform rapid diagnosis.

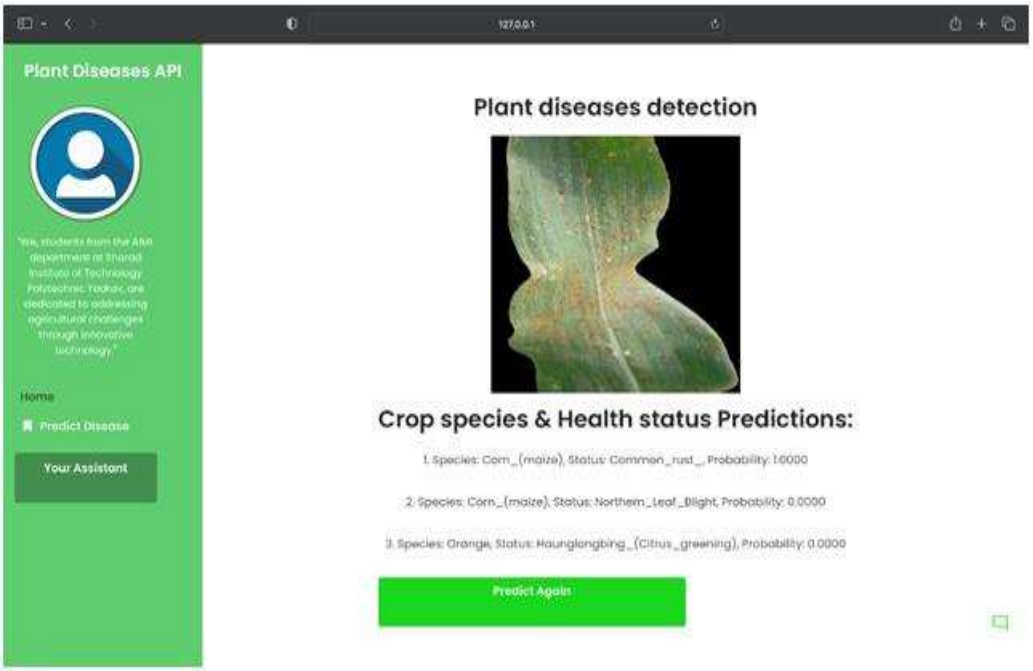
7. User-Friendly Chatbot Interface:

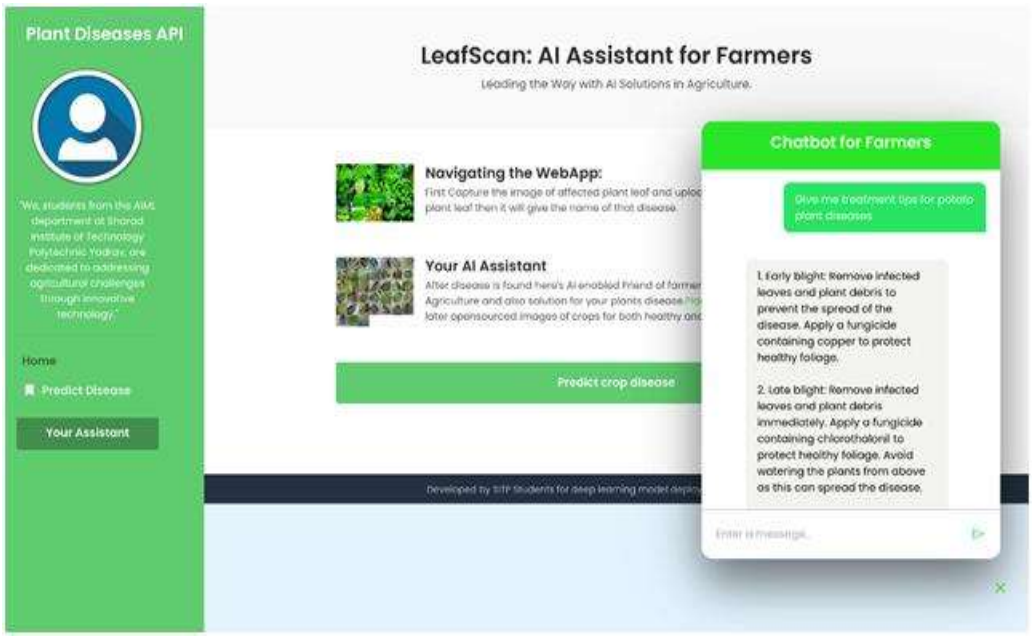
Created a user-friendly chatbot interface to interact with farmers.

OUTPUT OF OUR PROJECT



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CONCLUSION

This Project demonstrate the ability of artificial intelligence (AI) to solve important problems and change the future of agriculture. The program is dedicated to controlling plant diseases and improving crop health and has achieved significant results, highlighting its importance and impact on the agricultural sector. The development of smart models for disease diagnosis combined with a user-friendly chatbot interface allows farmers to diagnose diseases quickly and accurately and receive good feedback in person. The accuracy achieved by AI models in

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disease identification and classification is a testament to the power of technology in solving long-term agricultural problems. The program supports global food security through sustainable and resilient agriculture, a critical issue in a changing world. As a result, "LeafScan: AI Assistant for Farmers" represents not only a technological breakthrough, but also a plant language that meets the real needs of the farming community.

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