Plant Disease Detection Using Mobile Application

Project Proposal

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Submitted by

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1. Introduction

Detection of plant diseases is essential for food security and agricultural output.

Plant diseases significantly impact global agriculture by reducing yields and affecting trade. Ensuring nurseries produce healthy plants is crucial for sustainable farming. However, current disease diagnostic methods, often costly and labor-intensive, are not ideal for quick on-site use in nurseries. There's a pressing need for new, fast, and cost-effective diagnostic technologies that can identify plant diseases directly where plants are grown. This project aims to explore technologies to improve disease detection in nurseries, enhance plant health management, and support sustainable agriculture worldwide.

2. Objectives

The objective of plant disease detection using leaf images is to create a model that can identify diseases in plants by analyzing images of their leaves. This model should work well despite external factors like the environment, noise, and background. By using Convolutional Neural Networks (CNNs), which are very effective for this task, the system can accurately detect various plant diseases. This approach not only improves performance but also makes the project easy to maintain and manage.

3. Problem Description

The project aims to develop a mobile application tailored for nurseries that facilitates the early detection of plant diseases. This application will utilize advanced image processing techniques, particularly Convolutional Neural Networks (CNNs), to analyze leaf images captured using mobile devices. By employing machine learning algorithms, the app will accurately identify various diseases affecting plants based on visual symptoms exhibited on their leaves. The ultimate goal is to provide nursery workers with a reliable tool that automates and enhances the process of disease detection, thereby ensuring prompt intervention and minimizing the spread of infections.

Early detection of plant diseases is critical in nurseries to maintain plant health and prevent significant economic losses. Current methods, predominantly reliant on manual inspection by trained experts, are time-consuming, costly, and subject to human error. These limitations often result in delayed diagnosis and ineffective disease management strategies. By introducing a mobile application equipped with

AI-driven disease detection capabilities, nurseries can streamline their operations, reduce dependency on specialized expertise, and promptly address emerging health issues in their plant populations. This technological advancement not only improves efficiency but also enhances overall nursery management practices, leading to healthier plants and sustainable agricultural practices.

4. Methodology

The project followed a phased approach where each step was carefully planned, developed and tested. Initial search helped identify the real world need for plant disease detection. The system was designed using modular architecture to support features like disease detection, symptoms explain and recommendation generate. Image processing and machine learning technique were used to detect disease, while a mobile friendly interface was designed for ease of use. Testing was integrated for each phase following the v-model structure. V-Model demonstrates the relationships between each phase of the development life cycle and its associated phase of testing.

5. Project Scope

The scope of this project is to create a mobile application that is easy to use for users, incorporating many cutting-edge technologies to improve agricultural sustainability and production. The following are the main elements of the project scope:

1. **User-Friendly Interface:**

   Develop a user-friendly web application for automated plant disease detection. Implement machine learning models for disease classification using image processing techniques.

2. **Image-Based Disease Detection**:

   Develop a feature that uses a Convolutional Neural Network (CNN) based on MobileNet V2 architecture to identify plant diseases from images captured or uploaded by the users. Upon detection, users will receive detailed information about the disease, including its symptoms and possible causes.

3. **Instant Alerts**:

   Immediate alerts will notify users as soon as a disease is detected in any uploaded image. These notifications will include recommendations for

immediate actions to prevent the spread of the disease, helping nursery workers respond quickly and effectively.

4. **Treatment Recommendations**:

   For each detected disease, the app will offer suggested treatments, tailored to the specific conditions of the nursery. Users will receive step-by-step guides on how to apply these treatments, ensuring that they can take the necessary steps to manage and eradicate the disease.

5. **Data and Reports**:

   The app will maintain a history of all disease detections and treatments, allowing users to generate reports on plant health and disease trends. This historical data can be invaluable for identifying recurring issues and improving overall plant care strategies.

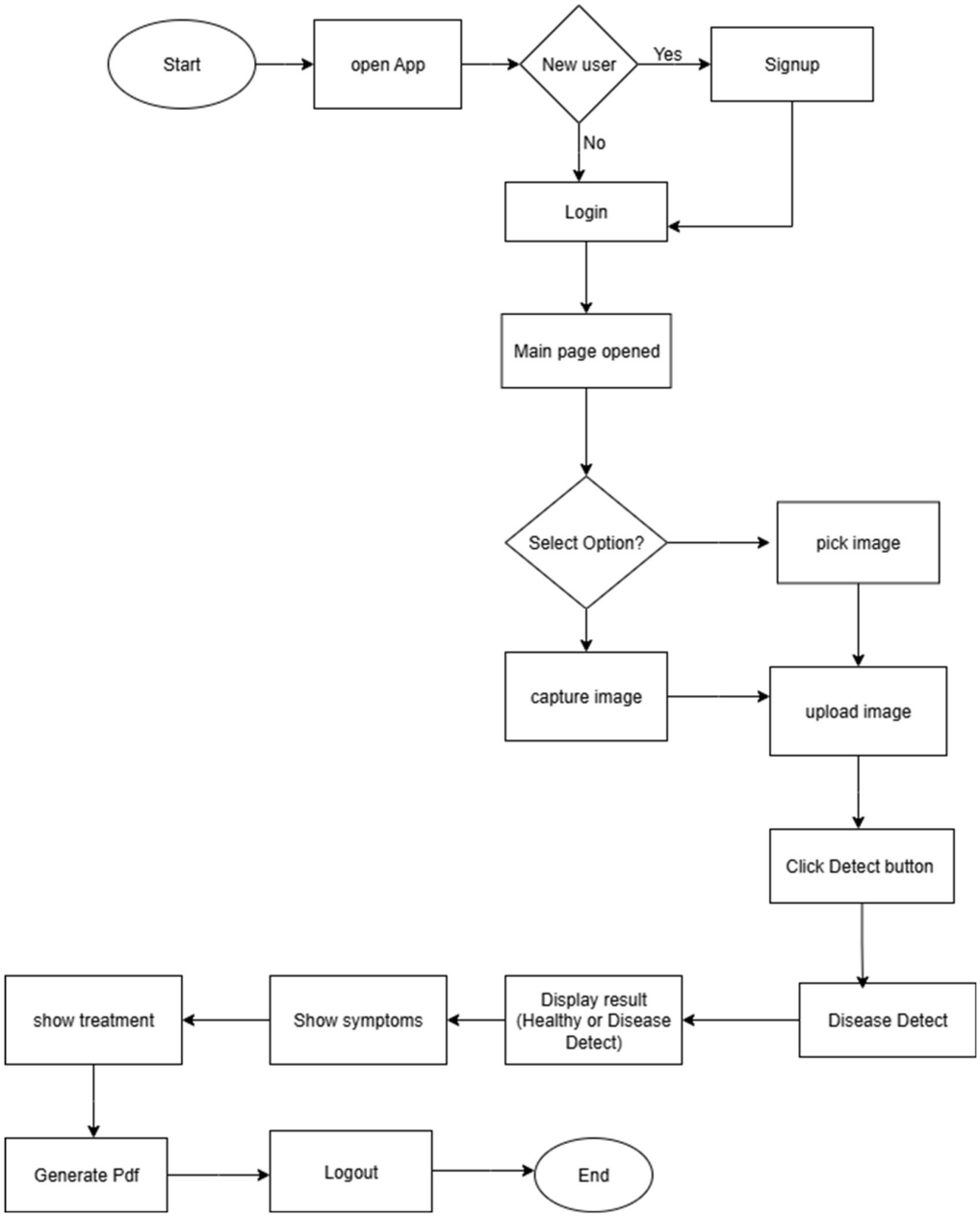
6. **Community Forum**:

   A built-in community forum will enable users to share their experiences, tips, and advice with one another. This platform will foster a supportive network of nursery workers who can collaborate and learn from each other's experiences.

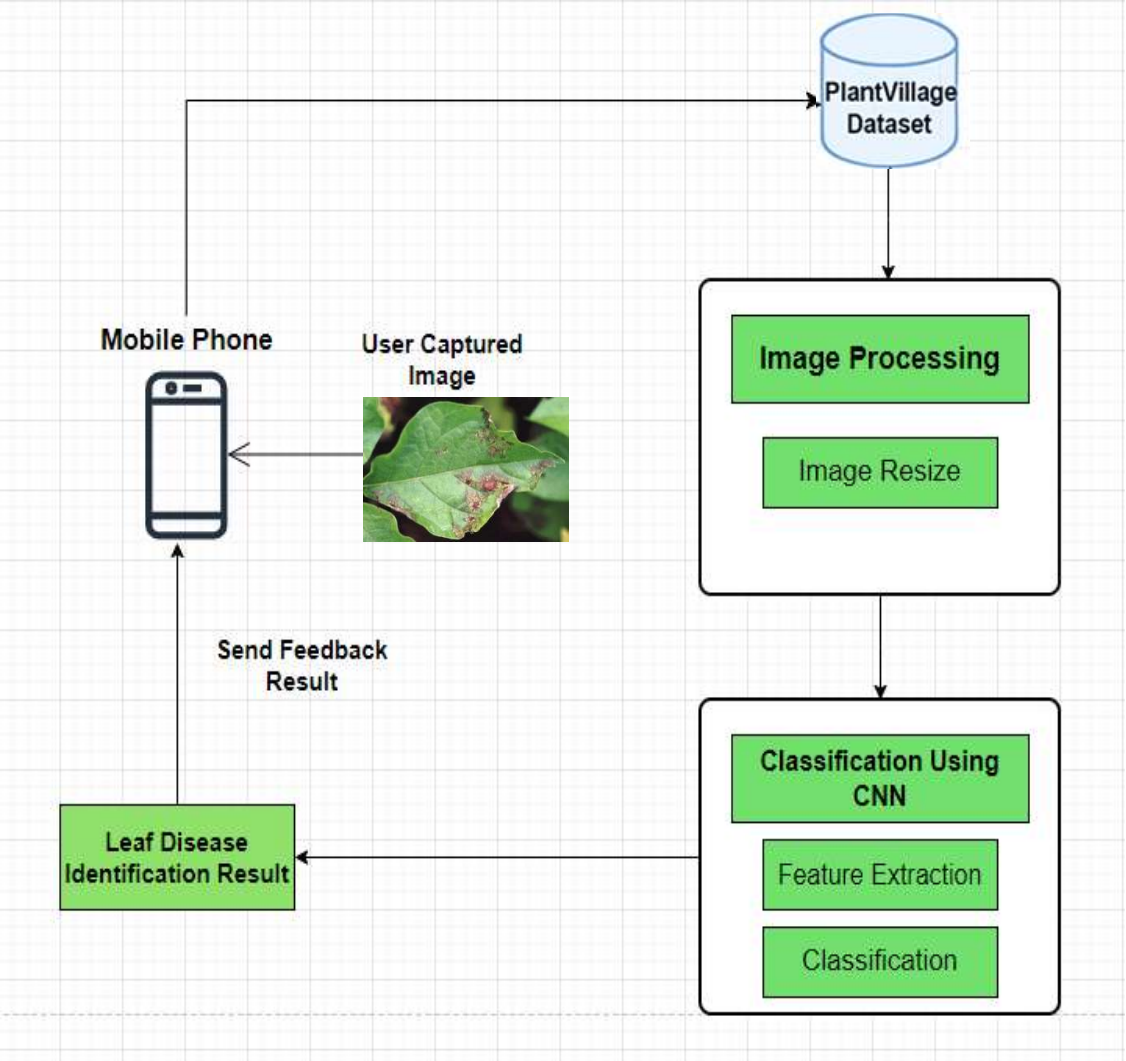
7. **Updates and Improvements:**

   Update the app with new features, disease databases, and improved algorithms. Collect user feedback to continuously enhance the app's functionality and user experience.

6. Flowchart


Start
open App
New user
Yes
Signup
No
Login
Main page opened
Select Option?
pick image
capture image
upload image
Click Detect button
Disease Detect
Display result (Healthy or Disease Detect)
Show symptoms
show treatment
Generate Pdf
Logout
End

7. Big Picture



8. Feasibility Study

The feasible study for the plant disease detection using mobile application assesses the possibility of developing a novel approach to enhancing agricultural practices using technology. This software addresses important farming concerns like fast disease identification, effective fertilizer management, and access to local weather and resources. It does this by combining advanced image processing, machine learning, and real-time data analysis. In order to increase agricultural productivity and sustainability, the app automates disease identification and offers real-time data.

i. Risk involved:

The plant disease detection using mobile application faces several risks that could affect how well it is implemented. One of the main hazards is the technical difficulty in integrating third-party APIs. Project schedule delays could result from integration problems with these APIs, which are essential for delivering location-based services and real-time meteorological data. The precision and dependability of the machine learning model employed to detect plant diseases present another important danger. Furthermore, there are risks associated with user adoption and engagement because low initial uptake or unfavorable feedback may prevent application usage and acceptance. Project deadlines, customer happiness, and legal compliance may all be impacted by these risks.

ii. Resource involved:

To mitigate risk and ensure successful delivery of the Plant Disease Detection using Mobile Application. These resources include dependable cloud services for backend hosting and machine learning model training, as well as high-performance development computers. It is essential to have access to extensive and varied datasets in order to train and improve the illness detection algorithms. Effective development and deployment require a talented team with experience in machine learning, project management, development, UI/UX design, and QA testing. Collaboration tools are necessary for team members to handle tasks and communicate with each other effectively. Budgetary allocations for user outreach and marketing are also essential to encourage adoption and guarantee the application successfully serves the needs of the agricultural community.

9. Solution Application Areas

The Mobile Application targets small to medium-scale farmers, offering real-time data and community support to enhance crop management, optimize resources, and boost productivity. It uses computer vision and machine learning to detect plant diseases early, reducing crop losses. The fertilizer calculator provides tailored recommendations, minimizing waste and costs. Real-time weather data helps farmers make informed decisions about planting, and harvesting, mitigating weather-related risks. The app also offers information on nearby plant shops, making resources easily accessible. Additionally, a community forum enables farmers to share knowledge and best practices. Overall, the application promotes

sustainable farming and improves farm productivity through technology and collaboration.

10. Tools/Technology

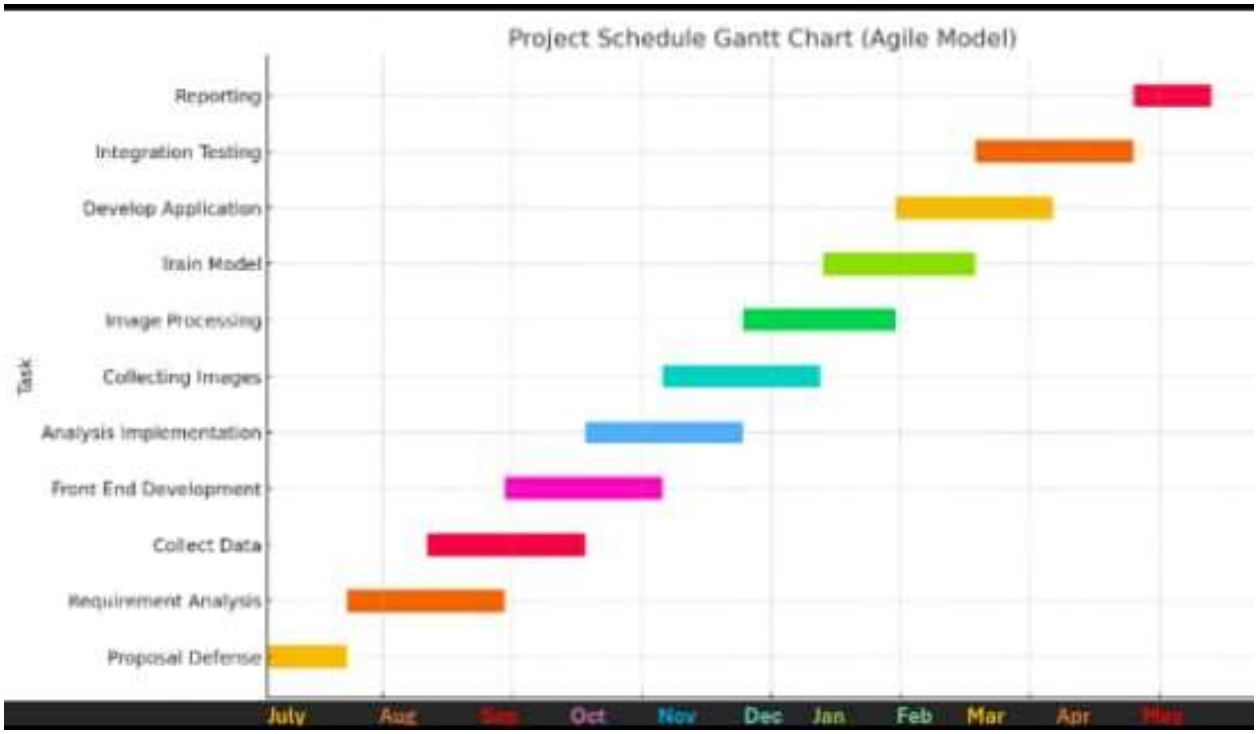
- **Software Requirements:**
  i. VS Code
  ii. Jupiter Notebook
  iii. Anaconda
  iv. Android Studio
  v. Emulator
  vi. Firebase

- **Hardware Requirements:**
  i. Laptop
  ii. USB
  iii. Mobile Phone

11. Responsibilities of the Team Members

RACI CHART				
TASK	HASNAIN	ZAINAB	KHADIJA	MISS-MUNTAHA
Requirement Gathering	R	R,A	I	I,C
Resources Planning	C	I	R,A	I,C
Frontend Development	I	R	R,A	I,C
Backend Development	R,A	I	C	I,C
Ai Algorithm Development	I	R,A	C	I,C
Database Setup	R,A	C	I	I,C
Data Preparation	R,A	I	C	I,C
Ai Integration	C	R,A	I	I,C
Testing	R	R	R,A	I,C
Documentation	I	C	R,A	I,C
Finalize And Deployment	I	R,A	R	I,C

12. Planning


Project Schedule Gantt Chart (Agile Model)
Task
Reporting
Integration Testing
Develop Application
Train Model
Image Processing
Collecting Images
Analysis Implementation
Front End Development
Collect Data
Requirement Analysis
Proposal Defense
July
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May

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