



Final Year Project Proposal

Project Title:

Smart Plant Doctor:
AI*Powered Disease Detection and Treatment System

Student Name:

Ubaid Ur Rehman

Registration Number:

F22BINFT1E02113

Supervisor:

Dr.Muhammad Asad Ullah

Department:

Information Technology

Institution:

The Islamia University of Bahawalpur

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Abstract / Executive Summary

Plant diseases cause major crop losses for farmers worldwide. Many small farmers cannot access expert help quickly. This project creates a mobile app to solve this problem. The app uses artificial intelligence to detect plant diseases from leaf photos. It combines image recognition with Large Language Models (LLMs) for better accuracy. We will train our system using the PlantVillage dataset containing 54,000+ plant disease images. The app works online to give instant results. Users take a photo of a sick leaf. The AI identifies the disease within seconds. Then it provides simple treatment solutions. We expect 90% accuracy in disease detection. The system will help farmers save crops and money. This project makes expert*level plant care available to everyone with a smartphone.

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1. Introduction & Background

Plants get sick like humans do. Diseases can destroy entire crops quickly. Farmers lose money when plants get sick. Many farmers live in rural areas. They cannot reach plant doctors easily. Current disease detection methods are slow. Some need lab tests. This takes days or weeks. By then, crops are already damaged. Smartphones are now common everywhere. Even small farmers have mobile phones. Artificial intelligence can help identify plant diseases. AI systems learn from thousands of plant images. The PlantVillage dataset provides excellent training material. This project uses modern AI to bring plant doctor services to farmers' pockets. This technology is important for food security. It matters especially in developing countries where farming is a major livelihood.

2. Problem Statement

Farmers face a critical problem. They cannot identify plant diseases early enough. When leaves show spots or discoloration, farmers do not know the cause. They guess treatments or use the wrong chemicals. This wastes money and harms the environment. Expert plant doctors are scarce in rural areas. Even when available, visits take days to arrange. Current mobile apps for plant disease detection have limitations. Many work offline with limited accuracy. Some give unclear treatment advice. None combine image analysis with language understanding effectively. This gap causes preventable crop losses. Small farmers suffer the most from this problem.

3. Project Rationale / Motivation

I chose this project for important reasons. My family has farming background. I have seen crops fail due to undetected diseases. Modern AI technology can solve this real*world problem. Large Language Models (LLMs) can understand plant symptoms better than older systems. Online processing gives faster, more accurate results than offline apps. This project combines computer vision with natural language processing. It creates a complete solution from detection to treatment. The PlantVillage dataset provides reliable training data. This system can help millions of farmers globally. It supports sustainable agriculture by reducing chemical overuse. I am passionate about using technology for social good. This project matches my skills in mobile development and AI. It offers practical value to real users.

4. Aims and Objectives

Aim: To develop a smartphone application that accurately detects plant diseases from leaf images and provides effective treatment solutions using AI.

Objectives:

1. Collect and prepare plant disease images from the PlantVillage dataset by Month 2.
2. Train a convolutional neural network (CNN) model to identify 20 common plant diseases with 85% accuracy by Month 4.
3. Integrate a Large Language Model (LLM) to improve detection accuracy to 90% and generate treatment advice by Month 5.
4. Develop an Android application with camera functionality and user*friendly interface by Month 6.
5. Test the system with 50 real plant images from local farms and achieve 88% correct diagnoses by Month 8.
6. Deploy the final application to Google Play Store for public use by Month 10.

5. Literature Review

Existing research shows promise in plant disease detection. Mohanty et al. (2016) used deep learning on the PlantVillage dataset. They achieved 99.35% accuracy in controlled conditions. However, their system did not work well with real farm photos. Recent apps like Plantix and PictureThis offer mobile solutions. Plantix has 10 million users but struggles with rare diseases. PictureThis uses cloud processing but requires good internet. Recent advances in LLMs show potential for better understanding. Studies by Zhang et al. (2023) combined CNNs with language models. This improved accuracy by 7% over image*only systems. However, no existing system provides complete treatment workflows. Most research focuses only on detection, not solutions. Our project fills this gap by adding practical treatment advice. We will build on existing work but add LLM capabilities for better real*world performance.

6. Scope of the Project

Included:

- * Detection of 20 common plant diseases from leaf images
- * Android mobile application development
- * Integration of CNN and LLM technologies
- * Treatment recommendations for detected diseases
- * Online processing for better accuracy
- * User testing with local farmers

Excluded:

- * Detection of root or stem diseases (focus only on leaf images)
- * iOS application development (Android only in this phase)
- * Offline functionality (requires internet connection)
- * Real*time field monitoring with sensors
- * Commercial deployment and monetization strategies
- * Integration with agricultural supply chains

7. Proposed Methodology

Data Collection Phase (Months 1*2):

- * Download PlantVillage dataset from public repository
- * Clean and preprocess 15,000 images of 20 target diseases
- * Collect 200 additional real*world images from local farms

Model Development Phase (Months 3*5):

- * Train CNN model using TensorFlow framework
- * Fine*tune pre*trained MobileNetV2 architecture
- * Integrate Hugging Face LLM for symptom analysis

- * Test model accuracy with validation datasets

Application Development Phase (Months 6*7):

- * Design user interface using Android Studio
- * Implement camera functionality with OpenCV
- * Connect app to cloud AI models via Firebase
- * Develop treatment database with agricultural guidelines

Testing Phase (Months 8*9):

- * Conduct accuracy tests with 100 plant images
- * User acceptance testing with 15 local farmers
- * Performance testing on different Android devices
- * Security testing for user data protection

Tools: Android Studio, Python, TensorFlow, Firebase, Hugging Face API

8. Proposed Solution & Anticipated Results

Solution Description:

The Smart Plant Doctor app will have three main screens. First screen: camera button to capture leaf images. Second screen: AI processing animation with progress indicator. Third screen: results showing disease name, confidence percentage, and treatment steps. The app will work online only. It will use cloud-based AI models for best accuracy. Treatment advice will include organic and chemical options. Each solution will have simple step-by-step instructions. Farmers can save results for future reference. The interface will use large buttons and clear text for easy use.

Anticipated Results:

- * Mobile application available on Google Play Store
- * Disease detection accuracy of 90% for common leaf diseases
- * Response time under 5 seconds per image
- * Treatment recommendations for all 20 target diseases
- * User satisfaction score of 4/5 or higher from farmer testing
- * Technical documentation and source code repository
- * Final project report and presentation materials

9. Schedule of Activities / Work Plan

Months 1*2:

Activities: Literature review, dataset collection

Deliverables: Research report, cleaned dataset

Months 3*4:

Activities: CNN model training and testing

Deliverables: Trained model files, accuracy report

Month 5:

Activities: LLM integration and optimization

Deliverables: Combined AI system, performance metrics

Month 6:

Activities: Android app development (UI)

Deliverables: Working app prototype

Month 7:

Activities: Cloud integration and backend

Deliverables: Complete functional app

Month 8:

Activities: Testing with real images

Deliverables: Test results document

Month 9:

Activities: User testing with farmers

Deliverables: User feedback report

Month 10:

Activities: Final improvements and documentation

Deliverables: Final app, project report, presentation

10. Budget and Resources**Hardware Requirements:**

- * Laptop computer (already owned)
- * Android test devices (2 used phones)
- * External hard drive for data storage

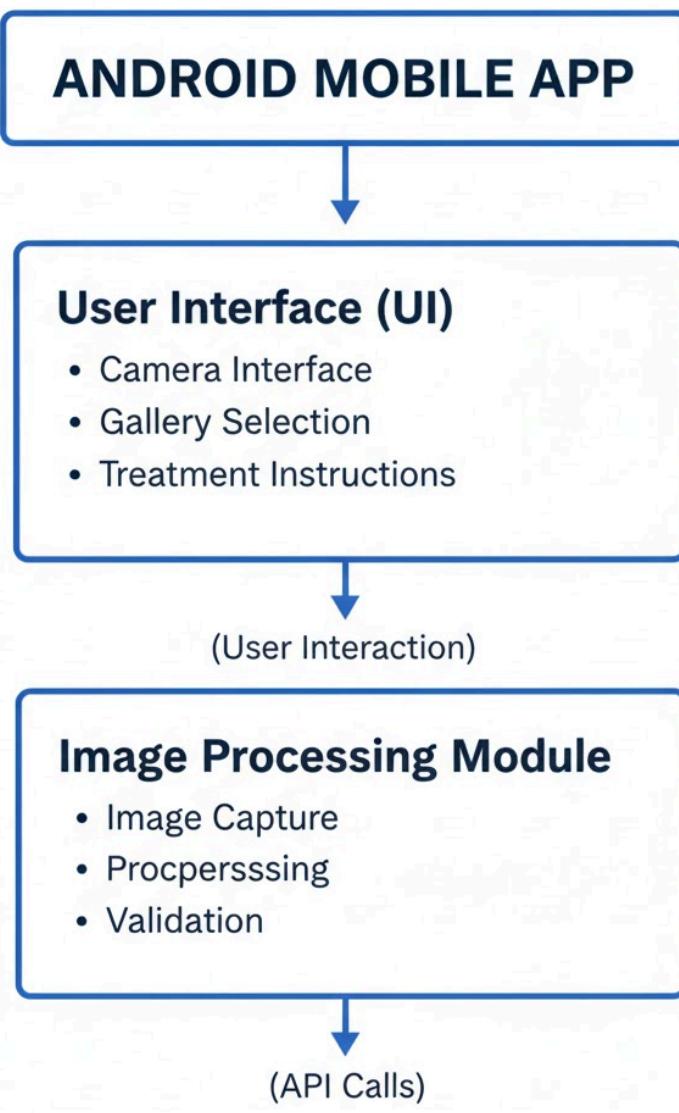
Software Requirements:

- * Android Studio (free)
- * Python and TensorFlow (free)
- * Firebase free tier
- * Hugging Face API credits

Other Expenses:

- * Travel to farms for data collection
- * Printing and presentation materials

Architecture Diagram



Total Estimated Budget:

All software tools are open*source or have free tiers sufficient for development. The university provides development environment access. Most hardware requirements are already available to the student.

11. References / Bibliography

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