

Shri Ramdeobaba College of Engineering & Management, Nagpur
Department of Computer Science & Engineering
Session: 2024-2025

Department: Computer Science and Engineering
Semester: V
Section: B

PROJECT SYNOPSIS

Title: "Potato Plant Disease Detection: A Mobile Application for Early Blight and Late Blight Identification Using CNN"

Member Details:

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➤ **Problem Definition:**

Potato farming is highly susceptible to diseases, especially early blight and late blight, which can cause significant crop losses if not detected early. Farmers often struggle to identify these diseases promptly due to a lack of resources or expertise, leading to reduced yield and quality. This project aims to develop a mobile application that utilizes image classification through Convolutional Neural Networks (CNN) to help farmers quickly and accurately identify whether a potato plant has a disease, specifically early blight or late blight, or is healthy.

➤ **Project Objectives:**

- * Develop a deep learning model using CNN to classify images of potato plants and identify diseases such as early blight and late blight.
- * Build a mobile application that allows farmers to take pictures of potato plants and receive instant feedback on the plant's health status.
- * Implement a backend system that serves the model efficiently and scales as needed using TensorFlow Serving and FastAPI.
- * Deploy the application and backend on Google Cloud Platform (GCP) to ensure reliability and accessibility.

➤ **Proposed Plan of Work:**

1. Data Collection and Preprocessing:

- Gather a comprehensive dataset of potato plant images, including healthy plants and those affected by early blight and late blight.
- Preprocess the images using data augmentation techniques to increase dataset size and improve model robustness.

2. Model Development:

- Design and train a Convolutional Neural Network (CNN) using TensorFlow to classify the images into three categories: healthy, early blight, and late blight.
- Perform hyperparameter tuning and model evaluation to ensure high accuracy and reliability.

3. Backend Development:

- Set up a FastAPI server to handle requests from the mobile app and serve the trained model using TensorFlow Serving.
- Implement necessary APIs for image upload, model inference, and result retrieval.

4. Frontend Development:

- Develop a mobile application using React Native that allows users to capture or upload images of potato plants and view the classification results.
- Create a web interface using React JS for monitoring and additional functionalities.

5. Deployment:

- Deploy the backend server, model, and database on Google Cloud Platform (GCP) to ensure scalability, security, and performance.
- Integrate the mobile app with the deployed backend for real-time disease detection.

➤ **Methodology:**

Model Building: Utilize TensorFlow for designing and training the CNN model. Implement data augmentation techniques to enhance model performance and use TensorFlow Datasets for efficient data handling.

Backend Server and ML Ops: Deploy the trained model using TensorFlow Serving and build a FastAPI server to manage model inference requests.

Frontend Development: Create user-friendly interfaces using React JS for the web and React Native for the mobile application.

Deployment: Use Google Cloud Platform (GCP) for deploying the backend server, model, and frontend components, ensuring seamless integration and scalability.

➤ **Technology:**

Model Building: TensorFlow, CNN, Data Augmentation, TensorFlow Datasets

Backend Server and ML Ops: TensorFlow Serving, FastAPI

Frontend: React JS, React Native

Deployment: Google Cloud Platform (GCP)

➤ **Functional Specifications [Deliverables]:**

* A trained CNN model capable of classifying potato plant images into healthy, early blight, or late blight categories.

* A mobile application that allows farmers to take pictures of potato plants and receive immediate disease classification results.

* A backend server with APIs for model inference and data handling, deployed on GCP.

* A web interface for monitoring and additional functionalities, integrated with the backend.

➤ **Project Scope:**

The project focuses on developing a mobile application and associated backend infrastructure to assist farmers in identifying potato plant diseases. The scope includes model development, application development, backend implementation, and deployment on a cloud platform. The project aims to provide an easy-to-use tool for farmers, improving disease detection accuracy and reducing the impact of blight on potato crops.

Approved by: Dr. Supriya Gupta

(Name of Guide and Sign)

