Potato Leaf Disease Classification App

Project Proposal

Project Code:

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Project Manager's Signature

Table of Contents

1. Abstract

This project aims to develop a mobile application that utilizes deep learning, retrieval augmented generation (RAG), and large language models (LLM) to accurately identify potato diseases from images and provide comprehensive information about the detected diseases. By combining these technologies, the app can offer farmers a more accurate, informative, and user-friendly solution for managing potato health.

2. Background and Justification

Potato diseases pose a significant threat to global food security, leading to economic losses for farmers. Early detection and intervention are crucial for effective disease management. Traditional methods of disease diagnosis can be time-consuming, labor-intensive, and prone to human error. Deep learning offers a promising solution, as it can accurately classify images based on complex patterns and features.

3. Research Methodology

Data Collection and Preprocessing:

- Gather a diverse dataset of potato plant images, including healthy and diseased plants with various diseases.
- Perform data cleaning, augmentation, and preprocessing to enhance model performance.

Model Development and Training:

- Develop a convolutional neural network (CNN) architecture tailored for image classification.
- Train the model on the preprocessed dataset, using techniques like transfer learning and data augmentation to improve accuracy.

Knowledge Base Creation:

- Gather a diverse dataset of potato disease information, including scientific papers, images, expert opinions, and any relevant textual data.
- Clean and preprocess the data.
- Vectorize the textual data using techniques like TF-IDF or word embedings.
- Index the vectorized data in a vector database.

RAG Model Development:

- Implement a retrieval system to search the knowledge base for relevant information based on the user's query.

- Use a pre-trained LLM to generate a response based on the retrieved information and the user's query.

4. Project Scope

The project will focus on developing a mobile application that can accurately identify potato diseases using deep learning. The app will include features for capturing images of potato plants, processing the images using the trained model, and providing real-time disease predictions. Additionally, the app will integrate RAG and LLM to offer comprehensive information about the detected diseases, including symptoms, treatment options, and prevention measures.

5. High level Project Plan

Phase 1: Data Collection and Preprocessing

- Gather and curate a diverse dataset of potato plant images
- Perform data cleaning, augmentation, and preprocessing

Phase 2: Model Development and Training

- Develop a CNN architecture
- Train the model on the preprocessed dataset

Phase 3: Knowledge Base Creation

- Gather and curate a diverse dataset of potato disease information
- Vectorize and index the data

Phase 4: RAG Model Development

- Implement the retrieval and generation components of the RAG model

Phase 5: Integration with Potato Disease Detection App

- Integrate the RAG model into the app to provide comprehensive information about detected diseases

Phase 6: Deployment and Testing

- Deploy the application on GCP
- Conduct thorough testing

6. References

1. The section should contain references of books, journals, magazines and websites consulted for the proposed research.
2. You may provide the names of the people and their contact information that you have consulted.