Plant disease detection

Dataset Name:

Bangladeshi Crop Disease Detection System

Dataset Source:

https://www.kaggle.com/datasets/nafishamoin/new-bangladeshi-crop-disease/code

Project Members:

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Project Supervisor:

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Introduction:

Agriculture is important for economy, but crop diseases can reduce harvests. Being able to quickly and accurately identify these diseases is key to improving crop production. This project aims to build a machine-learning system that can detect crop diseases from images. By using Convolutional Neural Networks (CNNs) and other machine learning models, it provides a reliable method for identifying diseases in corn crops, which are a major agricultural product.

Objectives:

The primary objectives of this project include:

1. Developing a deep learning model (CNN) to classify crop diseases from corn leaf images.
2. Comparing the performance of the CNN model with traditional machine learning approaches such as K-Nearest Neighbors (KNN), SVM, and Logistic Regression.
3. Addressing data imbalance issues through visualization and class weighting to ensure fair model evaluation.
4. Enhancing model performance through data augmentation techniques.

Used Models:

1. Convolutional Neural Network (CNN)

A custom CNN architecture is developed with the following benefits:

1. Local Connectivity ➔ Helps detect detailed patterns efficiently
2. Parameter Sharing ➔ Uses same pattern detectors across entire image
3. Pooling Operations ➔ Combines information from nearby regions

2. Traditional Machine Learning Models

- **K-Nearest Neighbors (KNN)**: Trained using flattened image features.
- **Support vector machine (SVM)** : using margin to classify the data
- **Logistic Regression**: Multiclass logistic regression for disease detection.

3. Evaluation Metrics

- **Accuracy**: Percentage of correct predictions.
- **Confusion Matrix**: Visualization of model predictions against true labels.
- **Classification Report**: Includes precision, recall, and F1-score for each class.

Results And Analysis:

1. **CNN Performance**:
    - Achieved high accuracy on both training and validation datasets.
    - Learning curves (accuracy and loss) indicate effective training with minimal overfitting.
2. **KNN and Logistic Regression**:
    - KNN provided a baseline for accuracy with simple distance-based classification.
    - Logistic Regression yielded competitive results for linearly separable classes.
3. **Confusion Matrices**:
    - Highlighted specific classes with higher misclassification rates, guiding future refinements.

Conclusion:

This project demonstrates the feasibility of using machine learning for crop disease detection in corn. The CNN model outperformed traditional approaches, benefiting from data augmentation and class weighting. Traditional models like KNN and Logistic Regression provide additional benchmarks for comparison. The proposed system has the potential to assist farmers in identifying diseases early and effectively.

Future Work:

1. Extending the system to include more crops and diseases.
2. Deploying the model as a mobile application for real-time disease detection in the field.
3. Integrating additional image preprocessing techniques to enhance model generalization.

References:

- Explore the Project on Kaggle
- TensorFlow Documentation
- Scikit-learn Documentation

Team Progress:

Project Steps

Task	Status	Due date	Description
Searching for suitable dataset	Done	~~18 Dec~~	using kaggle to find the suitable dataset for our project
Choosing a specific data	Done	~~18 Dec~~	we selected : Bangladeshi Crop Disease Detection System
Writing a basic code	Done	~~19 Dec~~	implement the basic code by help of some kaggle tools in datasets
Adding new methods	Done	~~19 Dec~~	search for some methods and implement new
Writing the project steps	Done	~~20 Dec~~	writing steps on the code as comments in the code file
Uploading the project file to github	Done	~~20 Dec~~	upload the total project on github
+ Add task			
		18 - 20 Dec	

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