

# 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:

1. Ahmed hegazy Mohamed kotb (section 1)
2. Ahmed Mohamed habiby imam (section 1)
3. Mohamed tarek Mohamed taha (section 3)

## Project Supervisor:

DR: Ahmed Mohamed Abdalazeem

## Introduction:

Agriculture is vital to Bangladesh's economy, but crop diseases often cause major losses in yield. Quickly and accurately identifying these diseases is crucial to boosting productivity. This project aims to create a machine-learning system that detects crop diseases from images. Using both Convolutional Neural Networks (CNNs) and traditional machine learning models, it offers a reliable way to classify diseases in corn crops, a key 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), 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.
- **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

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

الحمد لله الذي هدانا لهذا