

Semester Project

Crop Pest and Disease Detection System Using Machine Learning

CS370 Artificial Intelligence



The Team

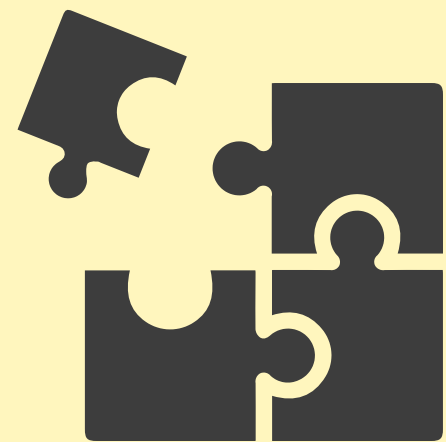
CMS	Name	Role
376610	Hasib Aslam	ResNet50, adversarial training
393223	Muhammad Sundam	YOLOv5, adversarial training
375700	Syed Aon Raza	YOLOv5, stats
369802	Ali Shahzad	ResNet50, pipelining

Introduction



Farmers have low literacy rate and do not have proper education

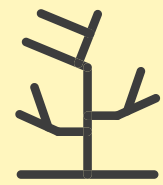
Many farmers are unable to recognize and treat crop diseases, and they do not have resources to hire a professional



Our project aims to provide a user-friendly solution for farmers

It will allow them to quickly identify diseases in these crops, significantly reducing their losses and improving quality

Dataset Properties



Description

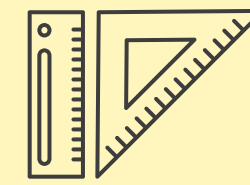
Crop pests/disease dataset sourced from local farms to aid in tackling crop infestations in developing countries



Classes

A total of 22 classes:

- Cashew - 5 classes
- Maize - 7 classes
- Tomato - 5 classes
- Cassava - 5 classes



Size

Raw dataset that contains 25000 data images of varied dimensions distributed over 22 classes

Model Selection

Classification Model: ResNet50

- ResNet50 (Residual Network 50) was developed by Microsoft Research in 2015
- The “50” in the name refers to the number of layers in the network
- Powerful image classification model that can be trained on large datasets
- Key innovation is the use of residual connections - allow it to learn a set of residual functions that map the input to the desired output

Leaf Detection Model: YOLOv5

- Ultralytics YOLOv5 is a cutting-edge, state-of-the-art (SOTA) model
- Builds upon the success of previous YOLO versions
- Designed to be fast, accurate, and easy to use
- Excellent choice for object detection and instance segmentation

Model Training and Hyperparameters

01

**ResNet50 Layers
Trained:
50**

02

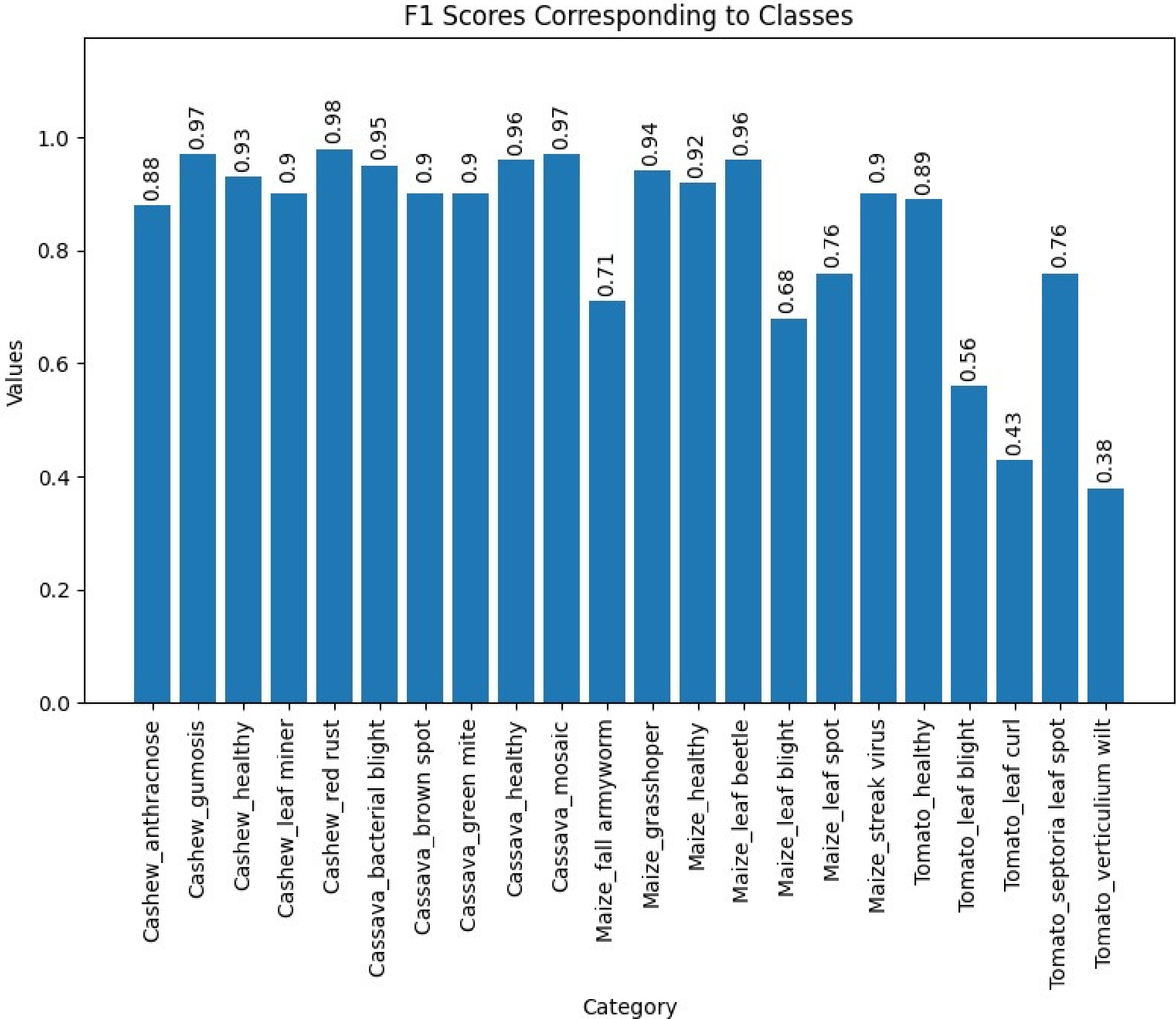
**Optimizer
Function:
Stochastic
Gradient Descent**

03

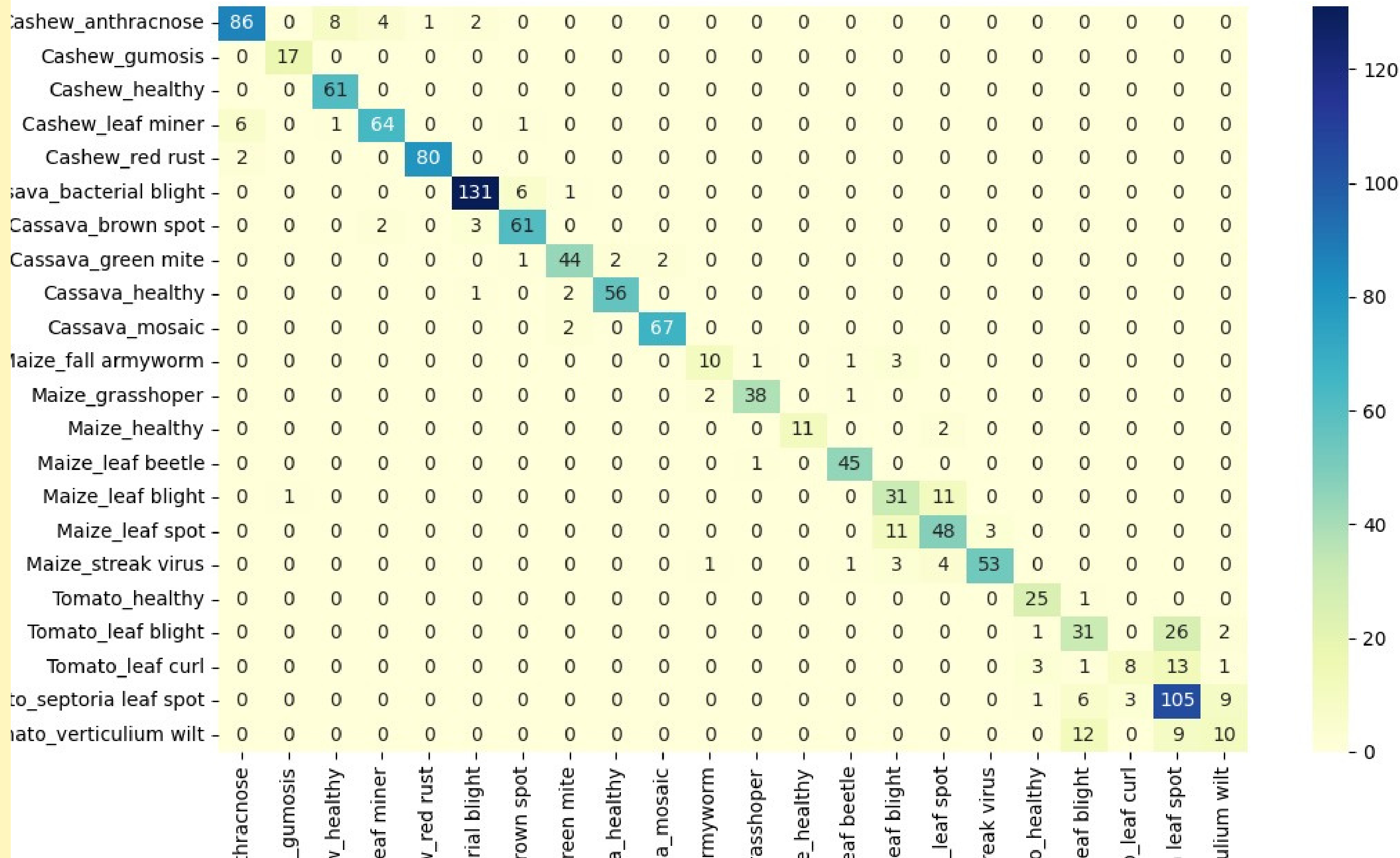
**Epochs: 10
Batch Size: 64
Learning Rate:
0.0000001
Momentum:
0.009**

Results and Accuracy

ResNet50 Model Accuracy:
87.5%



Confusion Matrix



Difficulties and Limitations

Memory Overflow

Batch Size

Loss fluctuation

Future Improvements



Treatment Section

Consult with agriculture professionals to add recommended treatment plans against each disease



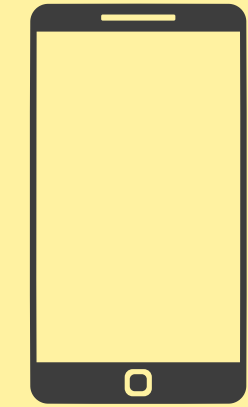
Improve Accuracy

Enhance model performance by improving its accuracy by adding more data, tuning algorithms etc.



Increase Crop-base

Add more crop examples, especially those that are vital to Pakistan's economy e.g. wheat, cotton, sugarcane



Launch Project

Launch a mobile application available on app stores, work with NGOs to help spread the word to revolutionize agro-industry.

Project Demo

