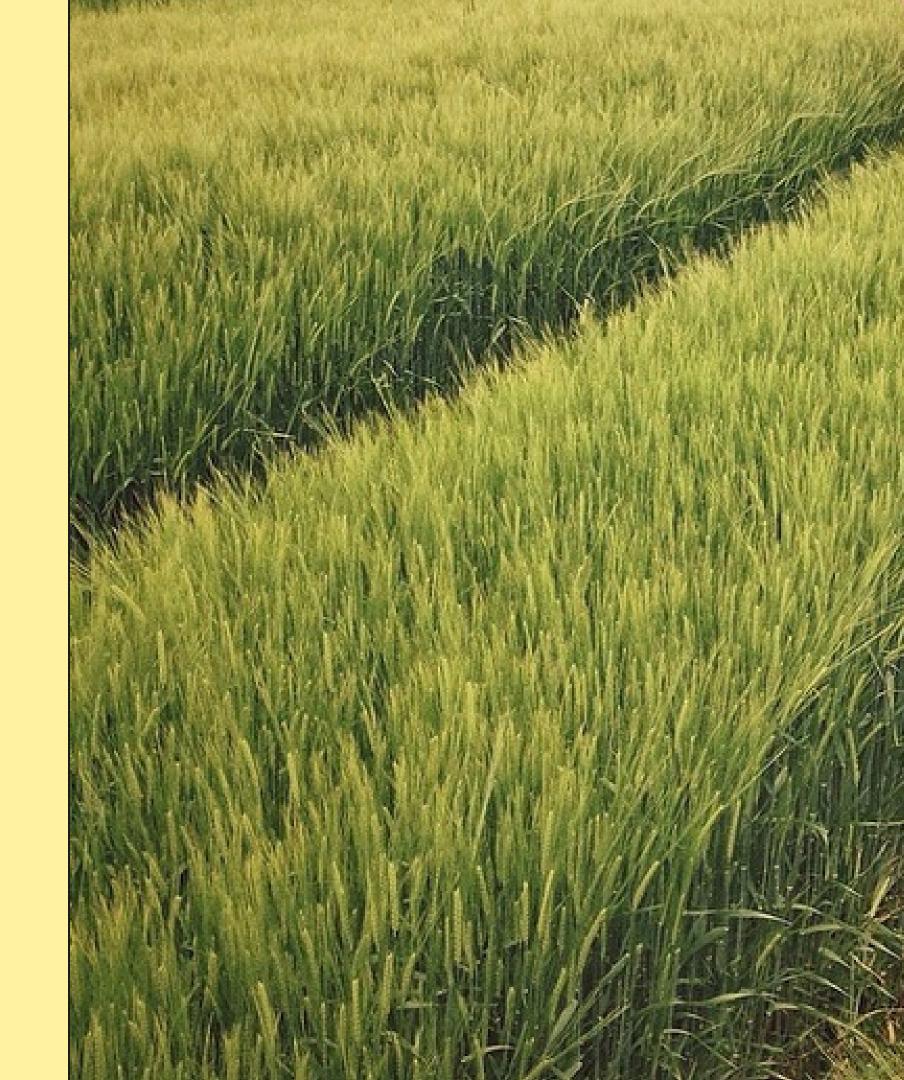
Semester Project

Crop Pest and Disease Detection System Using Machine Learning

CS370 Artificial Intelligence



The Team

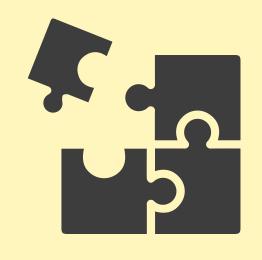
CMS	Name	Role								
376610	Hasib Aslam	ResNet50, adversarial training								
393223	Muhammad Sunaam	YOLOv5, adversarial training								
375700	Syed Aon Raza	YOLOv5, stats								
369802	Ali Shahzad	ResNet50, pipelining								

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 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

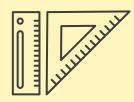
Crop pests/disease
dataset sourced from
local farms to aid in
tackling crop
infestations in
developing countries



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

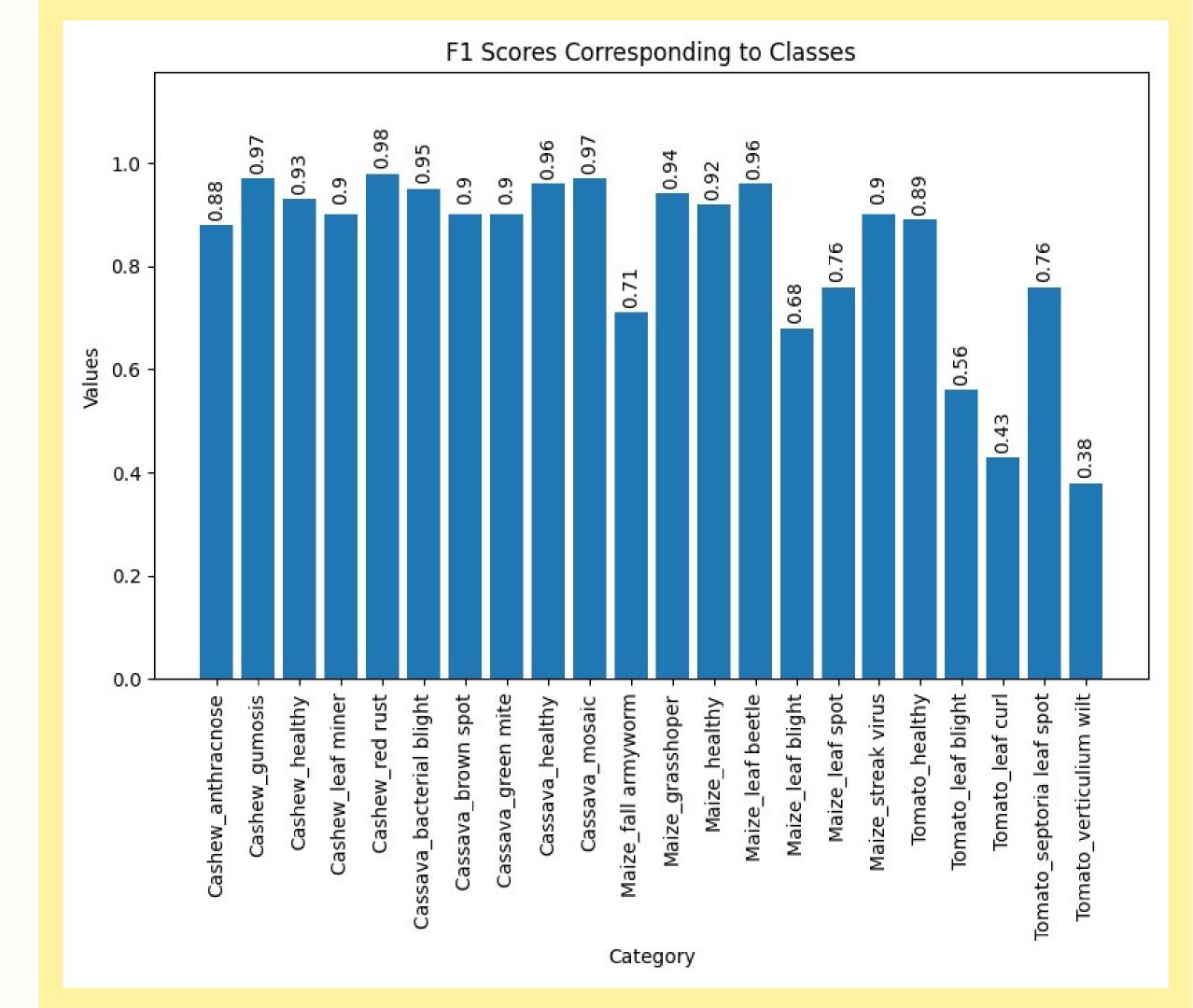
Optimizer
Function:
Stochastic
Gradient Descent

03

Epochs: 10
Batch Size: 64
Learning Rate:
0.000001
Momentum:
0.009

Results and Accuracy

ResNet50 Model Accuracy: 87.5%



Confusion Matrix

17 <u>0-0</u>																							
ashew_anthracnose - 8	36	0	8	4	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cashew_gumosis -	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cashew_healthy -	0	0	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cashew_leaf miner -	6	0	1	64	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cashew_red rust -	2	0	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ava_bacterial blight -	0	0	0	0	0	131	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cassava_brown spot -	0	0	0	2	0	3	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cassava_green mite -	0	0	0	0	0	0	1	44	2	2	0	0	0	0	0	0	0	0	0	0	0	0	
Cassava_healthy -	0	0	0	0	0	1	0	2	56	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cassava_mosaic -	0	0	0	0	0	0	0	2	0	67	0	0	0	0	0	0	0	0	0	0	0	0	
1aize_fall armyworm -	0	0	0	0	0	0	0	0	0	0	10	1	0	1	3	0	0	0	0	0	0	0	
Maize_grasshoper -	0	0	0	0	0	0	0	0	0	0	2	38	0	1	0	0	0	0	0	0	0	0	
Maize_healthy -	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	2	0	0	0	0	0	0	
Maize_leaf beetle -	0	0	0	0	0	0	0	0	0	0	0	1	0	45	0	0	0	0	0	0	0	0	
Maize_leaf blight -	0	1	0	0	0	0	0	0	0	0	0	0	0	0	31	11	0	0	0	0	0	0	
Maize_leaf spot -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	48	3	0	0	0	0	0	
Maize_streak virus -	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3	4	53	0	0	0	0	0	
Tomato_healthy -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	1	0	0	0	
Tomato_leaf blight -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	31	0	26	2	
Tomato_leaf curl -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	8	13	1	
to_septoria leaf spot -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	3	105	9	
nato_verticulium wilt -	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	9	10	
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	racnos	gumosis	healthy	nin	d rust	olig	own spot	een mite	_healthy	osa	Wor)op(alth	eet	olig	leaf spot	Vir.	alth	olig	f curl	leaf spot	иw	
	المار	gur	_he	eaf mine	red	rial blight	owr	een	_he	a_mosaic	myworm	asshoper	e_healthy	af beetle	eaf blight	eaj	eak virus	o_healthy	eaf blight	eaf	eat	ılium wilt	

- 120

- 100

- 80

- 60

- 40

- 20

- 0

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



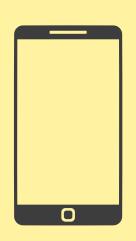
Improve Accuracy

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



Increase Cropbase

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 agroindustry.

Project Demo

