

Healthy Leaves

Image Classification

| United Nations (UN)

| Kaggle Dataset

Proceedings of the National
Academy of Sciences (PNAS)



Project Goal



Identify leaves
between 22 classes,
11 healthy and 11
diseased.



Twelve plants named
as Mango, Arjun,
Alstonia Scholaris,
Guava, Bael, Jamun,
Jatropha, Pongamia
Pinnata, Basil,
Pomegranate, Lemon,
and Chinar have been
selected.

Why Leaves Matter



Food Security

4274 The United Nations declared 2020 the International Year of Plant Health. It is estimated that food production will need to increase by 60% by 2050 to feed the estimated 10 billion people expected on Earth.



Yields

According to the university of Hawaii Manoa leaf disease can lead to 90% loss in yields for mangoes.

Research conducted by the University of Florida found that 90% of yields were lost due to leaf disease in pomegranates.



Economic Cost

The Food and Agriculture Organization of the United Nations (FAO) estimates that plant diseases cost the global economy around US\$220 billion per year, with 20–40% of crop production lost.

Dataset



Train

4274 Images



Validation

110 Images



Test

110 Images

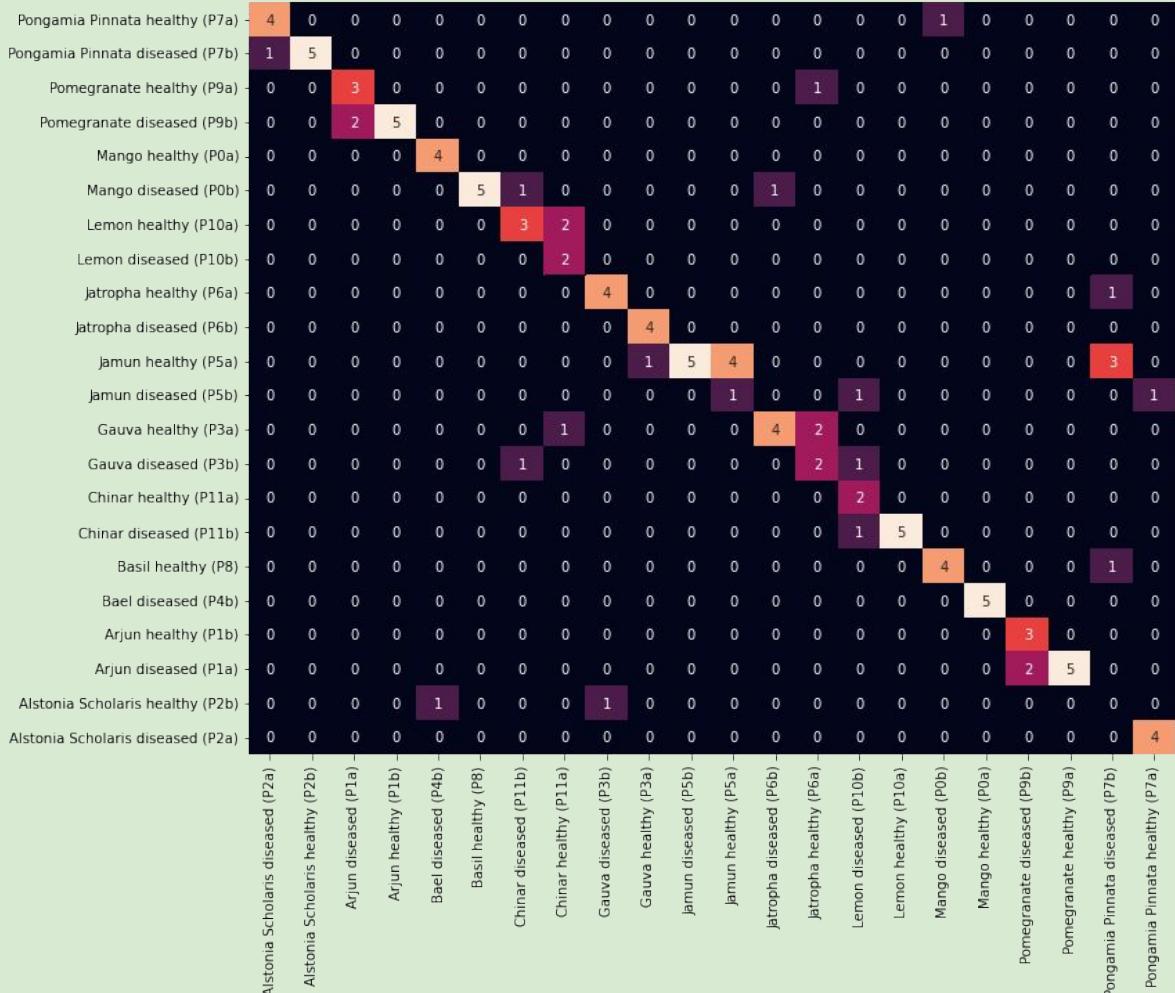


Leaf samples



Accuracy 75%

Healthy Leaves				Diseased Leaves			
Plant Name	Precision	Recall	F1-score	Plant Name	Precision	Recall	F1-score
Alstonia Scholaris	1.00	1.00	1.00	Alstonia Scholaris	1.00	1.00	1.00
Arjun	0.83	1.00	0.91	Arjun	0.83	1.00	0.91
Basil	0.56	1.00	0.71	Basil	1.00	0.47	0.57
Chinar	0.80	0.80	0.80	Chinar	0.67	0.40	0.50
Gauva	1.00	1.00	1.00	Gauva	0.71	1.00	0.83
Jamun	0.00	0.00	0.00	Jamun	0.36	1.00	0.53
Jatropha	1.00	0.60	0.75	Jatropha	0.80	0.80	0.80
Lemon	0.80	0.80	0.80	Lemon	1.00	0.60	0.75
Mango	1.00	0.80	0.89	Mango	1.00	1.00	1.00
Pomegranate	1.00	1.00	1.00	Pomegranate	1.00	1.00	1.00
Pongamia	1.00	1.00	1.00	Pongamia	0.00	0.00	0.00



Leaf Discrepancy



Pongamia Diseased

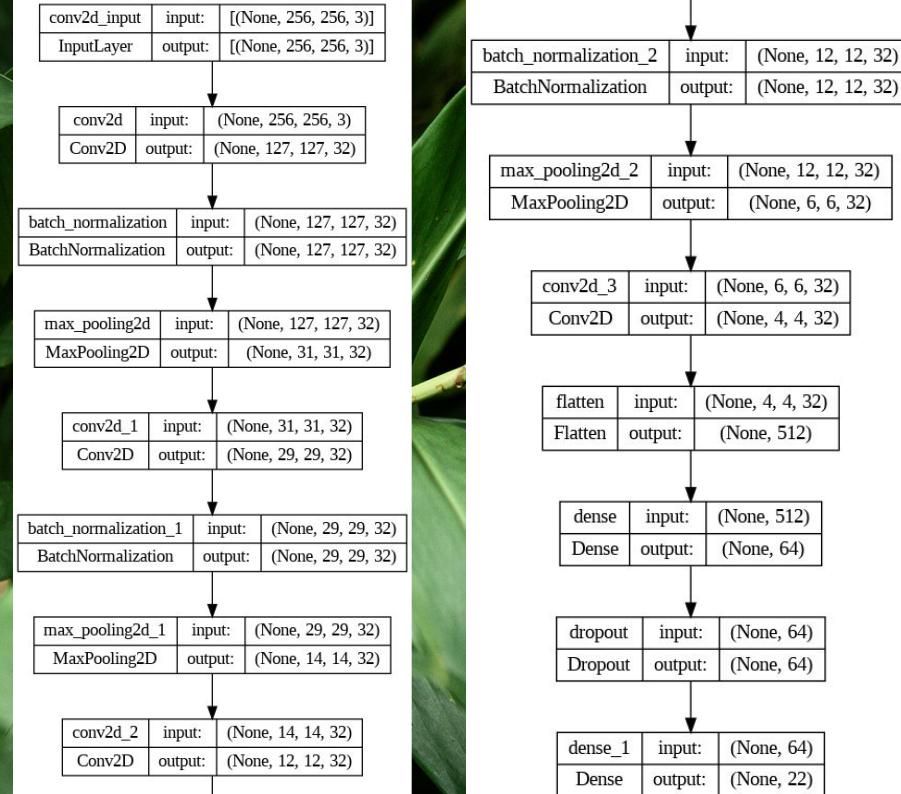


Jamun Healthy



75%

CNN Model





Suggestions

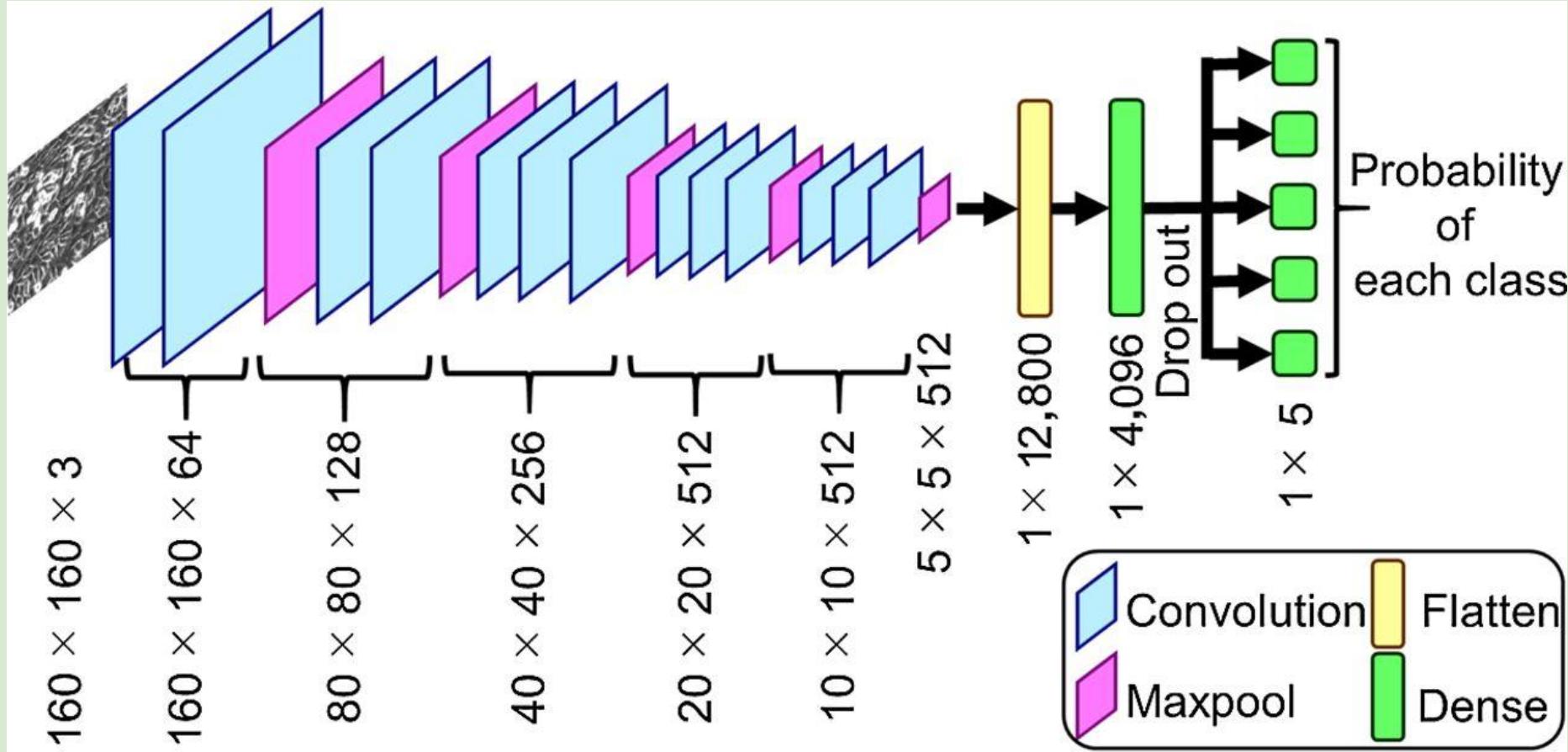


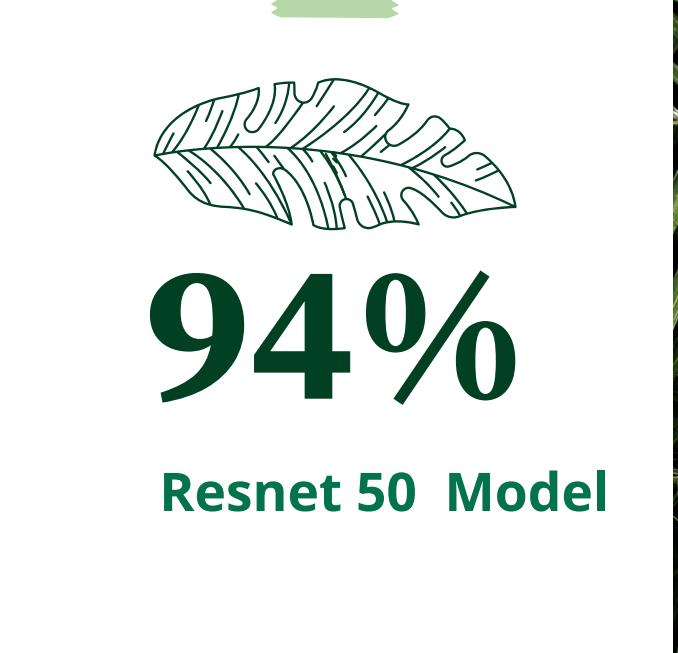
More Data



Leverage Datasets

Use pre created models
made for higher
accuracy





input_9	input:	[(None, 256, 256, 3)]
InputLayer	output:	[(None, 256, 256, 3)]

sequential_3	input:	(None, 256, 256, 3)
Sequential	output:	(None, 224, 224, 3)

tf.__operators__.getitem_2	input:	(None, 224, 224, 3)
SlicingOpLambda	output:	(None, 224, 224, 3)

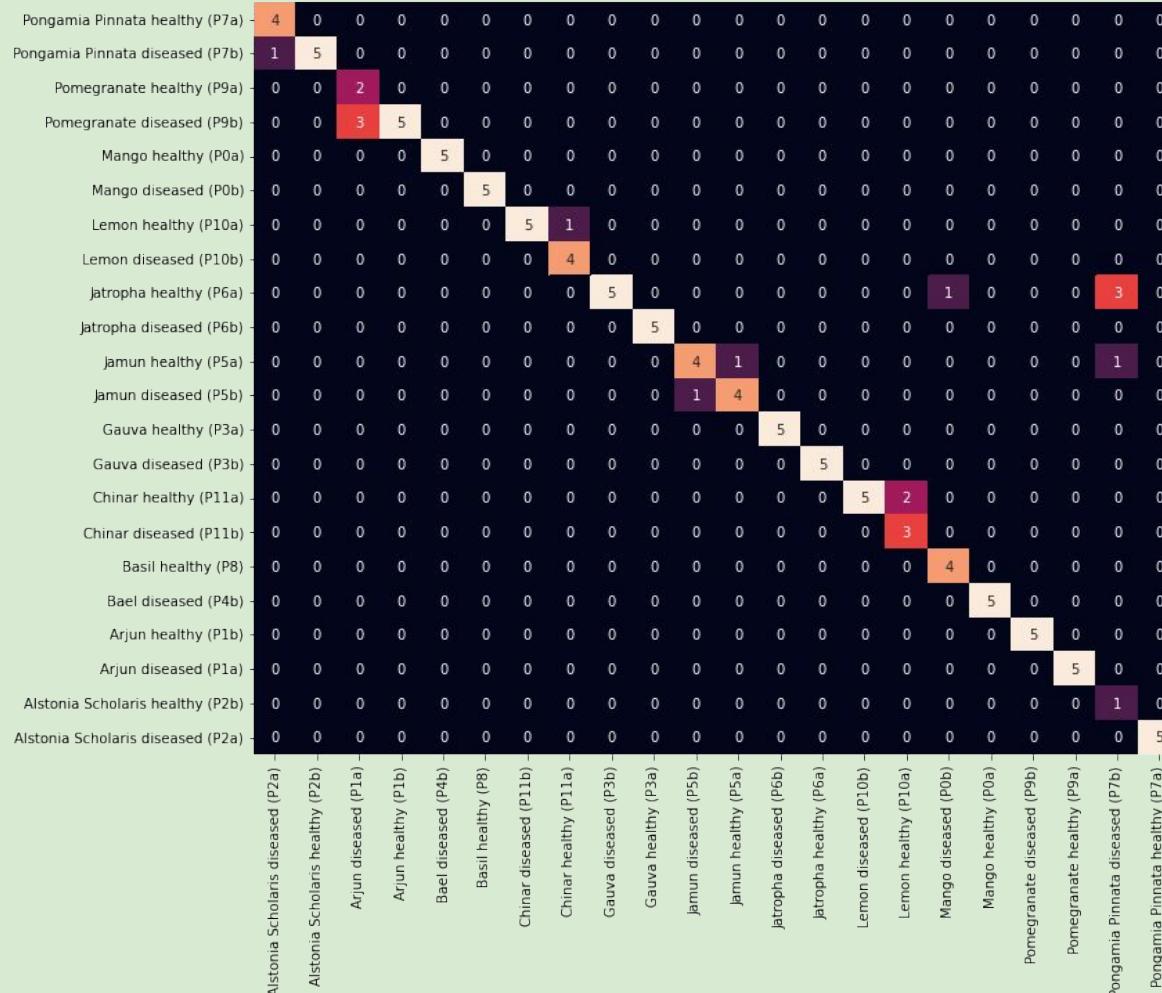
tf.nn.bias_add_2	input:	(None, 224, 224, 3)
TFOpLambda	output:	(None, 224, 224, 3)

resnet50	input:	(None, None, None, 3)
Functional	output:	(None, None, None, 2048)

conv2d_1	input:	(None, 7, 7, 2048)
Conv2D	output:	(None, 7, 7, 22)

global_average_pooling2d_1	input:	(None, 7, 7, 22)
GlobalAveragePooling2D	output:	(None, 22)

dense_1	input:	(None, 22)
Dense	output:	(None, 22)



Thank You

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