

Foliar Disease in Apple trees

1. About Project

This project is about detecting foliar disease in apple trees using the defected images of the leaves of apple trees. Foliar disease is an infection that causes rust, scab, and yellow spots on plant leaves. This project aims to detect whether the leaves has foliar disease or not. This project is trained using sequential model.

2. Model Training

This project is trained using sequential model. There are 4 layers in the model of conv2D with 'relu' activation function. There is also one dense layer with softmax activation function. The output layer gives the final prediction uses softmax activation. The optimizer used is Adam and loss is categorical_crossentropy. This model was trained over 40 epochs and achieved a training accuracy of 93.39%

```
Model: "sequential"
Layer (type)                 Output Shape              Param #
-----
conv2d (Conv2D)              (None, 224, 224, 64)     1792
max_pooling2d (MaxPooling2D) (None, 112, 112, 64)     0
conv2d_1 (Conv2D)            (None, 112, 112, 64)     36928
max_pooling2d_1 (MaxPooling2D) (None, 56, 56, 64)     0
conv2d_2 (Conv2D)            (None, 56, 56, 128)      73856
max_pooling2d_2 (MaxPooling2D) (None, 28, 28, 128)     0
conv2d_3 (Conv2D)            (None, 28, 28, 256)      295168
max_pooling2d_3 (MaxPooling2D) (None, 14, 14, 256)     0
flatten (Flatten)            (None, 50176)            0
dense (Dense)                (None, 4)                200708
-----
Total params: 608,452
Trainable params: 608,452
Non-trainable params: 0
```

Testing Accuracy: 0.9339

3. Dataset

The dataset used in Foliar disease in apple trees has images of leafs having disease like scab, rust or more than one disease and leafs having no disease i.e. Healthy. Dataset also include train.csv and test.csv file with labelled disease value.

This dataset is available on Kaggle at the following link:

<https://www.kaggle.com/c/plant-pathology-2020-fgvc7/data>

4. Libraries:

Python: Python is an interpreted high-level general-purpose programming language. It is dynamically-typed and garbage-collected. Python is widely used in multiple domains such as data science, machine learning and deep learning.

TensorFlow: TensorFlow is an open-source library for machine learning and deep learning. It is mainly used for training and inference of deep neural networks. It was developed by Google Brain Team for internal Google research and production.

NumPy: NumPy is a Python library used for working with arrays. It was developed by Travis Oliphant in 2005. NumPy provides array object which is 50x faster than traditional Python lists.

Matplotlib: Matplotlib is a comprehensive library for creating static, animated and interactive visualizations with Python.

tqdm: tqdm is a library in Python which is used for creating Progress Meters or Progress Bars. tqdm got its name from the Arabic name *taqaddum* which means 'progress'.

Shutil: The shutil module offers a number of high-level operations on files and collections of files. In particular, functions are provided which support file copying and removal. For operations on individual files, see also the os module.

Natsort: natsort provides a function **natsorted** that helps sort lists “naturally” (“naturally” is rather ill-defined, but in general it means sorting based on meaning and not computer code point)

Cv2: OpenCV is a great tool for **image processing and performing computer vision tasks**. It is an open-source library that can be used to perform tasks like face detection, objection tracking, landmark detection, and much more. It supports multiple languages including python, java C++

5. Output:

The below are the snapshots of this project, first we need to upload the trained model by clicking on upload model. Than model will be added. Now to test the image of leaf click on added model. Then click on Results button to see the results.



Foliar Disease in Apple Trees

Upload Model Results

Models

apple

Add model with name:



Foliar Disease in Apple Trees

apple

Browse... apple2.h5

Submit

Foliar Disease in Apple trees

Add image to test:

Foliar Disease in Apple Trees

No file selected.






Final Output:

Foliar Disease in Apple trees

Foliar Disease in Apple Trees

Results

apple

Sr.No	Your Image	Disease Name	Accuracy
1		SCAB	99.44210648536682
2		RUST	98.3125388622284
3		HEALTHY	99.80425834655762
4		RUST	99.9998688697815
5		HEALTHY	76.35751366615295