Deloitte.

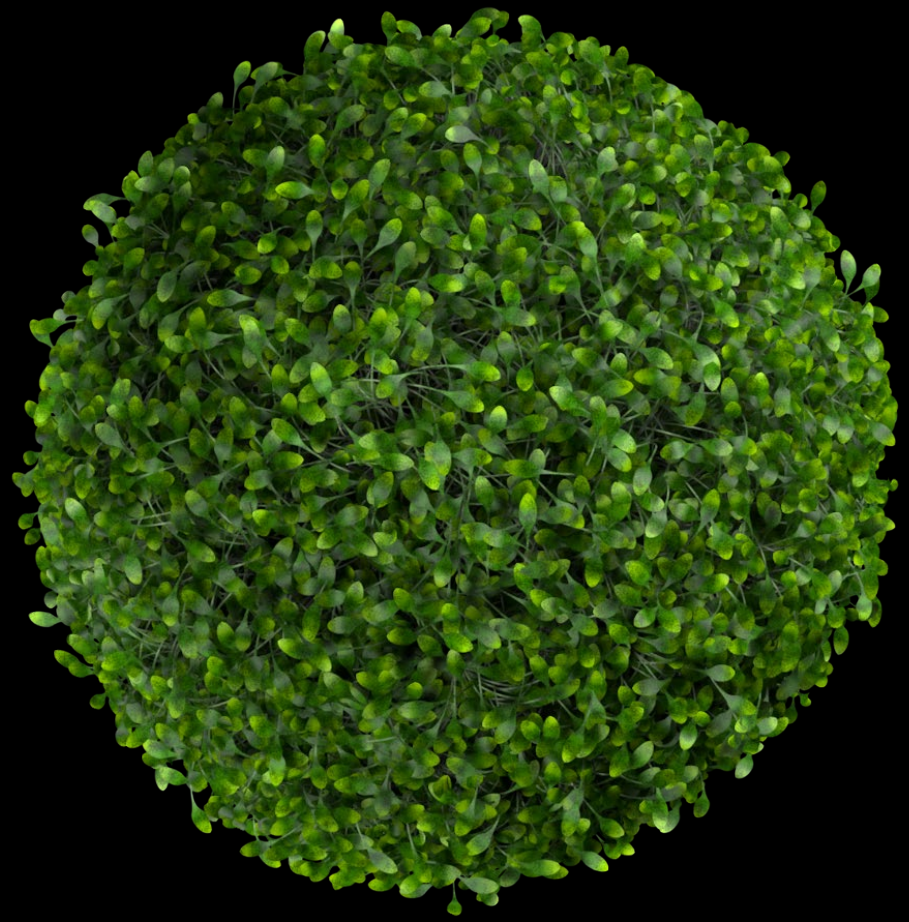


Image Classification: Plant Diseases

Ian Haas, Capstone 01/06/2023

MAKING AN IMPACT THAT MATTERS since 1845

Cotton Plant Diseases

Leaf Diseases

- Issues that visibly manifest on the leaves
- 6 classes of leaf conditions

Image Classification

- Trained with images of leaf condition
- Identify the condition of new images of leaves

Agriculture Application

- Results in the field and remote samples
- Efficient and appropriate response to issues

Reasons Why

The inspiration to apply AI

1

Disease Diagnosis
Explore the exciting possibilities of automating diagnosis.

2

Agriculture and Gardening
Large scale applications as well as accessibility to individuals.

3

Image Classification
A fascinating aspect of machine learning that has so much potential to continue to impact our world

4

Drones
So much visual data can be gathered remotely and AI provides efficient processing

Leaf Diseases

6 classes of leaf condition

Leaf images data set: Easily classifiable, visually identifiable; leaves are more photogenic

Cotton Plant: Valuable commodity and large component of agriculture industry

Sample Data: Randomly selected example of each class from data set

Aphids

Army worm

Bacterial Blight

Healthy leaf

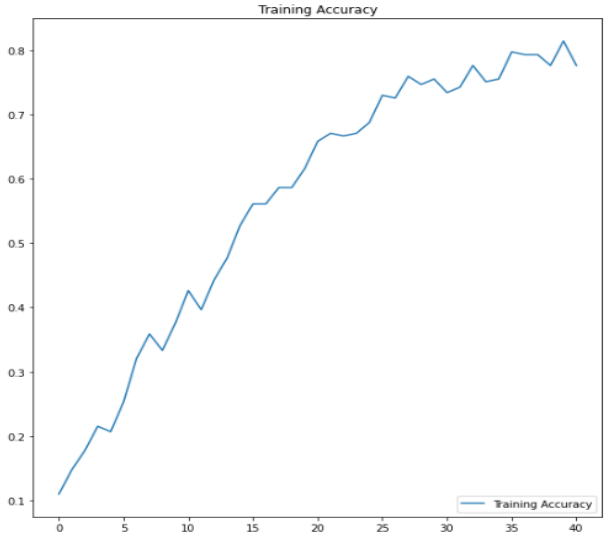
Powdery Mildew Edited\5.jpg

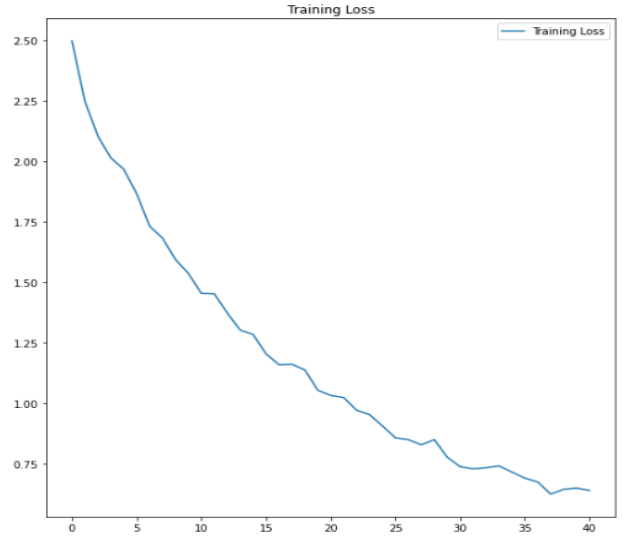
Target spot

Image Classification

The Process

- Transfer learning with Keras and Tensor flow
- MobileNetV2
- Feature Extraction and Fine Tuning
- Random Transformation for training
- Loss: Cross Entropy , Accuracy
- Optimization: Adam Optimizer RMS Propagation





100% 50/50 [03:16<00:00, 3.92s/epoch, loss=0.498, accuracy=0.869]

```
Our model has achieved an accuracy of  86.92% in 50 epoch(s)
```

Identifying a new issue

Keras pipeline for faster performance

Possible mobile application for field id

expected class = target spot

Input
[Unseen by model]

expected = target spot | predicted = Target spot

Output
[Labeled by model]

For the Future

Potential Application

Optimization: Improve model with more data

Specialization: Tailor to individual farming operations and specific species and crops

Versatility: Identification on individual basis, possibly with mobile devices in the field, as well as systemic identification through tools like drone photography

Thank you for your time

Please let me know if you have any questions