

Brown Spot Disease Detection in Passion Fruit Leaves

A Portable Deep Learning Based Platform for Passion
Fruit Disease Identification



Moses Bomera
Dr. Andrew Katumba
Dr. Cosmas Mwikirize



Outline

- Background
- Passion fruits
- Dataset Creation & Preprocessing
- Model
- Preliminary Results
- Conclusion & Future Work
- Acknowledgements

Background

- Pests and diseases affect yields and increase losses.
- Farmers lack sufficient information to combat these challenges.
- Lack of a reliable, timely diagnostic intervention.
- Filling the gap by developing a portable platform making use of a SOTA deep learning algorithm for disease diagnosis.

Passion Fruits



Diseases



Brown Spot Disease (Leaf)



Woodiness Virus Disease (Fruit)



Woodiness Virus Disease (Leaf)

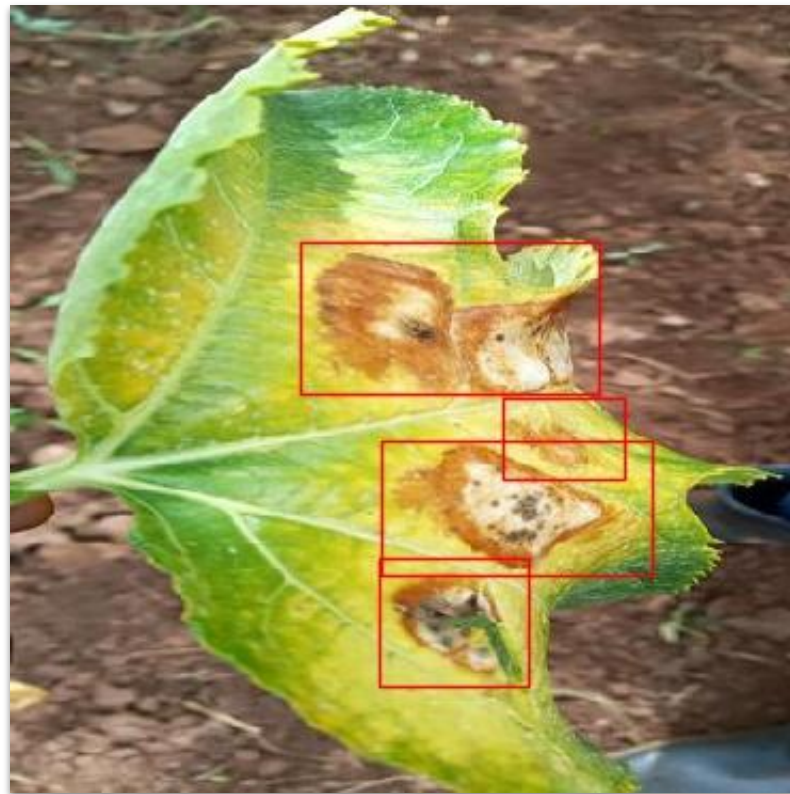
Dataset Creation

- Collected ~20,000 images.
- Images were captured by regular smartphones.
- The collection was done in conjunction with NARO.
- Open the dataset to community.



Dataset Preprocessing

- Randomly selected 2000 images.
- Cropped and resized to 400 x 400.
- Annotated using Labelbox.
- Train (0.7), Val (0.2), Test (0.1)

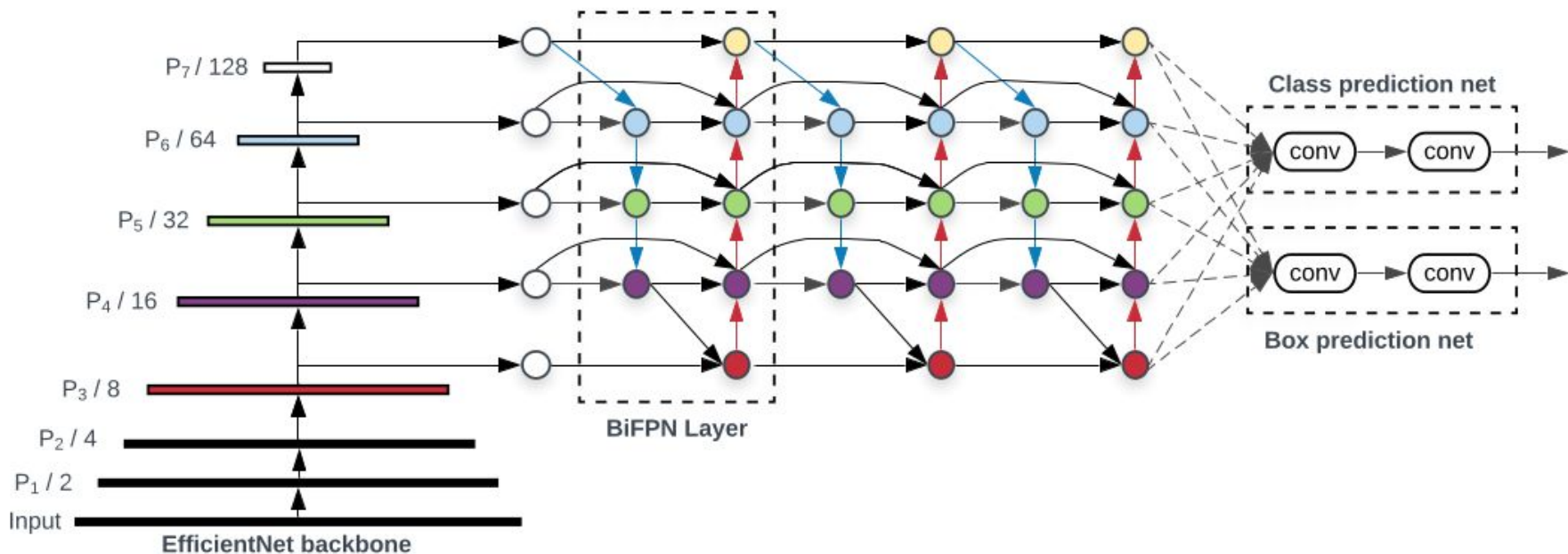


Use-case considerations

- Efficiency (Low Computation Cost).
- High Accuracy.

Model: EfficientDet Architecture

Efficientdet Neural Network [1]



Model Parameters

Transfer Learning (Efficientdet-d3)

Parameter	Value
Batch Size	4
Learning rate	0.08
Optimizer	sgd
momentum	0.9

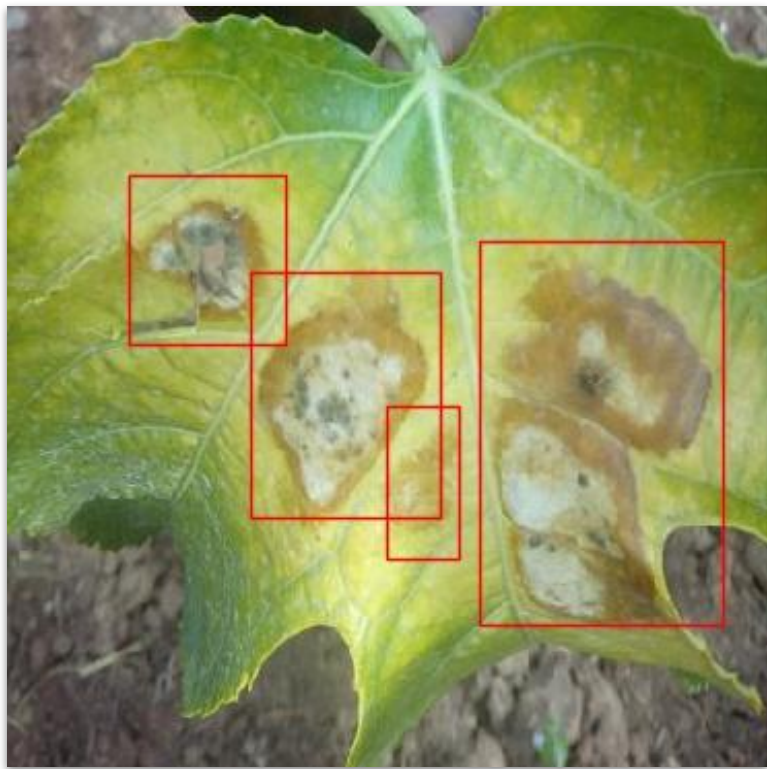
Training Hardware

- K80 GPU
- 56 GiB Memory
- Azure Virtual Machine

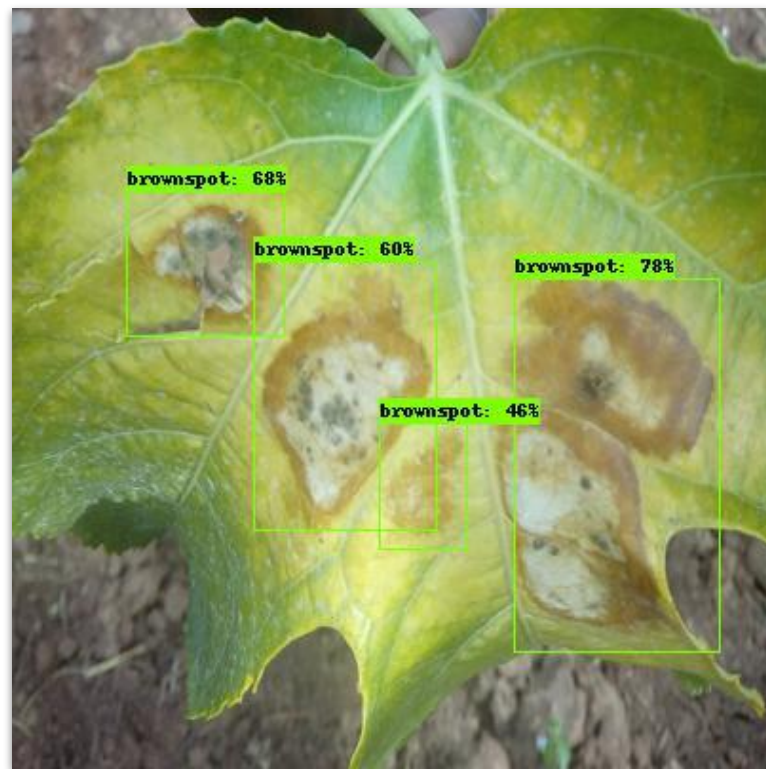
Preliminary Results

	Validation	Test
AP (IoU 0.5:0.95)	0.3249	0.351

Inference



Ground truth



Predictions

Inference Cont'd



Ground Truth



Predictions

Mean Inference Time

Platform	GPU*	CPU*
Time	0.06	0.63

*Time in seconds

Conclusion & Future Work

- The model generalizes with an mAP of 0.351
- Model limitations
- Comparison with two SOTA models (YOLO) and SSD.
- Design a data augmentation policy.
- Add more data to the pipeline.

References

1. Efficientdet Neural Network, <https://arxiv.org/abs/1905.11946>

Acknowledgements



Thank You, Questions?

Email: mosesbomera@gmail.com