

Plant Disease Detection

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For both tomato
and potato plants

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For both tomato
and potato plants

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Introduction

- World production of tomatoes: 161.7 million metric tons
- Estimated value from sales : \$ 59 billion
- How much money is lost to bad crops?



**\$6.7
Billion**

What is blight?

1. Blight is a fungal disease
2. Grows in 8 - 32 celsius (46F - 89F)
3. Affects tomatoes and potatoes
4. Most common prevention method is manual screening

Problem Statement

Because Blight causes such a significant loss in crop loss. Early detection is paramount. Due to the cost of manual screening. We need an effective way to identify the early stages of blight.

Exploratory Data Analysis

EDA



Tomato Classes

- Healthy: 1000 images
- Early Blight: 1,591
- Early Blight: 1,909



Potato Classes

- Healthy: 152 images
- Early Blight: 1,591
- Early Blight: 1,000

Tomato Image Samples

Healthy



Early Blight



Late Blight



Potato Image Samples

Healthy



Early Blight



Late Blight

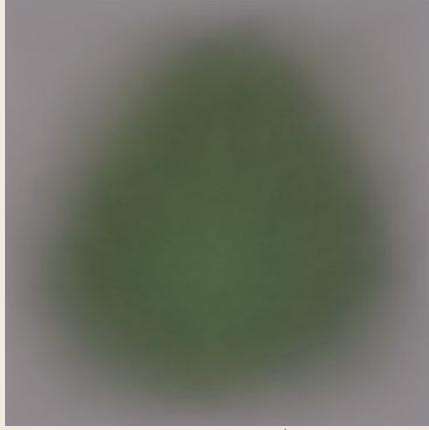


Tomato Class Averages

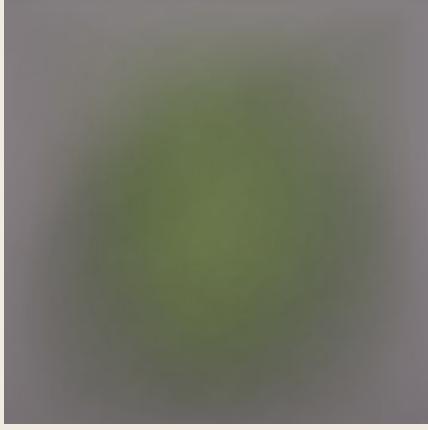
Healthy



Early Blight

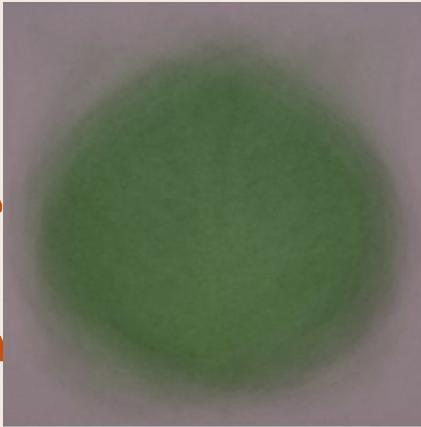


Late Blight



Potato Class Averages

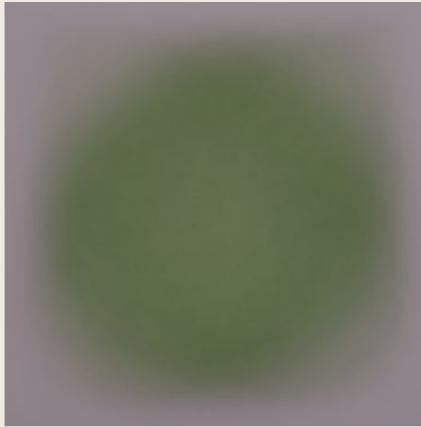
Healthy



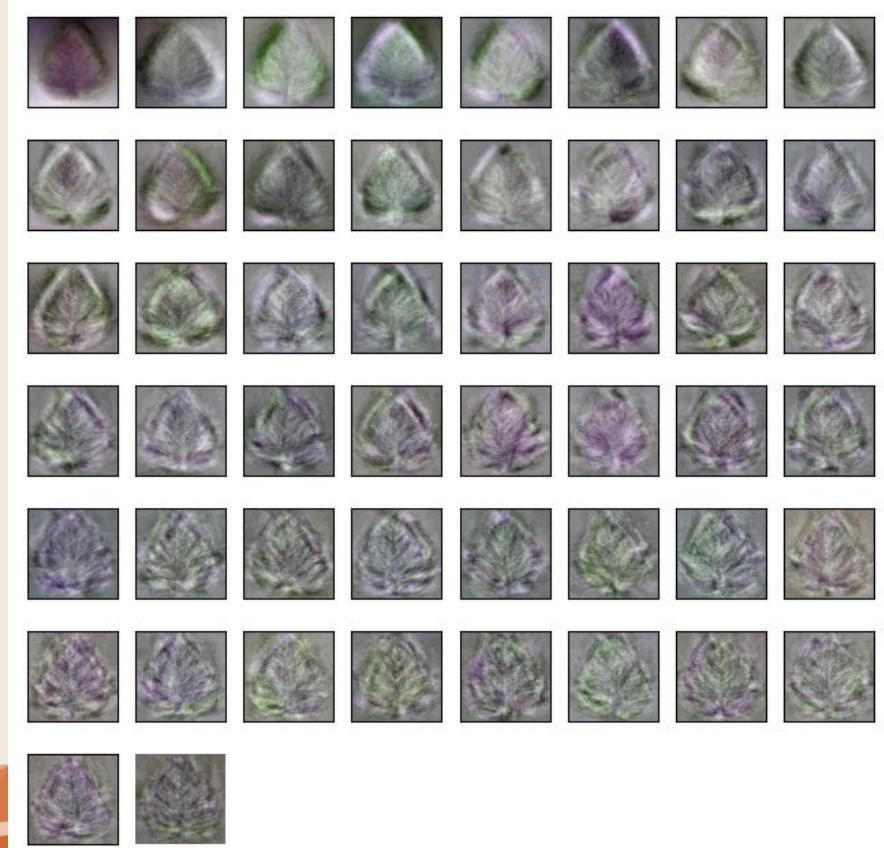
Early Blight



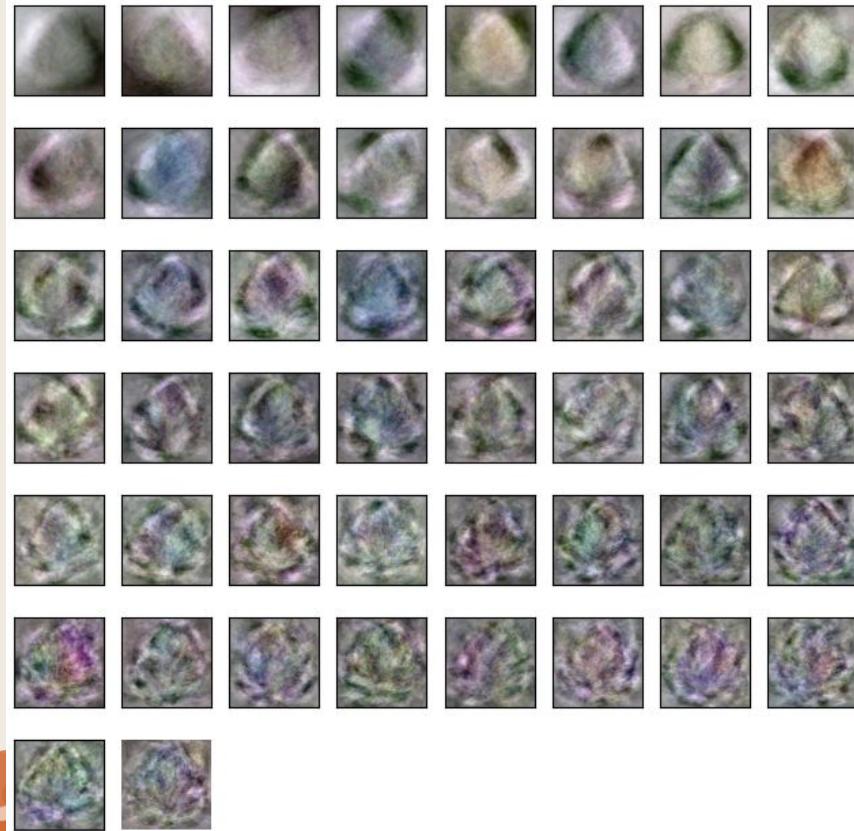
Late Blight



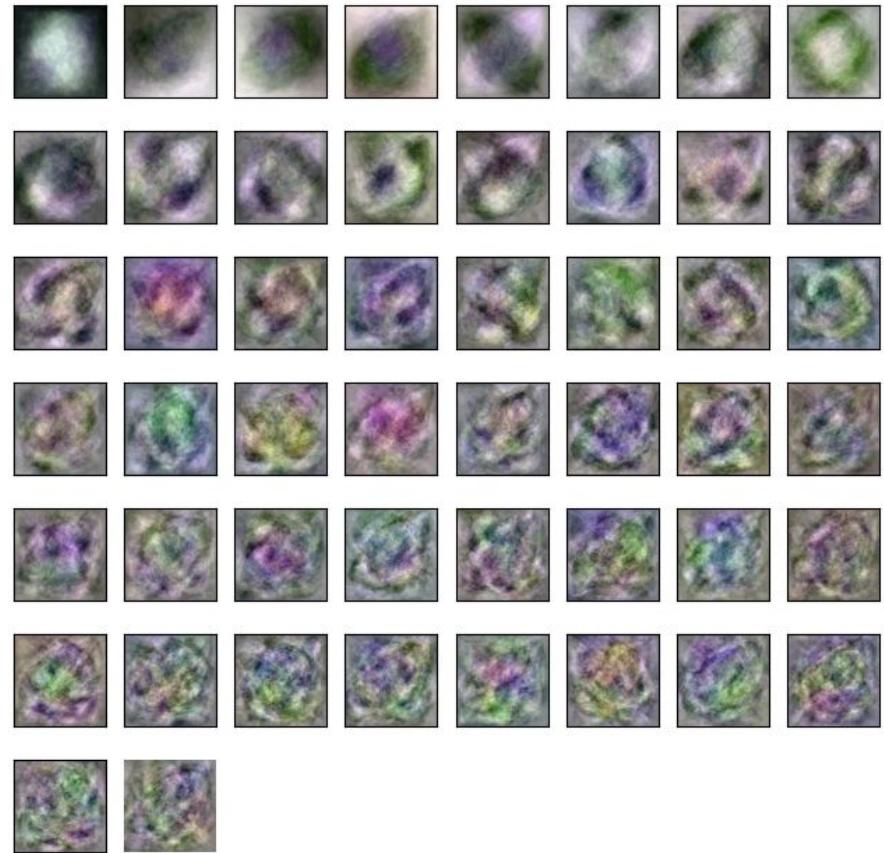
Healthy Tomato EigenImage



Early Blight Tomato EigenImage



Late Blight Tomato EigenImage



Modeling & Evaluation

Modeling for each crop



Potatoes

Classifying leaf as:

- Healthy
- Early Blight
- Late Blight

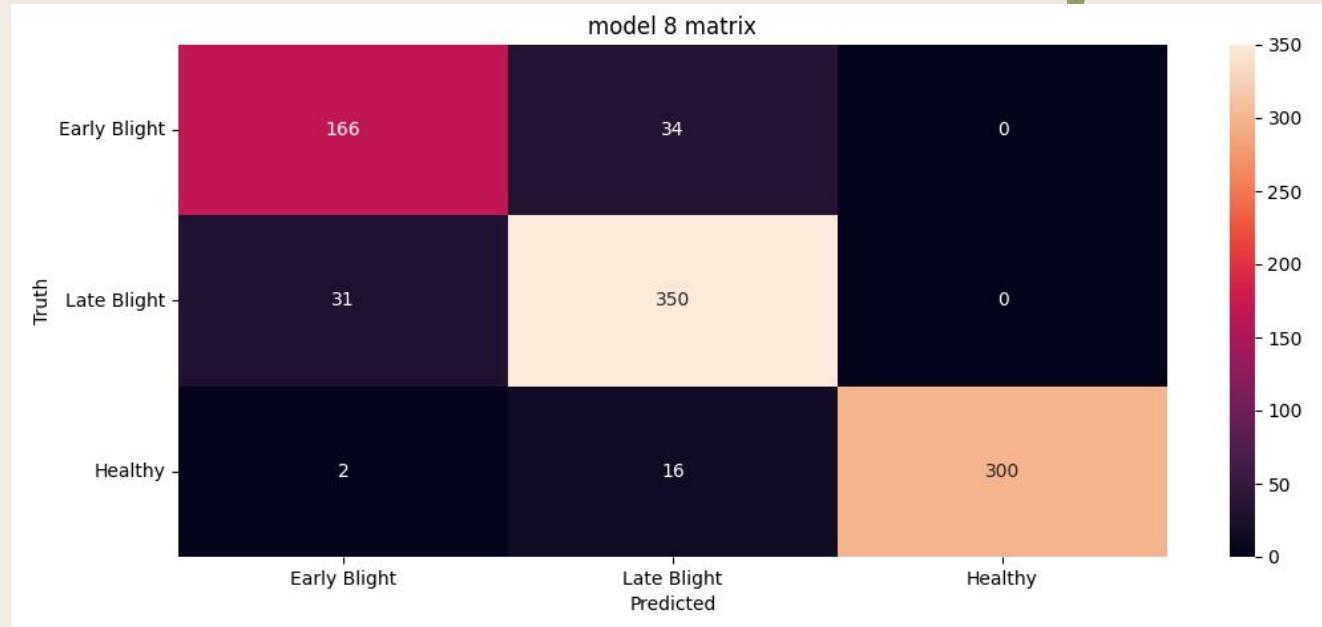


Tomatoes

Classifying leaf as:

- Healthy
- Early Blight
- Late Blight

Tomato Best Model



Healthy

Recall: .99
F1: .99

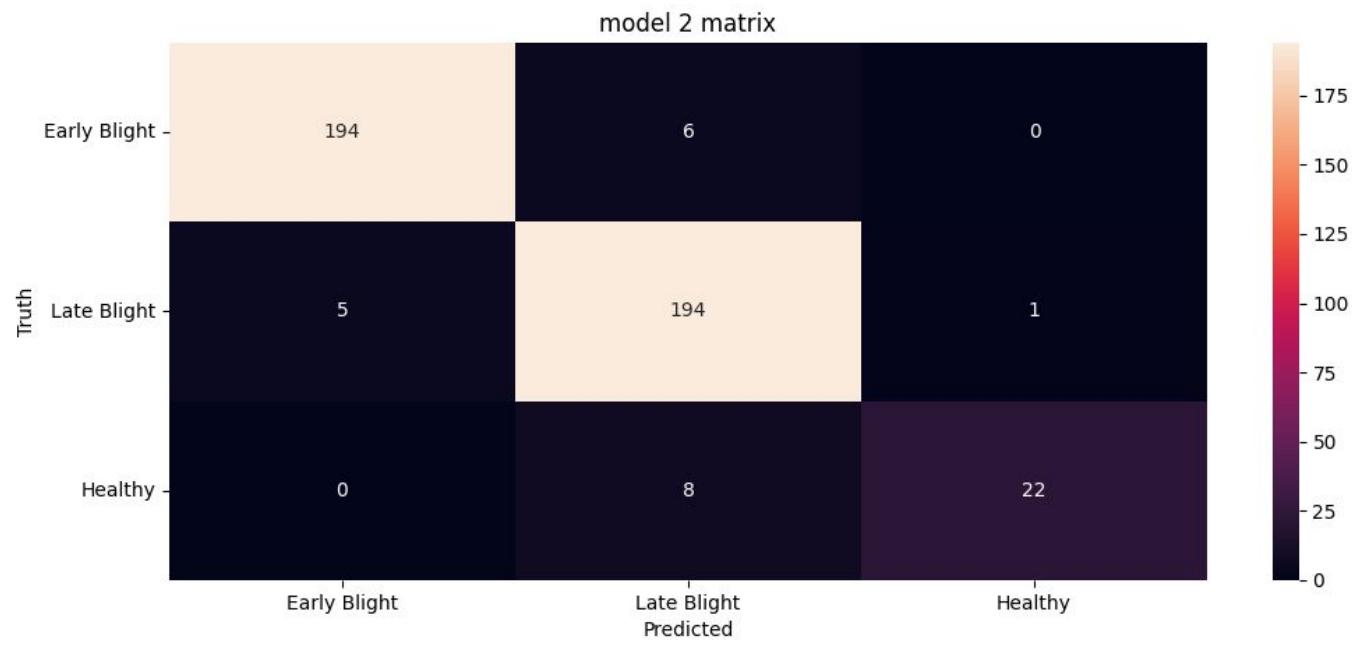
Early Blight

Recall: .78
F1: .82

Late Blight

Recall: .94
F1: .92

Potato Best Model



Healthy

Recall: .80

F1: .86

Early Blight

Recall: .96

F1: .97

Late Blight

Recall: .97

F1: .95

Conclusion

Both models did well in predicting plant classes.



The Potato model did well even with a class imbalance

Recommendations



Build a Transfer Learner

Combine Both models into one to see if there are any improvements for both plants



Build a website

Allow farmers to crowdsource data to improve models performance and lower class imbalances



Solve class imbalances

Try implementing over or undersampling for the class imbalances. Alternatively, data augmentation

Thanks!

Do you have any questions?

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