Leaf Classification For Early Disease Detection

By Jesse Villines

Overview

1

Dataset

14 Plant Classes

37 Disease sub-classes

86,147 Images

2

The Model

Convolutional Neural Network

3

Deployment

Streamlit web/phone application

AWS Deeplens

Reduce Economic Harm

Certain types of pathogens can cost orchards up to $150,000 an acre. Source

Detect Issues early

By having an automated watch system via AWS DeepLens even the home gardener can monitor crop health easily.

Check from your phone

Machine Learning model integration on phone and computer for access even without AWS DeepLens device.

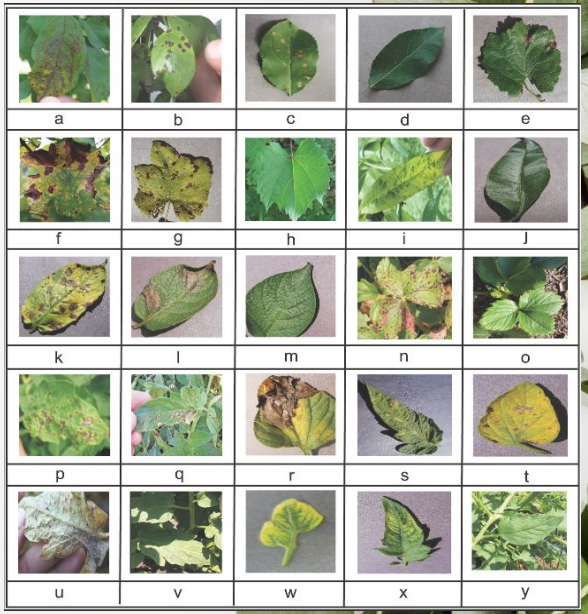
14 Plant classes

Apple, blueberry, cherry, corn, grape, orange, peach, bell pepper, potato, raspberry, soybean, squash, and tomato.

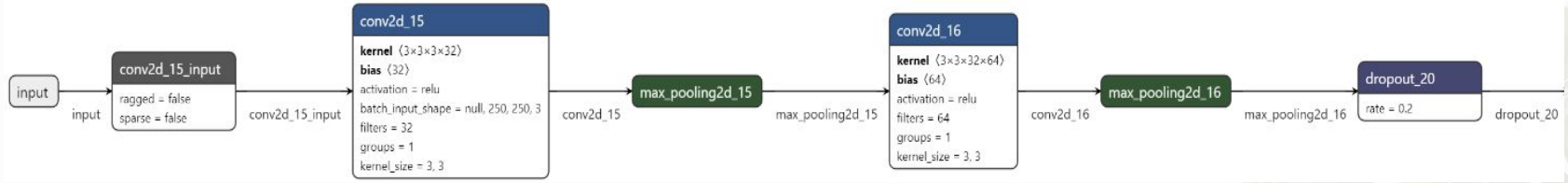
37 Disease Subclasses

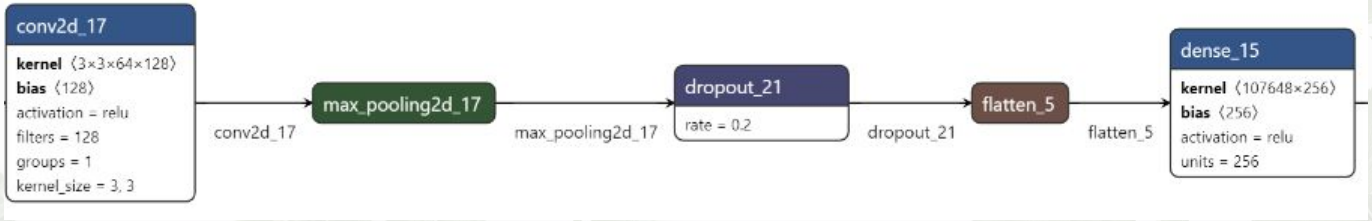
Including: black rot, powdery mildew, northern leaf blight, early and late stage blight, bacterial spots, spider mites, and leaf mold.

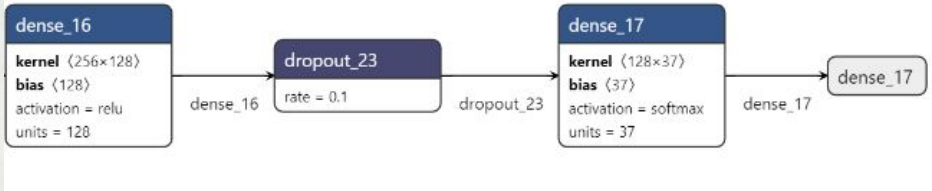
PlantVillage dataset



Dense Convolutional Neural Network Architecture Map *Generated using NeutronViewer*



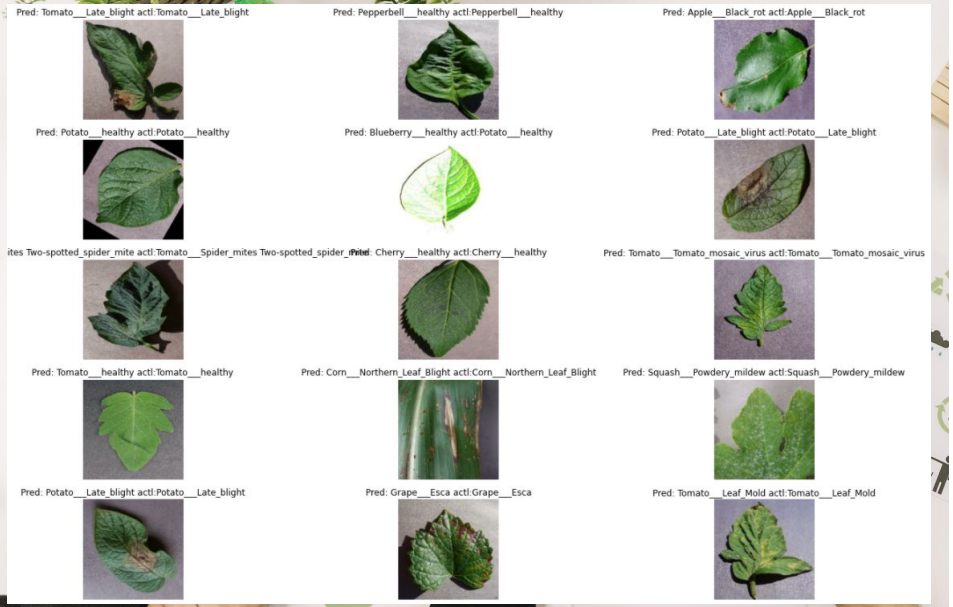


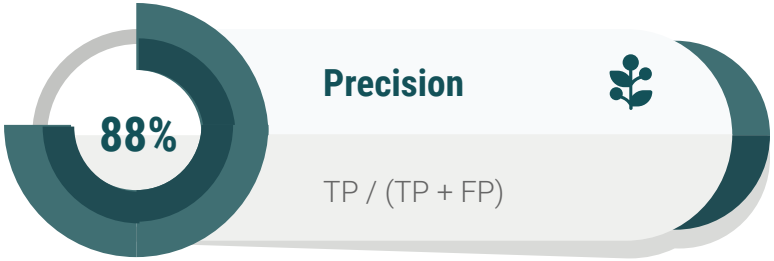


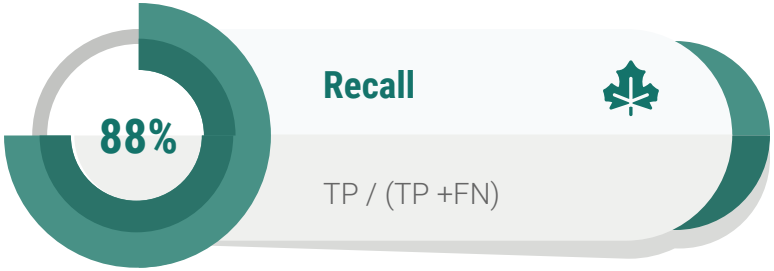
Model Topology

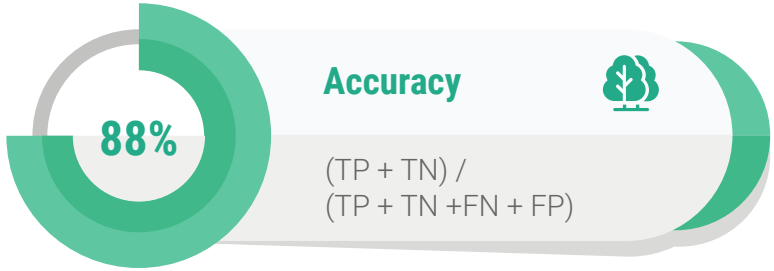
- 3 Convolutional Layers
- 3 Max Pooling Layers
- 3 Dropout Layers
- 3 Dense Layers

Model Performance









Deploy Image Classification Model to Streamlit Web Application

1

Link Streamlit account to Github Repository containing:

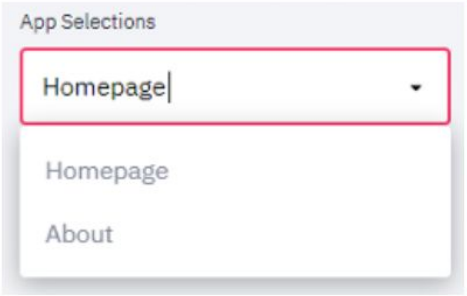
2

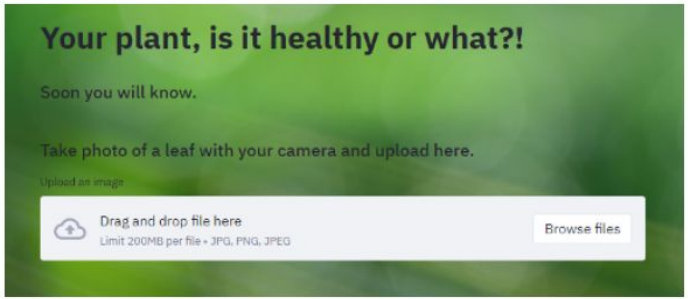
TensorFlow Model

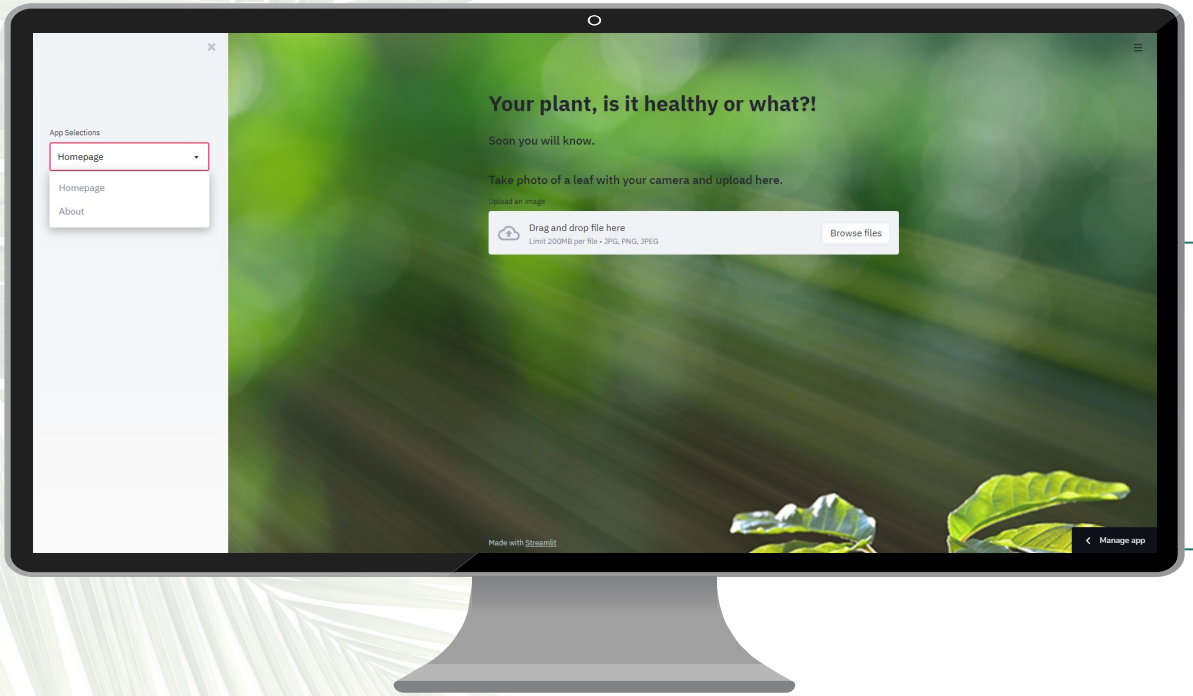
.py script

Deploy Streamlit Application

3

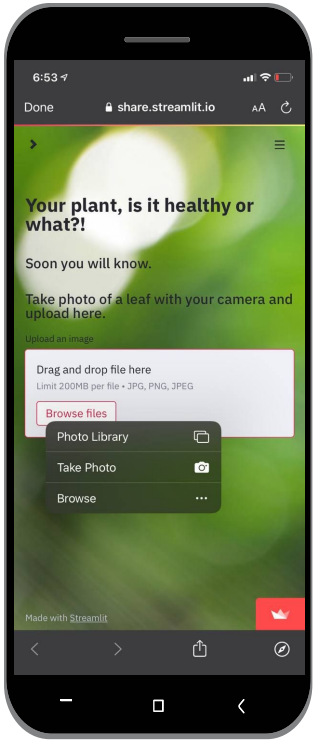






Desktop Software

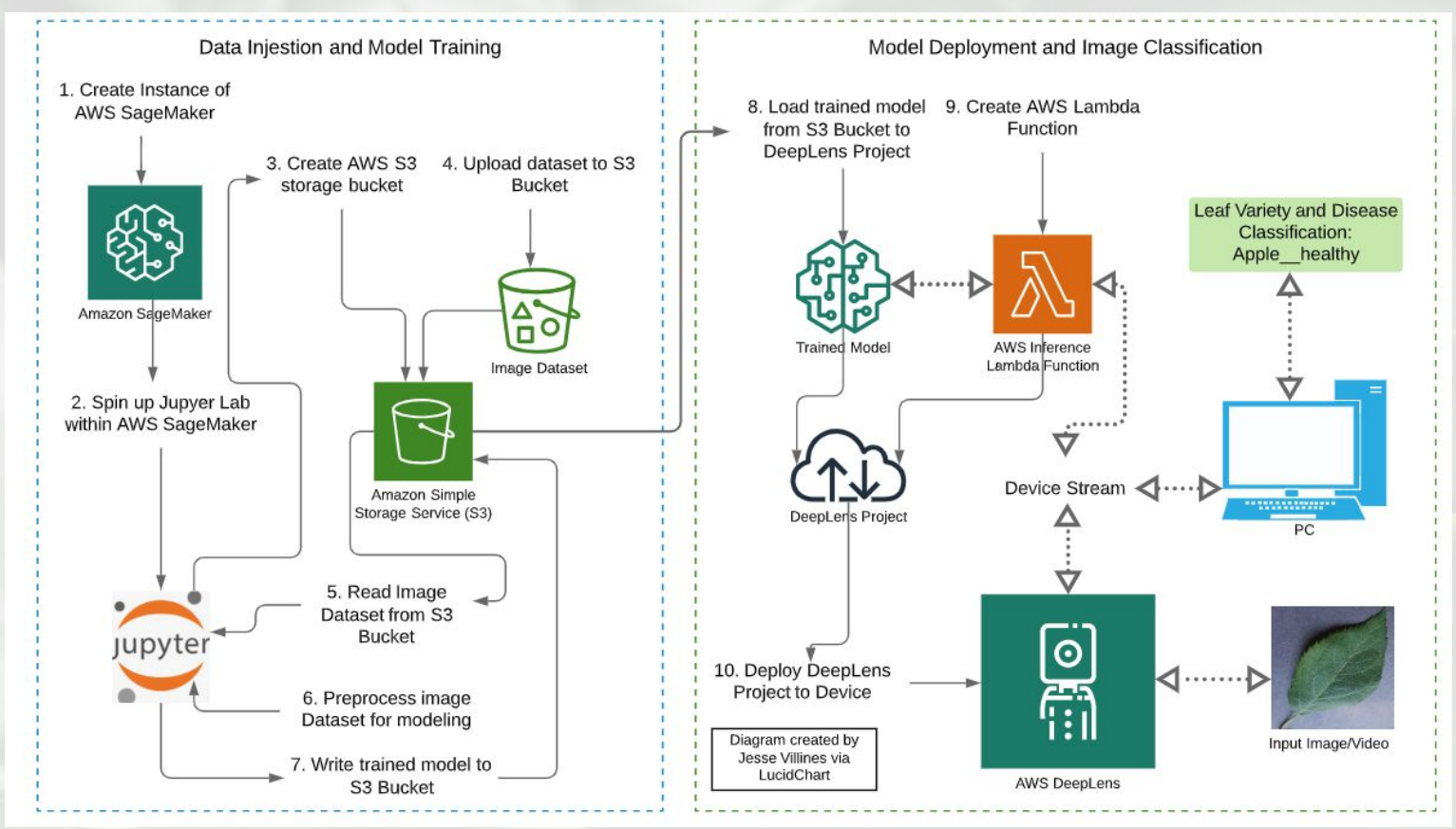
Just select “Browse Files”, upload a photo, and it will return the type and disease of supported plant types.



Mobile Web

A scalable data solution, ready to analyze your plants today. All for free.

DeepLens Model Deployment Flow



The device in action

Photo source

Areas for **further** development.

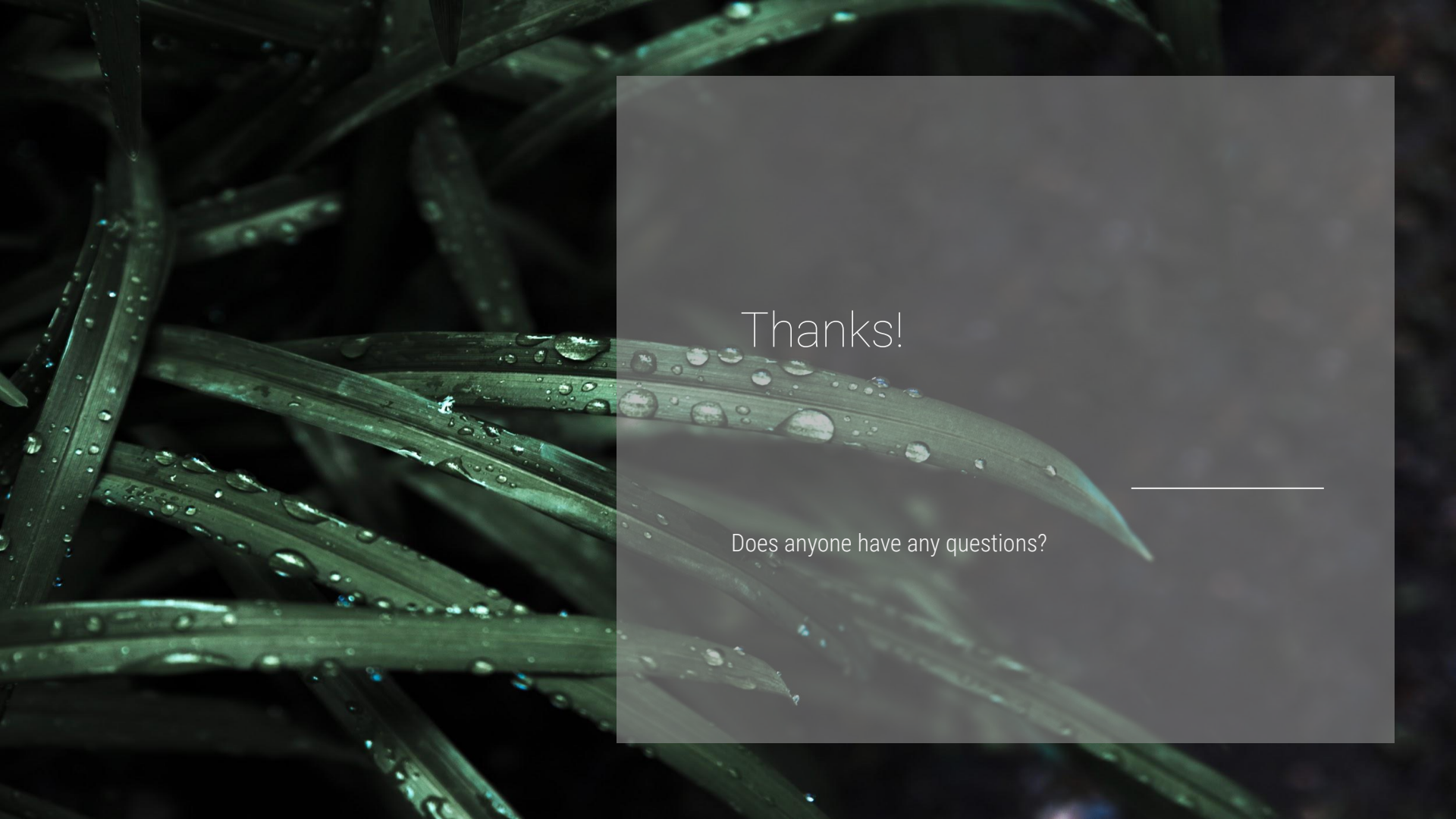
- Include in analysis additional plants and diseases
- Deploy CNN on devices cheaper than the AWS DeepLens, such as Raspberry Pi + camera in order to scale the product for market.
- Add more descriptive treatment labels for diseases with product recommendations. Partner with product owners.

The team

JESSE VILLINES

Jesse is a data scientist with a passion for discovering and explaining the stories hidden in data. He has an educational background in quantitative economics and finance and is a self-starter actively acquiring new skills and techniques to engineer machine learning solutions for social good. This personality trait spills over into his spare time where he runs ultra-marathons, snowboards big mountains, and climbs technical 20,000' peaks in the Andes.

Check out more of his work on Linkedin and Github



Thanks!

Does anyone have any questions?