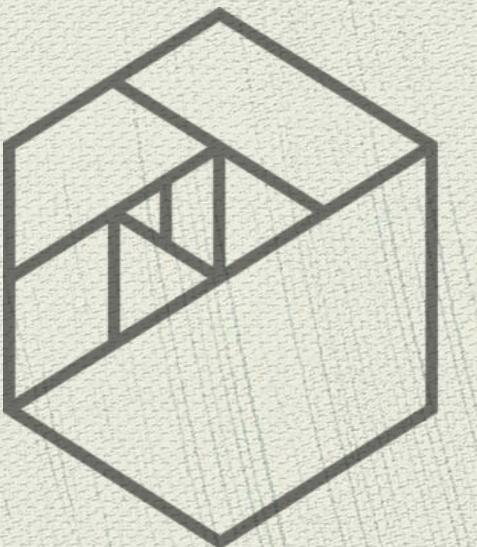


# Classifying Trees from Google Street View Utilizing Deep Learning



METIS

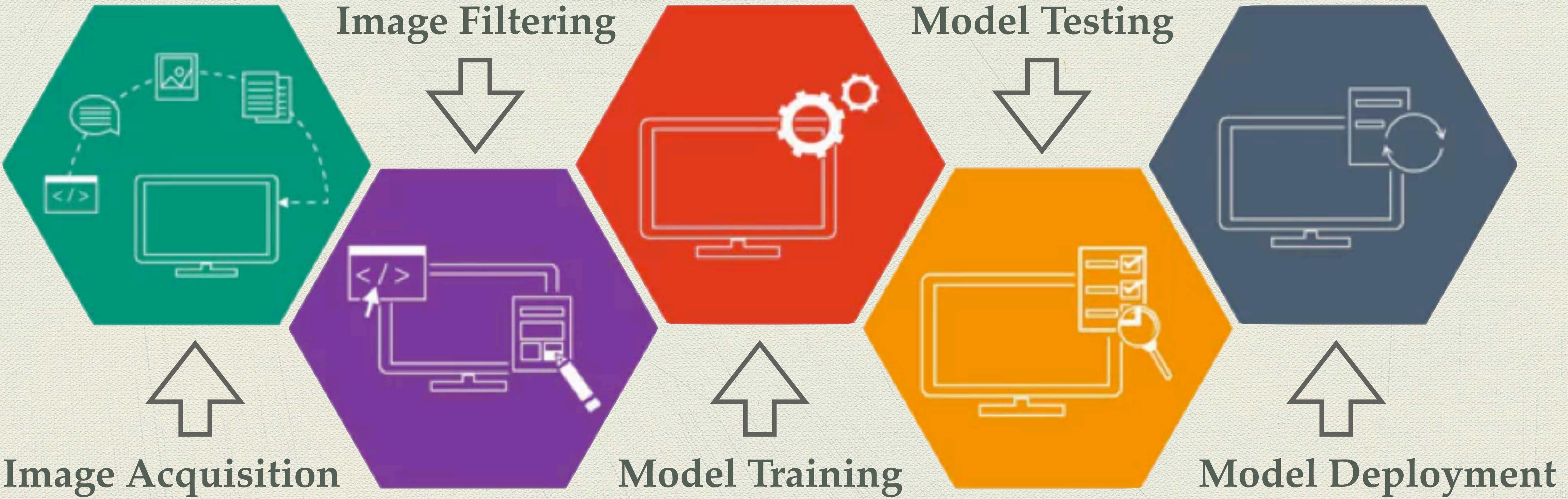
*Alex Bell*  
*December 12, 2018*

# Motivation

- ◆ Defining characteristic of Seattle
- ◆ Create a way to save time and money
- ◆ Update database: 59% never verified



# Project Workflow

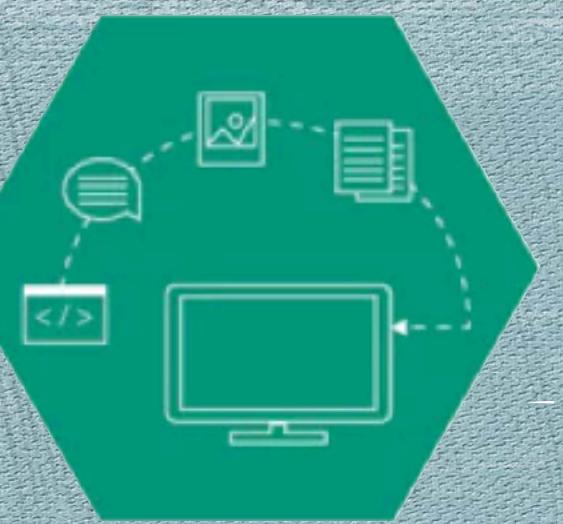


 python™

 Keras

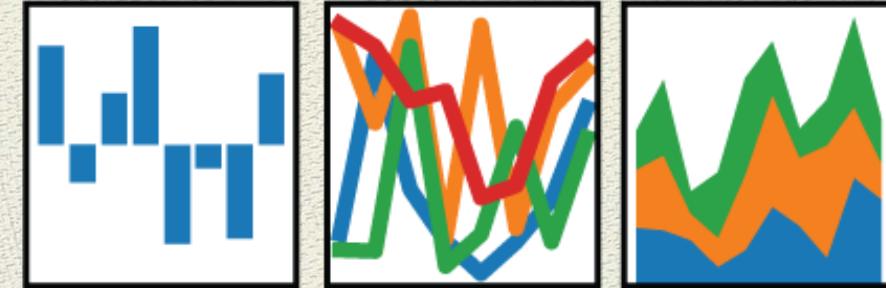
 amazon  
web services

# Data & Image Acquisition



- ◆ City of Seattle street trees database
- ◆ 12,706 street trees in 82 genus classifications
- ◆ Google Street View API

pandas  
 $y_i t = \beta' x_{it} + \mu_i + \epsilon_{it}$



Google Maps APIs

# Missing Trees Examples



Construction Site

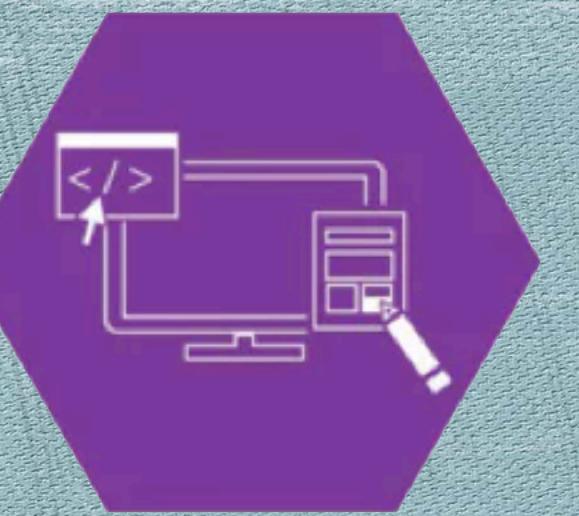


Trees Removed



Blocked View

# Neural Network #1: Places 365

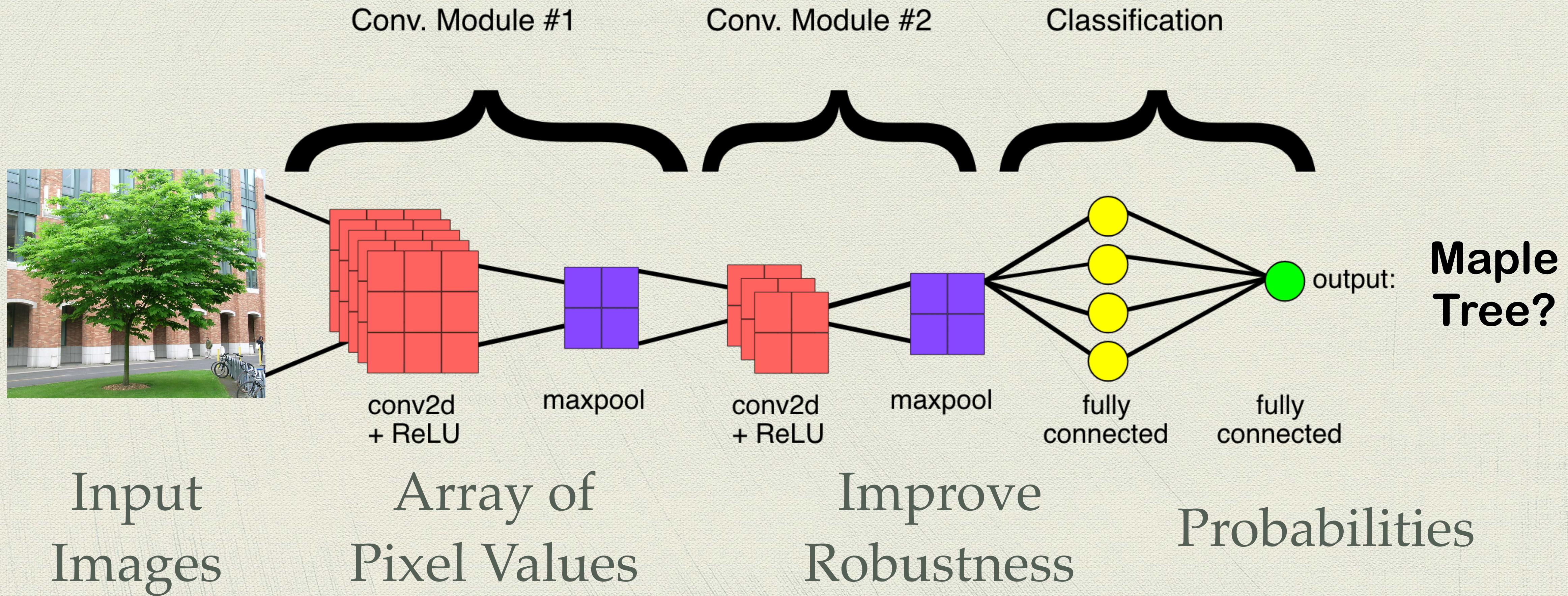


- ◆ Utilized as filter
- ◆ Categorized into scenes
- ◆ Odd classifications investigated
- ◆ Removed 175 tree-less images

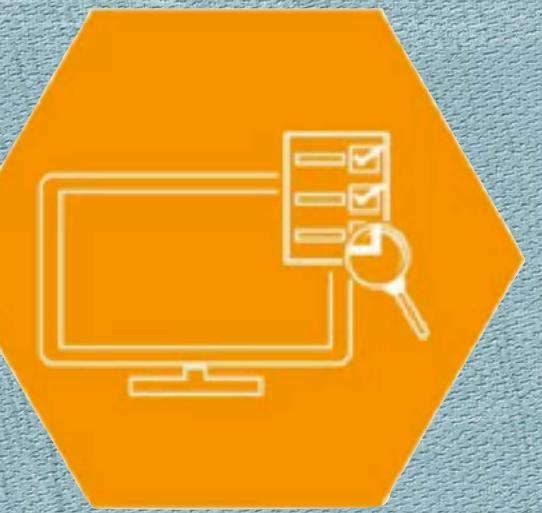
 PyTorch



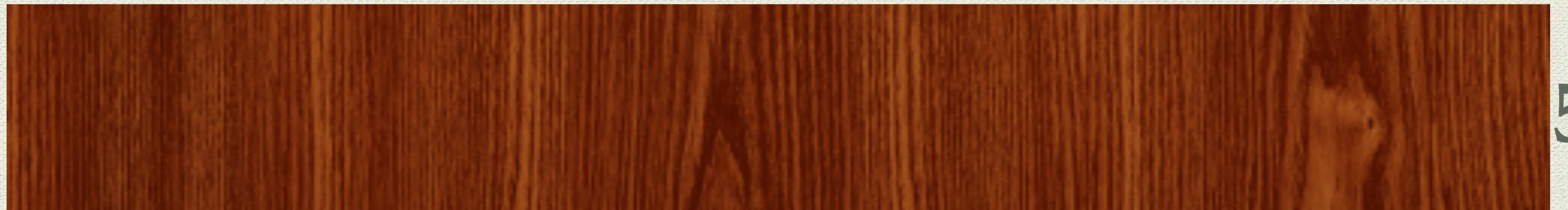
# Convolutional Neural Network



# Results: Accuracy 56%



My Predictions



Majority Class



Random Guess



0

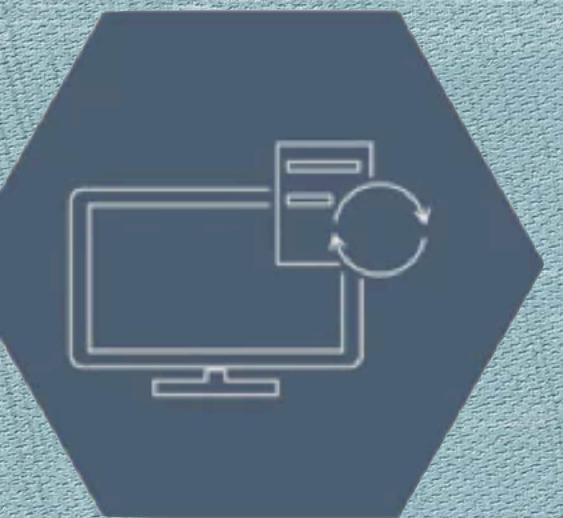
0.15

0.3

0.45

0.6

# Successful Predictions



Pyramidal (Carpinus)

Capitol Hill



Cherry Plum (Prunus)

Ballard

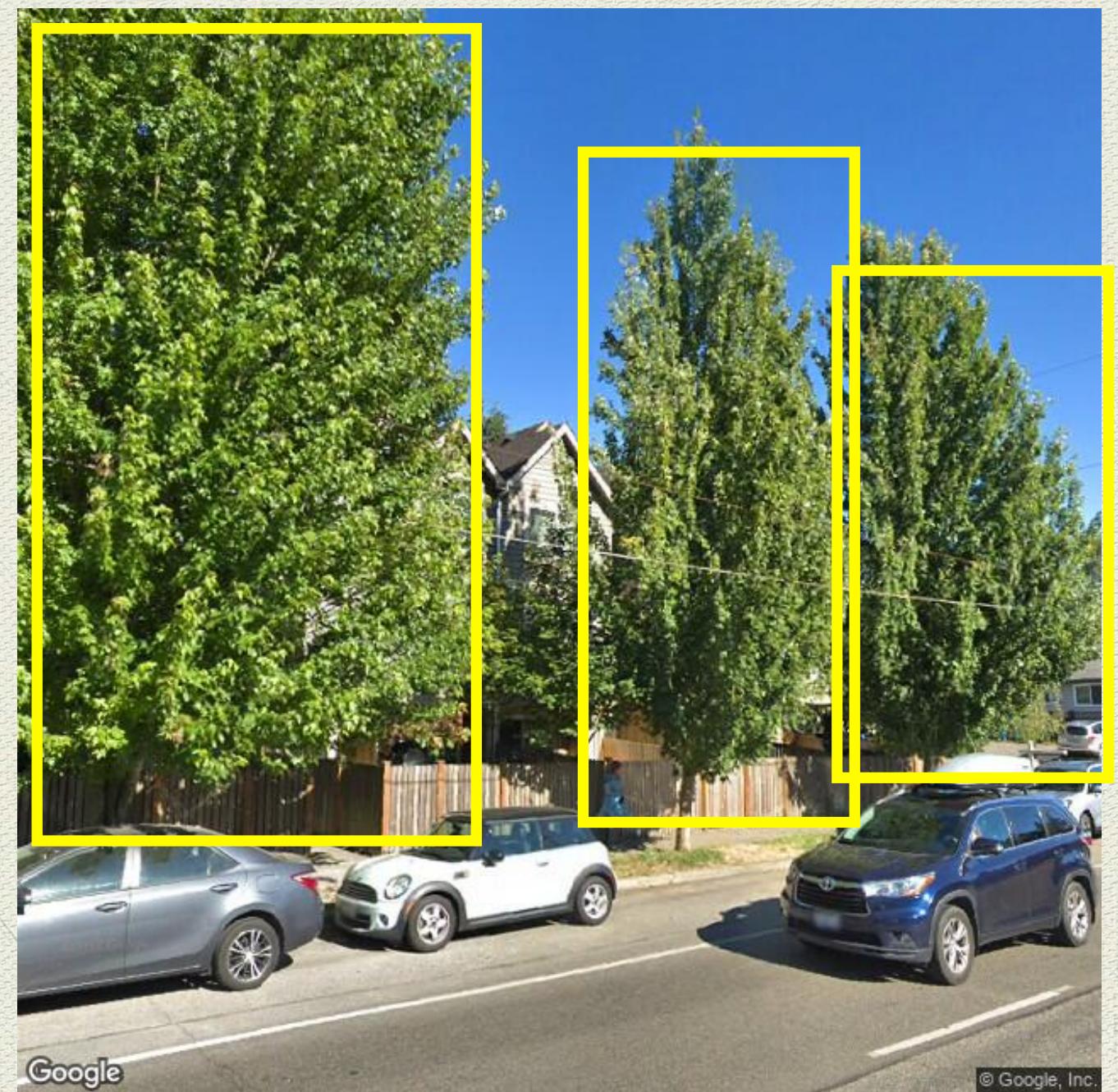


Chestnut (Aesculus)

Ravenna

# Future Work

- ◆ Object localization & detection
- ◆ Classify individual species
- ◆ Create a mobile app to test images



# Thank You



in/ alexwbell



github.com / datalex3



[datasci.alex@gmail.com](mailto:datasci.alex@gmail.com)



[medium.com@alexwbell](https://medium.com/@alexwbell)

