
St. Lucia

The Roof is On Fire

Client Project

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Contents

1. Two Data Science Problems
2. The Data Processing Approaches
 - a. The First Approach - Manual Labeling
 - b. The Second Approach
3. Evaluation

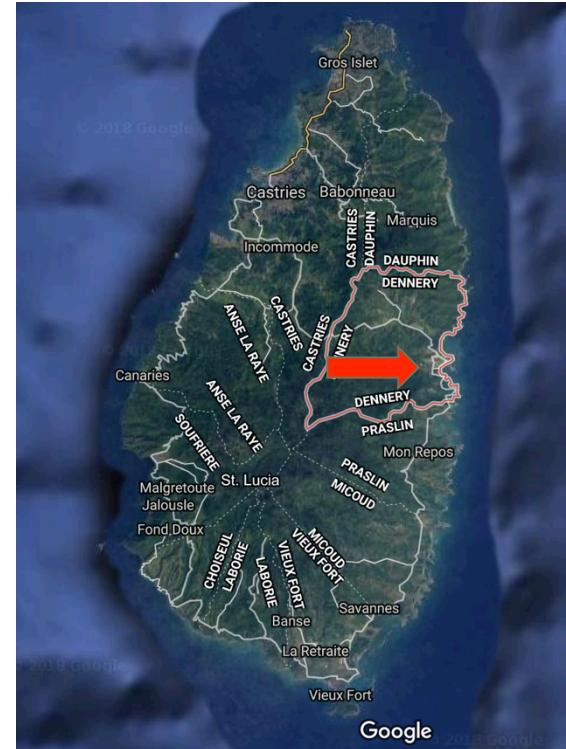
About Dennery and the Two Problems

Dennery, St. Lucia is a fishing village along the Atlantic Ocean side of St. Lucia.

Help St. Lucia prepare for next hurricane season by predicting rooftop quality and integrity using drone image to prioritize interventions.

2 Problems:

- Classify objects (roof or not)
- Determine Rooftop Quality



Data on Dennery

Data provided:

- Drone images of Dennery
 - 3,519,622,414 bytes
 - RGB
 - Elevation - Digital Terrain Model (DTM)
 - Lidar - Digital Surface Model (DSM)
 - DSM - DTM = Height
- GIS Layers from OpenStreetMap and Charim
- Containing .tiff, .aux, .prj files
- Metadata of Geo Coordinates



The Image - Dennery



The Roofs



Challenges

GIS

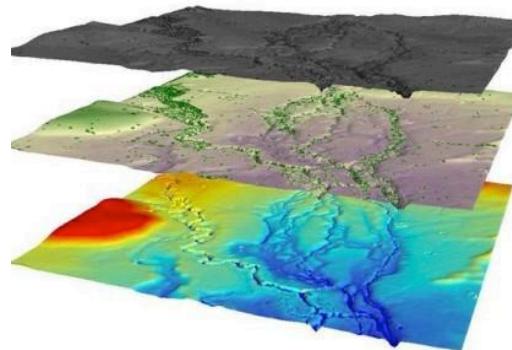
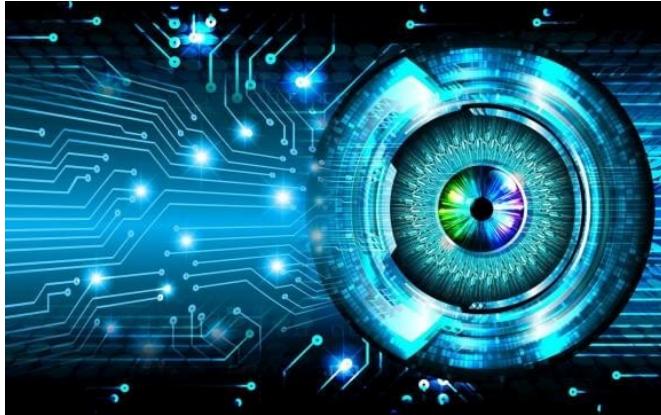
Image Processing

Deep learning

How does GIS work?

Which libraries / systems to use?

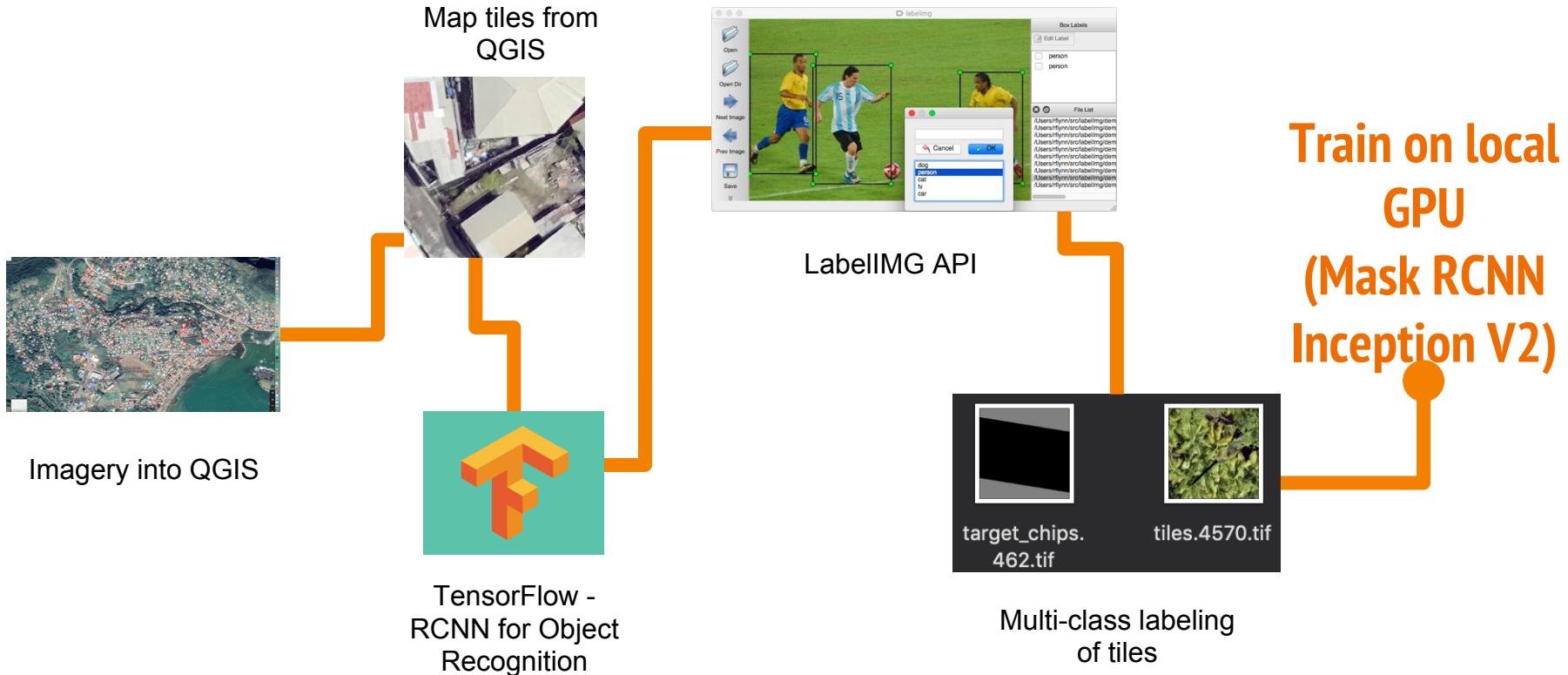
Which neural networks to work with?



The First Approach - Manual Labeling

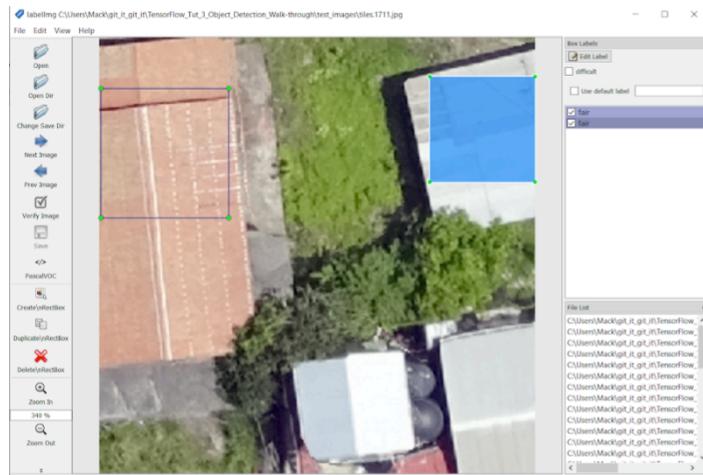
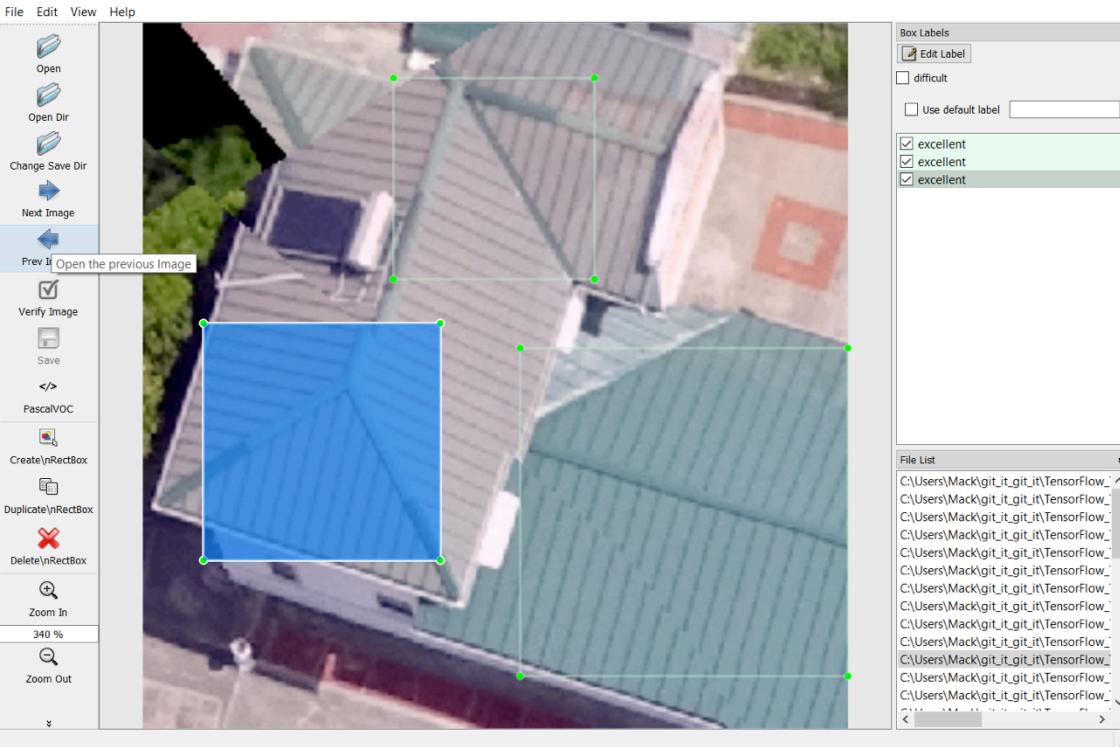


Hand-labelling for Condition Classification



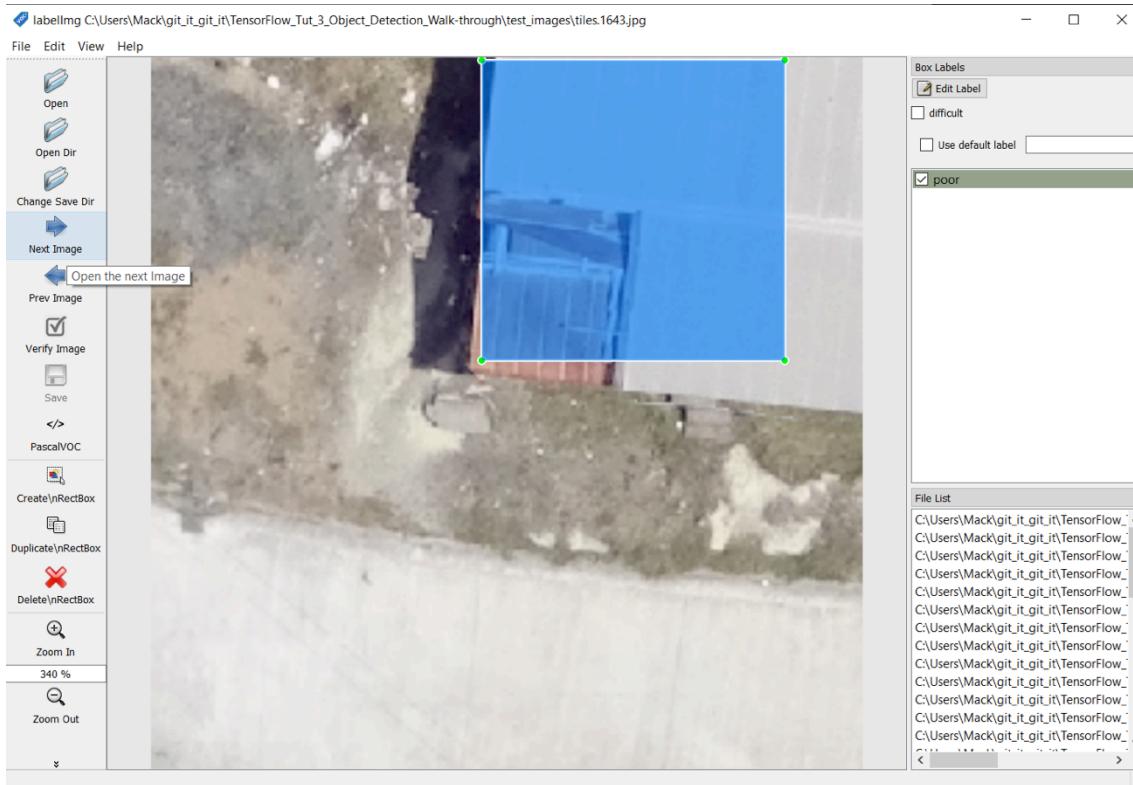
Label IMG process

labelImg C:\Users\Mack\git_it_git_it\TensorFlow_Tut_3_Object_Detection_Walk-through\test_images\tiles.1151.jpg



Set bounding
box over class
example

Label IMG process

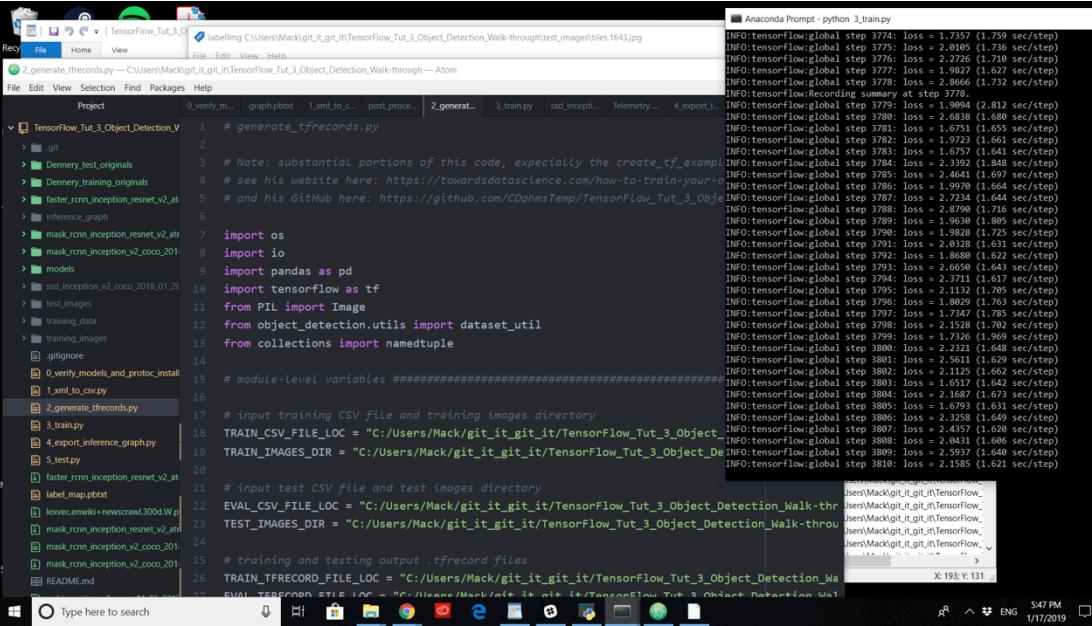


- 1 - Poor
- 2 - Fair
- 3 - Good
- 4 - Excellent

Training with Mask RCNN

A slow, but accurate model

Very “greedy”

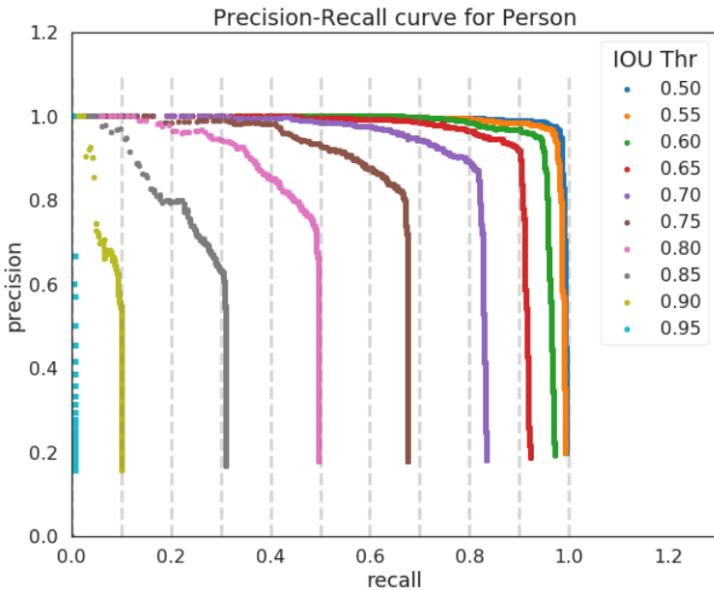


```
Anacoda Prompt: python 3_train.py
INFO:tensorflow:global step 3774: loss = 1.7357 (1.759 sec/step)
INFO:tensorflow:global step 3775: loss = 2.0105 (1.736 sec/step)
INFO:tensorflow:global step 3776: loss = 2.2726 (1.710 sec/step)
INFO:tensorflow:global step 3777: loss = 2.0595 (1.627 sec/step)
INFO:tensorflow:global step 3778: loss = 2.8666 (1.732 sec/step)
INFO:tensorflow:Recording summary at step 3778
INFO:tensorflow:global step 3779: loss = 1.9094 (2.812 sec/step)
INFO:tensorflow:global step 3780: loss = 2.6838 (1.680 sec/step)
INFO:tensorflow:global step 3781: loss = 1.6751 (1.655 sec/step)
INFO:tensorflow:global step 3782: loss = 1.9702 (1.664 sec/step)
INFO:tensorflow:global step 3783: loss = 2.6757 (1.641 sec/step)
INFO:tensorflow:global step 3784: loss = 2.3392 (1.848 sec/step)
INFO:tensorflow:global step 3785: loss = 2.4644 (1.697 sec/step)
INFO:tensorflow:global step 3786: loss = 2.7232 (1.644 sec/step)
INFO:tensorflow:global step 3787: loss = 2.7232 (1.716 sec/step)
INFO:tensorflow:global step 3788: loss = 2.9630 (1.716 sec/step)
INFO:tensorflow:global step 3789: loss = 1.9630 (1.716 sec/step)
INFO:tensorflow:global step 3790: loss = 1.9828 (1.725 sec/step)
INFO:tensorflow:global step 3791: loss = 2.0328 (1.631 sec/step)
INFO:tensorflow:global step 3792: loss = 1.8686 (1.622 sec/step)
INFO:tensorflow:global step 3793: loss = 2.6659 (1.643 sec/step)
INFO:tensorflow:global step 3794: loss = 2.3774 (1.617 sec/step)
INFO:tensorflow:global step 3795: loss = 2.0932 (1.631 sec/step)
INFO:tensorflow:global step 3796: loss = 1.8029 (1.763 sec/step)
INFO:tensorflow:global step 3797: loss = 1.7347 (1.785 sec/step)
INFO:tensorflow:global step 3798: loss = 2.1528 (1.702 sec/step)
INFO:tensorflow:global step 3799: loss = 1.7326 (1.969 sec/step)
INFO:tensorflow:global step 3800: loss = 2.0328 (1.631 sec/step)
INFO:tensorflow:global step 3801: loss = 2.5611 (1.620 sec/step)
INFO:tensorflow:global step 3802: loss = 2.1125 (1.662 sec/step)
INFO:tensorflow:global step 3803: loss = 1.6517 (1.642 sec/step)
INFO:tensorflow:global step 3804: loss = 2.1687 (1.673 sec/step)
INFO:tensorflow:global step 3805: loss = 1.6793 (1.631 sec/step)
INFO:tensorflow:global step 3806: loss = 2.3258 (1.630 sec/step)
INFO:tensorflow:global step 3807: loss = 2.0434 (1.606 sec/step)
INFO:tensorflow:global step 3808: loss = 2.0434 (1.606 sec/step)
INFO:tensorflow:global step 3809: loss = 2.5937 (1.640 sec/step)
INFO:tensorflow:global step 3810: loss = 2.1585 (1.621 sec/step)

Users\ Mack\git_it\git_it\TensorFlow_Tut_3_Object_Detection_Walk-through>
X: 193 Y: 131
```

The terminal window displays a log of TensorFlow training steps, showing loss values and execution times. The file explorer window shows the project structure, including files like 2_generate_tfrecords.py, 3_train.py, and 4_export_inference_graph.py, along with various configuration and utility scripts.

Current Issue - TensorFlow not producing key params

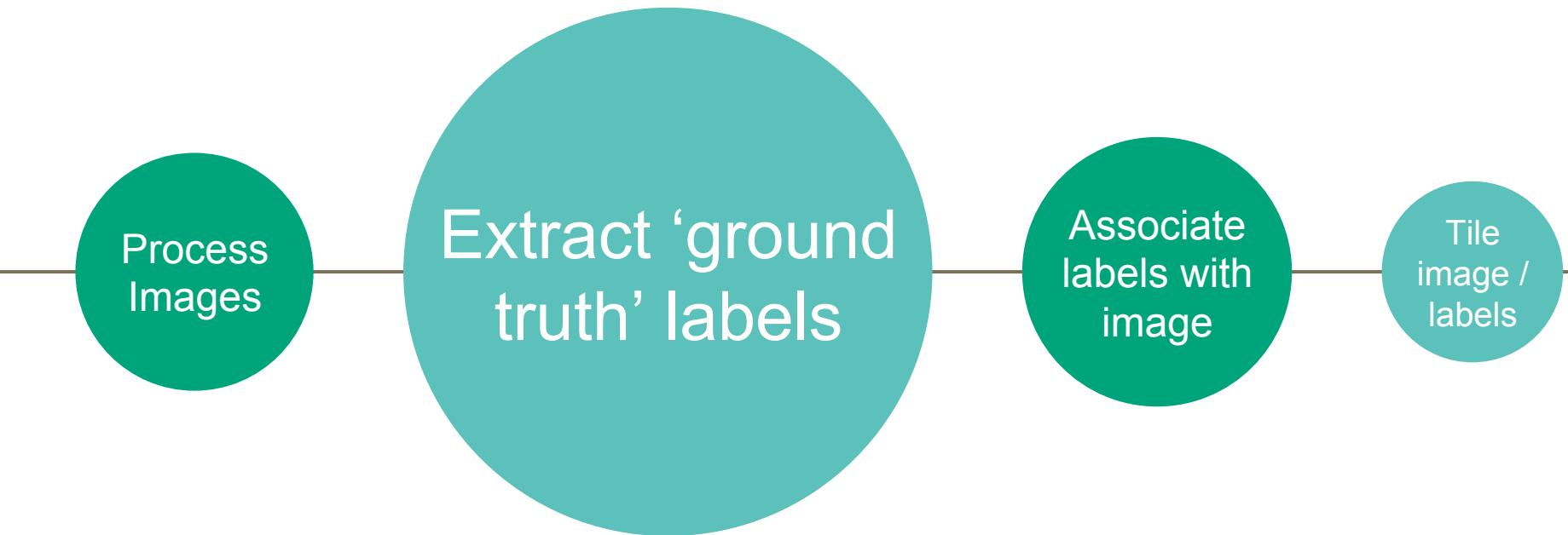


Score Threshold



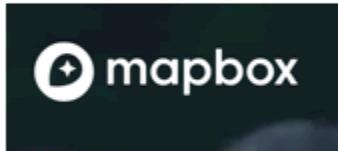
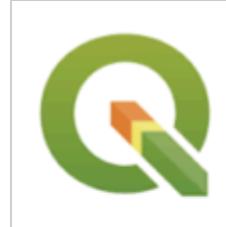
Intersection over
Union

The Second Approach



Automatic Labeling of Geospatial Data

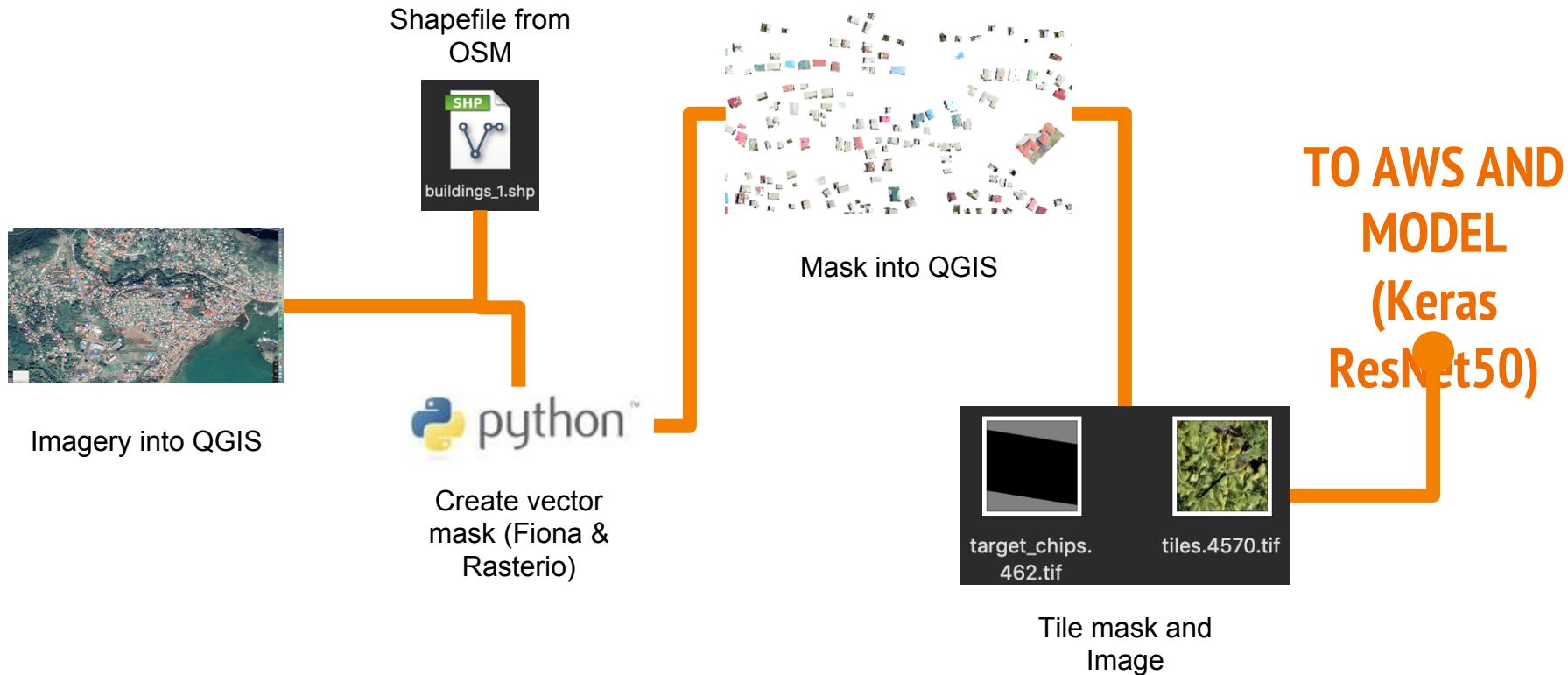
label-maker



OSM QA TILES



Semi-automatic labelling of Geospatial Data



The Model

- ResNet50
 - 50 layer residual neural network
 - Pre-trained on ImageNet datasets
 - Suitable for working with geospatial data
- Run on an AWS GPU instance (p2.xlarge)
- Using the Keras API

Evaluating Process

Data

Understanding Data
Manipulating / Using Drone Data

Model

Which models
How to model
Evaluating models
