1. Install
   1. SET UP WINDOWS MACHINE TRAINING ENVIRONMENT
      1. Create a new folder in c:/tensorflowX
      2. Download <https://github.com/tensorflow/models>
      3. Put it in c:/tensorflow1
      4. Rename from “models-master” to “models”
      5. Go to model zoo <https://github.com/tensorflow/models/blob/master/research/object_detection/g3doc/detection_model_zoo.md>
         1. Download “[ssd\_mobilenet\_v2\_quantized\_coco](http://download.tensorflow.org/models/object_detection/ssd_mobilenet_v2_quantized_300x300_coco_2019_01_03.tar.gz)”
      6. Move that file into the folder into “C:\tensorflow1\models\research\object\_detection”
         1. Extract the contents using 7zip
      7. Go to <https://github.com/thisisbilly1/tf-training>
         1. Download and paste into the object\_detection folder
      8. Create a folder named “images”
         1. Create a “test” folder
         2. Create a “train” folder
   2. SET UP ANACONDA VIRTUAL ENVIRONMENT
      1. Google anaconda, install
      2. Create new env – python 3.5
         1. Name it “tensorflow1”
      3. Click open terminal – this is where we will install the libraries that we’ll need
         1. python -m pip install --upgrade pip
         2. pip install --ignore-installed --upgrade tensorflow-gpu
            1. test that TF is installed by importing it

import tensorflow as tf

tf.\_\_version\_\_

* + - * 1. if it does not work, try using:

pip install tensorflow==1.14.0

* + - 1. install other required libraries

conda install -c anaconda protobuf

pip install pillow

pip install lxml

pip install Cython

pip install contextlib2

pip install jupyter

pip install matplotlib

pip install pandas

pip install opencv-python

* + 1. **Set a path that points to \models, \models\research and \models\research\slim**

**set PYTHONPATH=C:\tensorflow1\models;C:\tensorflow1\models\research;C:\tensorflow1\models\research\slim**

**This command has to be done every time the tensorflow1 virtual environment is closed.**

* 1. Compile protobufs
     1. Protobuf files are used by TF to configure model and training parameters. We need to compile these

cd C:\tensorflow1\models\research

protoc --python\_out=. .\object\_detection\protos\anchor\_generator.proto .\object\_detection\protos\argmax\_matcher.proto .\object\_detection\protos\bipartite\_matcher.proto .\object\_detection\protos\box\_coder.proto .\object\_detection\protos\box\_predictor.proto .\object\_detection\protos\eval.proto .\object\_detection\protos\faster\_rcnn.proto .\object\_detection\protos\faster\_rcnn\_box\_coder.proto .\object\_detection\protos\grid\_anchor\_generator.proto .\object\_detection\protos\hyperparams.proto .\object\_detection\protos\image\_resizer.proto .\object\_detection\protos\input\_reader.proto .\object\_detection\protos\losses.proto .\object\_detection\protos\matcher.proto .\object\_detection\protos\mean\_stddev\_box\_coder.proto .\object\_detection\protos\model.proto .\object\_detection\protos\optimizer.proto .\object\_detection\protos\pipeline.proto .\object\_detection\protos\post\_processing.proto .\object\_detection\protos\preprocessor.proto .\object\_detection\protos\region\_similarity\_calculator.proto .\object\_detection\protos\square\_box\_coder.proto .\object\_detection\protos\ssd.proto .\object\_detection\protos\ssd\_anchor\_generator.proto .\object\_detection\protos\string\_int\_label\_map.proto .\object\_detection\protos\train.proto .\object\_detection\protos\keypoint\_box\_coder.proto .\object\_detection\protos\multiscale\_anchor\_generator.proto .\object\_detection\protos\graph\_rewriter.proto .\object\_detection\protos\calibration.proto .\object\_detection\protos\flexible\_grid\_anchor\_generator.proto

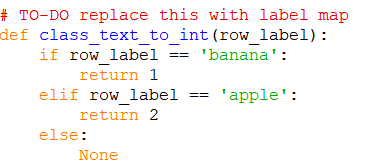
* + 1. If you get no errors, it ran successfully. Check in \object\_detection\protos for the “\*\_pb2.py” files
  1. Run setup.py
     1. cd C:\tensorflow1\models\research directory

python setup.py build

python setup.py install

1. Training
   1. Gather pictures
      1. Label them using labelImg.
         1. <https://www.dropbox.com/s/tq7zfrcwl44vxan/windows_v1.6.0.zip?dl=1>
         2. Put it in C:\tensorflow1 folder
      2. Split the images 80% in the train folder, 20% in the test folder
      3. Open the image labeler and start labelling the images
   2. Generate training data
      1. cd C:\tensorflow1\models\research\object\_detection

python xml\_to\_csv.py

* + - 1. check in your images folder. There should now be 2 .csv files
  1. edit “generate\_tfrecord.py”
     1. change the function “class\_text\_to\_int” to fit your label map
     2. example:
  2. Generate the TF record files

python generate\_tfrecord.py --csv\_input=images\train\_labels.csv --image\_dir=images\train --output\_path=train.record

python generate\_tfrecord.py --csv\_input=images\test\_labels.csv --image\_dir=images\test --output\_path=test.record

* 1. Create label map create a file called “labelmap.pbtxt” in object\_detection/training
     1. This tells the trainer what each object is this is related to how we set up our “class\_text\_to\_int” function.
     2. For our example:

item {

id: 1

name: 'banana'

}

item {

id: 2

name: 'apple'

}

* 1. Configure training
     1. Copy the “ssd\_mobilenet\_v2\_quantized\_300x300\_coco.config” from the \object\_detection\samples\configs folder into \object\_detection\training
     2. Line 9: change the num\_classses to however many objects you are detecting
     3. Line 156: change fine\_tune\_checkpoint to "C:/tensorflow1/models/research/object\_detection/ssd\_mobilenet\_v2\_quantized\_300x300\_coco\_2019\_01\_03/model.ckpt"
     4. Line 175: change input\_path to "C:/tensorflow1/models/research/object\_detection/train.record"
     5. Line 177: change label\_map\_path to "C:/tensorflow1/models/research/object\_detection/training/labelmap.pbtxt"
     6. Line 181: change the num\_examples to the number of images that you have in your \images\test folder
     7. Line 189: change input\_path to "C:/tensorflow1/models/research/object\_detection/test.record"
     8. Line 191: change label\_map\_path to "C:/tensorflow1/models/research/object\_detection/training/labelmap.pbtxt"

1. TRAINING

python model\_main.py --model\_dir=training --pipeline\_config\_path=training/ssd\_mobilenet\_v2\_quantized\_300x300\_coco.config

1. Viewing training progress
   1. Use tensorboard
   2. Open another terminal

cd C:\tensorflow1\models\research\object\_detection

tensorboard --logdir=training

* 1. copy the link and paste it into FireFox

SET UP PI