Xrelab - Non-Maxima Suppression on Detected Images

Issues seen while using the current scripts present (while using the windows OS)

- Below is a list of changes, you can take the list as a reference, but I am sure you will need something different to make it work on your own windows machine because each environment is different. Make these changes and make sure the path names are correct
  1. in myfrcnn\demo.py,
  #from model.nms_wrapper import nms
  from nms.py_cpu_nms import py_cpu_nms as nms

  2. in myfrcnn\layer_utils\proposal_target_layer.py
  #from utils.cython_bbox import bbox_overlaps

  3. in myfrcnn\layer_utils\proposal_layer.py
  #from model.nms_wrapper import nms

  4. in myfrcnn\layer_utils\anchor_target_layer.py
  #from utils.cython_bbox import bbox_overlaps

  5. in \myfrcnn\model\test.py
  #from model.nms_wrapper import nms

  The Definition parse_args() , has been changed as below to make the model work on resnet 101

```
def parse_args():
  """Parse input arguments."""
  parser = argparse.ArgumentParser(description='Tensorflow Faster R-CNN demo')
  parser.add_argument('--net', dest='demo_net', help='Network to use [vgg16 res101]',choices=NETS.keys(), default='res101')
  parser.add_argument('--dataset', dest='dataset', help='Trained dataset [pascal_voc pascal_voc_0712]',choices=DATASETS.keys(),
default='pascal_voc')
  args = parser.parse_args()
  return args
```

- The Below three files are always required for a complete model, which is not there for vgg16 , hence it does not work and throws out an “path error”. I figured that out from a lot of searches and this link help me understand where the error was : https://stackoverflow.com/questions/41265035/tensorflow-why-there-are-3-files-after-saving-the-model
  vgg16_faster_rcnn_iter_70000.ckpt.meta
  vgg16_faster_rcnn_iter_70000.ckpt.index
  vgg16_faster_rcnn_iter_70000.ckpt.data-00000-of-00001

- Give only absolute path for better clarity, the below has been changed in the demo.py function:

```
path=os.getcwd()
print(path, "---" ,NETS[demonet][0])
tfmodel = os.path.join('C:/Public/xrelab/Week7_detection1/data/voc_2007_trainval_voc_2012_trainval/', NETS[demonet][0])
#tfmodel = os.path.join('../data/voc_2007_trainval+voc_2012_trainval',NETS[demonet][0])
#tfmodel=path
print("checking the model here", tfmodel)
```

- Go through the TF link here to understand what the code does , and understand how to debug: https://www.tensorflow.org/guide/saved_model

- My Current Anaconda has the config as such below which is functional

```
boost                     1.67.0          py36hf75dd32_0    conda-forge
boost-cpp                 1.67.0           hea38baa_0    conda-forge
bs4                       0.0.1                 <pip>
bz2file                   0.98                  <pip>
bzip2                     1.0.6            hfa6e2cd_5    anaconda
ca-certificates           2018.4.16                0    conda-forge
certifi                   2018.4.16           py36_0    conda-forge
cffi                      1.11.5          py36h945400d_0
chardet                   3.0.4           py36h420ce6e_1
click                     6.7                   <pip>
colorama                  0.3.9           py36h029ae33_0
configparser              3.5.0                 <pip>
cryptography              2.2.1           py36hfa6e2cd_0
cycler                    0.10.0          py36h009560c_0
Cython                    0.28.4                <pip>
decorator                 4.2.1               py36_0
dlib                      19.9             np111py36_0    conda-forge
docutils                  0.14            py36h6012d8f_0
easydict                  1.7                   <pip>
entrypoints               0.2.3           py36hfd66bb0_2
face-recognition-models   0.3.0                 <pip>
freetype                  2.8.1            ha63716d_1    conda-forge
future                    0.16.0                <pip>
gym                       0.10.5                <pip>
h5py                      2.7.1           py36he54a1c3_0
hdf5                      1.10.1           h98b8871_1
html5lib                  0.9999999             py36_0
icc_rt                    2017.0.4         h97af966_0
icu                       58.2             ha66f8fd_1
idna                      2.6             py36h148d497_1
imagesize                 1.0.0                 py36_0
intel-openmp              2018.0.0                 8
ipykernel                 4.8.2                 py36_0
ipython                   6.2.1           py36h9cf0123_1
ipython_genutils          0.2.0           py36h3c5d0ee_0
ipywidgets                7.1.2                 py36_0
jedi                      0.11.1                py36_1
jinja2                    2.10            py36h292fed1_0
jpeg                      9c               hfa6e2cd_0    conda-forge
jsonschema                2.6.0           py36h7636477_0
jupyter                   1.0.0                 py36_4
jupyter_client            5.2.3                 py36_0
jupyter_console           5.2.0           py36h6d89b47_1
jupyter_core              4.4.0           py36h56e9d50_0
kaggle                    1.4.2                 <pip>
keras                     2.1.5                 py36_0
kiwisolver                1.0.1           py36h12c3424_0
```

```
libpng                    1.6.34            h7602738_1    conda-forge
libprotobuf               3.5.2             he51fdeb_1    conda-forge
m2w64-gcc-libgfortran     5.3.0                     6
m2w64-gcc-libs            5.3.0                     7
m2w64-gcc-libs-core       5.3.0                     7
m2w64-gmp                 6.1.0                     2
m2w64-libwinpthread-git   5.0.0.4634.697f757        2
markdown                  2.6.11                py36_0
markupsafe                1.0            py36h0e26971_1
matplotlib                2.2.2          py36h153e9ff_0
mistune                   0.8.3                 py36_0
mkl                       2018.0.2                  1
mkl_fft                   1.0.1          py36h452e1ab_0
mkl_random                1.0.1          py36h9258bd6_0
msys2-conda-epoch         20160418                  1
nbconvert                 5.3.1          py36h8dc0fde_0
nbformat                  4.4.0          py36h3a5bc1b_0
networkx                  2.1                    <pip>
notebook                  5.4.1                 py36_0
numpy                     1.11.3         py36h4a99626_4
numpydoc                  0.7.0          py36ha25429e_0
opencv-python             3.4.0.12               <pip>
openssl                   1.0.2o            hfa6e2cd_1    conda-forge
packaging                 17.1                  py36_0
pandas                    0.22.0         py36h6538335_0
pandoc                    1.19.2.1           hb2460c7_1
pandocfilters             1.4.2          py36h3ef6317_1
parso                     0.1.1          py36hae3edee_0
patsy                     0.5.0                 py36_0
pickleshare               0.7.4          py36h9de030f_0
Pillow                    5.0.0                  <pip>
pip                       9.0.3                 py36_0
pip                       18.0                   <pip>
plotly                    2.5.1                 py36_0
prompt_toolkit            1.0.15         py36h60b8f86_0
protobuf                  3.5.2          py36he51fdeb_0    conda-forge
py4j                      0.10.6                py36_0
pycparser                 2.18           py36hd053e01_1
pyglet                    1.2.4                  <pip>
pygments                  2.2.0          py36hb010967_0
pyopenssl                 17.5.0         py36h5b7d817_0
pyparsing                 2.2.0          py36h785a196_1
pyqt                      5.6.0          py36hb5ed885_5
pysocks                   1.6.8                 py36_0
pyspark                   2.3.0                 py36_0
python                    3.6.5              h0c2934d_0
python-dateutil           2.7.2                 py36_0
pytz                      2018.3                py36_0
PyWavelets                0.5.2                  <pip>
pywinpty                  0.5.1                 py36_0
pyyaml                    3.12           py36h1d1928f_1
pyzmq                     17.0.0         py36hfa6e2cd_0
qt                        5.6.2              h2639256_8    conda-forge
qtconsole                 4.3.1          py36h99a29a9_0
requests                  2.18.4         py36h4371aae_1
scikit-image              0.13.1                 <pip>
scikit-learn              0.19.1         py36h53aea1b_0
scipy                     1.0.1          py36hce232c7_0
seaborn                   0.8.1          py36h9b69545_0
send2trash                1.5.0                 py36_0
setuptools                39.0.1                py36_0
simplegeneric             0.8.1                  py36_2
sip                       4.18.1         py36h9c25514_2
six                       1.11.0         py36h4db2310_1
snowballstemmer           1.2.1          py36h763602f_0
sphinx                    1.7.2                 py36_0
```

```
sphinxcontrib           1.0           py36hbbac3d2_1
sphinxcontrib-websupport  1.0.1         py36hb5e5916_1
sqlite                3.24.0           hb652765_0    conda-forge
statsmodels             0.8.0         py36h6189b4c_0
tensorflow              1.2.1               py36_0
terminado               0.8.1               py36_1
testpath                0.3.1         py36h2698cfe_0
tornado                 5.0.1               py36_1
tqdm                   4.19.8               py36_0
traitlets               4.3.2         py36h096827d_0
typing                  3.6.4               py36_0
urllib3                 1.22          py36h276f60a_0
vc                     14.1              h0510ff6_3
vs2015_runtime         15.5.2                   3
wcwidth                 0.1.7         py36h3d5aa90_0
werkzeug                0.14.1              py36_0
wheel                   0.30.0        py36h6c3ec14_1
```

Output

```
Namespace(dataset='pascal_voc', demo_net='res101')
C:\Public\xrelab\Week7_detection1 --- res101_faster_rcnn_iter_110000.ckpt
checking the model here
C:/Public/xrelab/Week7_detection1/data/voc_2007_trainval_voc_2012_trainval/res101_faster_rcnn_iter_110000.ckpt
<nets.resnet_v1.resnetv1 object at 0x000002A4584A7400>
C:/Public/xrelab/Week7_detection1/data/voc_2007_trainval_voc_2012_trainval/res101_faster_rcnn_iter_110000.ckpt
Model restrored !!!
Loaded network
C:/Public/xrelab/Week7_detection1/data/voc_2007_trainval_voc_2012_trainval/res101_faster_rcnn_iter_110000.ckpt
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Demo for data/demo/000001.jpg
Entering into the Demo function
Detection took 33.073s for 300 object proposals
```

Code

```
'''
Custom implementation of nms (Non-Maxima Suppression)

-Using Felzenszwalb et al.
'''
import numpy as np

def non_max_supress_slow(boxes, overlapThresh):
    if len(boxes)==0:
        return []

    #initialize a list of picked indices
    pick=[]

    #grab the coordinates of the bounding boxes
    x1=boxes[:,0]
    y1=boxes[:,1]
    x2=boxes[:,2]
    y2=boxes[:,3]
```

```
   #compute the area of the bounding boxes and sort the boundng boxes by the bottom-right y-
coordinate
   area=(x2-x1+1)*(y2-y1+1)
   idxs=np.argsort(y2) #very important

   while len(idxs)>0:
      last=len(idxs)-1
      i=idxs[last]
      pick.append(i)
      suppress=[last]

      # Time of compute the overlap ratios to ignore some of the bounding boxes
      for pos in range(0, last):
         j=idxs[pos]

         #find the largest (x,y) coordinates for the start of the bounding box and the smallest (x,y)
coordinates for the end of the bbox
         xx1=max(x1[i], x1[j])
         yy1=max(y1[i], y1[j])
         xx2=min(x2[i], x2[j])
         yy2=min(y2[i], y2[j])

         #Width and height of the bounding box
         w=max(0,xx2-xx1+1)
         h=max(0,yy2-yy1+1)

         #Compute the ratio of overlap between the computed Bounding box and the bounding
box on the area list
         overlap=float(w*h)/area[j]

         # if there is sufficient overlap, supress the current bounding box
         if overlap>overlapThresh:suppress.append(pos)

      #delete all indexes from the index list that are in the suppression list
      idxs=np.delete(idxs, suppress)
   # return only the bounding boxes that were picked
   return pick
```

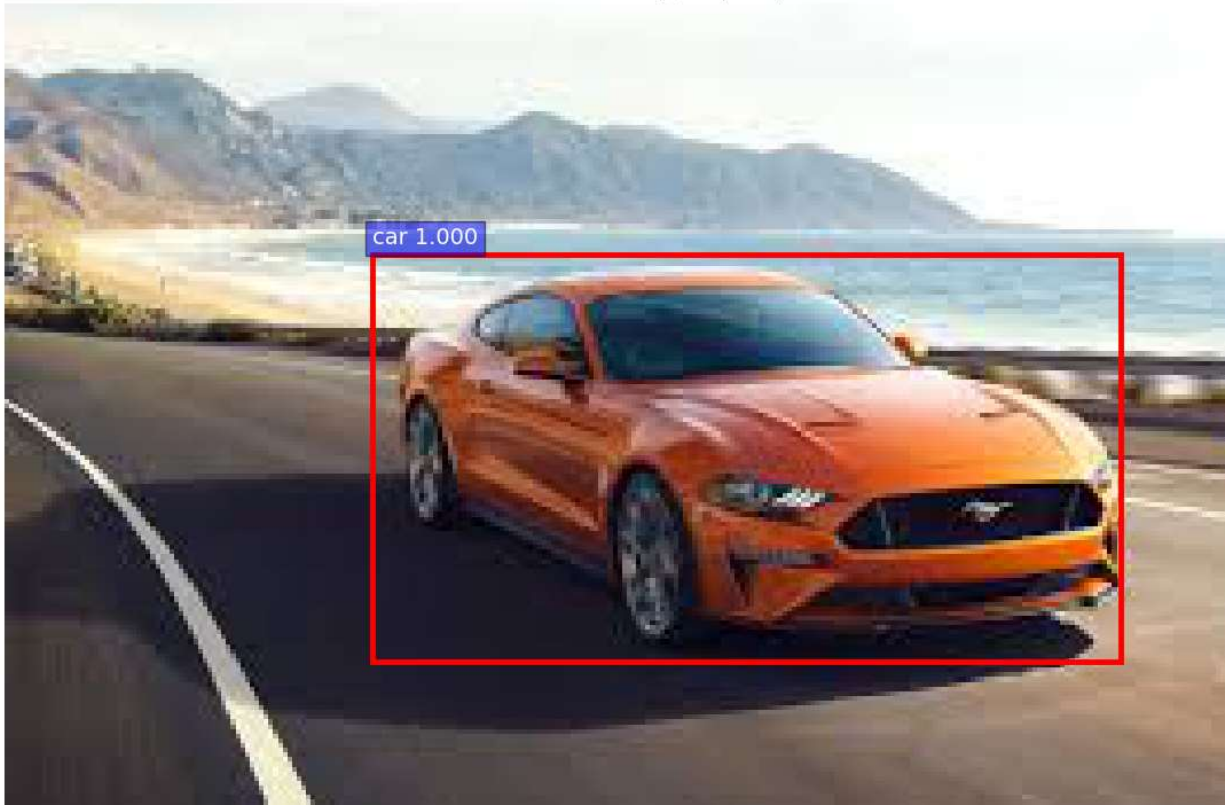
Output

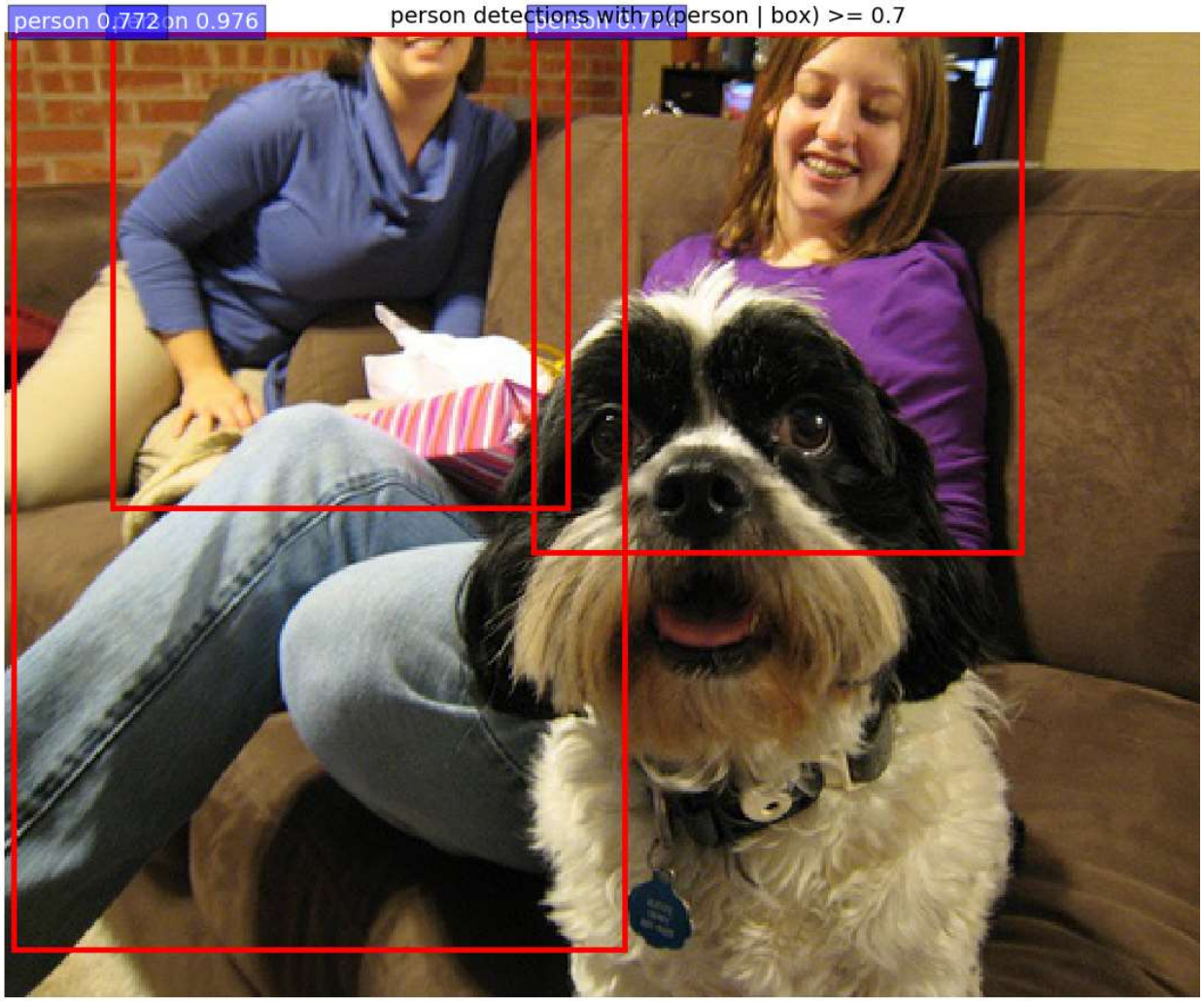
- Per class Output

```
[[ 0.00000000e+00  7.53882446e+01  8.59855042e+01  1.82000000e+02
   1.76660717e-04]
 [ 5.27669067e+01  1.75738159e+02  2.73335266e+02  1.82000000e+02
   4.03766791e-07]
 [ 2.66698227e+01  1.44555435e+02  2.28405914e+02  1.80168167e+02
   4.84814382e-06]
 [ 1.87606674e+02  1.11119522e+02  2.74000000e+02  1.72879929e+02
   6.45169820e-08]
 [ 0.00000000e+00  1.67456818e+01  1.90810150e+02  1.70641388e+02
   7.72375643e-06]
 [ 1.63595428e+02  2.85271263e+01  2.69738220e+02  1.52213379e+02
   1.38052462e-06]
 [ 1.34481239e+00  2.11989021e+00  1.70276108e+01  1.68099728e+01
   1.64946002e-07]
 [ 5.39297256e+01  3.95479679e+00  7.01377792e+01  1.50176420e+01
   3.97014844e-07]
 [ 2.69408752e+02  1.49826717e+00  2.74000000e+02  1.47632170e+01
   1.25326991e-07]
 [ 1.68714249e+02  2.41870022e+00  1.82132401e+02  1.07102919e+01
   5.55073825e-07]]
```

- Detections Visualized :

car detections with p(car | box) >= 0.7




person detections with p(person | box) >= 0.7
person 0.772
person 0.976