

Project 3 - PII Detection Using YOLO

1. Installed darknet, downloaded the pre-trained weight file and finished setting up yolo.

```
darknet -- -bash -- 157x21
Last login: Mon Nov 12 18:43:06 on ttys000
Christins-MBP:~ christinwilson$ git clone https://github.com/pjreddie/darknet
Cloning into 'darknet'...
remote: Enumerating objects: 5901, done.
remote: Total 5901 (delta 0), reused 0 (delta 0), pack-reused 5901
Receiving objects: 100% (5901/5901), 6.14 MiB | 1.93 MiB/s, done.
Resolving deltas: 100% (3944/3944), done.
Christins-MBP:~ christinwilson$ cd darknet
Christins-MBP:darknet christinwilson$ make
mkdir -p obj
mkdir -p backup
mkdir -p results
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./src/gemm.c -o obj/gemm.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./src/utils.c -o obj/utils.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./src/cuda.c -o obj/cuda.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./src/deconvolutional_layer.c -o obj/deconvolutional_layer.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./src/convolutional_layer.c -o obj/convolutional_layer.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./src/list.c -o obj/list.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./src/image.c -o obj/image.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./src/activations.c -o obj/activations.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/detector.c -o obj/detector.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/nightmare.c -o obj/nightmare.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/instance-segmenter.c -o obj/instance-segmenter.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/darknet.c -o obj/darknet.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/captcha.c -o obj/captcha.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/lsd.c -o obj/lsd.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/super.c -o obj/super.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/art.c -o obj/art.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/tag.c -o obj/tag.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/cifar.c -o obj/cifar.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/go.c -o obj/go.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/rnn.c -o obj/rnn.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/segmenter.c -o obj/segmenter.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/regressor.c -o obj/regressor.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/classifier.c -o obj/classifier.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/coco.c -o obj/coco.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/yolo.c -o obj/yolo.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/detector.c -o obj/detector.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/nightmare.c -o obj/nightmare.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/instance-segmenter.c -o obj/instance-segmenter.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/darknet.c -o obj/darknet.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/captcha.c -o obj/captcha.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/lsd.c -o obj/lsd.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/super.c -o obj/super.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/art.c -o obj/art.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/tag.c -o obj/tag.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/cifar.c -o obj/cifar.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/go.c -o obj/go.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/rnn.c -o obj/rnn.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/segmenter.c -o obj/segmenter.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/regressor.c -o obj/regressor.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/classifier.c -o obj/classifier.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/coco.c -o obj/coco.o
gcc -Iinclude/ -Isrc/ -Wall -Wno-unused-result -Wno-unknown-pragmas -Wfatal-errors -fPIC -Ofast -c ./examples/yolo.c -o obj/yolo.o
darknet.o libdarknet.a -o darknet -lm -pthread libdarknet.a
Christins-MBP:darknet christinwilson$ wget https://pjreddie.com/media/files/yolov3.weights
--2018-11-13 08:58:22-- https://pjreddie.com/media/files/yolov3.weights
Resolving pjreddie.com (pjreddie.com)... 128.208.3.39
Connecting to pjreddie.com (pjreddie.com)[128.208.3.39]:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 248007048 (237M) [application/octet-stream]
Saving to: 'yolov3.weights'

yolov3.weights 100%[=====] 236.52M 979KB/s in 4m 28s

2018-11-13 09:02:51 (902 KB/s) - 'yolov3.weights' saved [248007048/248007048]

Christins-MBP:darknet christinwilson$
```

2. Downloaded the dataset. There are 110 images in the private folder and 101 in the public folder.

3. Ran the detector on both the private and public images and stored the objects in two separate txt files.

```
priv.txt
person: 100%
cup: 60%
cup: 52%
bottle: 81%
person: 100%
person: 96%
person: 94%
person: 100%
person: 99%
person: 100%
person: 100%
sofa: 52%
sports ball: 62%
sports ball: 100%
dog: 98%
person: 99%
person: 51%
person: 100%
person: 100%
person: 59%
person: 100%
person: 95%
chair: 99%
person: 54%
chair: 99%
person: 100%
person: 100%
person: 100%
bird: 69%
dog: 75%
person: 100%
bed: 50%
person: 100%
person: 100%
person: 100%
book: 98%
person: 100%
person: 100%
book: 63%
baseball bat: 64%
cell phone: 52%
person: 100%
person: 100%
person: 98%
person: 98%
person: 98%
person: 97%
person: 95%
person: 92%
person: 90%
person: 89%
person: 88%
person: 87%
person: 82%
person: 67%
person: 67%
person: 58%
person: 56%
```

```
pub.txt
person: 99%
vase: 99%
train: 88%
truck: 100%
person: 94%
person: 94%
person: 82%
person: 98%
person: 60%
person: 97%
person: 96%
person: 100%
person: 100%
person: 100%
person: 100%
person: 94%
person: 91%
person: 66%
handbag: 55%
person: 100%
person: 100%
handbag: 57%
cake: 61%
person: 95%
person: 99%
person: 100%
train: 100%
person: 100%
person: 97%
person: 83%
giraffe: 100%
giraffe: 100%
giraffe: 99%
giraffe: 97%
hot dog: 57%
diningtable: 60%
car: 99%
car: 99%
person: 100%
person: 50%
person: 77%
person: 98%
bicycle: 72%
bicycle: 100%
person: 92%
car: 90%
person: 69%
person: 99%
boat: 76%
person: 97%
person: 95%
person: 92%
person: 91%
person: 91%
person: 88%
person: 87%
person: 84%
person: 82%
```


Public

No of occurrences	Object
124	person
15	bottle
6	knife
6	chair
4	giraffe
4	car
4	book
3	train
2	handbag
2	diningtable
2	cup
2	cat
2	cake
2	boat
2	bird
2	bicycle
1	vase
1	umbrella
1	truck
1	tie
1	oven
1	keyboard
1	hot dog
1	broccoli
1	bed
1	backpack
1	apple

private

No of occurrences	object
156	person
26	cup
8	wine glass
8	dog
6	chair
5	tvmonitor
5	diningtable
5	cell phone
5	bottle
4	sports ball
4	knife
4	book
3	fork
3	cat
3	car
3	bowl
3	bed
2	suitcase
2	sofa
2	microwave
2	bicycle
1	vase
1	truck
1	tie
1	spoon
1	remote
1	refrigerator
1	handbag
1	carrot
1	cake
1	broccoli

No of occurrences	object
1	boat
1	bird
1	baseball bat

Observations:

Both tables have 'person' in the top. This means that people prefer to keep their photos both private and public. Thus it is the environment that they are in that are actually deciding whether the image should be private or public.

When the image has objects like train, giraffe, car, book and handbag, they are usually public images.

When the image has cups, wine glasses, and screens like monitors or cellphone, they are usually private images.

APPENDIX

public.py

CODE:

```
import os
from subprocess import Popen, PIPE
f=open("pub.txt", "a+")
images_dir = "/users/christinwilson/darknet/data/dataset"

#loop to run the detector on every image in the folder
for img in os.listdir(os.getcwd()+"/data/dataset/public"):
    count=0
    setting = "public"
    p = Popen(['./darknet', 'detect', 'cfg/yolov3.cfg',
'yolov3.weights', images_dir + '/' + setting + '/' + img], cwd = '/
users/christinwilson/darknet', stdout = PIPE, stderr = PIPE)
    stdout, stderr = p.communicate()

    #get the number of characters in stdout
    for line in stdout:
        count+=1

    #get the position where the first line of stdout ends
    pos=stdout.find('\n')

    #obtain the substring of stdout with just objects and percentage
    stdout=stdout[pos+1:count-1]

    #write it to the file
    f.write(stdout)
f.close()
```


private.py

CODE:

```
import os
from subprocess import Popen, PIPE
f=open("priv.txt", "a+")
images_dir = "/users/christinwilson/darknet/data/dataset"

#loop to run the detector on every image in the folder
for img in os.listdir(os.getcwd()+"/data/dataset/private"):
    count=0
    setting = "private"
    p = Popen(['./darknet', 'detect', 'cfg/yolov3.cfg',
'yolov3.weights', images_dir + '/' + setting + '/' + img], cwd = '/
users/christinwilson/darknet', stdout = PIPE, stderr = PIPE)
    stdout, stderr = p.communicate()

    #get the number of characters in stdout
    for line in stdout:
        count+=1

    #get the position where the first line of stdout ends
    pos=stdout.find('\n')

    #obtain the substring of stdout with just objects and percentage
    stdout=stdout[pos+1:count-1]

    #write it to the file
    f.write(stdout)
f.close()
```

Program to Delete percentages:

CODE:

```
lines=[line.rstrip('\n') for line in open('priv.txt')]
f=open("private.txt", "a+")
for x in lines:
    pos=x.find(':')
    x=x[0:pos]
    f.write(x+'\n')
f.close()
lines=[line.rstrip('\n') for line in open('pub.txt')]
f=open("public.txt", "a+")
for x in lines:
    pos=x.find(':')
    x=x[0:pos]
    f.write(x+'\n')
f.close()
```