

```

#import necessary packages

import cv2

import os

import numpy as np

from .utils import download_file


initialize = True

net = None

dest_dir = os.path.expanduser('~') + os.path.sep + '.cvlib' + os.path.sep + 'object_detection' +
os.path.sep + 'yolo' + os.path.sep + 'yolov3'

classes = None

#colors are BGR instead of RGB in python
COLORS = [0,0,255], [255,0,0]


def populate_class_labels():

    #we are using a pre existent classifier which is more reliable and more efficient than one
    #we could make using only a laptop
    #The classifier should be downloaded automatically when you run this script

    class_file_name = 'yolov3_classes.txt'

    class_file_abs_path = dest_dir + os.path.sep + class_file_name

    url = 'https://github.com/Nico31415/Drowning-Detector/raw/master/yolov3.txt'

    if not os.path.exists(class_file_abs_path):

        download_file(url=url, file_name=class_file_name, dest_dir=dest_dir)

    f = open(class_file_abs_path, 'r')

    classes = [line.strip() for line in f.readlines()]


    return classes


def get_output_layers(net):

```

```

#the number of output layers in a neural network is the number of possible
#things the network can detect, such as a person, a dog, a tie, a phone...
layer_names = net.getLayerNames()

output_layers = [layer_names[i[0] - 1] for i in net.getUnconnectedOutLayers()]

return output_layers

```

```

def draw_bbox(img, bbox, labels, confidence, Drowning, write_conf=False):

```

```

    global COLORS

```

```

    global classes

```

```

    if classes is None:

```

```

        classes = populate_class_labels()

```

```

    for i, label in enumerate(labels):

```

```

        #if the person is drowning, the box will be drawn red instead of blue

```

```

        if label == 'person' and Drowning:

```

```

            color = COLORS[0]

```

```

            label = 'DROWNING'

```

```

        else:

```

```

            color = COLORS[1]

```

```

    if write_conf:

```

```

        label += ' ' + str(format(confidence[i] * 100, '.2f')) + '%'

```

#you only need to points (the opposite corners) to draw a rectangle. These points

#are stored in the variable bbox

```
cv2.rectangle(img, (bbox[i][0],bbox[i][1]), (bbox[i][2],bbox[i][3]), color, 2)
```

```
cv2.putText(img, label, (bbox[i][0],bbox[i][1]-10), cv2.FONT_HERSHEY_SIMPLEX, 0.5, color, 2)
```

```
return img
```

```
def detect_common_objects(image, confidence=0.5, nms_thresh=0.3):
```

```
    Height, Width = image.shape[:2]
```

```
    scale = 0.00392
```

```
    global classes
```

```
    global dest_dir
```

```
    #all the weights and the neural network algorithm are already preconfigured
```

```
    #as we are using YOLO
```

```
    #this part of the script just downloads the YOLO files
```

```
    config_file_name = 'yolov3.cfg'
```

```
    config_file_abs_path = dest_dir + os.path.sep + config_file_name
```

```
    weights_file_name = 'yolov3.weights'
```

```
    weights_file_abs_path = dest_dir + os.path.sep + weights_file_name
```

```
    url = 'https://github.com/Nico31415/Drowning-Detector/raw/master/yolov3.cfg'
```

```
    if not os.path.exists(config_file_abs_path):
```

```
        download_file(url=url, file_name=config_file_name, dest_dir=dest_dir)
```

```
url = 'https://pjreddie.com/media/files/yolov3.weights'
```

```
if not os.path.exists(weights_file_abs_path):
```

```
    download_file(url=url, file_name=weights_file_name, dest_dir=dest_dir)
```

```
global initialize
```

```
global net
```

```
if initialize:
```

```
    classes = populate_class_labels()
```

```
    net = cv2.dnn.readNet(weights_file_abs_path, config_file_abs_path)
```

```
    initialize = False
```

```
blob = cv2.dnn.blobFromImage(image, scale, (416,416), (0,0,0), True, crop=False)
```

```
net.setInput(blob)
```

```
outs = net.forward(get_output_layers(net))
```

```
class_ids = []
```

```
confidences = []
```

```
boxes = []
```

```
for out in outs:
```

```
    for detection in out:
```

```
        scores = detection[5:]
```

```
        class_id = np.argmax(scores)
```

```
        max_conf = scores[class_id]
```

```
        if max_conf > confidence:
```

```
center_x = int(detection[0] * Width)
center_y = int(detection[1] * Height)
w = int(detection[2] * Width)
h = int(detection[3] * Height)
x = center_x - w / 2
y = center_y - h / 2
class_ids.append(class_id)
confidences.append(float(max_conf))
boxes.append([x, y, w, h])
```

```
indices = cv2.dnn.NMSBoxes(boxes, confidences, confidence, nms_thresh)
```

```
bbox = []
```

```
label = []
```

```
conf = []
```

```
for i in indices:
```

```
    i = i[0]
```

```
    box = boxes[i]
```

```
    x = box[0]
```

```
    y = box[1]
```

```
    w = box[2]
```

```
    h = box[3]
```

```
    bbox.append([round(x), round(y), round(x+w), round(y+h)])
```

```
    label.append(str(classes[class_ids[i]]))
```

```
    conf.append(confidences[i])
```

```
return bbox, label, conf
```