

Project Development

Phase Sprint-3

Date	07 November 2022
Team ID	PNT2022TMID22570
Project Name	Virtual Eye - Life Guard for Swimming Pools to Detect Active Drowning
Maximum Marks	8 Marks

```
#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(m  
            ax_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
```