

Project Development Phase

Sprint3-Test Cases

Date	12 Nov 2022
Team ID	PNT2022TMID01218
Project Name	Virtual Eye - Life Guard for Swimming Pools To Detect Active Drowning
Maximum Marks	4Marks

Init.py

```
from .object_detection import detect_common_objects
```

Object_detect.py

```

#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

```

Utils.py

```

import requests import progressbar as pb import os def
download_file(url, file_name, dest_dir):
    if not os.path.exists(dest_dir):
        os.makedirs(dest_dir) full_path_to_file = dest_dir +
os.path.sep + file_name

    if os.path.exists(dest_dir + os.path.sep + file_name): return
full_path_to_file print("Downloading " + file_name + " from " +
url)

    try: r = requests.get(url, allow_redirects=True, stream=True)
    except:
        print("Could not establish connection. Download failed") return None
file_size = int(r.headers['Content-Length']) chunk_size =
1024
numBars = round(file_size / chunk_size) bar =
pb.ProgressBar(maxval=numBars).start()

    if r.status_code != requests.codes.ok:
        print("Error occurred while downloading file") return None

```

```
count = 0
with open(full_path_to_file, 'wb') as file:
    for chunk in r.iter_content(chunk_size=chunk_size):
        file.write(chunk)
        bar.update(count)
        count +=1
return full_path_to_file
```

App.py:

```

import time
import cv2 import
numpy as np
from cloudant.client import Cloudant
from flask import Flask, request, render_template, redirect, url_for
from playsound import playsound
import cvlib as
cv
from cvlib.object_detection import draw_bbox

# Loading the model

# Authenticate using an IAM API key
client = Cloudant.iam('5alffd26-d995-410e-af77-546fb6498fd8-
bluemix','5rUgrIfVeYtIyTqJ0hAvTOvIYvJDNIklr-sDUHQrcLnN', connect=True)

# Create a database using an initialized client my_database
= client.create_database('my_database')

app=Flask( name )

#default home page or route
@app.route('/')
def index():
    return render_template('index.html')

@app.route('/index.html')
def home():
    return render_template("index.html")

#registration page

```

```

@app.route('/register')
def register():
    return render_template('register.html')

@app.route('/afterreg', methods=['POST'])
def afterreg():
    x = [x for x in request.form.values()]
    print(x)
    data = {
        '_id': x[1], # Setting _id is optional
        'name': x[0],
        'psw': x[2]
    }
    print(data)
    query = {'_id': {'$eq': data['_id']}}

    docs = my_database.get_query_result(query)
    print(docs)
    print(len(docs.all()))

    if(len(docs.all())==0):
        url = my_database.create_document(data)
        #response = requests.get(url)
        return render_template('register.html', pred="Registration Successful, please login using your details")
    else:
        return render_template('register.html', pred="You are already a member, please login using your details")

#login page
@app.route('/login')
def login():
    return render_template('login.html')

@app.route('/afterlogin', methods=['POST'])
def afterlogin():
    user = request.form['_id']
    passw = request.form['psw']
    print(user, passw)
    query = {'_id': {'$eq': user}}

    docs = my_database.get_query_result(query)
    print(docs)
    print(len(docs.all()))

    if(len(docs.all())==0):
        return render_template('login.html', pred="The username is not found.")
    else:
        if((user==docs[0][0]['_id'] and passw==docs[0][0]['psw'])):
            return redirect(url_for('prediction'))
        else:

```



```

        print('Invalid User')

@app.route('/logout')
def logout():
    return render_template('logout.html')

@app.route('/prediction')
def prediction():
    return render_template('prediction.html')

@app.route('/result', methods=["GET", "POST"])
def res():
    webcam = cv2.VideoCapture('drowning.mp4')

    if not webcam.isOpened():
        print("Could not open webcam") exit() t0 =
        time.time() #gives time in seconds after 1970

    #variable dcount stands for how many seconds the person has been
standing still for centre0 = np.zeros(2) isDrowning= False

    #this loop happens approximately every 1 second, so if a person doesn't
move,
    #or moves very little for 10seconds, we can say they are drowning

    #loop through frames while
webcam.isOpened(): # read frame
from webcam status, frame =
webcam.read()

    if not status: print("Could not
        read frame") exit()
    # apply object detection bbox, label, conf =
cv.detect_common_objects(frame) #simplifying for
only 1 person

    #s = (len(bbox), 2)
    if(len(bbox)>0):
        bbox0 = bbox[0]
        #centre = np.zeros(s)
        centre = [0,0]
        #for i in range(0, len(bbox)):
            #centre[i]
= [(bbox[i][0]+bbox[i][2])/2, (bbox[i][1]+bbox[i][3])/2 ]

        centre = [(bbox0[0]+bbox0[2])/2, (bbox0[1]+bbox0[3])/2 ]

    #make vertical and horizontal movement variables
hmov = abs(centre[0]-centre0[0]) vmov =
abs(centre[1]-centre0[1])

```

```

#there is still need to tweek the threshold
#this threshold is for checking how much the centre has moved

x=time.time()

threshold = 10 if(hmov>threshold or
vmov>threshold):
    print(x-t0, 's')
    t0 = time.time()
    isDrowning = False
else:
    print(x-t0, 's')
    if((time.time() - t0) > 10):
        isDrowning = True

    #print('bounding box: ', bbox, 'label: ' label , 'confidence: '
conf[0], 'centre: ', centre)
    #print(bbox,label ,conf, centre)
    print('bbox: ', bbox, 'centre:', centre, 'centre0:', centre0)
    print('Is he drowning: ', isDrowning)

    centre0 = centre
    # draw bounding box over detected objects out =

draw_bbox(frame, bbox, label, conf,isDrowning)

#print('Seconds since last epoch: ', time.time()-t0)

# display output cv2.imshow("Real-time object
detection", out) if(isDrowning == True):
    playsound('alarm.mp3') webcam.release()
    cv2.destroyAllWindows()
    return render_template('prediction.html',prediction="Emergency
!!! The Person is drowining")
    #return render_template('base.html')

# press "Q" to stop if cv2.waitKey(1)
& 0xFF == ord('q'):
    break

# release resources
webcam.release()
cv2.destroyAllWindows()
#return render_template('prediction.html',)

""" Running our application """
if name == " main ":
    app.run(debug=True)

```

Detect.py:

```

import cvlib as cv
from cvlib.object_detection import
draw_bbox import cv2 import time import
numpy as np
from playsound import playsound
#for PiCamera
#from picamera Import PiCamera
#camera = PiCamera
#camera.start_preview()
# open webcam
webcam = cv2.VideoCapture(0)

if not webcam.isOpened():
    print("Could not open webcam")
    exit()

t0 = time.time() #gives time in seconds after 1970

#variable dcount stands for how many seconds the person has been standing
still for
centre0 = np.zeros(2)
isDrowning = False

#this loop happens approximately every 1 second, so if a person doesn't move,
#or moves very little for 10seconds, we can say they are drowning

#loop through frames while
webcam.isOpened():

    # read frame from webcam status,
    frame = webcam.read()

    if not status: print("Could not
        read frame") exit()

    # apply object detection bbox, label, conf =
    cv.detect_common_objects(frame) #simplifying for
    only 1 person

    #s = (len(bbox), 2)

    if (len(bbox)>0): bbox0 =
        bbox[0] #centre =
        np.zeros(s) centre =
        [0,0]

```

```

        #for i in range(0, len(bbox)):
            #centre[i]
    =[(bbox[i][0]+bbox[i][2])/2, (bbox[i][1]+bbox[i][3])/2 ]

    centre =[(bbox0[0]+bbox0[2])/2, (bbox0[1]+bbox0[3])/2 ]

    #make vertical and horizontal movement variables
    hmov  =  abs(centre[0]-centre0[0])    vmov  =
    abs(centre[1]-centre0[1])

    #there is still need to tweek the threshold
    #this threshold is for checking how much the centre has moved

    x=time.time()

    threshold = 10 if(hmov>threshold or
    vmov>threshold):
        print(x-t0, 's')
    t0      =      time.time()
    isDrowning  =      False
    else:

        print(x-t0, 's') if((time.time()
        - t0) > 10):
            isDrowning = True

    #print('bounding box: ', bbox, 'label: ' label , 'confidence: '
    conf[0], 'centre: ', centre)
    #print(bbox,label ,conf, centre)
    print('bbox: ', bbox, 'centre:', centre, 'centre0:', centre0)
    print('Is he drowning: ', isDrowning)

    centre0 = centre
    # draw bounding box over detected objects

    out = draw_bbox(frame, bbox, label, conf,isDrowning)

    #print('Seconds since last epoch: ', time.time()-t0)

    # display output cv2.imshow("Real-time object
    detection", out) if(isDrowning == True):
    playsound('alarm.mp3')

    # press "Q" to stop if
    cv2.waitKey(1) & 0xFF == ord('q'):
        break

# release resources
webcam.release()
cv2.destroyAllWindows()

```