FINAL DELIVERABLE PROJECT

DOCUMENTATION

Date	11 November 2022
Team ID	PNT2022TMID48119
Project Name	VirtualEye-Lifeguard for Swimming Pools to Detect the Active Drowning

CHAPTER-1

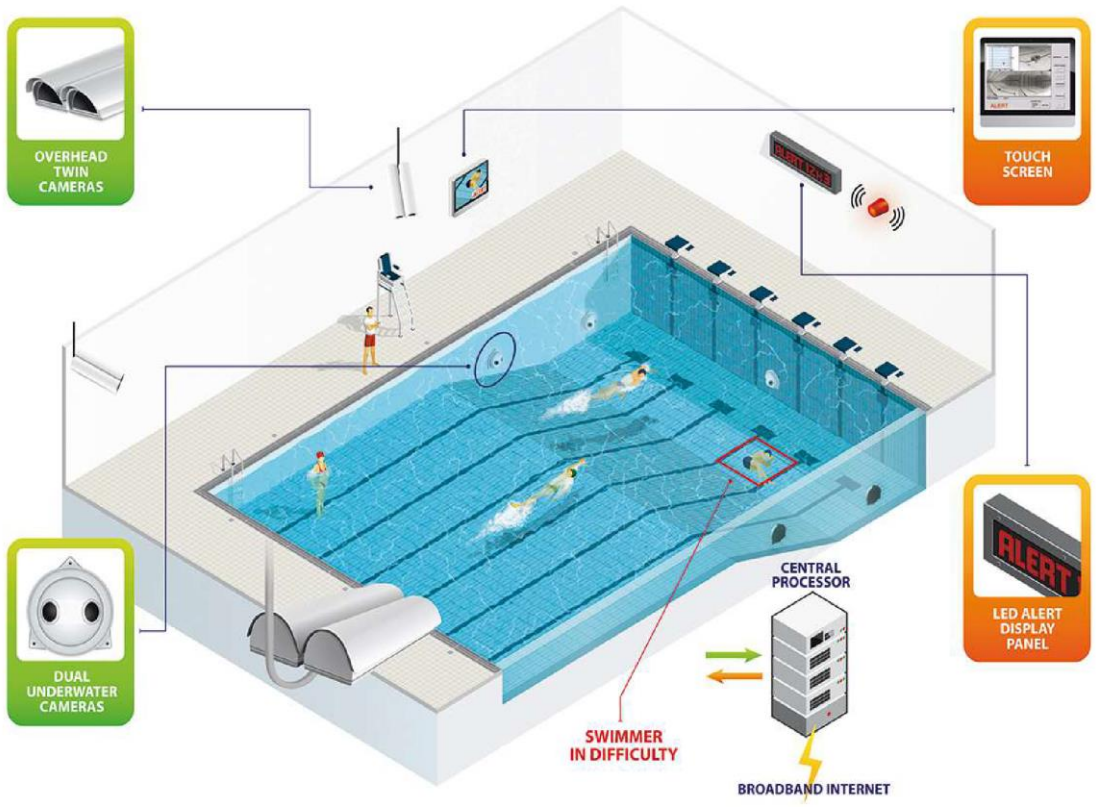
1.INTRODUCTION

Recently, there has been growing interest around the topic of drowning detection systems (DDS) in the sport and leisure industry both across the UK and globally. Advancements in technology, coupled with the importance of pool safety, has led to its growing prominence, with mention of DDS now in documents such as HSG179 - the latest UK standards document for health and safety in swimming pools (Health and Safety Executive, 2018). However, the topic is a debated area for various reasons explored in this review.

Whilst there are plenty of academic articles dedicated to the technology and design behind these products in the fields of biometrics, computer science and electronic engineering, there is limited academic research investigating their application to real-world scenarios. Furthermore, there is uncertainty around their use alongside traditional lifeguarding; whether international testing standards (ISO standards) are robust enough; and general risks affecting the effectiveness of these products. This includes factors such as water clarity, high pool occupancy, lighting, glare and attractions such as water slides and wave machines. These concerns alongside the lack of research and high installation costs have resulted in a reluctance by some operators to incorporate DDS into their pools. This signifies the importance of independent research into DDS. intends to support the move towards the shared goal of improved pool safety.

This piece will begin with an overview of the different definitions of DDS, followed by an explanation of the aims and methodology of this review. It will then discuss what the current DDS standards are alongside legislation and guidance available around DDS, and provide a summary of the shared responsibilities towards the effective operation of DDS. Following this, the literature review will examine the co-existence between DDS and traditional lifeguarding, provide an analysis of its impact so far, and conclude with recommendations on the direction of future DDS research.

1.1 Project Overview



1.2 Purpose

>> Establish and outline what is known on Drowning Detection Systems.
>> Evaluate the current literature on Drowning Detection Systems, including their use in indoor pool environments along with interaction with traditional lifeguarding.
>> Better understand where DDS are positioned in the health and safety landscape of indoor swimming pools.

The value that can be generated from these aims stem from the recognition that currently, there are no published documents drawing together all the current DDS research. The literature review aims to contribute as independent research in this field and hopes to signpost the potential future direction of DDS research.

CHAPTER-2

2. LITERATURE SURVEY

Of the differing definitions of DDS, most outline three defining elements:

1) surveillance,
2) detection of a pool user in difficulty, and
3) raising an alarm

For example, ISO_20380 (the document published by the International Organisation for Standardization (2017) outlining the international safety requirements and test standards for DDS) defines the technology as an 'automated system including means for digitizing series of images of people in the pool basin, means for comparing and analysing digitized images and decision means for setting off and sending an alarm to trained staff when a detection occurs'. In comparison, there are broader definitions that are inclusive of other technologies that focus on the surveillance aspect, for example, 'DDS is used to describe various electronic systems that are designed to assist with the surveillance of swimmers within the water of a swimming pool' (Sport England, 2011). This definition would include CCTV that helps give lifeguards an underwater view but does not have the capacity to detect a pool user in difficulty or raise an alarm. For this to be effective, staff would have to make sure the CCTV is being monitored at all times, making the staff experience with this very different to the experience of using a DDS falling under the first definition. It is important to distinguish what exactly constitutes a DDS as there are different areas of responsibility required from different actors involved in the effective operation of DDS, which will be examined in chapter 4. For this literature review, research has focused on the definition used by the ISO and other sources that incorporate all three elements of surveillance, detection and alarm raising.

2.1 Existing Problem

Whilst literature on DDS mostly agrees on areas such as the risks and issues associated with DDS performance, there are other areas where sources offer differing points of view, for example, DDS and their co-existence with lifeguards. There is debate around whether DDS can be helpful or harmful towards lifeguarding practices and how DDS may change the landscape of traditional lifeguarding, as well as some disagreement on whether they serve as justification for reducing lifeguard numbers. The term 'blended lifeguarding' or 'modern lifeguarding' has been newly coined to describe the concept of traditional lifeguarding practices being blended with technology for drowning detection (Swimming Pool Scene, 2017).

Currently, there is little qualitative or quantitative research analysing the experiences of lifeguards themselves relating to this concept.

2.2 References

[1]AngelEye. (2019). AngelEye – Distributors. Retrieved from: https://www.angeleye.it/news. php?id=28&newscat=10

[2]Aquatics International. (2007). Traumatic Experiences – Should we make our youngest lifeguards come face to face with death? Retrieved from: https://www.aquaticsintl.com/facilities/traumaticexperiences_o

[3]British Standards Institution. (2018). BS EN 15288-1, Swimming pools for public use. Safety requirements for design. Retrieved from: https://shop.bsigroup.com/ProductDetail/?pid=000000000030360254

[4]British Standards Institution 1. (2018). BS EN 15288-2, Swimming pools for public use. Safety requirements for operation. Retrieved from: https://shop.bsigroup.com/ProductDetail/?p id=000000000030360257

[5]Drowning Prevention. (2017). The Need. Retrieved from: https://www.drowningprevention.com.au/

[6]German Institute for Standardization. (2019). German national guideline DGfdB R 94.15 “Test methods for camera-based drowning detection systems under operational conditions” (German Association for Public Swimming Pools).

[7]Haizhou Li, Haizhou Li, Kar-Ann Toh and Liyuan Li. (2012). Advanced Topics in Biometrics, World Scientific Publishing Co. Pte. Ltd., ISBN-13 978-981-4287-84-5

[8]Health and Safety Executive. (2018). HSG179, Health and safety in swimming pools (Fourth edition).

[9]ISO (2017) ISO_20380, First edition, Public swimming pools — Computer vision systems for the detection of drowning accidents in swimming pools — Safety requirements and test methods.

2.3 PROBLEM STATEMNET DEFINITION

1. Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in hotels.

2. Applying the CNN algorithm to the dataset.Beginners, especially, often feel it difficult to breathe underwater which causes breathing trouble which in turn causes a drowning accident.

3.To overcome this conflict, a meticulous system is to be implemented along the swimming pools to save human life.

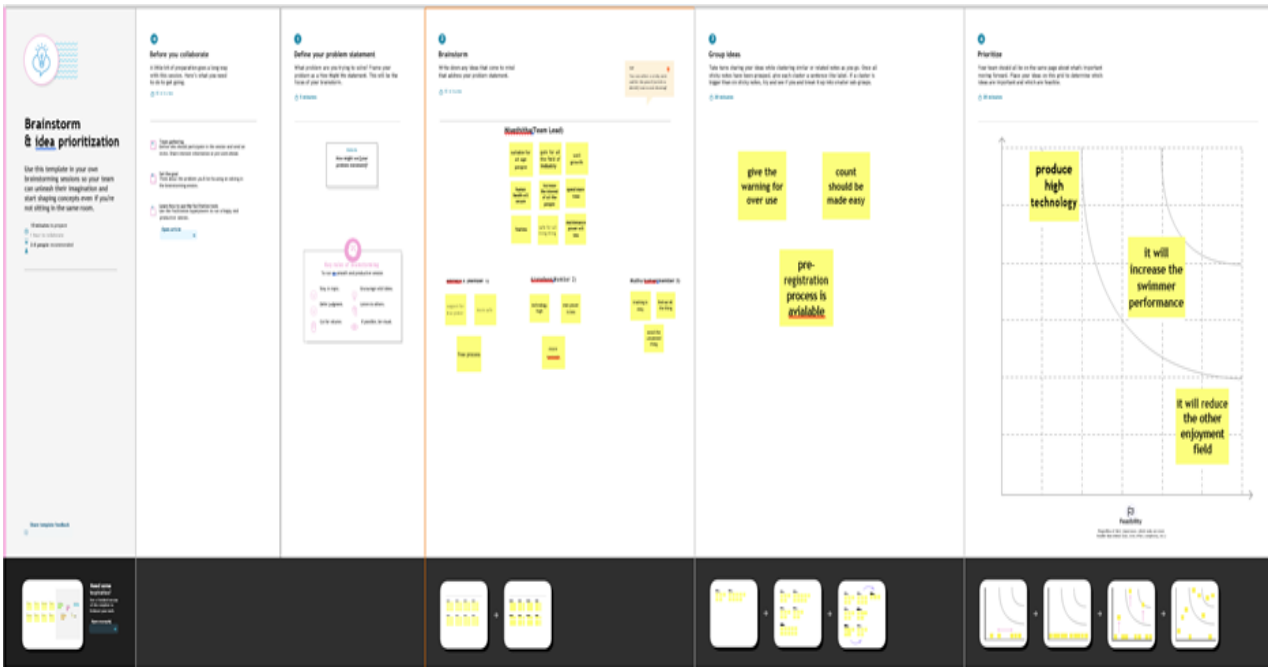
CHAPTER-3

3.IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

Virtual-Lifeguard For Swimming Pools to Detect the Active .Drowning

3.2 IDEATION & BRAINSTORMING

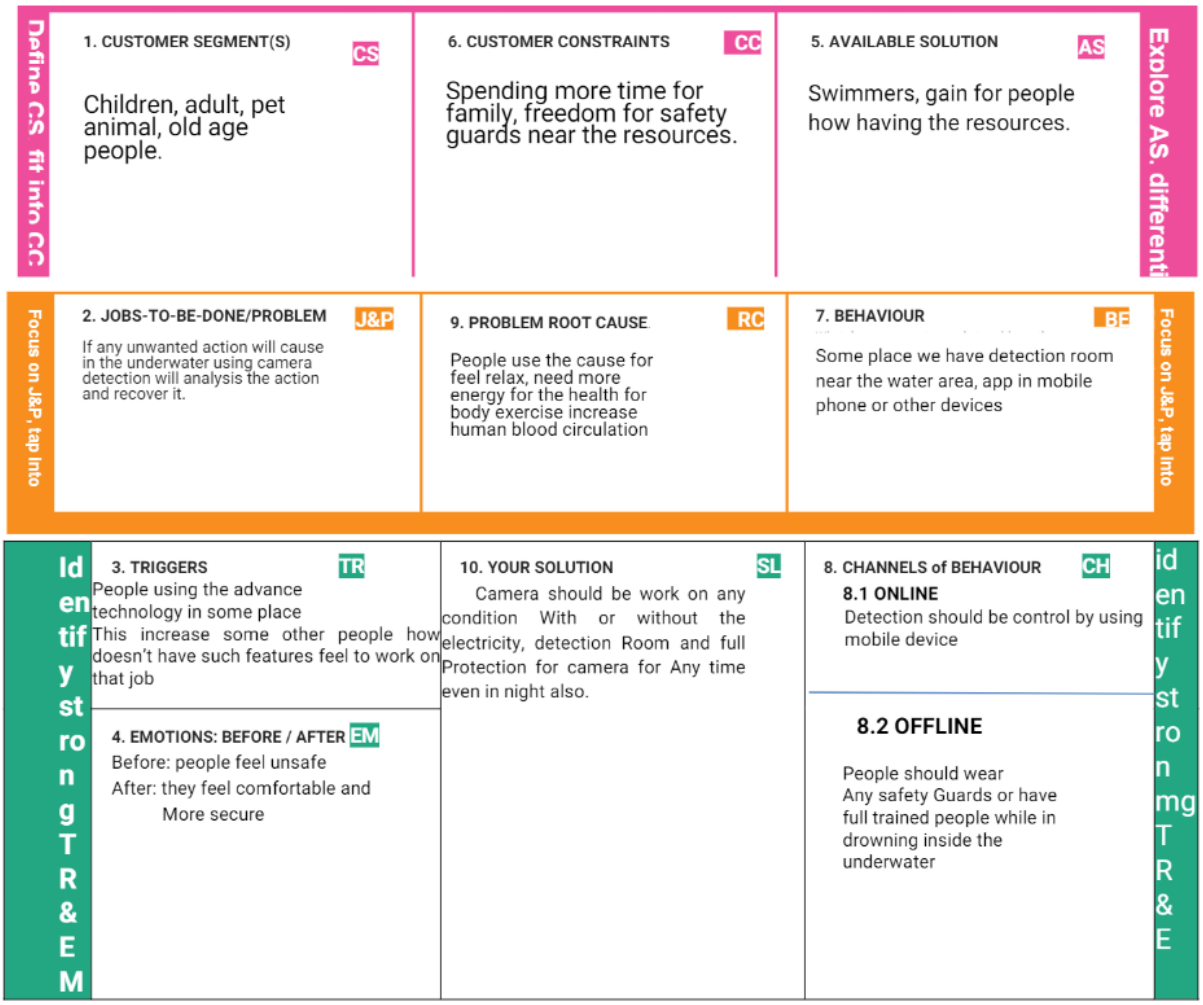


3.3 PROPOSED SOLUTION

Proposed Solution Template:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	People use the swimming for enjoyment, health Exercise but for all age of the people pool is really dangerous we need lifeguard, in duty swimming pools are very dangerous in the underwater.
2.	Idea / Solution description	In this project, using Artificial intelligence technology, using the camera help we can detect the people action and positions and also we check breathing level of the people inside the underwater and use of any alarms system we can detect the some of them are in the problem
3.	Novelty / Uniqueness	The uniqueness of the our system is track the people position and body condition in the drowning using YOLO Algorithm. It is fast and very speed in the detection
4.	Social Impact / Customer Satisfaction	In world most of them are unexcepted cause very serious death in the underwater not only in the city but most occurs in the rural area in the public places (well, lakes) we should avoid the accident in the underwater drowning
5.	Business Model (Revenue Model)	In the software field this well increase good income. Safety innovation in the swimming related issues this makes attractive for end users to use our software product
6.	Scalability of the Solution	IBM cloud server will collect all the data and stored in the server. This will more safe and secure

3.4 PROBLEM SOLUTION FIT



CHAPTER-4

4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Installation	Install the camera inside the underwater, connect necessary app in the phone or otherdevice
FR-2	Detection	Near swimming pool area use detectionroom for monitor or use IBM cloud forstorage purpose of the details
FR-3	Audio	Give the alert signal for the people enterinto the underwater and leaving into underwater
FR-4	Support	Extra support from the lifeguard if any person pulse rate will decrease inside the water
FR-5	Prior alert	Extreme level problem should be occursgive the alert signal for the entire pool

4.2 NON-FUNCTIONAL REQUIREMENT

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	A Lifeguard should be present in all the time near pool
NFR-2	**Security**	Alert message or signal should be give by the lifeguard of swimmer
NFR-3	**Reliability**	Triggers if any immediate needs of theswimmer inside the pool
NFR-4	**Performance**	If any unwanted position changes and thepulse rate will decrease this will detect it.
NFR-5	**Availability**	Equipment and other requirement should bechecked by the lifeguards
NFR-6	**Scalability**	Virtual eye lifeguard detects potential drownings and it should be notifies you.

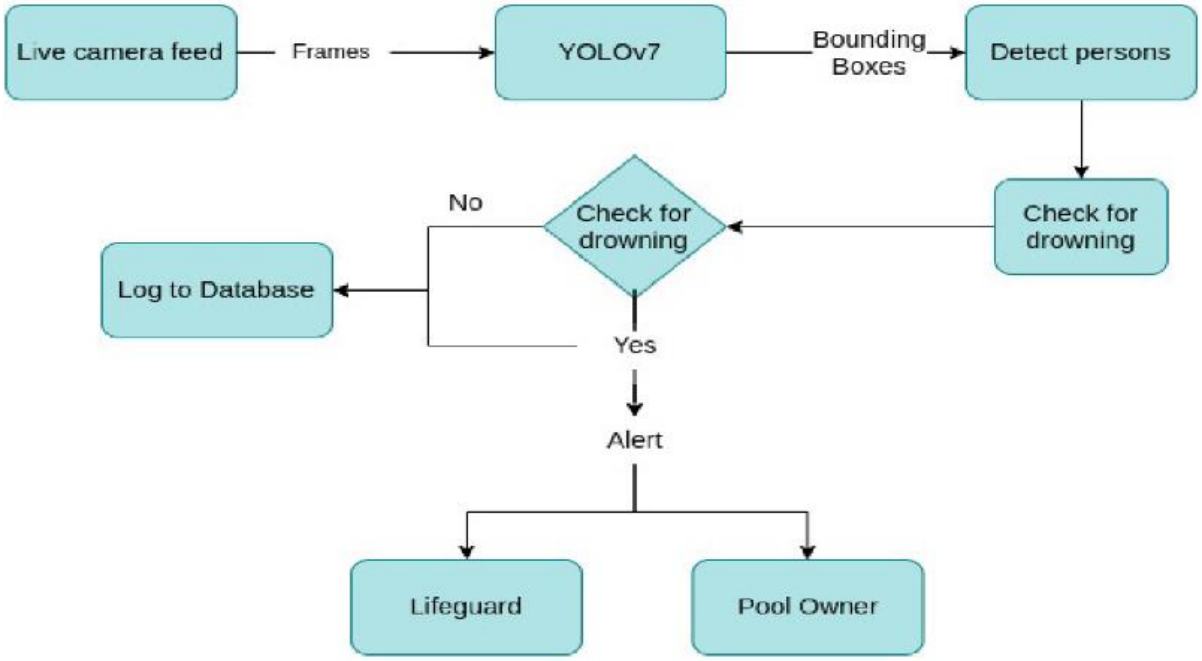
CHAPTER-5

5. PROJECT DESIGN

5.1 DATAFLOW DIAGRAMS

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes theinformation, and where data is stored

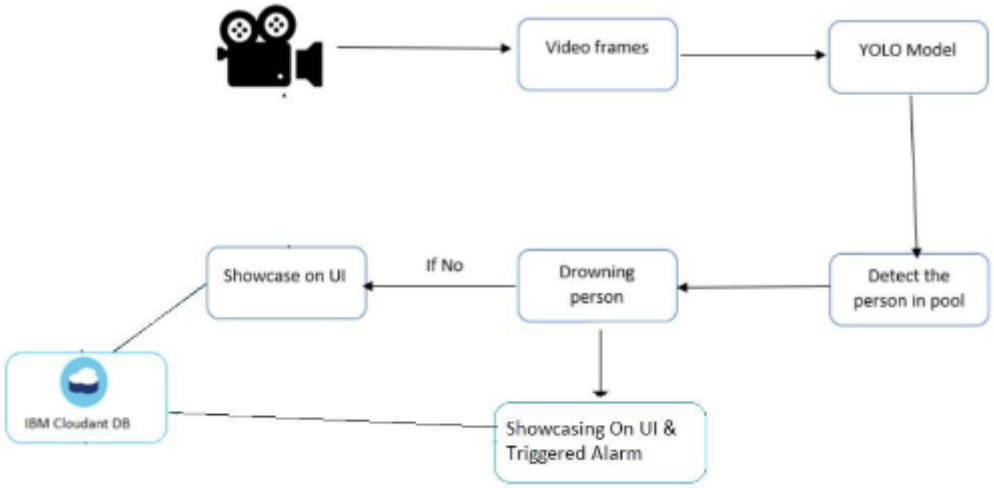


5.2 SOLUTION & TECHNICAL ARCHITECTURE

Solution Architecture:

- To find underwater movement while person in drowning they have any Problem or anything else we will find the solution using the Artificial Intelligence (AI) detection technology.

- Usually, such systems can be developed by installing more than 16 cameras underwater and ceiling and analyzing the video feeds to detect any anomalies. AS a POC we make use of one camera that streams the video underwater and analyses the positionof swimmers to assess the probability of drowning, if it is higher then an alert will be generated to attract lifeguards' attention.



5.3 USER STORIES

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Pool owner)	Installation	USN-1	Install the camera inside the underwater, connect necessary app in the phone or other device	I can cameras to the IBM cloud DB	High	Sprint-1
Customer (Lifeguard	Secure thepeople	USN-2	As a user, I can secure the drowning personsfrom the pool	I can save the drowning person	High	Sprint-1
Customer (swimmers)	safety	USN-3	As a user, I can swim inside the underwater without fear of the Drowning	I can swim safely	medium	Sprint-2
Customer care (Executive)	Contact	USN-4	As a user, I Can resolve if any problem occurs with any device technically	I can contact the customer care executiveto resolve any issues	Medium	Sprint-3
Administrator	Dashboard	USN-5	Management of the drowning detection systemand database management	I can access the system's logs and any other data instantly	High	Sprint-4

CHAPTER-6

6.1 SPRINT PLANNING & ESTIMATION

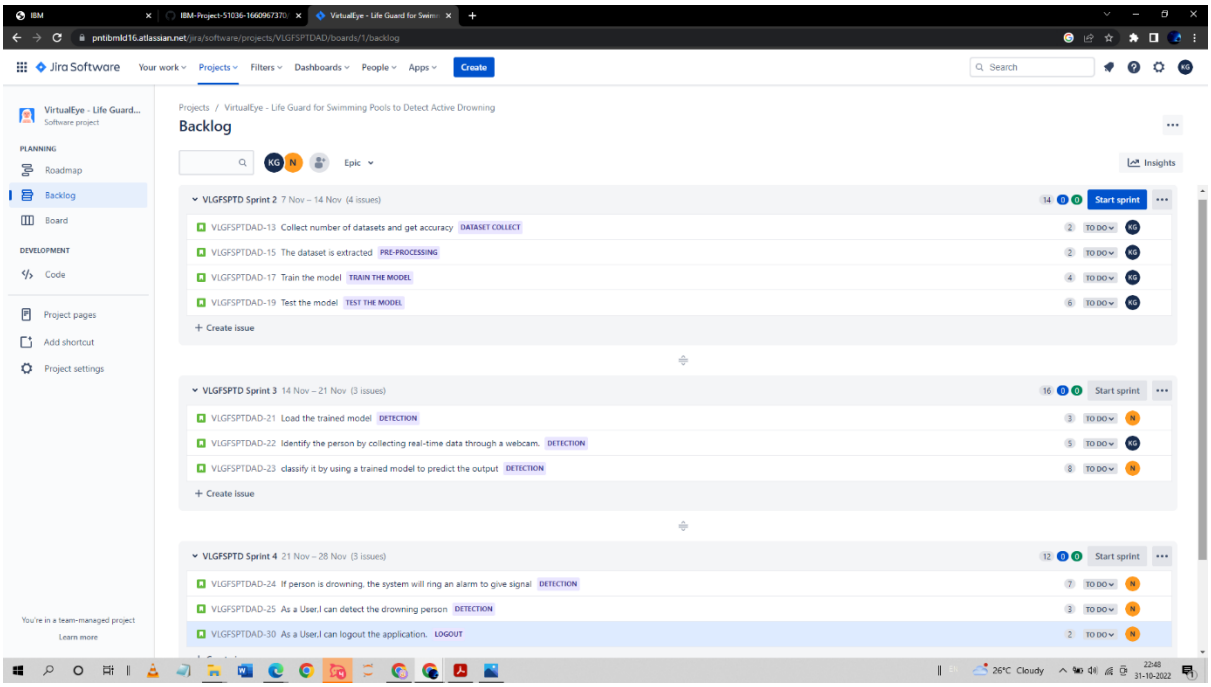
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date(Actual)
Sprint-1	8	6 Days	24 Oct 2022	29 Oct 2022	6	29 Oct 2022
Sprint-2	14	6 Days	31 Oct 2022	05 Nov 2022	12	05 Nov 2022
Sprint-3	16	6 Days	07 Nov 2022	12 Nov 2022	11	12 Nov 2022
Sprint-4	12	6 Days	14 Nov 2022	19 Nov 2022	12	19 Nov 2022

6.2 SPRINT DELIVERY SCHEDULE

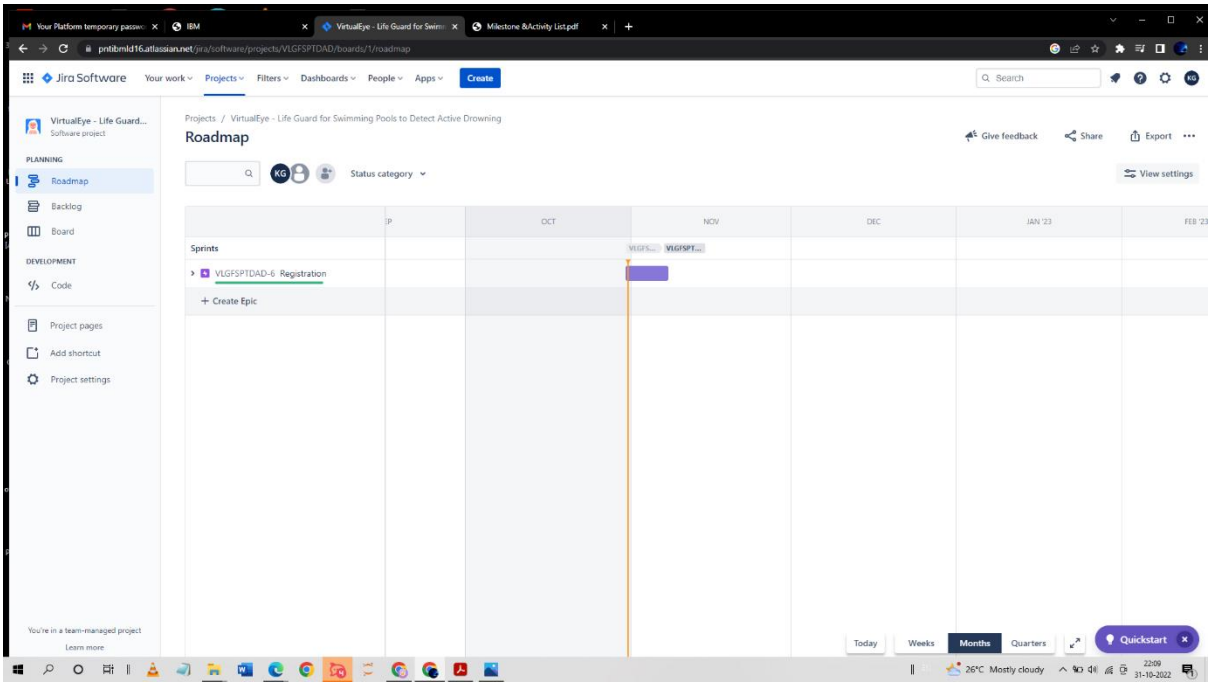
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	VLGFSP-1	As a user, I can register for the application by entering my email, password, and confirmingmy password.	2	High	Nivethitha
Sprint-1	Registration	VLGFSP-2	As a user, I will receive confirmation email oncel have registered for the application	1	High	Muthukumar
Sprint-1	Registration	VLGFSP -3	As a user, I can register for the application through Facebook	2	Low	Azarudeen
Sprint-1	Registration	VLGFSP -4	As a user, I can register for the applicationthrough Gmail	2	Medium	Abinaya
Sprint-1	Login	VLGFSP -6	As a user, I can log into the application byentering email & password	1	High	Nivethitha
Sprint-2	Dataset Collect	VLGFSP -11	Collect number of datasets and get accuracy	2	Medium	Muthukumar
Sprint-2	Pre-processing	VLGFSP -12	The dataset is extracted	2	High	Azarudeen
Sprint-2	Train the model	VLGFSP -13	Train the model.	4	High	Abinaya
Sprint-2	Test the model	VLGFSP -14	Test the model	6	High	Nivethitha
Sprint-3	Detection	VLGFSP -15	Load the trained model.	3	High	Muthukumar
Sprint-3	Detection	VLGFSP -16	Identify the person by collecting real-time datathrough a webcam.	5	Medium	Azarudeen
Sprint-3	Detection	VLGFSP -16	classify it by using a trained model to predictthe output	8	High	Abinaya
Sprint-4	Detection	VLGFSP -17	If person is drowning, the system will ring analarm to give signal	7	High	Nivethitha
Sprint-4	Detection	VLGFSP -18	As a User,I can detect the drowning person.	3	Medium	Muthukumar
Sprint-4	Logout	VLGFSP -19	As a User,I can logout the application.	2	Low	Azarudeen

6.3 REPORT FROM JIRA

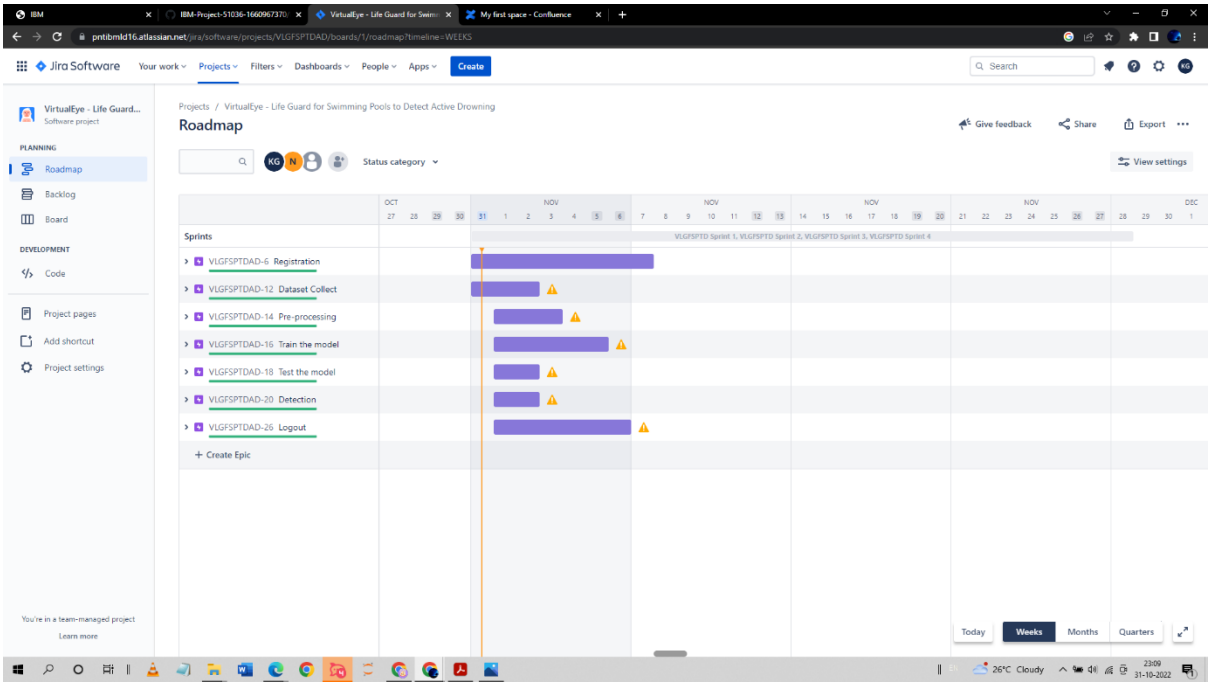
Backlog (scrum)



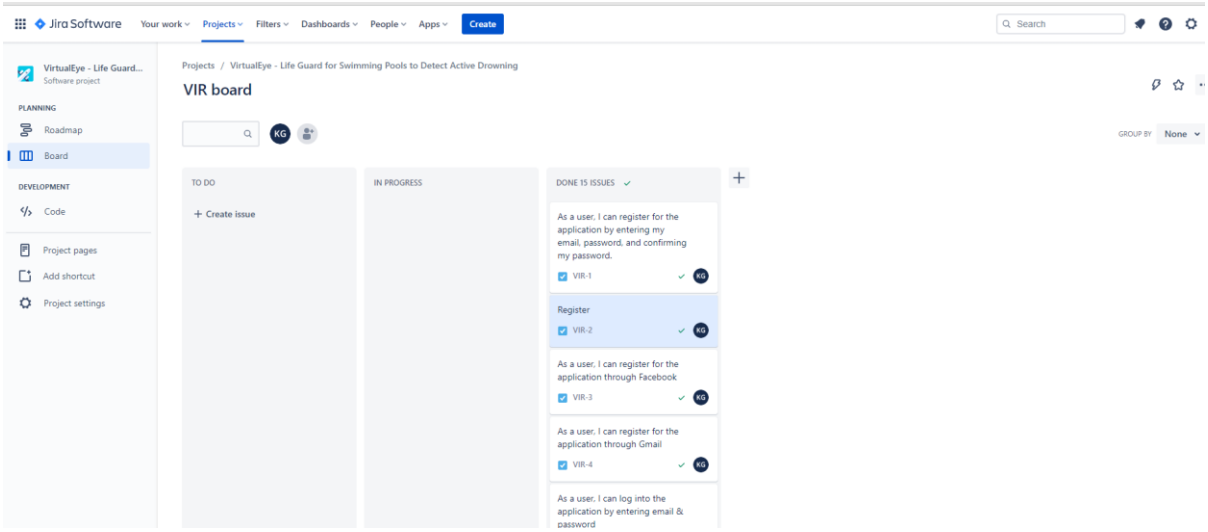
Roadmap



Chart



Board (Kanban)



CHAPTER-7

7. CODING & SOLUTION

7.1 FEATURE 1

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layers = -1, 61

[convolutional]

batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear

[yolo]
mask = 3,4,5

anchors = 10,13, 16,30, 33,23, 30,61, 62,45, 59,119, 116,90,
156,198, 373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1random=1

[route] layers = -4

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[upsample]
stride=2

[route]
layers = -1, 36

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=256
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1

pad=1 filters=256
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=256
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear

[yolo]
mask = 0,1,2
anchors = 10,13, 16,30, 33,23, 30,61, 62,45, 59,119, 116,90,
156,198, 373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1
random=1

7.2 FEATURE 2

```
#import necessary packagesimport
cv2
import os
import numpy as np
from .utils import download_file

initialize = Truenet
= 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 scriptclass_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 blueif 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
```

CHAPTER-8

8.TESTING

8.1 TEST CASES

Test case ID	Feature Type		Test Scenario	Steps TO Execute	Test	Expected Result	Actual Result
LoginPage_TC_OO1	Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on My account button	I.Enter URL and click go 2.Click on My Account dropdown button 3.Verify login/Singup popup displayed or not	Login.html	Login/Signup popup should display	Working as
LoginPage_TC_002		Home Page	Verify the UI elements in Login/Signup popup	I.Enter URL and dick go 2.Click on My Account dropdown 3.Verify login/Singup popup with below UI elements: a.email text box b.password text box c. L%in button d.New customer? Create account link e. Last password? Recovery password link	Login.html	Application should show below elements: a.email text box b.password text box c.Login button with orange colour d. New custotner? Create account link e.Last password? Recovery password link	Working as expected
LoginPage_TC_OO3	Functional	Home page	Verify user is able to log into application with Valid credentials	I.Enter URL and dick go 2.Click on My Account dropdown 3.Enter Valid username/email in Email text 4.Enter valid password in password text box 5. Click On in button	Username:lax@gmail password: lax26	User should navigate to prediction homepage	working as
LoginPage_TC_OO4	Functional	Login page	Verify user is able to log into application with Invalid credentials	1, Enter URL and click go 2.Click on My Account dropdownbutton 3.Enter Invalid username/email in Email text box 4.Enter valid password in password text box 5.Click on •n button	Username:lax password:lax26	Application should show 'Incorrect email or password ' validation message.	working as
LoginPage_TC_004	Functional	Login page	Verify user is able to log into application with Invalid credentials	I-Enter URL and click go 2.Click On My Account dropdown 3.Enter Valid username/email In Email text box 4.Enter Invalid password in password text box 5.Click on in button	username:lax26@mail password:lax26	Application should show •Incorrect email or password ' validation message.	working as
LoginPage_TC_OO5	Functional	Login page	Verify user is able to into application with InValid credentials	I.Enter URL and click go 2.Click on My Account dropdown 3.Enter Invalid username/email in Email text box 4. Enter Invalid password in password text box 5. Click on I in button	username:lax26@mail password:1803	Application should show 'Incorrect email or password ' validation message.	working as
Predictionpage_TC_ 00 6	Functional	Prediction Page	Page should display whether the person is drowning or not	1, Camera should take pictures of people swimming in pools 2. It should predict the probability of drowning 3. It should show a bounding box displaying the probability Of drowning	image Of people drowning	generate a alert to lifeguard if people are drowning	Working as

8.2 USER ACCEPTANCE TESTING

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and howthey were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	7	3	1	2	13
Duplicate	1	0	2	0	3
External	2	3	0	1	6
Fixed	10	2	4	10	26
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	1	0	0	41
Security	42	0	0	42
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

CHAPTER-9

9.RESULT

9.1 PERFORMANCE METRICS

```
<html lang="en">

<head>
        <meta charset="UTF-8">

    <meta name="viewport" content="width=device-width, initial-scale=1.0">

        <meta http-equiv="X-UA-Compatible" content="ie=edge">

        <title>High Quality Facial Recognition</title>

    <link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min. css" rel="stylesheet">

    <script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.js">

    </script>

    <script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js">

    </script>

    <script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js">

    </script>
```

```
<link href="{{ url_for('static', filename='css/main.css') }}"rel="stylesheet">
            <style>
            .bg-dark {
                  background-color: #42678c!important;
            }
            #result {
                  color: #0a1c4ed1;
            }
            </style>
</head>

<body style="background-color:black";>
<header id="head" class="header">
          <section  id="navbar">
                <h1 class="nav-heading"></i>Virtual Eye</h1>
             <div class="nav--items">
                <ul>
                   <li><a  href="{{ url_for('index')}}">Home</a></li>
                                 <li><a
href="{{ url_for('logout')}}">Logout</a></li>
                  <!-- <li><a href="#about">About</a></li>
                  <li><a href="#services">Services</a></li> -->

      </ul>
      </div>
      </section>
         </header>
         <div class="container">
            <div id="content" style="margin-top:2em">
                  <div class="container">
                    <div class="row">
                          <div class="col-sm-6 bd" >
```

```
                    <h2><em style="color:white;">High Quality Facial
Recognition</em></h2>
                        <br>
                    <p><h5><i style="color:white;">Emotion Detection Through
Facial Feature Recognition</i></h5></p>
                        <img src="https://130e178e8f8ba617604b-
8aedd782b7d22cfe0d1146da69a52436.ssl.cf1.rackcdn.com/facial- recognition-
use-triggers-gdpr-fine-showcase_image-10-a- 12991.jpg"
style="height:240px"class="img-rounded" alt="Gesture">
                    </div>
                    <div class="col-sm-6">
                        <div>
                            <h4 style="color:white;">Upload
Image Here</h4>
                <form action = "http://localhost:5000/" id="upload-file"
method="post" enctype="multipart/form-data">
                            <label for="imageUpload" class="upload-
label">
                                Choose Image
                            </label>
                            <input type="file" name="image"
id="imageUpload" accept=".png, .jpg, .jpeg,.pdf">
                    </form>

                    <div class="image-section" style="display:none;">
                        <div class="img-preview">
                            <div id="imagePreview">
                            </div>
                        </div>
                        <div>
                          <button type="button" class="btn btn-info btn-lg "
id="btn-predict">Analyse</button>
```

```
    </div>
                        </div>

                        <div class="loader" style="display:none;"></div>

                        <h3>
                            <span id="result"> </span>
                        </h3>


                    </div>
                        </div>

                      </div>
                    </div>
                    </div>
</div>
</body>


<footer>
   <script src="{{ url_for('static', filename='js/main.js') }}"
type="text/javascript"></script>
</footer>

</html>
```

Index.html

```
<!DOCTYPE html>
<html lang="en">
<head>
        <meta charset="UTF-8">
        <meta http-equiv="X-UA-Compatible" content="IE=edge">
```

```
    <meta name="viewport" content="width=device-width, initial-scale=1.0">

        <!--Bootstrap -->
    <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/css/bootstrap.min.css" integrity="sha384-Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm" crossorigin="anonymous">
    <script src="https://code.jquery.com/jquery-3.2.1.slim.min.js" integrity="sha384-KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93hXpG5KkN" crossorigin="anonymous"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.12.9/umd/popper.min.js" integrity="sha384-ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPskvXusvfa0b4Q" crossorigin="anonymous"></script>
    <script src="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/js/bootstrap.min.js" integrity="sha384-JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PVCmYl" crossorigin="anonymous"></script>


    <script src="https://kit.fontawesome.com/8b9cdc2059.js" crossorigin="anonymous"></script>
    <link href="https://fonts.googleapis.com/css2?family=Akronim&family=Roboto&display=swap" rel="stylesheet">
        <link rel="stylesheet" href="../static/style.css">
        <!-- <script defer src="../static/js/main.js"></script> -->
        <title>Virtual Eye</title>
```

```
</head>
<body>
        <header id="head" class="header">
        <section  id="navbar">
              <h1 class="nav-heading"></i>Virtual Eye</h1>
           <div class="nav--items">
              <ul>
                                    <li><a
href="{{ url_for('index')}}">Home</a></li>
                                    <li><a
href="{{ url_for('login')}}">Login</a></li>
                                    <li><a
href="{{ url_for('register')}}">Register</a></li>
                  <li><a href="{{ url_for('login')}}">Demo</a></li>
              </ul>
           </div>
        </section>
        <section id="slider">
   <div id="carouselExampleIndicators" class="carousel" data-ride="carousel">
            <ol class="carousel-indicators ">
         <li      data-target="#carouselExampleIndicators"      data-slide-      to="0"
class="active "></li>
          <li data-target="#carouselExampleIndicators" data-slide-to="1"></li>
          <li data-target="#carouselExampleIndicators" data-slide-to="2"></li>
            </ol>
            <div class="carousel-inner">

              <div class="carousel-item active">
            <img class="d-block w-100" src="../static/img/1.png"alt="First slide">
```

```
                </div>
                <div class="carousel-item">
              <img    class="d-block    w-100"    src="../static/img/second.jpg"
alt="Second slide">
                </div>
                <div class="carousel-item">
              <img class="d-block w-100" src="../static/img/third.jpg"alt="Third slide">
                </div>
              </div>
       <a       class="carousel-control-prev"       href="#carouselExampleIndicators"
role="button" data-slide="prev">
          <span          class="carousel-control-prev-icon"          aria-
hidden="true"></span>
                <span class="sr-only">Previous</span>
              </a>
       <a       class="carousel-control-next"       href="#carouselExampleIndicators"
role="button" data-slide="next">
          <span          class="carousel-control-next-icon"          aria-
hidden="true"></span>
                <span class="sr-only">Next</span>
</a>
</div>

         </section>
</header>
<section id="about">
          <div class="top">
              <h3    class="title    text-muted">
                 ABOUT PROJECT
              </h3>
```

<h2>Problem:</h2>

Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in the hotels, weekend tourist spots and barelypeople have in their house backyard. Beginners, especially oftenfeel it difficult to breathe under water and causes breathing trouble which in turn cause a drowning accident. Worldwide, drowning produces a higher rate of mortality without causing injury to children. Children under six of their age are found to besuffering the highest drowning mortality rates worldwide..Such kinds of deaths account for the third cause of unplanned death globally, with about 1.2 million cases yearly.

<h2>Solution:</h2>

To overcome the conflict, a meticulous system is to be implemented along the swimming pools to save the human life. Bystudying body movement patterns and connecting cameras to an artificial intelligence (AI)system we can devise an underwater poolsafety system that reduces the risk of drowning. Usually such systems can be developed by installing more than 16 cameras underwater and ceiling and analysing the video feeds to detect any anomalies . but AS a POC we make use of one camera that streams the video underwater and analyses the position of

swimmers to assess the probability of drowning ,if it is higher thanan alert will be generated to attract lifeguards attention.

Note : The system is not designed to replace a lifeguard or other human monitor, but to act as an additional tool. â€œIt helpsthe lifeguard to detect the underwater situation where they canâ€™t easily observe.

</section>

<section id="footer">
Copyright Â© 2022. All Rights Reserved

</section>
</body>
</html>

Logout.html

```
<!DOCTYPE html>
<html >

<head>
        <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
        <title>Virtual Eye</title>
  <link                    href='https://fonts.googleapis.com/css?family=Pacifico'
rel='stylesheet' type='text/css'>
<link                    href='https://fonts.googleapis.com/css?family=Arimo'
rel='stylesheet' type='text/css'>
<link        href='https://fonts.googleapis.com/css?family=Hind:300'       rel='stylesheet'
type='text/css'>
<link  href='https://fonts.googleapis.com/css?family=Open+Sans+Condensed:300'
rel='stylesheet' type='text/css'>


<link               href='https://fonts.googleapis.com/css?family=Merriweather'
rel='stylesheet'>
<link           href='https://fonts.googleapis.com/css?family=Josefin            Sans'
rel='stylesheet'>
<link                    href='https://fonts.googleapis.com/css?family=Montserrat'
rel='stylesheet'>

<style>
.header {
                    top:0; margin:0px;
```

```
                    left:  0px;
                    right: 0px;
                    position: fixed;
                    background-color:  #28272c;
                    color: white;
                    box-shadow: 0px 8px 4px grey;
                    overflow: hidden;
                    padding-left:20px;
                    font-family: 'Josefin Sans';
                    font-size: 2vw;
                    width: 100%;
                    height:8%;
                    text-align: center;
                }
                .topnav {
  overflow: hidden;
  background-color: #333;
}

.topnav-right a {
  float: left; color:
  #f2f2f2;
  text-align: center;
  padding: 14px 16px; text-
  decoration: none; font-
  size: 18px;
}

.topnav-right a:hover {
  background-color: #ddd;
  color: black;
}
```

```
      .topnav-right        a.active        {
        background-color:      #565961;
        color: white;
}

      .topnav-right    {
        float: right;
        padding-right:100px;
}

.login{
margin-top:-70px;
}
body {

        background-color:#ffffff;
        background-repeat:          no-repeat;
        background-size:cover;
        background-position: 0px 0px;
        }
.main{
              margin-top:100px;
              text-align:center;
}
form { margin-left:400px;margin-right:400px;}

input[type=text],  input[type=email],input[type=number],input[type=password]   {
width: 100%;
        padding:     12px     20px;
        display:       inline-block;
        margin-bottom:18px;
        border: 1px solid #ccc;
```

```
        box-sizing: border-box;
}

button {
        background-color:       #28272c;
        color: white;
        padding:   14px   20px;
        margin-bottom:8px;
        border:   none;   cursor:
        pointer; width: 20%;
}

       button:hover     {
        opacity: 0.8;
}

       .cancelbtn           {
        width: auto;
        padding:          10px          18px;
        background-color: #f44336;
}

       .imgcontainer  {  text-
        align: center;
        margin: 24px 0 12px 0;
}

       img.avatar     {
        width: 30%;
        border-radius: 50%;
}
```

```
        .container          {
          padding: 16px;
}

        span.psw      {
          float: right;
          padding-top: 16px;

}

/* Change styles for span and cancel button on extra small screens
*/
        @media  screen  and  (max-width:  300px)  {
          span.psw {
             display:    block;
             float: none;
          }
          .cancelbtn         {
             width: 100%;
          }
}

</style>
</head>

<body style="font-family:Montserrat;">

<div class="header">
 <div  style="width:50%;float:left;font-size:2vw;text-  align:left;color:white;  padding-top:1%">Virtual eye</div>
          <div class="topnav-right" style="padding-top:0.5%;">

            <a  href="{{ url_for('home')}}">Home</a>
```

```
          <a href="{{ url_for('login')}}">Login</a>
          <a href="{{ url_for('register')}}">Register</a>
        </div>
</div>
<div class="main">
<h1>Successfully Logged Out!</h1>
<h3 style="color:#4CAF50">Login for more information<h3>

        <a     href="{{     url_for('login')     }}"><button
type="submit">Login</button></a>
</form>
</div>

</body>
</html>
```

Prediction.html

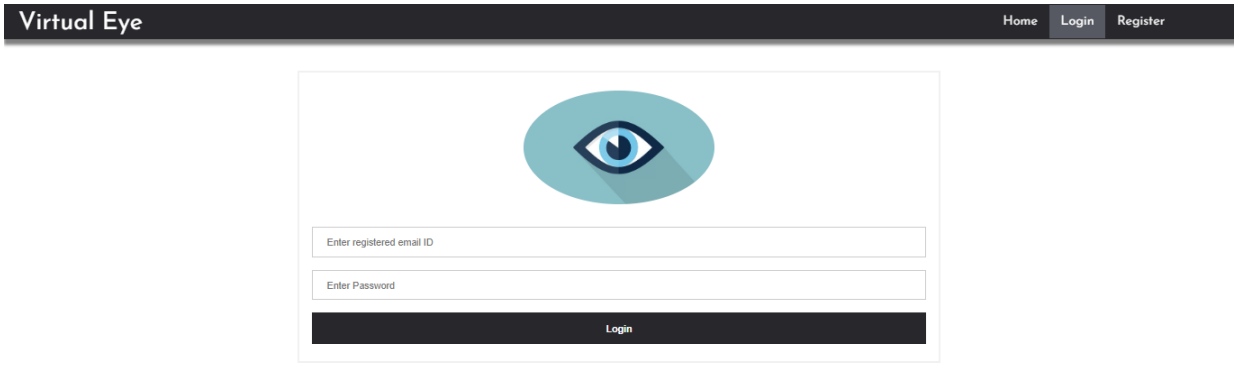
```
<!DOCTYPE html>
<html lang="en">
<head>
          <meta charset="UTF-8">
          <meta http-equiv="X-UA-Compatible" content="IE=edge">
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
          <!--Bootstrap -->
   <link  rel="stylesheet"  href="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/css/boo
tstrap.min.css"                                                    integrity="sha384-
Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGg
FAW/dAiS6JXm" crossorigin="anonymous">
   <script                    src="https://code.jquery.com/jquery-3.2.1.slim.min.js"
integrity="sha384-
```

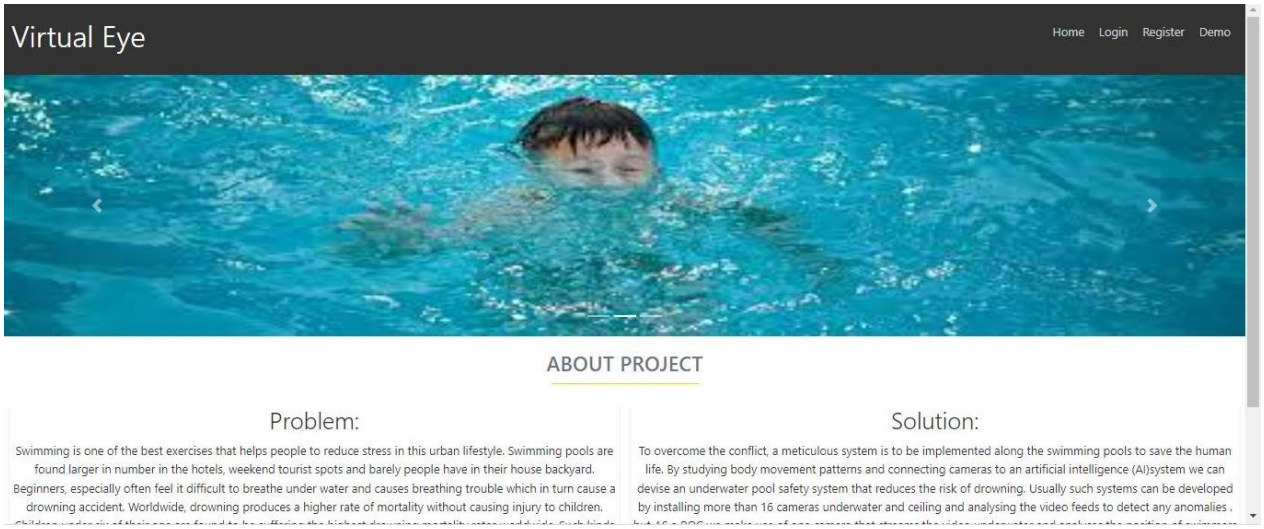
```
KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpG
FF93hXpG5KkN" crossorigin="anonymous"></script>
   <script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.12.9/umd/
popper.min.js" integrity="sha384-
ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPsk
vXusvfa0b4Q" crossorigin="anonymous"></script>
   <script src="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/js/bootst
rap.min.js" integrity="sha384-
JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5
+76PVCmYl" crossorigin="anonymous"></script>


   <script src="https://kit.fontawesome.com/8b9cdc2059.js"
crossorigin="anonymous"></script>
   <link href="https://fonts.googleapis.com/css2?family=Akronim&family=
Roboto&display=swap" rel="stylesheet">
        <link rel="stylesheet" href="../static/style.css">


        <script defer src="../static/js/JScript.js"></script>
        <title>Prediction</title>
</head>
<body>
        <header id="head" class="header">
           <section  id="navbar">
                <h1 class="nav-heading"></i>Virtual Eye</h1>
              <div class="nav--items">
                <ul>
                   <li><a  href="{{ url_for('index')}}">Home</a></li>
```

```
                                    <li><a
href="{{ url_for('logout')}}">Logout</a></li>
                    <!-- <li><a href="#about">About</a></li>
                    <li><a href="#services">Services</a></li> -->

        </ul>
        </div>
        </section>
            </header>
            <!-- dataset/Training/metal/metal326.jpg -->
            </br>
            <section id="prediction">
    <h2 class="title text-muted">Virtual Eye- Life Guard forSwimming Pools to
Detect Active Drowning</h1>
            <div class="line" style="width: 900px;"></div>
                        </section>
                        </br>
                <section id="about">

<div class="body">
<div class="left">
            <p>
```

Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in the hotels, weekend tourist spots and barelypeople have in their house backyard. Beginners, especially oftenfeel it difficult to breathe under water and causes breathing trouble which in turn cause a drowning accident. Worldwide, drowning produces a higher rate of mortality without causing injury to children. Children under six of their age are found to besuffering the highest drowning mortality rates worldwide..Such kinds of deaths account for the third cause of unplanned death globally, with about 1.2 million cases yearly.

```
                    </p>
</div>
<div class="left">

        <div class="prediction-input">
      <img class="d-block w-100" src="../static/img/second.jpg"alt="Second slide">
            </br>
            <form       id="form"       action="/result"       method="post"
enctype="multipart/form-data">

              <input type="submit" class="submitbtn" value="ClickMe! For a
Demo">
                  </form>
              </div>
              <h5 style="text-color:Red">
              <b style="text-color:Red">{{prediction}}<b>
             </h5>
</div>
</div>
</section>

          </br></br>


        <section id="footer">
          <p>Copyright Â© 2021. All Rights Reserved</p>

        </section>
</body>

</html>
```


Virtual Eye
Home
Login
Register
Enter registered email ID
Enter Password
Login


Virtual Eye
Home
Login
Register
Demo
ABOUT PROJECT
Problem:
Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in the hotels, weekend tourist spots and barely people have in their house backyard. Beginners, especially often feel it difficult to breathe under water and causes breathing trouble which in turn cause a drowning accident. Worldwide, drowning produces a higher rate of mortality without causing injury to children.
Solution:
To overcome the conflict, a meticulous system is to be implemented along the swimming pools to save the human life. By studying body movement patterns and connecting cameras to an artificial intelligence (AI)system we can devise an underwater pool safety system that reduces the risk of drowning. Usually such systems can be developed by installing more than 16 cameras underwater and ceiling and analysing the video feeds to detect any anomalies .

Virtual Eye

Home Logout

Virtual Eye- Life Guard for Swimming Pools to Detect Active Drowning

Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in the hotels, weekend tourist spots and barely people have in their house backyard. Beginners, especially often feel it difficult to breathe under water and causes breathing trouble which in turn cause a drowning accident. Worldwide, drowning produces a higher rate of mortality without causing injury to children. Children under six of their age are found to be suffering the highest drowning mortality rates worldwide..Such kinds of deaths account for the third cause of unplanned death globally, with about 1.2 million cases yearly.

Click Me! For a Demo

Virtual Eye

Home Logout

Virtual Eye- Life Guard for Swimming Pools to Detect Active Drowning

Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in the hotels, weekend tourist spots and barely people have in their house backyard. Beginners, especially often feel it difficult to breathe under water and causes breathing trouble which in turn cause a drowning accident. Worldwide, drowning produces a higher rate of mortality without causing injury to children. Children under six of their age are found to be suffering the highest drowning mortality rates worldwide..Such kinds of deaths account for the third cause of unplanned death globally, with about 1.2 million cases yearly.

Click Me! For a Demo

Emergency !!! The Person is drowining

CHAPTER-10

10. ADVANTAGES & DISADVANTAGES

***ADVANTAGES:**

(i) user feel comfortable and more secure

(ii) Children, adult, pet animal , old age people are used

(iii) spending more time for family, freedom for safety guards near the Swimming pool

(iv) Swimmers, resort are gain in the financal

(v) drowning should be monitored

***DISADVANTAGE:**

(i) For uneducated people will suffer from this technology
(ii) Electricity will be required
(iii) Software and hardware requirement will need

CHAPTER-11

11. CONCLUSION

This section will draw from three core documents: ISO_20380, HSG179, and the recently published German guideline, DGfdB R 94.15. A summary of each is given, outlining the key messages they disseminate and what this means for those involved with DDS.

ISO_20380 This document focuses on the requirements for the installation, operation, maintenance and performance of DDS, the testing methods, and the information required from the supplier in the operating manual. These international standards do not apply to systems used in domestic pools or pools smaller than 150m2 .

Prior to the installation of any DDS, 'a technical study shall be carried out by the supplier in consultation with or based on information provided by the swimming pool's owner/operator'. This is to establish the quantity and positioning of the equipment making up the system such as cameras, central processing unit, alarm tools, and other related equipment. The technical study must also provide a technical drawing of the pool basin, showing areas of 'coverage' and 'non-coverage', as well as the minimum lighting levels required above and below the water surface for the DDS to operate within performance requirements. To carry out the study, a list of factors to consider are given, outlining the variables that make each pool unique such as the architecture, and alarm reception coverage area of mobile devices to be used with the system. With this information all in one document, the technical study can be used to help optimise performance of the system, and forms part of the contract between the supplier and the pool operator. The next area of the standard is the performance requirements. This outlines the requirements needed to pass the regular maintenance testing and performance requirements for normal operation. This section covers the alarm set off time for operational performance, which is to be 15 seconds or less and displayed on the system interface. It also states that the alarm set off time must be built-in and shall not be changeable by staff. The section also discusses the areas covered by the DDS and highlights that each trained staff member must be aware of these areas. Another coverage-related requirement is that the DDS must be able to temporarily create areas where detection is disabled, to manage specific activities such as rescue drills.

CHAPTER-12

12. FUTURE SCOPE

This lifeguard system consists of three main components, i.e., the drowning detection, the rescuing drone, and the hazardous activity detection. All three components combined will create a system capable of detecting drowning victims, dispatching an inflatable tube using a drone (as depicted in Fig.9) and detecting hazardous activities—eventually becoming an entity that could assist a lifeguard. The system is accessible to its primary user, presumably a pool owner or a lifeguard, in the form of an interface with a sound alarm and an android mobile service that holds the capabilities of receiving Firebase notifications. Confined with a few of the hardware limitations, such as the use of a single camera and the Jetson Nano at the presence of better-quality hardware, could affect the speed and accuracy of the overall system is becoming a state-of-theart.

This limitation could be omitted with the use of multiple cameras that could be placed over the premises in several ground coordinates, increasing the accuracy of the computer vision algorithms. Moreover, due to the inability to fly a drone in extreme weather conditions such as rain, strong winds or lightning, the system is limited to be used under few specifications. As swimming in extreme weather conditions is not preferred either, the system could be further improved to emit a warning signal if a person was to swim in any of the above weather conditions, bypassing the need to fly the drone. Additionally, all the processing is done on the clientside of the applications on the Jetson Nano board, preventing any security and privacy issues that might arise due to the sensitive information inputted through the cameras. For future developments convenience wise, the system could benefit by having an additional set of cameras to identify and verify a drowning or a hazardous activity on the premises. Accessibility could also be improved by extending the Android service to be an application both in Android and iOS platforms that could hold the details of each premise individually, making a centralized system that watches over the decentralized pool premises. Both drown and hazardous activity detection could be improved by gathering a night time dataset that increases the accuracy of the data in low light.

CHAPTER-13

13. APPENDIX

(i) SOURCE CODE

```
[net]
# Testing#
batch=1
# subdivisions=1#
Training batch=64
subdivisions=16
width=608 height=608
channels=3
momentum=0.9
decay=0.0005 angle=0
saturation = 1.5
exposure = 1.5hue=.1

learning_rate=0.01
burn_in=1000 max_batches =
500200policy=steps
steps=400000,450000
scales=.1,.1

[convolutional]
batch_normalize=1
filters=32 size=3
stride=1
pad=1
activation=leaky

# Downsample

[convolutional]
batch_normalize=1
filters=64 size=3
stride=2
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=32 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=64 size=3
stride=1
pad=1
activation=leaky
```

[shortcut]from=-
3
activation=linear#

Downsample

[convolutional]
batch_normalize=1
filters=128 size=3
stride=2
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=64 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=64 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

Downsample

[convolutional]
batch_normalize=1

filters=256size=3
stride=2 pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3

stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]

batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear#

Downsample

[convolutional]
batch_normalize=1
filters=512 size=3
stride=2

pad=1 activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1

pad=1 activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]

batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear#

Downsample

[convolutional]
batch_normalize=1
filters=1024 size=3

```
stride=2
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
```

activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

######################

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=1024
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=1024

activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=1024
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear

[yolo]
mask = 6,7,8
anchors = 10,13, 16,30, 33,23, 30,61, 62,45, 59,119, 116,90,
156,198, 373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1random=1

[route] layers = -4

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[upsample]
stride=2

[route]
layers = -1, 61

[convolutional]

batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear

[yolo]
mask = 3,4,5

anchors = 10,13, 16,30, 33,23, 30,61, 62,45, 59,119, 116,90,
156,198, 373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1random=1

[route] layers = -4

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[upsample]
stride=2

[route]
layers = -1, 36

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=256
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1

```
pad=1 filters=256
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=256
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear


[yolo]
mask = 0,1,2
anchors = 10,13,  16,30,  33,23,  30,61,  62,45,  59,119,  116,90,
156,198,  373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1
random=1
```

Source code(ii)

```
#import necessary packagesimport
cv2
import os
import numpy as np
from .utils import download_file

initialize = Truenet
= 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 scriptclass_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 blueif 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
```

Github Link:

[Link- Github]

Demo Link

[Project Demo Link]