



An Intelligent Weapon Detection System for Surveillance Cameras

Graduation Project II (Final Presentation)



Team Members

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Agenda

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Introduction



Introduction

Importance & Problem Statement

- Security threats have become common and real in this time, humans are no longer able to protect valuables.
- On the other hand, the presence of humans has become more intense in public places. With so many criminals impossible to discern them by visual ability,
- For this, the developers and the police are working to secure it both technically and realistically. Because security alone is unable to deal with such matters



Valuables
Insurance

Social
Insurance



Teams



Introduction

Aim

Create a system connected to a camera that can identify the criminal who enters public places, by identifying if he is carrying a gun, trifle, or a knife. and to give a warning to all those present in public place and warn them.

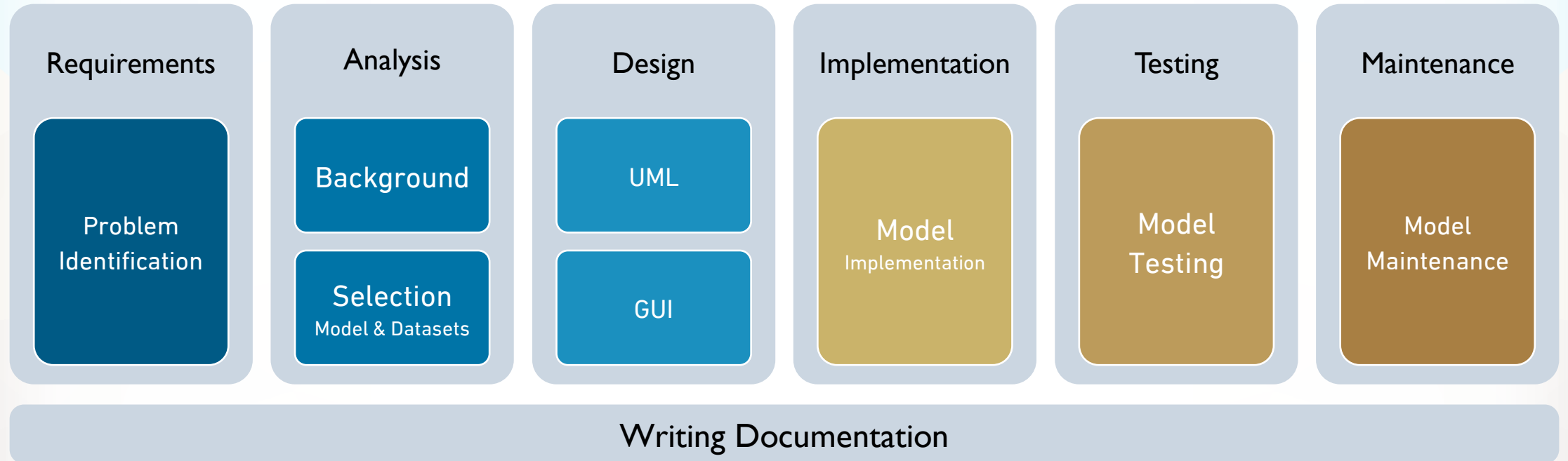
Objectives

1. Create model(s) for threat/Weapon Detection
2. Train the model(s) using relevant data sets
3. Measure the performance of the model(s).
4. Enhance the system until it reaches an accepted accuracy rate.



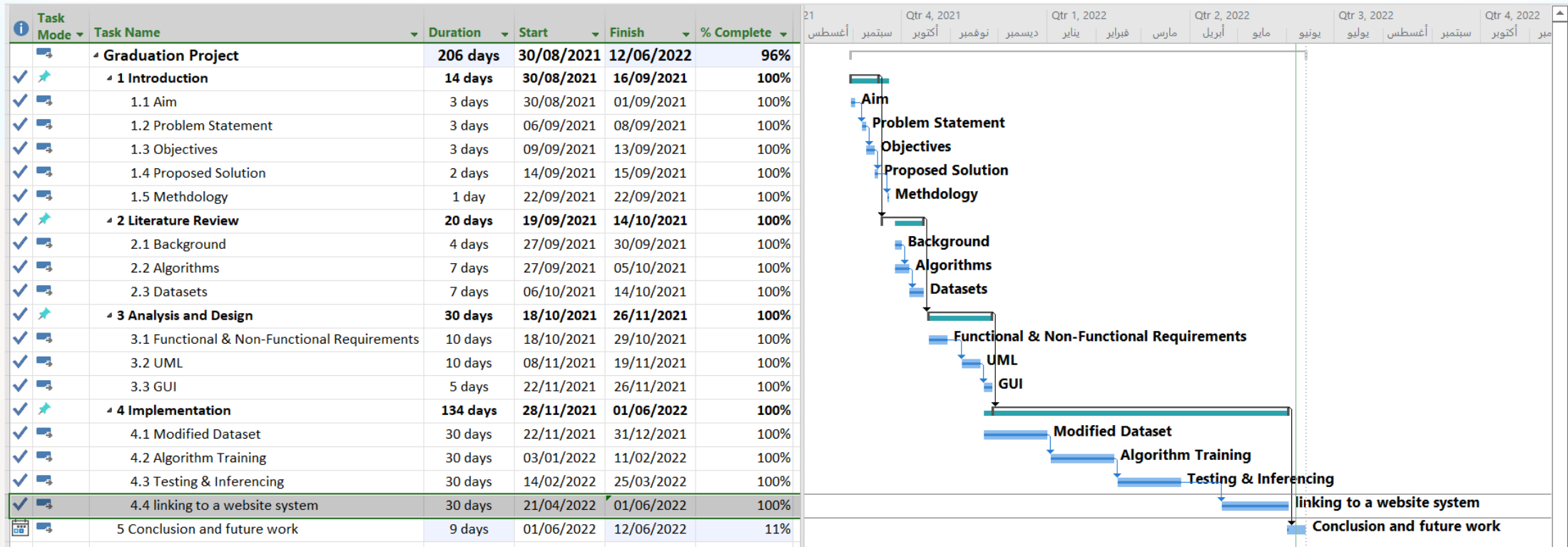
Introduction

Methodology





Introduction | Timeline





Background

Background

Object Detection

Define:

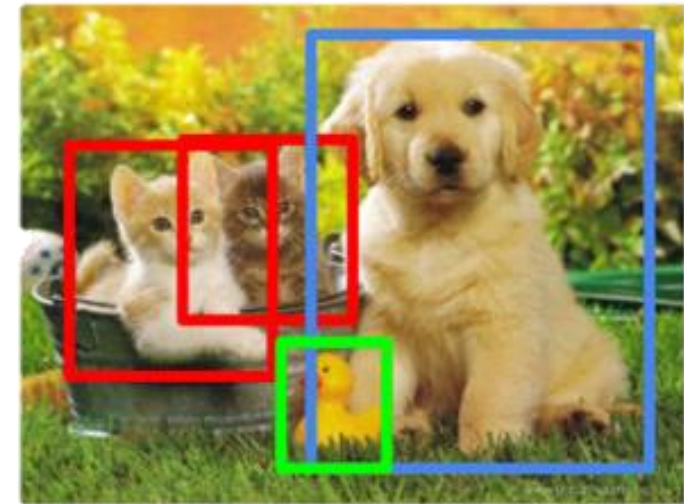
Using a bounding box, determine the presence of things in an image and the types or classes of the objects discovered

Input

an image with one or more things, such as a photograph, is utilized

Output

One or more bounding boxes (e.g., specified by a point, width, and height)



CAT DOG DUCK



Background

Algorithms

YOLOv5: 2020

The YOLOv5 model is the most current addition to the YOLO family of models. It was created and is maintained using the Darknet framework. YOLOv5 is the first YOLO model to be written in the PyTorch framework, making it significantly lighter and easier to use.

PYTORCH

Deep Learning with PyTorch



Analysis & Design



Analysis & Design

Function Requirement

1. Login
2. Create account
3. Identify a person holding a weapon
4. Create an alarm if a weapon detected
5. Display camera stream
6. Logout

Non-Function Requirement

1. The system security
2. Visibility all 24/7
3. Accuracy in recognizing OD
4. Speed in recognizing OD
5. Preserve the privacy of the place



Analysis & Design

Actors



System



Admin



Users



Implementation



Implementation

Modified Dataset

Dataset type	Ful datasets	1st sample
Knife	21500	2570
Gun	15000	3240
Total Datasets	37000	6000

Types of Object detection annotation

1. PascalVOC (.XML)
2. CreateML (.JSON)
3. YOLO (.TXT)



Implementation

YOLO Dataset annotation format

An Object detection annotation format, that having a text file per each picture (containing the annotations and a numeric representation of the label) and a label map (which translates the numeric IDs to human readable strings) are included in this format. The annotations are normalized to lie between 0 and 1, making them easier to deal with even after resizing or extending the photos .

Img.txt	0	0.716797	0.395833	0.216406	0.147222
	1	0.687109	0.379167	0.255469	0.158333
	2	0.420312	0.395833	0.140625	0.166667



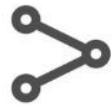
Implementation

Algorithm Training



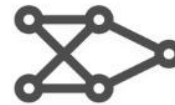
Nano
YOLOv5n

4 MB_{FP16}
6.3 ms_{V100}
28.4 mAP_{COCO}



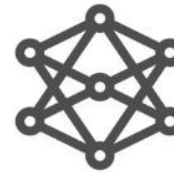
Small
YOLOv5s

14 MB_{FP16}
6.4 ms_{V100}
37.2 mAP_{COCO}



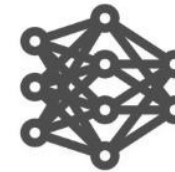
Medium
YOLOv5m

41 MB_{FP16}
8.2 ms_{V100}
45.2 mAP_{COCO}



Large
YOLOv5l

89 MB_{FP16}
10.1 ms_{V100}
48.8 mAP_{COCO}



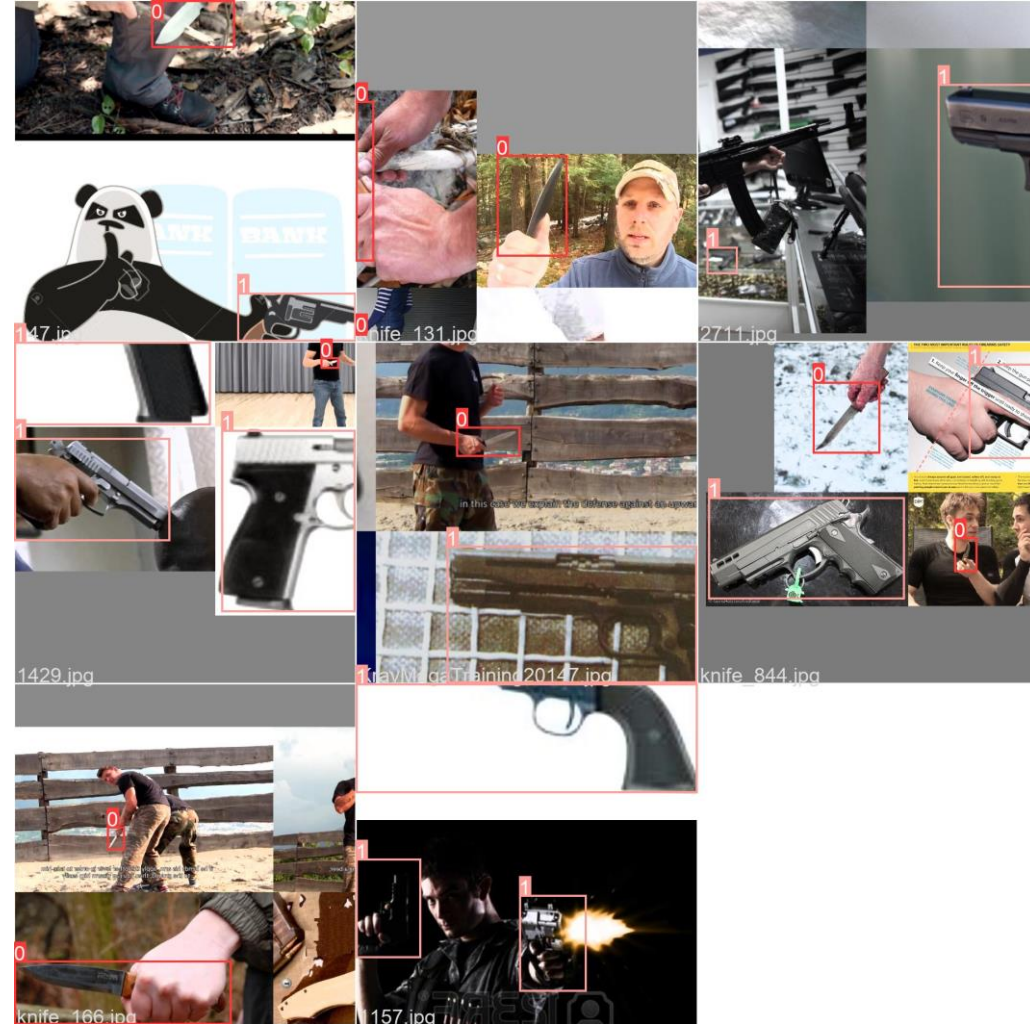
XLarge
YOLOv5x

166 MB_{FP16}
12.1 ms_{V100}
50.7 mAP_{COCO}

Implementation

1st Training: YOLOv5m

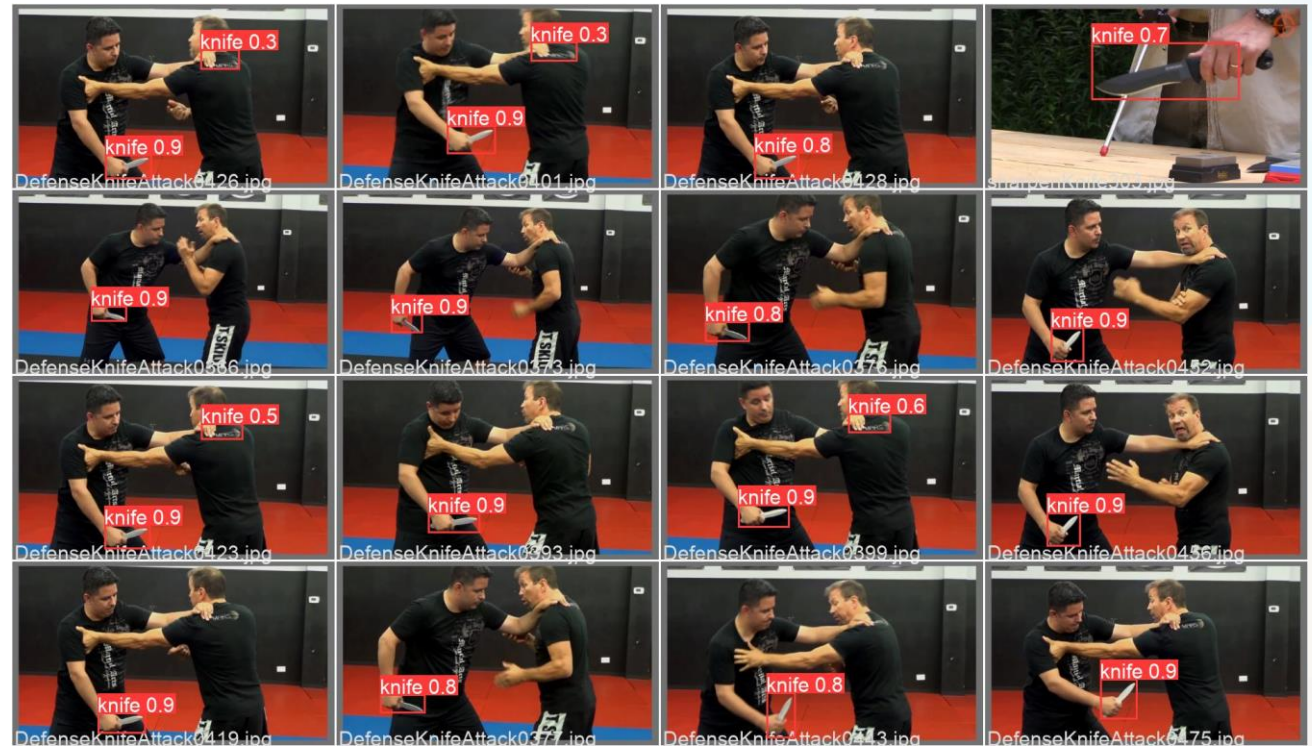
Trained batch of trained model



Implementation

1st Training: YOLOv5m

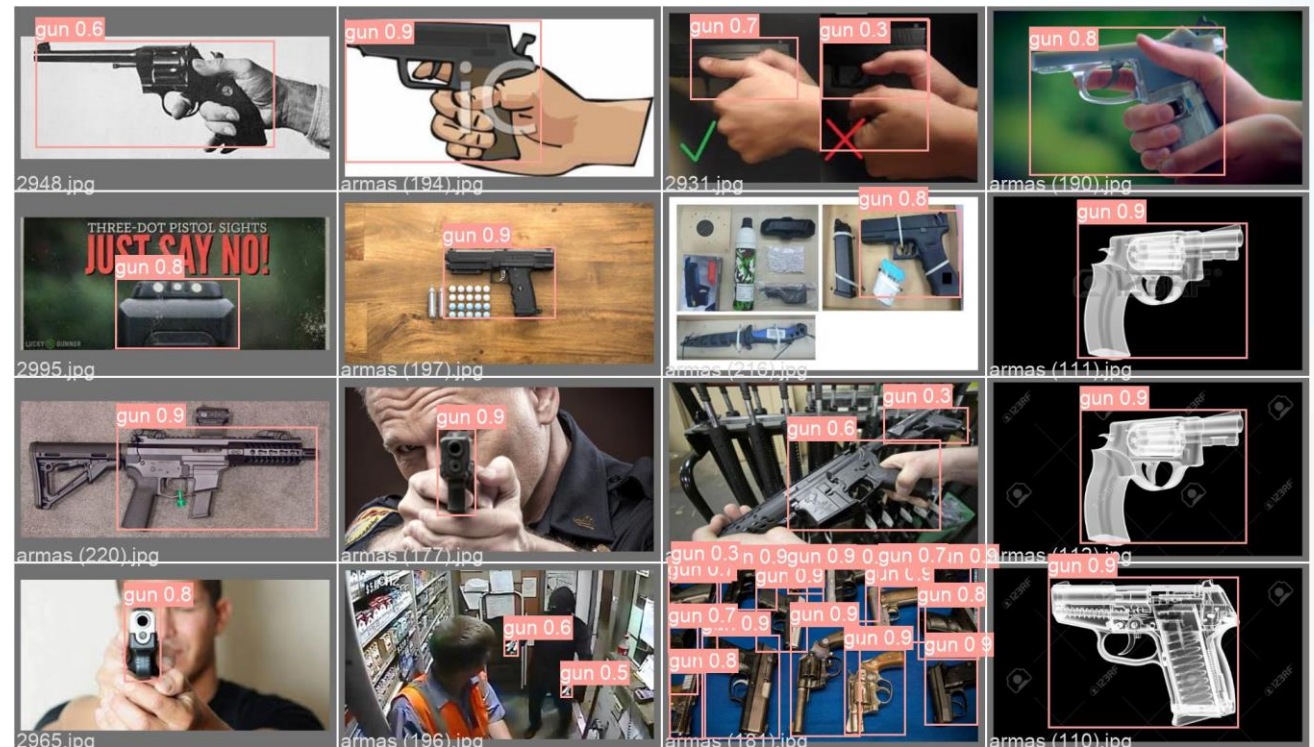
Validation batch of trained model
(knives)



Implementation

1st Training: YOLOv5m

Validation batch of trained model (guns)



Implementation

Tools





Implementation

Website | Our users

WD-CCTV

Welcome : AdminView CameraUser ▾Logout

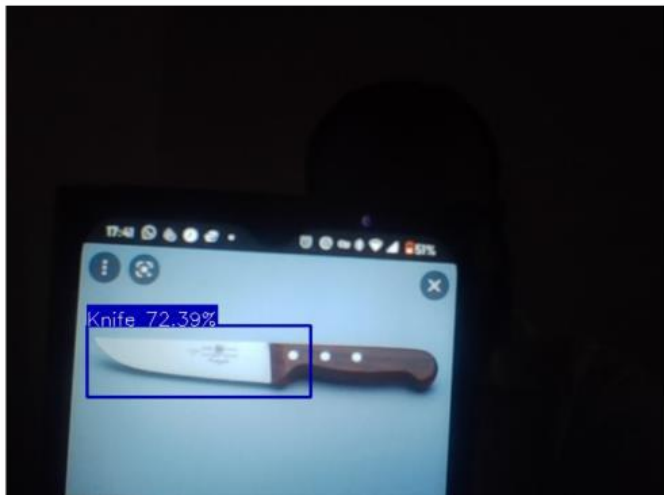
Our Users

Name	Email	Phone	Shift	Update	Delete
Admin	admin@wd-cctv.com	566666666	1	Update	Delete
1	1@cctv.com	54454646	2	Update	Delete

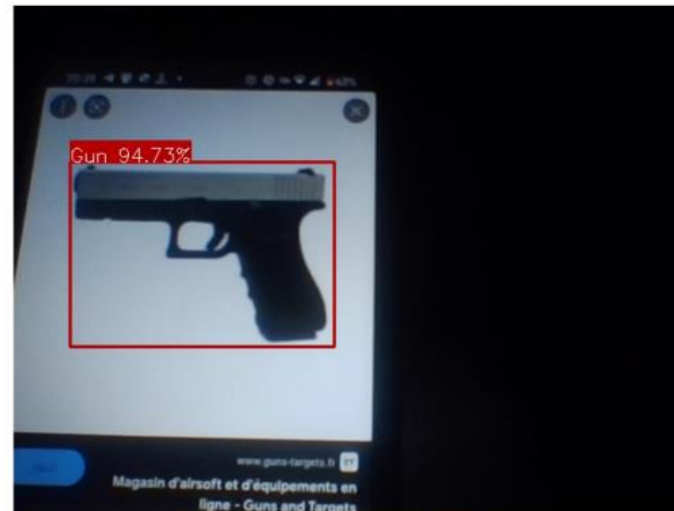
Implementation

Website | Detect using camera

Viewing Camera



Viewing Camera



Camera

Name: Webcam

Location: Labtop



Implementation

Webstie



Thanks! For



Listening