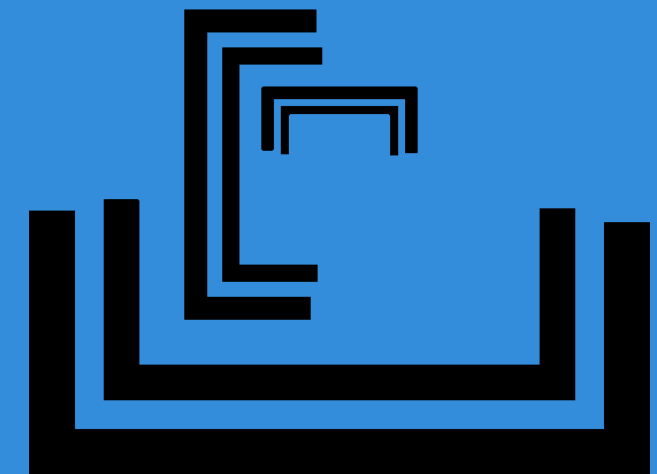
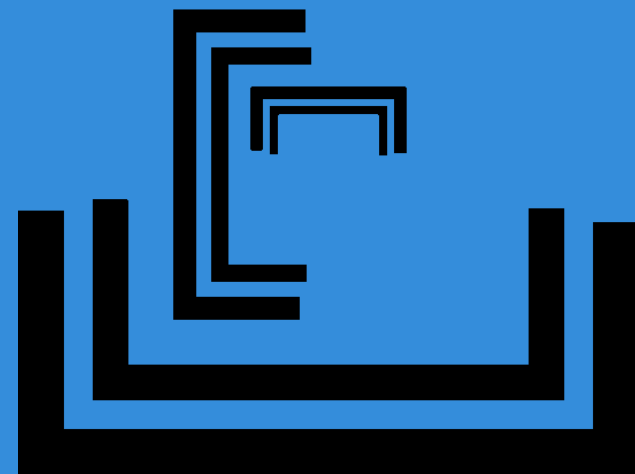
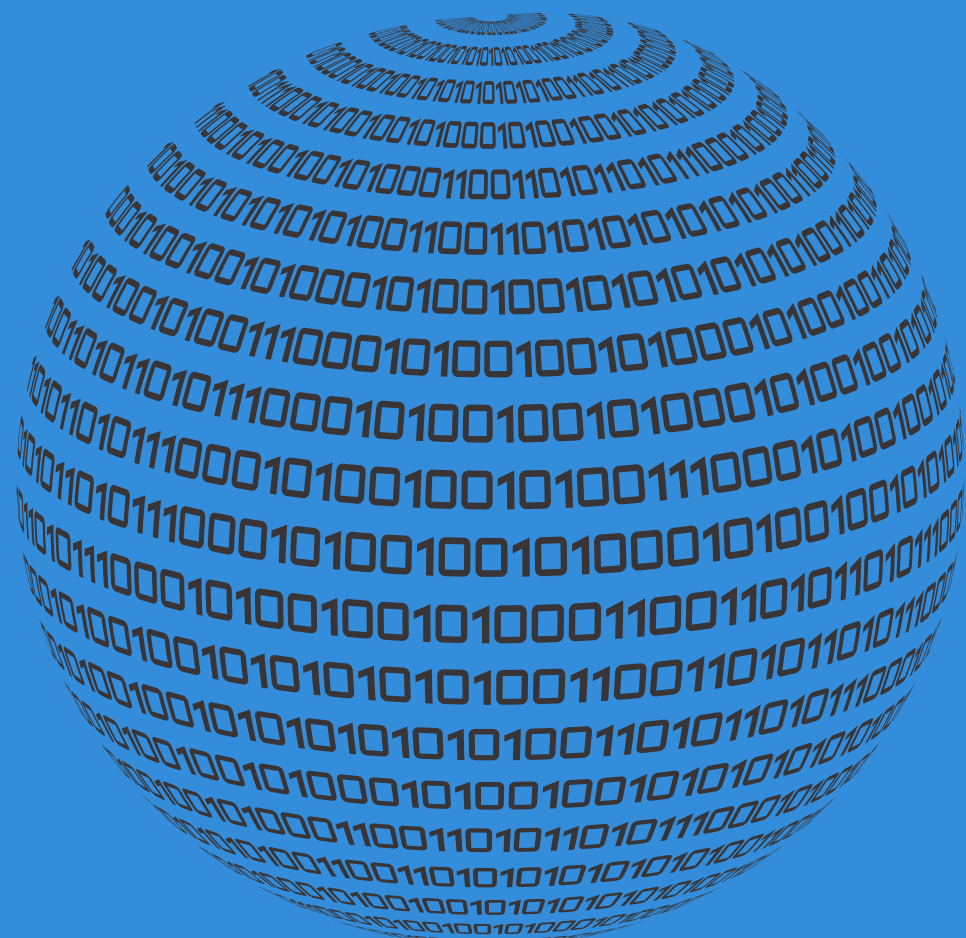


# INTRODUCTION

## PREVENTION OF COVID-19 WITH THE HELP OF DEEP LEARNING



PRESENTED  
BY-



# TEAM ALPHAQ

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Aagam Jain (DTU, COE)

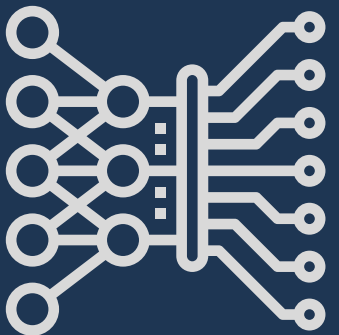
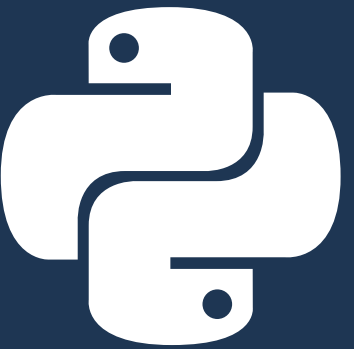
- We all know that deadly COVID -19 is hitting the world with its second wave.
- In heavily populated countries like India, maintaining social distance is a troublesome task for security personnels.
- It is evident that generalizing the use of mask is also a tedious work.
- All institutions have deployed employees to check mask and temperature, this in turn makes the employee susceptible to being exposed to COVID-19.
- People in public transports, not wearing masks can prove to be a potential threat to all people using that specific means of transport.

**PROBLEM  
SET  
TO FOCUS  
ON.**



# SOLUTIONS

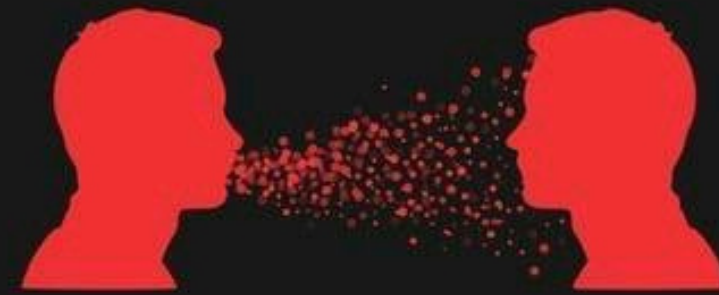
- Make a Neural Network able to detect images of people wearing or not wearing a mask.
- Detection of multiple people and checking them for mask.
- Deploying the network to accept video frames from CCTVs.
- Making a model which can estimate the distance between two people and hence determining the Social distancing by marking the people and threat based on distance.



# NEED OF MASK AND SOCIAL DISTANCING



- THE GOAL IS TO PREVENT THE DROPLETS PRODUCED FROM TALKING, COUGHING, SNEEZING, ETC., FROM LEAVING ONE PERSON AND INFECTING ANOTHER. MASK WEARING DISRUPTS THIS SIGNIFICANTLY.
- DATA FROM STUDY SHOWS THAT EVEN A DISTANCE OF THREE FEET SIGNIFICANTLY DECREASES THE SPREAD OF THE CORONAVIRUS FROM ONE PERSON TO ANOTHER. AT SIX FEET THE RISK DECREASES EVEN FURTHER, AT NINE FEET EVEN FURTHER THAN THAT, AND SO ON, PARTICULARLY IN AN INDOOR SETTING.



**90% RISK**  
OF TRANSMISSION



**30% RISK**  
OF TRANSMISSION



**5% RISK**  
OF TRANSMISSION

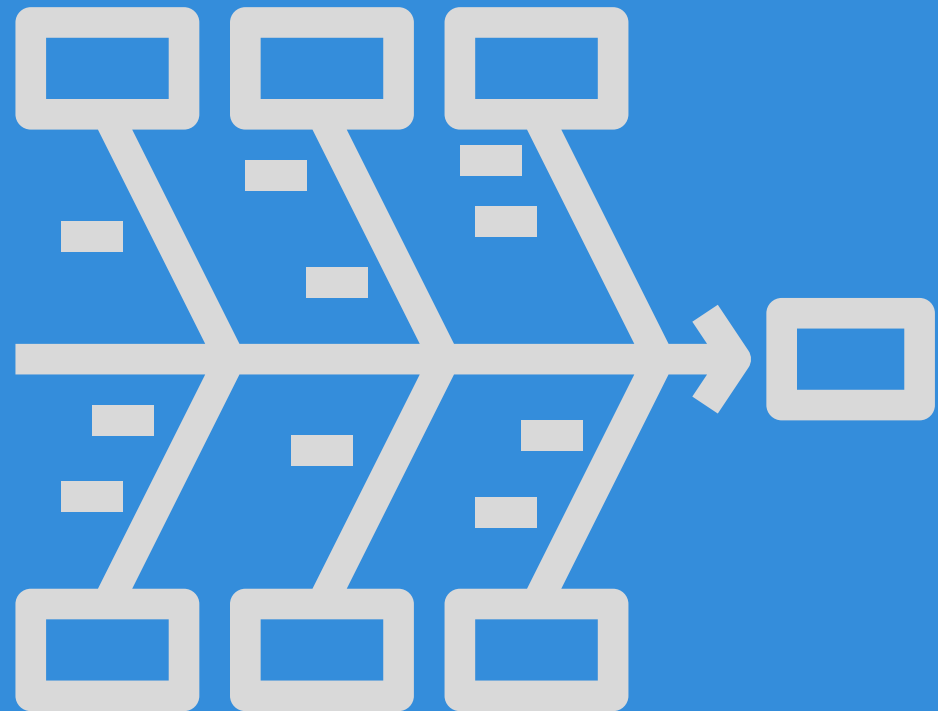


**1.5% RISK**  
OF TRANSMISSION



**0% RISK**  
OF TRANSMISSION

# FEATURES OF OUR PROJECT



- Detects the presence of multiple faces at the same time.
- Determines if a person is wearing a mask or not.
- Acts as an alarm for people not following social distancing.
- We can save this data on the server.
- Detects whether social distancing is being followed or not.

## LANGUAGE:

PYTHON 3.9.4

## LIBRARIES IMPLEMENTED:

TENSORFLOW

KERAS

OPENCV

YOLO V3

## CONCEPTS USED:

DEEP LEARNING FOR IMAGE EVALUATION

OBJECT DETECTION USING OPENCV

DISTANCE ESTIMATION USING YOLOV3

# Technologies used

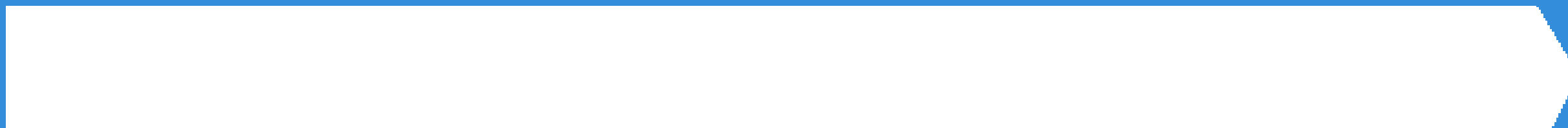


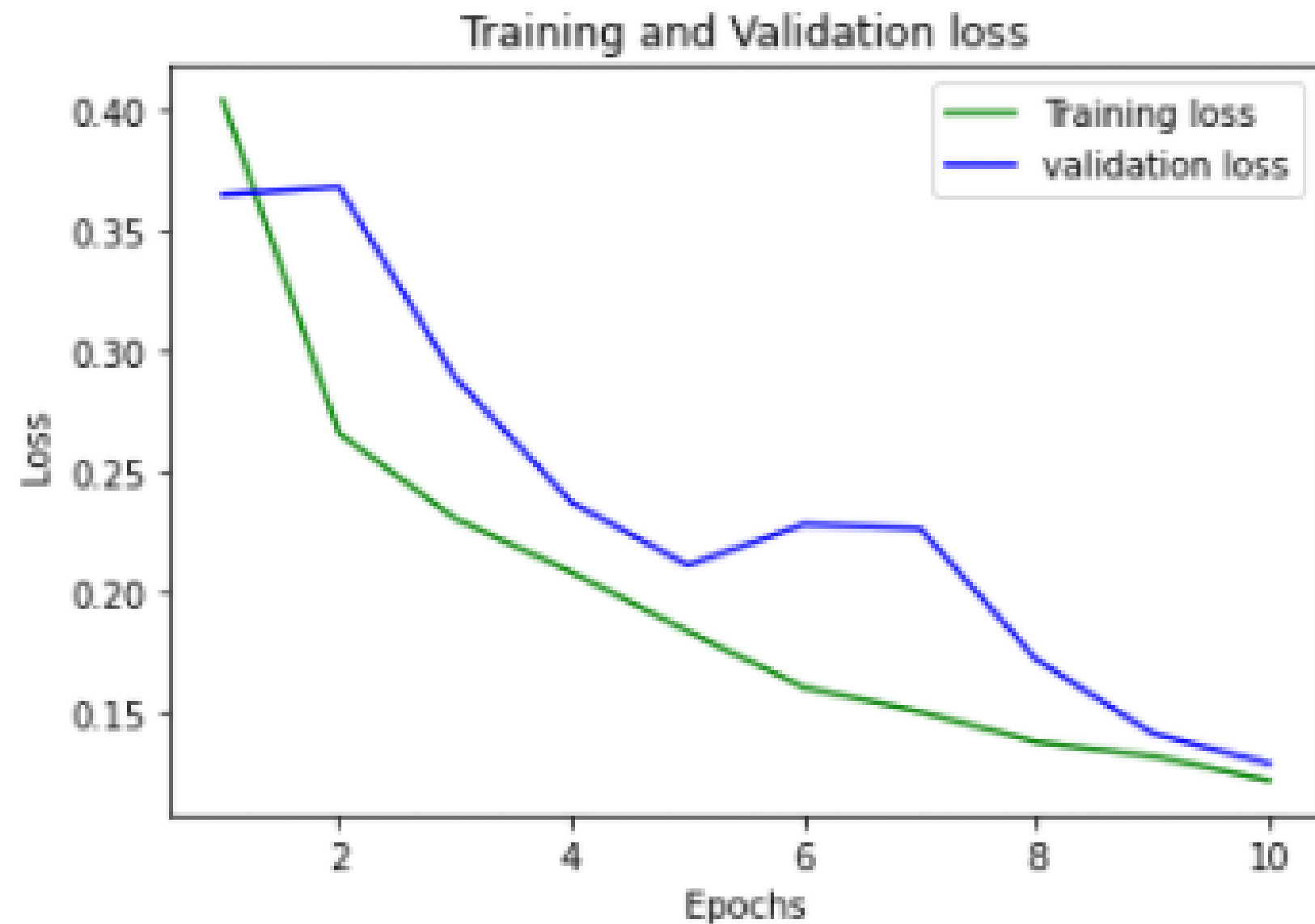


# DETECTION OF MASK



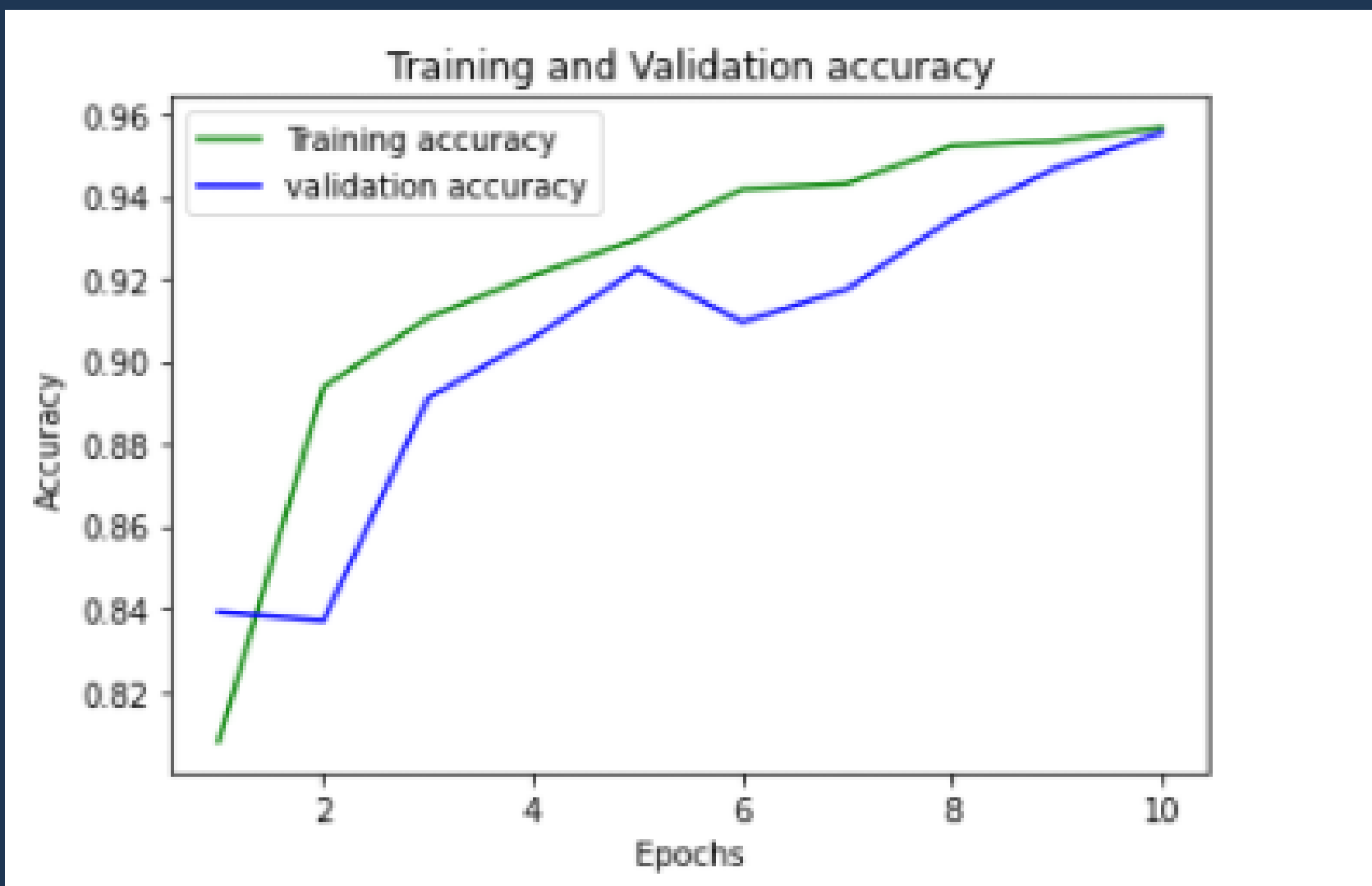
- WE CAN PLAY A SURVEILLANCE VIDEO AND PRESENCE OF A PERSON WILL BE DETECTED.
- PRESENCE OF MASK WILL BE CONFIRMED.
- IF MASK IS NOT PRESENT THEN THE PERSON WILL BE ALARMED AND THE SPREAD OF COVID-19 WILL BE CONTROLLED.





- **OUR PROJECT IS MORE OPTIMIZED BECAUSE OF THE USE OF BINARY CATEGORICAL CROSSENTROPY IN ORDER TO CALCULATE THE LOSS VALUE.**
- **WE HAVE A STEEPER SLOPE FOR VALIDATION LOSS WHICH SHOWS THAT OUR PROJECT HAS AN EFFICIENT EPOCHS TO LEARNING RATIO.**





- **DUE TO THE OPTIMIZATION TECHNIQUES THE ACCURACY CROSSES 96 PERCENT IN JUST 10 EPOCHS.**

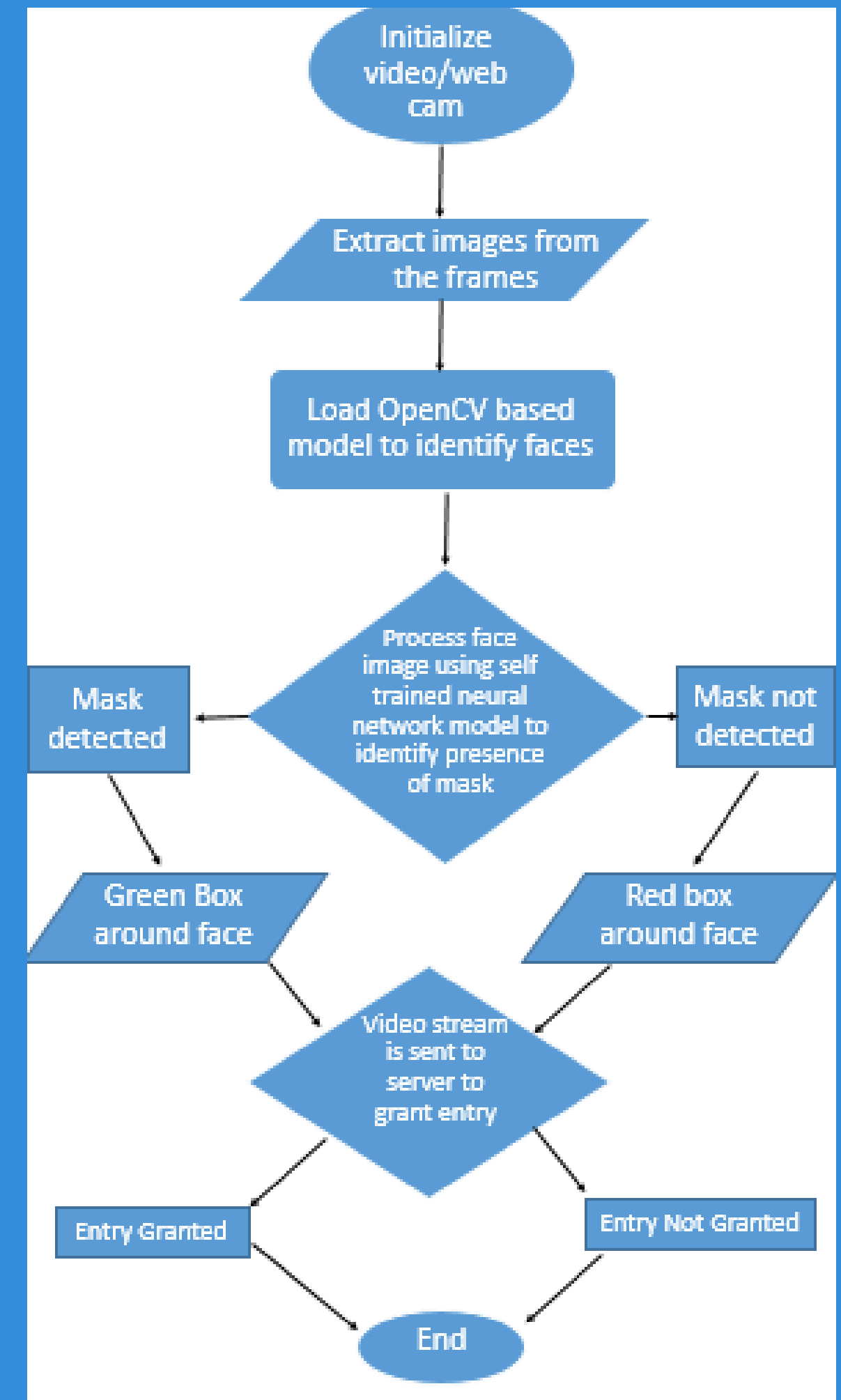
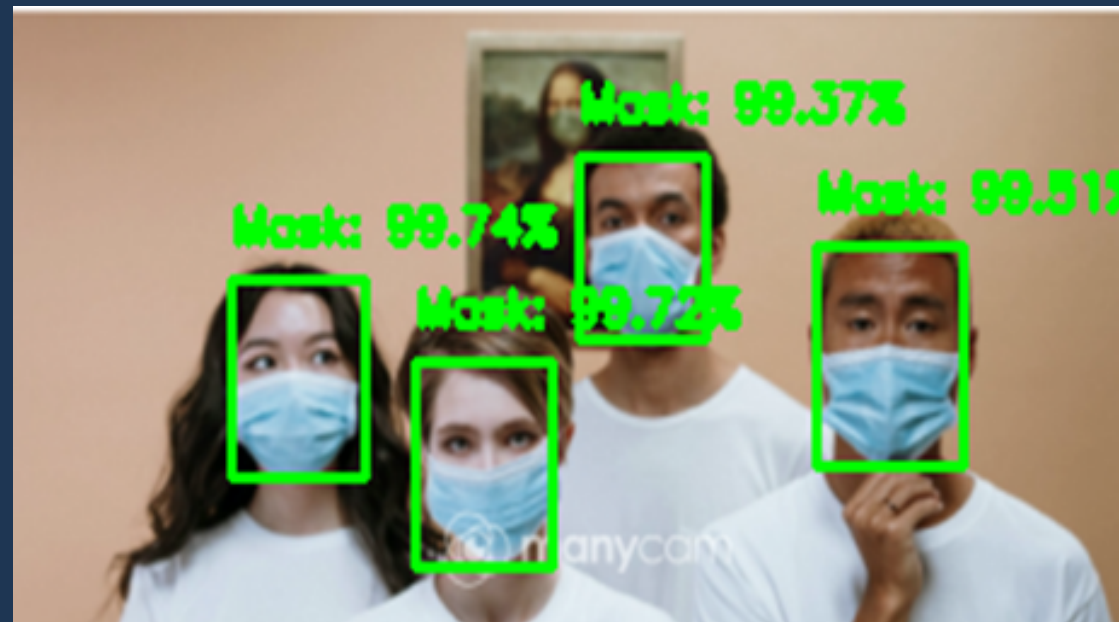




THE NEURAL NETWORK ALONE WAS NOT ABLE TO TAKE IN ACCOUNT MULTIPLE FACES AND THE FACES FAR FROM THE WEBCAM. SO BY USING OPENCV WE CAN DETECT AND SEPARATE ALL THE FACES AND THEN FURTHER ANALYSE THEM AS A LIST OF DATA OBTAINED FROM MULTIPLE FACES.



# THE FLOW OF CONTROL



# WHY MACHINE LEARNING?

IF SOMEONE TRIES TO BRING A COUNTERPLAN LIKE COVERING THE FACE WITH HIS/HER HANDS LET US SAY.

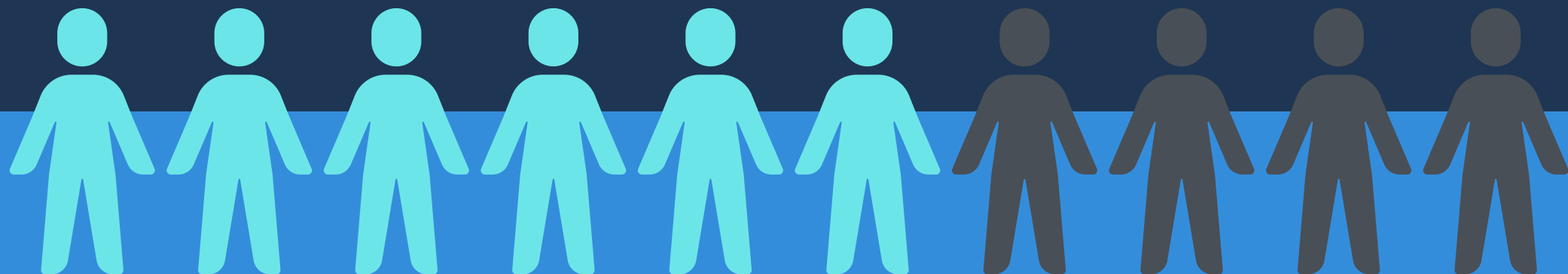
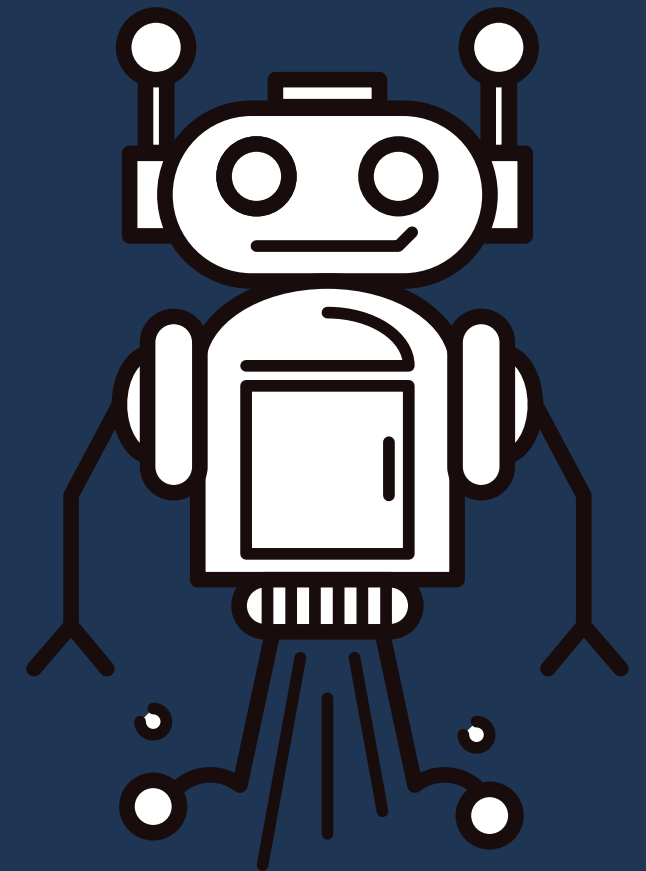
ALL WE NEED TO DO IS MAKE THE MODEL LEARN AGAIN. AS WE TRAIN IT AGAINST FACES COVERED WITH HANDS INSTEAD OF MASKS WITH A NEGATIVE VALIDATION FOR SUCH IMAGES IT WILL START TAKING CARE OF SUCH AN EXCEPTION APPROPRIATELY.

THIS IS THE VERY ESSENCE OF MACHINE LEARNING THAT, AS WE GET SOME NEW DATA, WE CAN ALWAYS MAKE THE MACHINE ADAPT TO THE CHANGE.



# Implementation of social distancing using AI

- A VIDEO IS PLAYED AND PEOPLE ARE DETECTED.
- DISTANCE BETWEEN PEOPLE IS CALCULATED USING THE ALGORITHM IN YOLOV3 UNDER OPENCV LIBRARY.
- DETECTS WHETHER SOCIAL DISTANCING IS BEING FOLLOWED OR NOT.

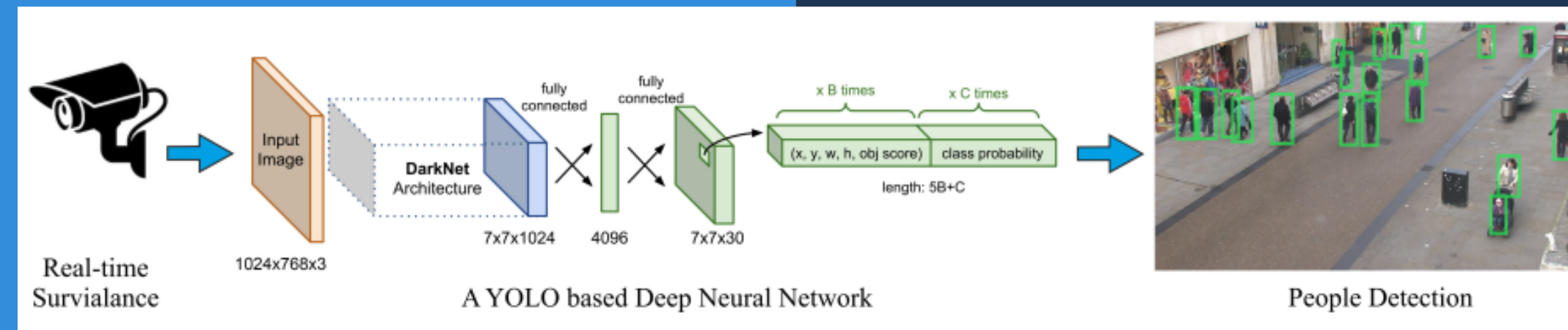
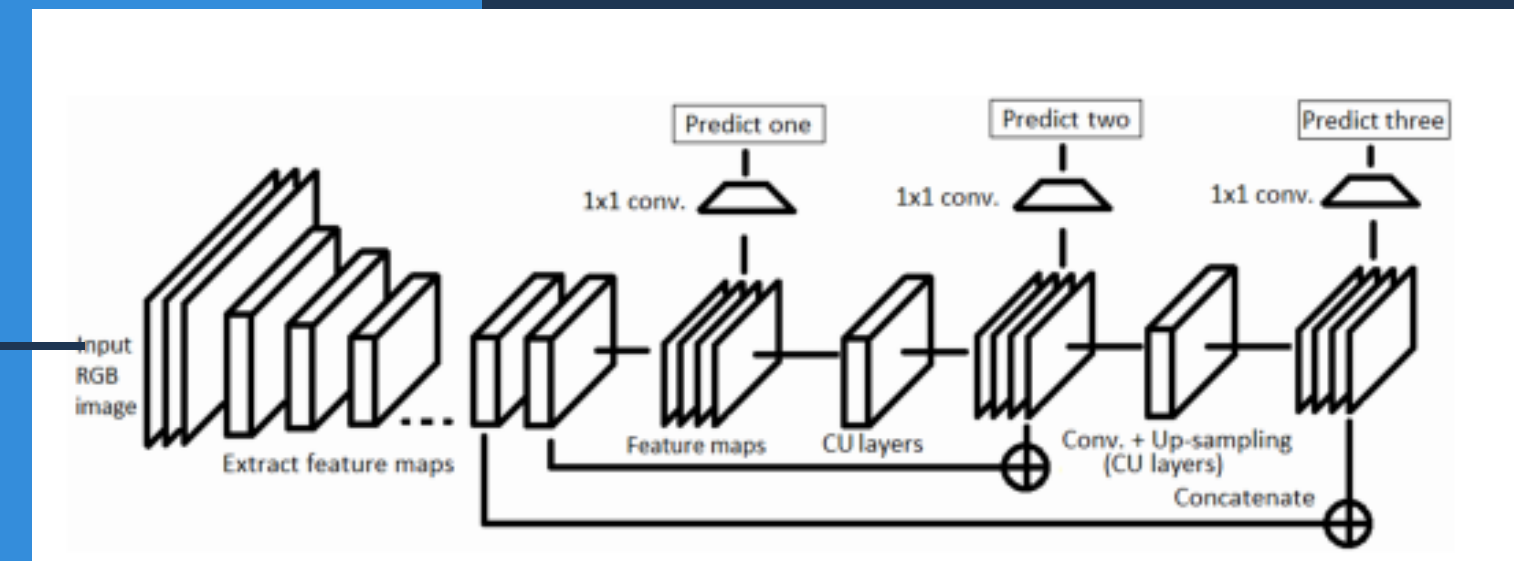


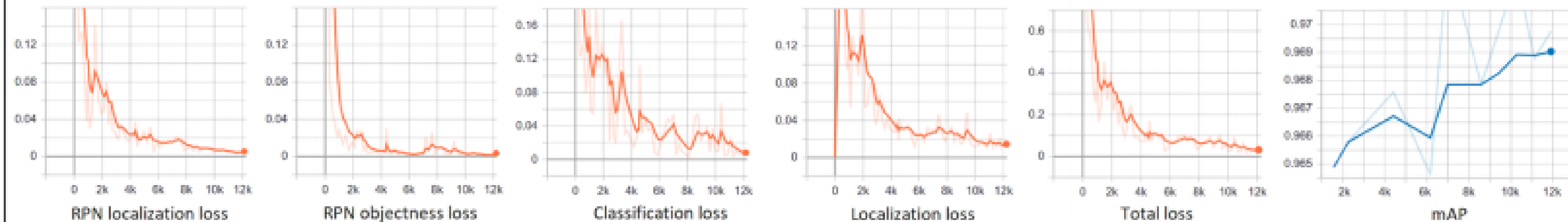


# WHY YOLO?

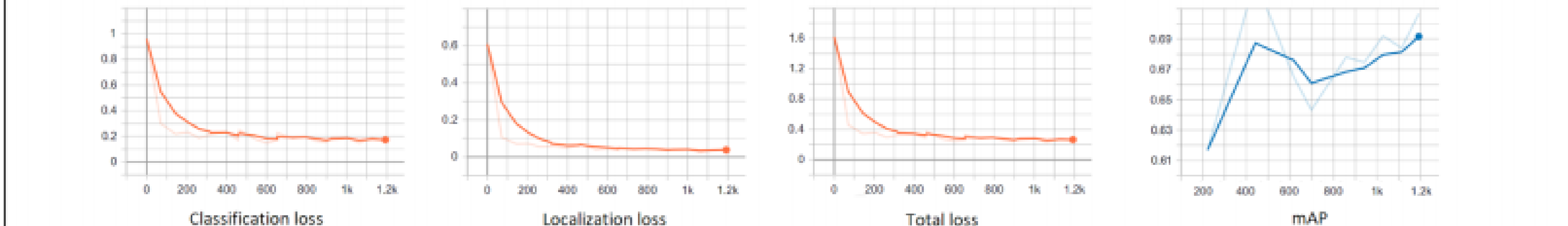
YOLO - YOU ONLY LOOK ONCE, CAN PREDICT THE TYPE AND LOCATION OF AN OBJECT BY LOOKING ONLY ONCE AT THE IMAGE. YOLO CONSIDERS THE OBJECT DETECTION PROBLEM AS A REGRESSION TASK INSTEAD OF CLASSIFICATION TO ASSIGN CLASS PROBABILITIES TO THE ANCHOR BOXES.

YOLO V3 GENERATES THREE PREDICTIONS FOR EACH SPATIAL LOCATION AT DIFFERENT SCALES IN AN IMAGE, WHICH ELIMINATES THE PROBLEM OF NOT BEING ABLE TO DETECT SMALL OBJECTS EFFICIENTLY

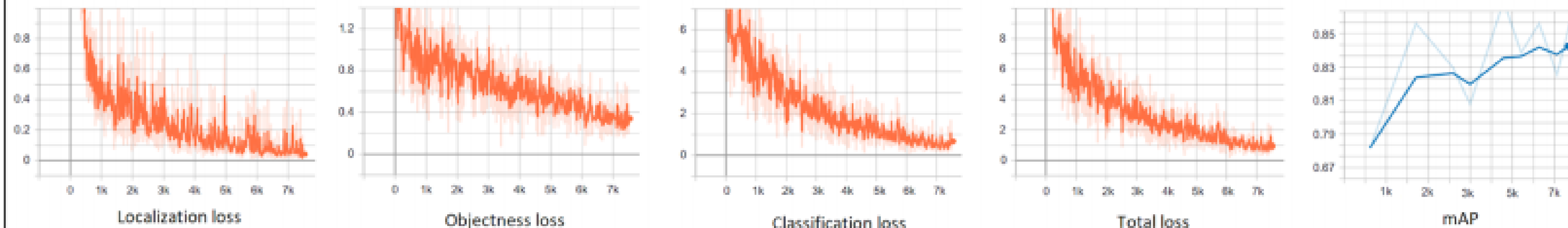




(a) Faster RCNN



(b) SSD



(c) YOLO v3

Melbourne City Surveillance Camera id.12347862

Connecting lines shows closeness among people.

- YELLOW: CLOSE
- RED: VERY CLOSE

Bounding box shows the level of risk to the person.

- BLUE: MEDIUM RISK
- ORANGE: LOW RISK
- GREEN: SAFE

Connecting lines shows closeness among people.

- YELLOW: CLOSE
- RED: VERY CLOSE

Connecting lines shows closeness among people.

- YELLOW: CLOSE
- RED: VERY CLOSE

Connecting lines shows closeness among people.

- YELLOW: CLOSE
- RED: VERY CLOSE

Bounding box shows the level of risk to the person.

- BLUE: GOOD: NO OR LOW RISK
- ORANGE: LOW RISK
- GREEN: SAFE

Bounding box shows the level of risk to the person.

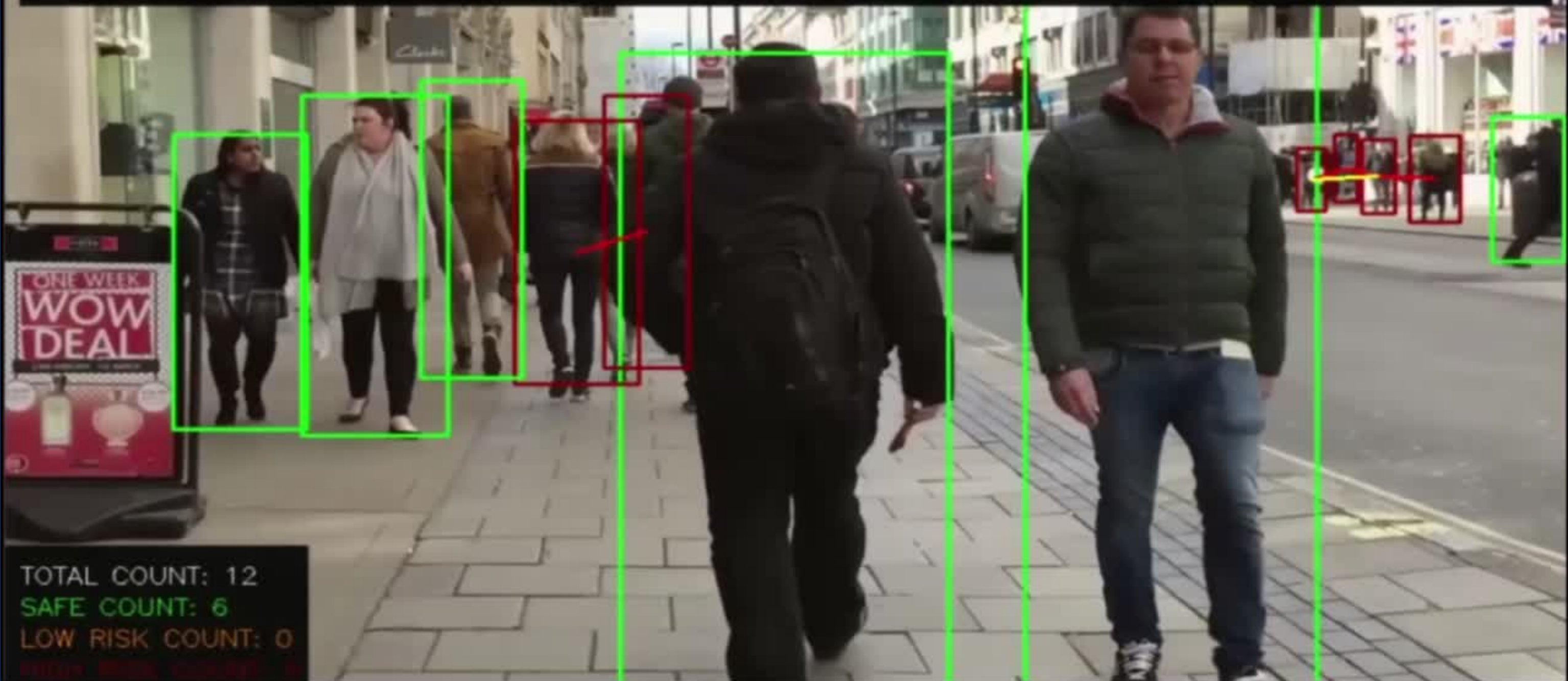
- BLUE: GOOD: NO OR LOW RISK
- ORANGE: LOW RISK
- GREEN: SAFE

Bounding box shows the level of risk to the person.

- BLUE: GOOD: NO OR LOW RISK
- ORANGE: LOW RISK
- GREEN: SAFE

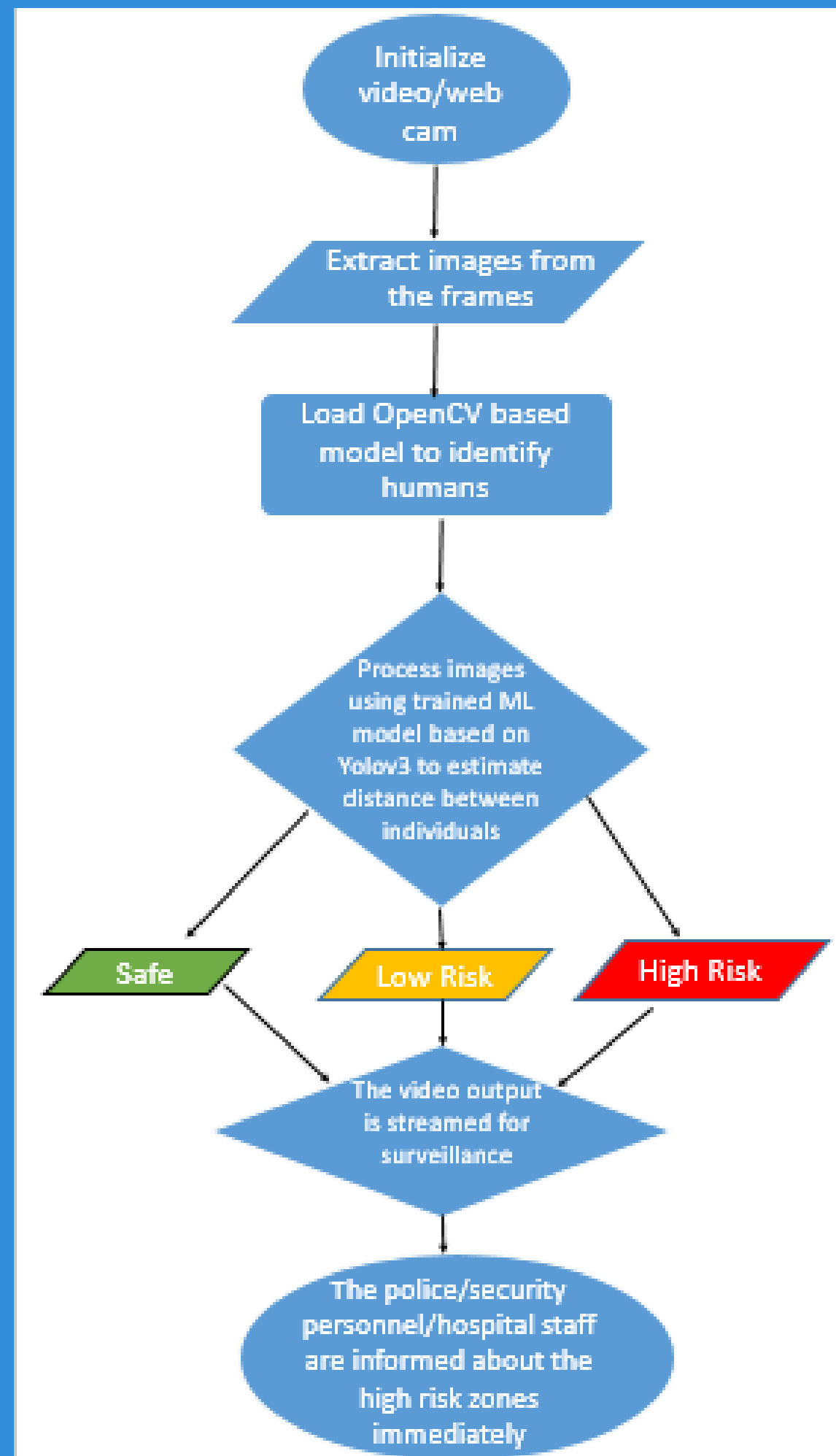
Bounding box shows the level of risk to the person.

- BLUE: GOOD: NO OR LOW RISK
- ORANGE: LOW RISK
- GREEN: SAFE



TOTAL COUNT: 12  
SAFE COUNT: 6  
LOW RISK COUNT: 0  
HIGH RISK COUNT: 6

# THE FLOW OF CONTROL





# Deployment

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- Our project can be used in live surveillance to monitor social distancing and the use of mask.
- We can use it in public places like metro stations , if people are found violating social distancing rules then security can be informed and we can easily make people follow rules.
- In this way human force can be reduced and we can make people follow COVID-19 norms efficiently.
- Thus, spread of virus can be controlled and economic zones can function normally.

# USE OF SPEECHLY API

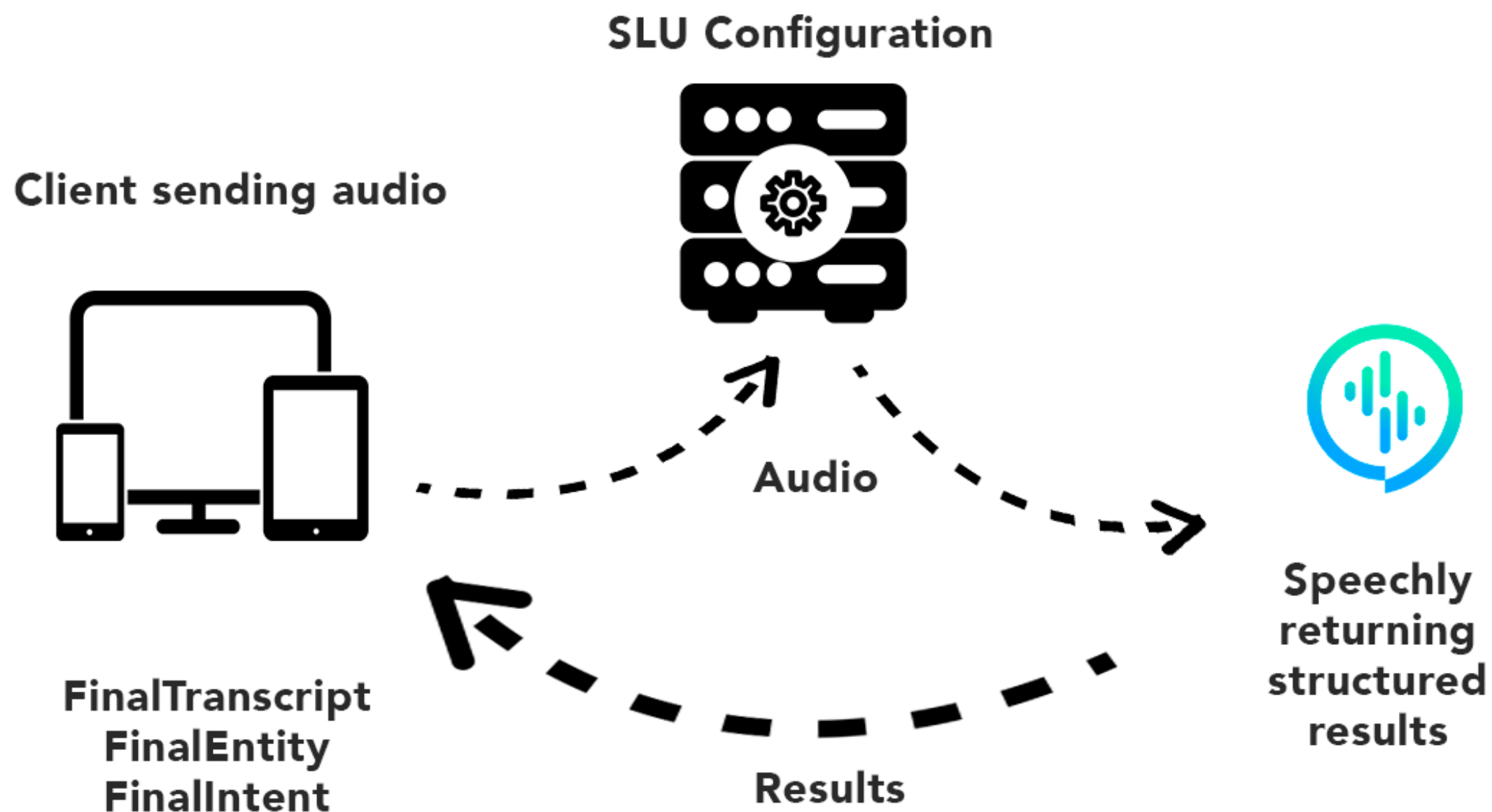
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- SPEECHLY IS A DEVELOPER TOOL FOR REAL TIME VOICE USER INTERFACE.
- WE HAVE USED SPEECHLY IN OUR MODEL IN ORDER TO MAKE THE USE OF INTERFACE TOUCHFREE WHICH WILL RESULT IN HALTING OFF THE SPREAD.
- THUS THERE WILL BE NO SCOPE OF SPREAD OF VIRUS AS NO PERSON WILL BE REQUIRED TO TOUCH THE INTERFACE.



**Speechly**

# SPEECHLY IMPLEMENTATION



**The mind is just like a muscle — the more you exercise it, the stronger it gets and the more it can expand.**

IDOWU KOYENIKAN

**FOOD FOR  
THOUGHT**





# References

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<https://ieeexplore.ieee.org/document/9138385>

<https://ieeexplore.ieee.org/document/9204934>

<https://arxiv.org/pdf/2003.09093.pdf>

<https://docs.speechly.com/slu-examples/>

