

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Security and safety of citizens are one of the great challenges that any nation must take responsibility. Citizens are inhabitants who lives in a nation, either they are native to the land or naturalized to the land. Citizens runs the nation, with the guidance of the government, they are the backbone of the nation [1]. Citizens work in industries, service and businesses in the country so that they can make a living and help the nation to thrive therefore it is crucial to make a safe environment for the citizens so that they may continue work in the nation and help it grow from the inside.

Indonesia with a population of 279 million people and covering an area of 1,919,440 sq km with an annual population growth of 1.1% indicate that Indonesia must cover a large ground and not to forget the negative effects of massive population brings such as unemployment and low quality of living might drive many individuals or groups of people to resort to crime. Security and safety challenges have great effects for the people who lives in the city, for example in Bandung with a population of 2.44 million people divided into 7 regions, with a population growth of 0.97% from 2020 to 2022 [1]. Using conventional methods for example human patrols, security guards and guard dogs placed in areas needed to be protected or crowded are not going to be enough to have a big of an impact to the safety of the citizen in the city, this is because there are just too many people to monitor or check, people who have malicious intend can easily conceal their actions and some crimes are not intercepted in time.

A new form of detection system must be implemented to counter such malicious attacks from happening to anyone in real-time. The advancement of technology allows a nation to effectively counter any malicious intend before it could ever happen to anyone, Of course, appropriate and effective solutions must be discovered for the numerous challenges listed above in order for these issues to be remedied.

As a result, in this research an innovative solution using deep learning based on image processing utilizing a CCTV used by the government, the police or anybody to make sure the region is safe with ability to detect the behavior of an individual carrying a sharp weapon in case the person is using it for malicious

purpose in real time.

## **1.2 Problem Formulation**

The problem considered in this research is the detection of suspicious activity and sharp weapon in closed area such as inside accommodation buildings, since there has been many cases of stolen motor bikes, electronics and etc. in many accommodation building especially in Mengger region in Sukapura.

## **1.3 Objectives**

The objective of this research is to implement a smart surveillance system based on Yolov3-Tiny deep learning algorithms. Using object detection method to detect objects and in this case suspicious behavior patterns and concealed sharp weapons, if suspicious and sharp weapon is detected it will be capture and put in the database located in the user's pc.

In previous research, object detection method is used to detect people wearing mask, thus in this research is to see if object detection method could be used for criminology cases and help to reduce criminal activity.

## **1.4 Scope of Works**

The work boundaries in this research are as follows:

1. The use of Yolov3-Tiny algorithm for deep learning model.
2. Using local host API for output live feed.
3. CPU is used for real-time detection and GPU is used in training.
4. Real time detection and auto capture of labelled object.
5. Webcam is use as an input for the system.
6. Remote control of the mini-pc for versatility.
7. NUC Intel mini-pc is used to process and store the deep learning model.
8. No use of QoS.
9. Research area is done in Jln Mengger Hillir, Sukapura, Buah batu, Bandung.

## 1.5 Research Gap

In previous research, object detection method is used to detect people wearing mask and temperature using CNN as the deep learning algorithm and it is tested inside a bus. Although the research is done and its results are satisfied such a research on criminology hasn't been done.

To conclude some the result of the previous research.

1. The best epochs for training this model were obtained, namely 200. Training the resulting accuracy is 0,9299 and the validation accuracy is 0,9127. Training loss is 0.2002 and validation loss is 0.2573. This matter shows that the model is already good at classifying people, masked and non-masked. [2]
2. The performance of the CNN classification model for detecting the use of this mask is satisfied.[2]
3. Testing the mask use detection system more optimally works on the face front look. In addition, this system is also more optimal for working at a distance 75cm, both for singular and plural objects. [2].

Author from the previous research suggested.

1. Using another thermal camera with higher resolution specifications in order to be able to read the temperature more accurately so that the tool does not need to be calibrated with a large calibration value. [2]
2. Using another face detection model that is capable of better detection faces from a variety of facial postures, able to better detect plural objects with a farther distance than has been done on this research. [2]

Previous research lacked the use of real-life scenario usage. Real life scenario testing is only done in a single place which is inside a bus. Thus in this research two real life scenario testing will conducted, internal environment and external environment. Using the suggestion of the author in this research object detection will be optimized to be used as criminology cases.

## 1.6 Research Method

The research method used in this research thesis are:

1. Literature Study

Collect data from journals, papers, articles, books, and other references related to deep learning, Yolov3, Object detection, Image processing, Surveillance system and etc. then discuss it with supervisors.

2. System design

Design the entire surveillance system.

3. Dataset collection and training model

Collecting datasets from the internet and manually. Three label classes must be identify in pictures which is “person”, “suspicious” and “sharp weapons”, Training the dataset using darknet architecture for the Yolov3-tiny a, training is done is Google Collaboratory

4. Implementation test and research implementation.

Test the system to detect two classes “suspicious” and “sharpweapon”. Research implementation is implementing the surveillance system in research area to gain real world data.

5. Data collection and data analysis

Collect and analyze the data.

## 1.7 Undergraduate Research thesis Organization

The rest of this research thesis is organized as follows:

- Chapter 2 BASIC CONCEPT

This chapter contains the concepts and theory explanation.

- Chapter 3 SYSTEM PLANNING

This chapter contains the workflow, flowchart and the system design flow.

- Chapter 4 DATA ANALYSIS AND EVALUATION

This chapter contains training results, implementation test result, research implementation and analysis.

- Chapter 5 CONCLUSIONS

This chapter contains the conclusion and suggestion.