CHAPTER I

INTRODUCTION

1.1. Background

The COVID-19 pandemic has accelerated the speed of AI used worldwide, Appen research instituted report that 41% company has accelerated its own adoption of AI in 2020 [1]. The massive surge of online in daily life has also led many organizations to heavily invested in AI. This massive surge of adoption rapidly speeds up the development of AI, especially in other industries where AI rarely adopted like healthcare, and education [1].

Today many people see AI as a tool that contributed to end pandemic that is happening. One of the prime examples is helping in detected face mask, or it can also be used to detect the early symptoms of COVID-19 and help to decide the chance that a patient is having COVID-19 based on the data given. The digital revolution has scaled the widely used of internet, and social media. In October 2020, 60% (4,66 Million) of the total population worldwide can access internet and 53% (4,14 Million) of the total population worldwide is an active social media user [2]. With this massive scale of digital adoption, it is surely that AI adoption in social space will give massive impact to this social media especially in time of social distancing enforce in many country [2].

One of application that is lack technological advancement is in the field of sign language, sign language translation technology is very far behind the ordinary language often speak for non-disabled person [3]. In 2019 study by Global Burden of Disease Study (GBD) shown that 1.57 billion people have some form of hearing loss, 35 million is estimated to have permanent hearing loss [4]. This creates a need for reliable digital sign language translation to remove the barrier for a non-disabled person to understand the sign language easily, and for the disable to easily used the sign language easily as their daily communication language [4].

The ongoing pandemic has led to many shortages of jobs, sign language interpreter is one of the many jobs that is currently lacked in workforce. This shortage is due to condition, and the unprecedented new situation that make real time translation is harder in the era of remote working, this shortage is impactful not only in present situation, but in the future [4].

This research aims to solve the shortage of sign language interpreter, by using Sign Language MNIST (Modified National Institute of Standards and Technology) as data sample. The data can be used to make multi-class classifier model that predict alphabet based on the given hand movement

1.2. **Aims and Objectives**

This research aims to create a sign language classifier, that can detect human hand, and translated different hand gesture into alphabet based on trained machine model. The focus of the research will used open-source Sign Language MNIST dataset, that can be found in Kaggle to be trained as machine learning model using TensorFlow and used the trained model in OpenCV software that is available open-sourced to allow reading human hand gesture real-time.

1.3. **Scope of the Research**

The main constraint in the research is as below:

1. The dataset that used by the author during the research is Sign Language MNIST, and author dataset that is created by the researcher himself.
2. The machine learning algorithm that is used during the research is CNN (Convolution Neural Network) to classify the images dataset.
3. The software that is used during the research is Jupyter Notebook, and the researcher will used TensorFlow to train the data, and OpenCV to detect the gestured given and provided prediction using model that is generated by TensorFlow.

1.4. **Research Method**

The research carried out consists of several main steps, namely: data processing, model development, and detection test. Chapter 3 provided a more detailed discussion of the method

1.5.**Thesis Structure**

This thesis is organized and divided into six chapter which are as follows:

a) **Chapter 1** contained background of the research, aim and objective of the research, scope of the research, research method, and thesis structure. In this chapter the urgency and the focus of the research is explained.

b) **Chapter 2** contained the theory associated with the research, which included the CNN (Convolution Neural Network), TensorFlow, and OpenCV. This chapter also dives into the insight of data that is used during the research, and how to analyse and read the evaluation for the model trained using a confusion matrix.

c) **Chapter 3** contained the methodology of which the research is conducted during the implementation of machine learning in training the models using TensorFlow, convert it to sign language detection using OpenCV.

d) **Chapter 4** describes the process of training the machine learning model using TensorFlow in Jupyter Notebook, then the implementation for detected and predict the alphabet for the gestured given using OpenCV.

e) **Chapter 5** include the data and analyses to the research, as well the outcome of the research.

f) **Chapter 6** conclude the paper and touches on future outlooks.