

CHAPTER I

INTRODUCTION

1.1. Background

The human's skin is the largest organ in the body which protects humans against heat, light and contributes to regulating the amount of fat and water in the body [1]. This benefit, however, comes with a drawback. Human skin is prone to be easily infected by germs, bacteria, fungal, allergies, viruses, or others which cause it to develop a disease like Acne, blackheads, herpes, chloasma, or even skin cancer [2]. Skin cancer is a major public health problem with its high mortality rate and is very common nowadays [3]. Skin cancer also represents half of the cancer diagnosed worldwide [4]. Based on United States data, there are 3 (three) most commonly diagnosed types of skin cancer, namely basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma. Fair-skinned individuals have more likelihood of being diagnosed with these common types of skin cancer compared to another racial group [5]. Based on the above explanation, this research will use basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma as research objects.

Nevertheless, any skin cancer should be checked immediately while it is still in the early stage, which increases the chance of it being cured significantly [6][7]. After all, the lack of medical knowledge in the public often resulted in late discovery where it may be too late to do anything about the disease [8]. The advancement of lasers and other medical technology has made it possible to

diagnose this skin cancer condition quickly and accurately. However, not all people have access to this kind of facility due to economy, time, lack of access, and lack of medical knowledge or awareness constraints [9].

Currently, the world saw the rise of smart medical applications that can accept data as input, be it an image or any other kind of data, and then process it before outputting a certain kind of prediction output and any other additional information [10]. These medical applications can be accessed by everyone as long as they have a smartphone, considering that information in this era of technology where everyone has one or even more than one smartphone, it will be a guarantee that everyone can access these applications. A web-based application is even easier to access since everyone has a browser [11]. Considering the lack of resource problems and the rise of these smart medical applications, this study will focus on the process of detecting skin cancer types using an application.

Dermatologist, a term for physician or doctor who specializes in skin disease condition, usually diagnose skin cancer by relying on visual input through their eyes. This is because skin cancer can be diagnosed by observing the color, shape, and texture of the disease [9]. Taking this information into account, it is possible to build an application that can accept image input, process it, and then outputting the probability of the skin cancer type to the user [12]. To accomplish this, a robust classification model is needed. This model should be powerful enough to extract the unique characteristic of skin cancer in an image, able to distinguish between different types of skin cancer, and able to output a consistent and accurate result [13].

Several popular machine learning algorithms can achieve the desired result above. SVM (Support Vector Machine) is a machine learning algorithm that can classify data with good accuracy. However, SVM (Support Vector Machine) is a rather rigid algorithm as it can only achieve a good consistent result provided that the image data stay consistent [14]. This is not acceptable, considering that the image input in the application will probably have different image angle, different lighting, and so on since it comes from people's smartphone which quality cannot be maintained. However, according to [15] [16], CNN (Convolutional Neural Network) deep learning algorithm is a proven algorithm that can achieve good consistent classification results even though the image condition is far from ideal. Since CNN (Convolutional Neural Network) utilizes a linear feed-forward architecture and it does not use a fully connected layers network, CNN (Convolutional Neural Network) can generalize better compared to others algorithm. This is also the reason that CNN (Convolutional Neural Network) can learn abstract features and able to identify objects efficiently [17]. Taking into factor all of the above information, this research will implement an image-based skin cancer type classification model using CNN (Convolutional Neural Network) in a web platform.

1.2. Research Questions

Based on the above introduction, there are a few research questions that will be discussed in this research, such as :

1. How can the application for skin cancer type detection become a solution for people who do not have access to a dermatologist due to financial issues, time, lack of access, and lack of knowledge regarding skin cancer?
2. How is the usage of the image-based skin cancer type classification model using CNN (Convolutional Neural Network) algorithm when implemented in a web-based application?

1.3. Problem Scope

Based on the research questions above, there are several scope limitations in place, such as :

1. The skin cancer type classification model is built to only predict 3 (three) types of common skin cancer in America, that is, BCC (Basal Cell Carcinoma), SCC (Squamous Cell Carcinoma), and Melanoma.
2. The image input of the classification model should be in a certain isolated format, the skin cancer should be located in the middle of the image with the surrounding skin covering the rest of the image without any kind of external object.

1.4. Research Objectives and Benefits

1.4.1. Research Objectives

This study was conducted to detect a person's skin cancer type based on image data using the Convolutional Neural Network (CNN) Algorithm in a web platform.

1.4.2. Research Benefits

Based on the above research objectives, there are several benefits coming from this research, such as :

1. The result of this study is expected to accurately predict a person's skin cancer type based on image data.
2. The result of this study is expected to be a solution for people who do not have access to a dermatologist due to problems like cost, time, distance, lack of knowledge or awareness, and others to check their own skin condition.
3. The result of this study is expected to be a starting point to raise awareness against the danger of skin cancer, to motivate people to go to a dermatologist to get their skin condition treated, and is not meant to be a replacement for the role of a dermatologist.