

CHAPTER I

INTRODUCTION

1.1 Background

The ear is a sensory organ that functions for hearing and maintaining body balance. This organ is also connected to the respiratory tract through the Eustachian tube, so that disorders of the nose or throat can affect the condition of the ear. One of the ear diseases that frequently occurs is otitis media, an infection of the middle ear that causes inflammation and fluid buildup behind the tympanic membrane [1], [2]. If not treated properly, this disease can lead to complications such as hearing loss, speech delay, and cognitive impairment [2].

Technological developments in the healthcare field have driven the use of various diagnostic methods, such as otoscopy, tympanometry, acoustic reflectometry, ultrasonography, and digital imaging to help detect ear diseases more accurately. Along with the development of artificial intelligence, deep learning-based methods have also begun to be used to help classify ear diseases from otoscopic images. Nevertheless, limited access to healthcare services and delays in diagnosis remain challenges in the management of ear diseases. Therefore, an artificial intelligence-based identification system is needed that can help with early detection and accurate classification of ear diseases through digital image processing [3], [4].

1.2 Problem Statement

Based on the background that has been described in the research "Ear Disease Classification System Using Convolutional Neural Network with *MobileNetv2* Architecture", the problem statement in this research can be formulated as follows:

1. How to design an ear disease classification system using CNN?
2. How is the performance of the MobileNetV2 architecture in classifying ear diseases?

1.3 Research Objectives

Based on the problem statement above, this study has the following objectives:

1. Developing an ear disease classification system based on CNN..
2. Analyzing the performance of MobileNetv2 in classifying ear images.

1.4 Research Benefits

Based on the research objectives stated above, the benefits of this research are as follows::

1. Knowing the performance of the CNN method with the MobileNetV2 architecture in the classification of ear images.
2. Adding knowledge on the application of Deep Learning in the field of healthcare

1.5 Problem Limitations

In order to keep this research focused and prevent it from expanding too broadly, the following limitations are established:

1. The system is capable of classifying only nine types of ear diseases according to the dataset utilized in this research.
2. The dataset used comes from a limited source, namely *Kaggle*, with a limited amount as well.
3. This research focuses only on the image classification process, not direct medical diagnosis.
4. Model evaluation is limited to the metrics of accuracy, precision, recall, and F1-score.