UNIVERSITI TEKNOLOGI MARA

DENTAL DISEASE DETECTION USING CONVOLUTIONAL NEURAL NETWORK (CNN)

FAIZNUR BINTI KAMALLUL ARIFFIN

BACHELOR OF COMPUTER SCIENCE (Hons.)

FEBRUARY 2024

ACKNOWLEDGEMENT

In the name of Allah S.W.T, the Most Merciful. All praise to Allah S.W.T and His abundant grace for being able to complete this Final Year Project Proposal for the subject Project Formulation (CSP600) and Project (CSP650). Thank Allah S.W.T for all the opportunities, challenges and strength that have been poured into completing this project. The lack of knowledge and ideas was a big part of what we dealt with while working on this project. A heartfelt speech of appreciation to the Prophet Muhammad (peace be upon him) who has become a guide to our lives.

First of all, I would like to express sincere gratitude to my supervisor, Madam Norizan binti Mohamad for helping me to finish this project by giving us helpful information, direction and tips. Thank you for giving me such clear instructions so that I could understand. I completed my project with perfection and distinction without Madam's assistance.

Next, I want to express my gratitude to my lecturer, Madam Ummu Fatihah binti Mohd Bahrin, for the remarkable attention, knowledge, and assistance during the subject of Project Formulation (CSP600) and Project (CSP650). The constant dedication to my education has had asignificant impact on my learning experience.

Finally, I want to express gratitude to my parents for their support and encouragement while I completed this project. I was grateful beyond words that my parents were complimentary. In addition, I want to express gratitude to my friends for always being ready to lend advice and knowledge when I need it.

ABSTRACT

Dental disease has become all too common in today's fast-paced environment. Other thanthat, dental covers many things in the mouth such as the jaw, gums, teeth, and many more. Dental diseases include dental caries (tooth decay), periodontal diseases, tooth loss, oral malignancies, and many others. All these diseases will have a negative impact on persons who suffer from toothache. Aside from that, because the dental disease is placedin the person's mouth, it is difficult to notice. As a result, natural eyes cannot be used andmust be replaced by medical tools. Because of that, the assistance of a dentist is critical. Indeed, due to technology nowadays, dental diseases may now be detected using Convolutional Neural Networks (CNN). Convolutional Neural Networks (CNN) are a type of artificial neural network that is commonly used in the field of Artificial Intelligence (AI). Many types of algorithms can be used for detection such as Support Vector Machines (SVM), Recurrent Neural Networks (RNNs), and many more but CNN shows the best result and accuracy which is 99%.

TABLE OF CONTENTS

CONTENT **PAGE**

SUPERVISOR APPROVAL ..... **ii**

STUDENT DECLARATION ..... **iii**

ACKNOWLEDGEMENT ..... **iv**

ABSTRACT ..... **v**

TABLE OF CONTENTS ..... **vi**

LIST OF FIGURES ..... **xi**

LIST OF TABLES ..... **xiii**

LIST OF ABBREVIATIONS ..... **xiv**

CHAPTER 1: INTRODUCTION **1**

1.1 Background of Study 1

1.2 Problem Statement 3

a) Incorrect diagnose from the dentist 3

b) Algorithms limitations 3

c) Rely on manual interpretation 4

d) Lack of dental knowledge 4

1.3 Objective 5

1.4 Project Scope 6

1.4.1 User 6
1.4.2 Dataset 6
1.4.3 Algorithm 6
1.5 Project Significant 7
1.5.1 Suspected dental patient 7
1.5.2 Dentist 7
1.6 Overview of Research Framework 8
1.7 Gantt Chart 10
1.8 Chapter Summary 11

CHAPTER 2: LITERATURE REVIEW 12

2.1 Image Processing 12
2.2 Dental Disease Detection 14
2.3 Dental Disease Detection Using Various Algorithm 16
2.3.1 You Only Look Once (YOLO) Algorithm 16
2.3.2 Optical Coherence Tomography (OCT) Algorithm 17
2.3.3 Convolutional Neural Network (CNN) Algorithm 18
2.4 Convolutional Neural Network (CNN) Algorithm 19
2.4.1 Overview of CNN Algorithm 19
2.4.2 Concept in CNN Algorithm 21
2.4.3 Advantages of CNN Algorithm 23
2.5 Implementation of CNN Algorithm in Various Problem 24