



DENTAL AI CHATBOT FOR DIAGNOSTICS AND POST-SURGERY CARE

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**LIST OF SYMBOLS**

<b>SYMBOL</b>		<b>UNIT</b>
$\alpha$	Test variable	$m^2$
$\lambda$	Interarrival rate	jobs/second
$\mu$	Service rate	jobs/second

**LIST OF TECHNICAL VOCABULARY AND ABBREVIATIONS**

ABC	=	Adaptive Bandwidth Control
MANET	=	Mobile Ad Hoc Network
Test	=	<p> Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nullam non condimentum purus. Pellentesque sed augue sapien. In volutpat quis diam laoreet suscipit. Curabitur fringilla sem nisi, at condimentum lectus consequat vitae.</p>

# CHAPTER 1 INTRODUCTION

## 1.1 Keywords

Keywords: Oral Surgery, Dentistry, Diagnose, Follow-up, Artificial Intelligence, Chatbot, Machine Learning, Natural Language Processing

## 1.2 Problem Statement

### 1.2.1 Problem Statement and Motivation

Individuals seeking healthcare in today's world often run into a number of challenges while attempting to acquire correct information regarding their symptoms and appropriate treatment. Many patients have minor illnesses or symptoms that might not necessarily require immediate medical attention from a doctor. Nevertheless, these individuals usually resort to clinics or hospitals for a diagnosis as there is a lack of information and assistance available.

This rise in patient visits not only places a considerable burden on healthcare facilities but also results in financial implications for patients themselves. The associated costs, such as consultation fees, diagnostic tests, and travel expenses, can impose an unreasonable financial strain on individuals. Moreover, this increased demand for medical attention has contributed to an imbalance in the doctor-to-patient ratio, affecting the overall quality of healthcare services provided. According to the National Statistical Office, the ratio of doctor-to-patient ratio is 1 to 8,057.

Furthermore, the challenges do not cease once treatment is initiated. After receiving medical care, many patients still have many concerns about their health conditions. Many patients desire prompt answers to their worries about their conditions. In addition to these concerns, patients often have recurring questions, commonly categorized as frequently asked questions (FAQs).

Regrettably, doctors and medical staff find themselves overwhelmed by the immense workload caused from the increased patient influx. As they aim to deliver quality care and diagnosis, they may have limited time and resources to respond satisfactorily to the patients.

To address these pressing issues and enhance the healthcare experience for both patients and healthcare providers, we were motivated to develop an application that can effectively address these issues. The application will have the capability to diagnose common diseases and answer frequently asked questions from the patient's symptoms. Additionally, it will feature a chatbot designed to follow up on patient conditions after surgery.

### 1.2.2 Potential Benefits

The purpose of this dental application is to reduce frequently asked questions from patients regarding oral symptoms or diseases and also help with post-surgery follow-up thus reducing the workload of the dentist and medical staff. Dentists can use the extra time they gain to concentrate on patients who require more extensive care.

In addition to the benefits that doctors receive from this application, patients and the general public also get their benefit as they have immediate access to oral diagnosis and knowledge. Since patients can understand their symptoms and get guidance on simple treatments, this helps to decrease needless doctor visits. Moreover, it can benefit patients by decreasing the expense of visiting the doctor to get a diagnosis. Another benefit that patients receive is continuous monitoring of their symptoms, which allows their doctor to be informed of any unexpected post-surgery problems.

### **1.3 Objectives**

- To acquire the knowledge and skills necessary for developing an AI-powered chatbot.
- To build a chatbot specialized in providing accurate answers to specific dental questions.
- To reduce doctors and staff by minimizing repeated questions and explanations from patients.

### **1.4 Expected Result**

This project aims to develop a chatbot utilizing advanced natural language processing and machine learning techniques to be able to address frequently asked questions related to oral surgeries and be able to perform post-surgery follow-up. The chatbot is expected to provide an accurate response.

### **1.5 Scope of Work**

The scope of this project involves the development of a chatbot designed to address frequently asked questions related to oral surgeries and provide post-surgery follow-up support. The chat bot will utilize natural language processing (NLP) and machine learning algorithms. The primary functions of the chatbot includes answering queries about each surgery, performing post-surgery follow-up, offering guidance and suggestions. Our primary focus will be on 4 specific surgical operations: Tooth Extraction, Wisdom Tooth Removal, Periodontal Surgery, Dental Implant Surgery.

The final deliverable of this project will be a fully functional chatbot integrated into a web application, able to handle a range of frequently asked questions and perform post-surgery follow-ups. The project involves extensive research into relevant dentistry information, the development and training of machine learning models for question answering, and the design and implementation of the user interface. A usability test will be conducted to assess the effectiveness and user-friendliness of the chatbot and the associated web application.

### **1.6 Project Schedule**

#### **1.6.1 Semester 1**

##### 1. Proposal

- Discuss Project with Advisors
- Kick-off meeting
- Write Project Idea
- Write Proposal Report
- Make Proposal Presentation

##### 2. Project Planning

- Collect Requirement
- Plan Task Schedule

##### 3. Learning and Research

- Research on Methodology
- Research On Oral Symptoms and FAG
- Research on Related Paper
- Study 4 Specific Oral Surgical Operations

- Study Post Surgery Follow-Up Procedure

#### 4. Collect Data

- Prepare for Data Collecting
- Data Collecting
- Clean Data

#### 5. Design and Data Preparation

- Make Use Case Diagram
- Make Architecture Diagram
- Design UX/UI
- Design AI Design
- Make Navigation Map

#### 6. Implementation

- Select an Appropriate State-of-the-art AI Model
- Select an Appropriate Chatbot Framework
- Select an Appropriate Front End Framework

#### 7. Final Report

- Write Final Report
- Make Final Presentation

### **Deliverables for Term 1**

- Final Proposal
- Use case diagram
- Architecture Diagram
- Navigation map
- ER Diagram
- Customer Journey
- Final UX/UI design
- Survey dental FAQ questionnaire for diagnosis and follow-up

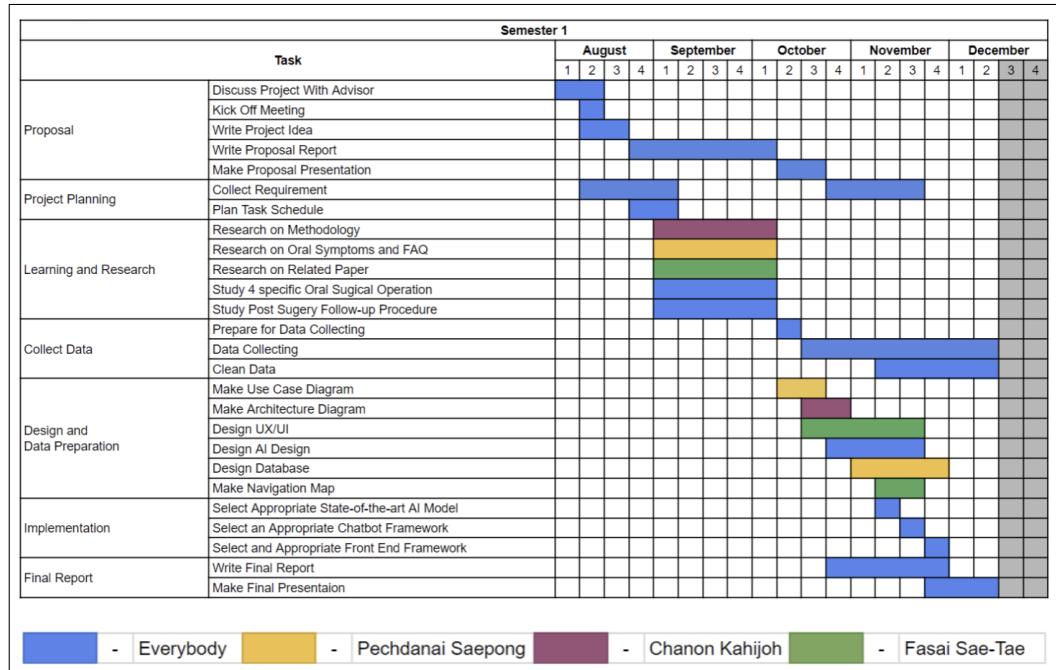


Figure 1.1 Semester 1 plan schedule

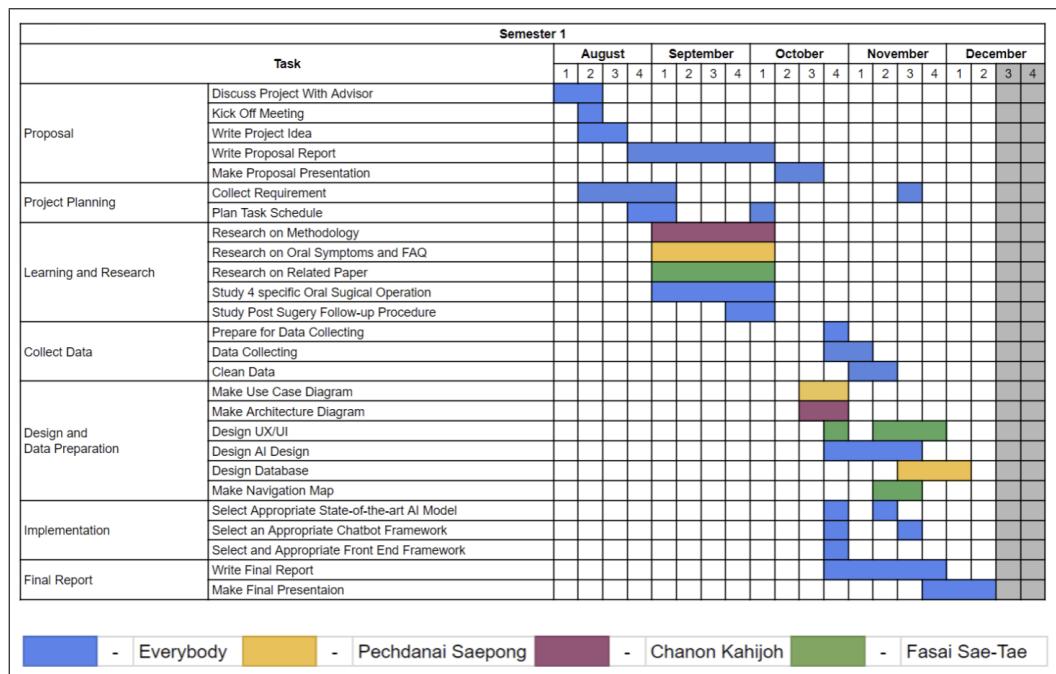


Figure 1.2 Semester 1 actual schedule

## 1.6.2 Semester 2

### 1. Deep Learning and Chatbot Implementation

- Model Implement
- Model Training
- Model Testing and Evaluation

### 2. Web Application Implementation

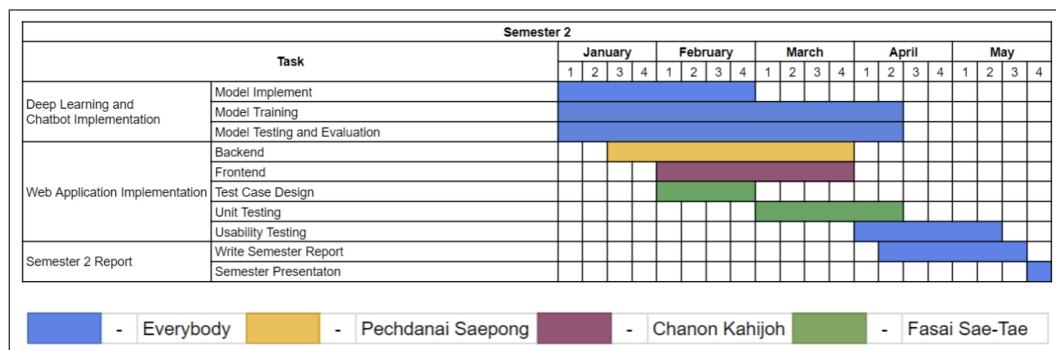
- Backend
- Frontend
- Test Case Design
- Unit Testing
- Usability Testing

### 3. Semester 2 Report

- Write Semester Report
- Semester Presentation

## Deliverables for Term 2

- Mobile application in both iOS and Android platform
- Testing result
- Feedbacks from users
- Senior Project Report



**Figure 1.3 Semester 2 plan schedule**

## CHAPTER 2 THEORY AND RELATED RESEARCH

### 2.1 Introduction

This chapter will explain the details of the core concept and the solution planning. Theory and core concepts, languages and technologies, and related research will be discussed in this chapter. First, we will cover the theory and core concept of both dentistry and artificial intelligence. Second, programming languages and technologies that are intended to be used in this project will be described in the “Languages and Technologies” section. Lastly, related research and similar solution approaches to the objective will be discussed in the “Related Research and Competing Solutions” section.

### 2.2 Theory and Core Concepts

Common oral problems, including tooth decay, wisdom teeth complications, and gum disease, require consistent treatment for a considerable number of patients. Dentists, who routinely engage with patient inquiries and symptom tracking, have recommended that our focus be directed towards Tooth Extraction, Wisdom Tooth Removal, Periodontal Surgery, and Dental Implant Surgery. These specific procedures directly address the aforementioned common oral problems, aligning our work with the suggestions of dental professionals.

#### 2.2.1 Tooth Extraction

Tooth extraction is a common dental procedure performed by a dentist or oral surgeon to remove a tooth from its socket in the jawbone. It is necessary for various reasons, including extensive tooth decay, crowding, tooth impaction, or as part of orthodontic treatment. Recovery typically takes a few days to a few weeks. The benefits of tooth extraction vary depending on the reason for the procedure. However, the disadvantages of tooth extraction often include challenges with chewing food and a potential loss of aesthetic appeal. Additionally, there may be complications that require careful monitoring, such as post-surgical swelling or infection.

#### 2.2.2 Wisdom Tooth Removal

Wisdom tooth extraction, also known as third molar extraction, is a dental procedure performed to remove the third molars, commonly referred to as wisdom teeth. These teeth often become impacted or lead to various dental issues due to their slow growth and limited space in the jaw. Surgery becomes necessary for various reasons, including the prevention of pain arising from the inability of third molars to erupt properly or the prevention of issues related to crowded and misaligned teeth. However, the most common concerns associated with this procedure are the potential side effects after surgery, such as swelling, unusually significant or continuous discharge, or facial distortion lasting more than two weeks.

#### 2.2.3 Periodontal Surgery

Periodontal surgery, also known as gum surgery, is a dental procedure aimed at treating various gum diseases and conditions. It involves the removal of infected gum tissue and, in some cases, the reshaping of the underlying bone to restore gum health and improve the stability of teeth. During this surgery, the dentist or periodontist carefully removes the diseased tissue and then shapes and contours the remaining gum and bone to promote optimal healing. In more advanced cases, bone grafts or tissue-stimulating proteins may be used to encourage tissue regeneration. Periodontal surgery is crucial in preventing the progression of gum

diseases, reducing gum pockets, and ultimately preserving the natural teeth. Besides its significant impact on oral health, undergoing periodontal surgery can also enhance an individual's confidence and self-esteem by restoring a healthy, aesthetically pleasing smile.

#### **2.2.4 Dental Implant Surgery**

A dental implant is a technology used to replace missing teeth by employing sturdy materials as dental implants to serve as replacements for natural tooth roots. Presently, it is common to use dental implants that encompass both the root and the tooth, as they closely resemble natural teeth in appearance and function realistically. Additionally, they aid in preventing the deterioration of the jawbone where the implant is placed. To be a suitable candidate for dental implants, a patient must possess healthy gums and adequate bone support for the tooth roots. Following a root canal procedure, it is imperative for the patient to consistently maintain their oral health. Dental implants offer numerous advantages, including the prevention of teeth from shifting or becoming misaligned due to tooth loss, as well as contributing to the strengthening and preservation of oral hygiene.

### **2.3 Languages and Technologies**

#### **2.3.1 Web Development Language**

##### **2.3.1.1 JavaScript**

JavaScript, abbreviated as JS and developed by Netscape in the mid-1990s, is one of the most used programming languages in web development. It enables the development of dynamic content within web pages, enhancing websites responsiveness to user interactions.

Operating as a scripting language on the client side, JavaScript runs directly within web browsers, facilitating interaction with the Document Object Model (DOM), which represents a webpage's structure and content.

JavaScript boasts a rich set of features and capabilities, including support for various data types, loops, functions, and more. Moreover, it offers many libraries and frameworks that simplify complex tasks.

A key attribute of JavaScript is its capacity to handle asynchronous operations. Asynchronous operations enable data retrieval without disrupting the user's experience, as these operations occur independently through mechanisms such as `async/await` and `Promises`.

##### **2.3.1.2 TypeScript**

Developed by Microsoft, TypeScript (or TS) is an enhanced version of JavaScript, adding strong typing and advanced features to the original language.

One of the most noticeable changes from default JavaScript is the introduction of a strong typing system. TypeScript requires variables, function parameters, and function return types to be explicitly defined with data types. This enhances error detection during the development process, resulting in fewer bugs when the website is deployed. It also promotes easier cooperation between developers, as the code becomes more understandable.

TypeScript offers additional features, such as interfaces and custom type definitions, which enable objects to have specific shapes. This feature enhances code comprehension and facilitates integration with third-party libraries.

##### **2.3.1.3 Python**

Python, famous for its ease of use and readability, has gained in popularity in web programming due to its flexibility and an extensive collection of frameworks designed for web application development. It

is frequently employed in web backend development, offering developers a wide range of frameworks and libraries to choose from. This diversity makes it an attractive choice for creating robust and scalable websites.

#### **2.3.1.4 Hypertext Markup Language**

Hypertext Markup Language, abbreviated as HTML, serves as the standard language for creating the structural framework of websites. It uses a markup syntax consisting of tags to define various components, including headings, paragraphs, links, images, etc. HTML's simplicity, adaptability, and compatibility with multimedia features have solidified its enduring importance in the realm of website development. It stands as an indispensable tool for developing everything from straightforward web pages to complex websites.

#### **2.3.1.5 Cascading Style Sheet**

Cascading Style Sheets, abbreviated as CSS, is commonly referred to as a "style sheet." It is a language used to format HTML documents, with CSS being responsible for defining rules that specify the presentation of content within a document. These rules encompass aspects such as text color, background color, font type, and text positioning. The fundamental concept behind CSS is the separation of HTML document content from the instruction used for formatting its display. By employing this separation, CSS achieves two primary objectives. Firstly, it ensures that the document's display format is independent of its content, facilitating the task of formatting HTML documents, especially when the content undergoes frequent changes. Secondly, CSS enables precise control over the presentation format of HTML documents, ensuring consistency across all pages within the same website. Styling rules for HTML documents were initially introduced in HTML 4.0 back in 1996, in the form of CSS Level 1 recommendations established by the World Wide Web Consortium (W3C).

### **2.3.2 Front-end Framework**

Front-end frameworks play a crucial role in web development by simplifying the creation of user interfaces. They encompass design, layout, and interactive elements such as forms and buttons. These frameworks provide pre-written code that includes HTML, CSS, and JavaScript components, facilitating code reuse and maintaining consistency across web projects. By leveraging front-end frameworks, developers can efficiently generate HTML and CSS, design responsive layouts for various devices, ensure a consistent user experience, automate repetitive tasks, and manage their code efficiently. Ultimately, front-end frameworks streamline and structure the development process, enabling the creation of user-friendly and visually appealing web applications. Examples of front-end frameworks are as follows:

- React: A front-end framework, React stands apart because of its virtual Document Object Model (DOM), which enhances its functionality. It is a perfect framework for those who expect high traffic and require a steady platform to manage it.
- Angular: Formally released in 2016, the Angular framework was established by Google to bridge the gap between the mounting demands of technology and conventional notions that displayed the results. In contrast to React, Angular is distinctive with its two-way data binding trait. It means that there is real-time synchronization between the view and model, where any alteration in the model replicates promptly on the view and vice versa. To reduce doctors and staff by minimizing repeated questions and explanations from patients.
- Vue.js: It has a small size and offers two main benefits – a visual DOM and a component-based structure. It also employs two-way data binding. This front-end framework is versatile and assists with

various tasks when building web applications. The difference between Vue and React is that Vue is a JS framework while React is a JS library. So, Vue is more suitable for large projects.

- Semantic-UI: The objective of Semantic lies in empowering the designers and developers by creating a language for sharing UI. It uses natural language that makes the entire code self-explanatory. The framework is comparatively new to the ecosystem. Still, with its striking user interface, simple functionalities, and features, it has become one of the most popular front-end frameworks.
- Next.js: Used by some of the world's largest companies, Next.js enables you to create full-stack web applications by extending the latest React features and integrating powerful Rust-based JavaScript tooling for the fastest builds.

### 2.3.3 Backend Framework

A backend framework serves as a foundational platform for developers to expedite the creation of web and mobile applications with standardization. In the context of backend frameworks, they simplify server-side development by offering tools, libraries, and components that streamline the construction of web applications. These frameworks automate various aspects of web development, enhancing efficiency and cleanliness in code design. Examples of backend frameworks are as follows:

- ExpressJS: It is a minimal Node.js framework used to develop highly flexible applications.
- Django: Django is the most popular Python framework used in web development. Based on the Don't Repeat Yourself (DRY) principle, Django focuses on code reusing, thus enhancing the development speed. It is also a very secure framework.
- Node.js: JavaScript is the most popular programming language in the world. With the emergence of Node.js, JavaScript's popularity in the backend development community increased rapidly, and in the last decade, Node.js has become one of the top names.
- Flask: It's a simple, highly flexible, and performing web framework. Being a lightweight framework, or micro-framework, it is easy to learn and understand Flask. Moreover, being a Python framework, it is very user-friendly.

### 2.3.4 Chatbot

A chatbot is a machine learning (ML) or artificial intelligence (AI) system designed to simulate and handle human conversations, whether written or spoken. These AIs enable users to interact with digital devices as if they were having a conversation with a human. Chatbots can vary widely in complexity, from basic systems that respond to user queries to advanced digital assistants that learn and adapt over time, providing personalized experiences as they collect and process data.

#### 2.3.4.1 Chatbot Framework

A Bot Framework is a platform where developers create and define the behavior of chatbots. It simplifies the complex task of building chatbots that can operate on various messaging platforms and software development kits (SDKs). While some frameworks claim "write once, deploy anywhere" capabilities, in practice, developers often need to create separate chatbots for each messaging platform. The Bot Framework comprises components such as the Bot Builder SDK, Bot Connector, Developer Portal, Bot Directory, and an emulator for testing. However, it may not be the best choice for beginners looking to learn chatbot development due to its complexity.

Examples of Bot frameworks include:

- DialogFlow
- Microsoft Bot Framework
- Rasa
- Amazon Lex
- IBM Watson Assistant
- Wit.ai
- Botpress

#### **2.3.4.2 Pretrained Chatbot Model**

A pretrained chatbot model is a Natural Language Processing (NLP) model that has been trained on a wide range of text data from sources such as books, articles, social media, etc. These models are equipped with the capability to understand and generate text that closely resembles human language, making them valuable for chatbot development and other natural language tasks. These chatbots can also undergo fine-tuning or additional training for a specific task or domain to enhance their accuracy and performance.

##### **2.3.4.2.1 DeBERTa**

DeBERTa (Decoding-enhanced BERT with disentangled attention) is a neural language model architecture designed to enhance the performance of pre-trained models like BERT (Bidirectional Encoder Representations from Transformers) and RoBERTa (Robustly optimized BERT approach) with two techniques, a disentangled attention mechanism and an enhanced mask decoder.

The disentangled attention mechanism involves representing each word with two vectors—one for content and one for position. Attention weights among words are then calculated using disentangled matrices for content and relative positions, allowing the model to independently consider semantic content and positional relationships during computations.

The enhanced mask decoder replaces the output softmax layer to predict masked tokens during model pre-training. Additionally, a new virtual adversarial training method is applied during fine-tuning to enhance the model's generalization for downstream tasks.

The DeBERTa V2 model is a variant of the transformer architecture designed for question-answering tasks. Its structure consists of an embedding layer for word representations, employing layer normalization and dropout for regularization. The core encoder is composed of multiple DeBERTa V2 layers, each featuring a disentangled self-attention mechanism, an intermediate layer with GELU activation, and output layers for attention and transformation. The model incorporates relative positional embeddings to efficiently capture token dependencies. The final layer includes a linear output module specialized for predicting start and end positions in the input sequence, crucial for question answering. Overall, DeBERTa V2 integrates advanced attention mechanisms and positional embeddings to enhance its ability to capture complex relationships within the input data for improved performance in question-answering tasks.

##### **2.3.4.2.2 mDeBERTa**

mDeBERTa is the multilingual version of DeBERTa. Both models have the same architecture but mDeBERTa supports multiple languages while DeBERTa supports only English.

### 2.3.5 Machine Learning

Machine Learning (ML) is a branch of Artificial Intelligence that tries to replicate how humans work. It uses the accumulated data in order to let machines learn step by step in order to improve its accuracy in the task they are trained to do.

#### 2.3.5.1 Decision Tree

A decision tree is a supervised machine learning algorithm used for categorizing and regression tasks. A decision tree consists of root node, decision nodes, leaf nodes, splitting, pruning, and branches.

The decision tree operates by employing various algorithms to decide to split a node into two or more sub-nodes. Decision trees work by iteratively partitioning nodes based on all available features and subsequently selecting the split that leads to the most uniform or homogeneous sub-nodes in terms of the target variable. This aims to create clear and distinct decision boundaries within the dataset, facilitating more accurate predictions or classifications by the decision tree model.

### 2.3.6 Random Forest

Random Forest is the combination of many decision trees and using results from all decision trees by either averaging or majority voting making it less biased which helps in overfitting problems. As you can see from Figure 1.2, the final results are obtained after getting results from many decision trees.

## **CHAPTER 3 DESIGN AND METHODOLOGY**

## CHAPTER 4 EXPERIMENTAL RESULTS

#### 4.1 Dental Frequently Asked Question Collection

Since the project should be able to answer the input queries, we have gathered commonly asked questions about the 4 surgeries mentioned. We conducted surveys and consulted with experts to ensure accurate and appropriate answers. This section contains the questionnaire and its results.

#### **4.1.1 Collection Process**

The questions were gathered using Google Forms. The questionnaire below was created aimed to cover a wide range of opinions and concerns regarding dental health and medical treatments. Questions in the questionnaire consisted of คุณเคยพิจารณาการรักษาหรือการผ่าตัดให้มาแล้วบ้าง, สาเหตุที่คุณเข้ารับการรักษา/ผ่าตัด, คำถามที่นักจักษ์เจอ-หรือส่องสัยได้ยกบปครและรักษา/ผ่าตัดข้างต้น, คำถามที่มักสงสัยหลังจากที่ได้รับการรักษา/ผ่าตัด.

# แบบสำรวจ เก็บข้อมูลค่าความเกี่ยวกับการรักษา<sup>ทางทันตกรรม</sup> และความคิดเห็นสำหรับฟิลเลอร์ บนเว็บทันตกรรม

แบบสำรวจี้เพื่อเก็บข้อมูลค่าความพึงพอใจของผู้คนที่หันมายและความคิดเห็นที่ได้จากการรักษา<sup>ทางทันตกรรม</sup> ที่มาโดยฟิลเลอร์ ซึ่งคือหัวใจของการรักษาทางทันตกรรมที่สำคัญมากในกระบวนการรักษาฟัน การฟื้นฟู  
จึงต้องอาศัยคุณภาพของฟิลเลอร์ ดังนั้น วิเคราะห์ความคิดเห็นของผู้คน นิยาม化เป็นส่วนหนึ่งในการประเมินผลการรักษา

หากมีปัญหาเรื่องเชื่อมสัมภาระกดคลิ๊กไฟฟ้าที่  
หมายเลขโทรศัพท์ 0921190203, หมายเลขไลน์ 0981613959, ทางไลน์มาได้ 0631514451  
“ขอขอบคุณที่ให้เวลาและเวลาตรวจสอบให้การคิดเห็นของคุณมาในครั้งนี้ค่ะ”

[fasai.sae@mail.kmutt.ac.th](mailto:fasai.sae@mail.kmutt.ac.th) [Switch account](#)

Not shared

[Next](#) Page 1 of 4 [Clear form](#)

Never submit passwords through Google Forms.

This form was created outside of your domain. [Report Abuse](#) · [Terms of Service](#) · [Privacy Policy](#)

Google Forms

**Figure 4.1** First page of the questionnaire



แบบสำรวจ เก็บข้อมูลค่าความเสี่ยงการรักษา<sup>ฟัน</sup> ทางทันตกรรม และความคิดเห็นล่าช้ารับฟีเจอร์  
เบราว์เซอร์ทันตกรรม

fasai.sae@mail.kmutt.ac.th [Switch account](#) 

 Not shared

\* Indicates required question

คุณเคยรักษาระบบรากฟาร์มได้ในช่องปากมาแล้วหรือไม่ \*

เคย  
 ไม่เคย

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**Figure 4.2** Second page of the questionnaire



**แบบสำรวจ เก็บข้อมูลคำานวณเกี่ยวกับการรักษา<sup>\*</sup>  
ทางทันตกรรม และความคิดเห็นสำหรับฟิลเลอร์  
บนเว็บทันตกรรม**

fasai.sae@mail.kmutt.ac.th Switch account 

 Not shared

\* Indicates required question

**คำถามทางด้านทันตกรรม**

คุณเคยผ่านการรักษาหรือการหาดัดใจใหม่แล้วป่าว \*

ก่อนฟัน  
 ก่อน/หลังฟื้ด  
 ก่อตัวเมืองลักษณะนูน  
 ก่อตัวรากฟันเรียบ  
 Other: \_\_\_\_\_

สถานที่ที่เคยเข้ารับการรักษา/มาตั้ง \*  
เช่น บล๊อกฟันอุด, มีพิษณุ

Your answer

สถานที่ที่ไม่จะเชื่อหรือสนใจที่จะไปรับการรักษา/มาตั้งดังนี้ \*  
เช่น การรักษาที่ดูแลสุขภาพในท้อง, ที่แพทย์牙科 ในโรงพยาบาลฯ

Your answer

สถานที่ที่ไม่กลับถ่ายร่องรอยจากฟันได้รับการรักษา/มาตั้ง \*  
เช่น ต้องกดค้างก่อนขยานยาชาใน, เดือดในหลอด อุบลฯ ฯ

Your answer

**Back** **Next** **Page 3 of 4** **Clear form**

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**Figure 4.3** Third page of the questionnaire



**แบบสำรวจ เก็บข้อมูลคำานวณเกี่ยวกับการรักษา<sup>\*</sup>  
ทางทันตกรรม และความคิดเห็นสำหรับฟิลเลอร์  
บนเว็บทันตกรรม**

fasai.sae@mail.kmutt.ac.th Switch account 

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**คำานวณเก็บกันเร็วๆ**

หากไม่รีบใช้ส่วนมากของคำานวณทันตกรรมและสามารถติดตามผลลัพธ์การผลิตได้  
คุณจะมาเพื่อฟิลเลอร์ไว้เพื่อเปลี่ยนไปรีบใช้ส่วนนี้มา

Your answer

**Back** **Submit** **Page 4 of 4** **Clear form**

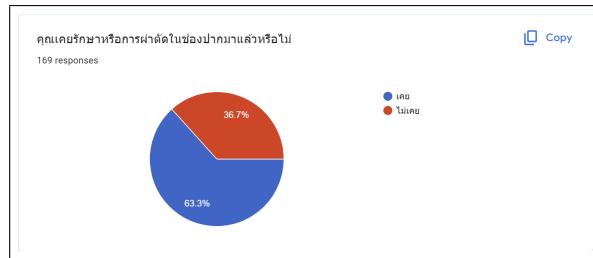
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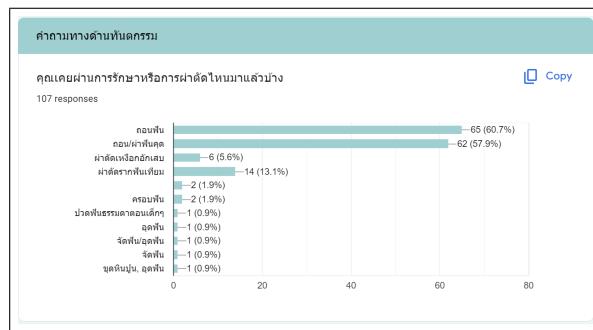
Google Forms

**Figure 4.4** Fourth page of the questionnaire

#### 4.1.2 Results



**Figure 4.5** Pie chart of Distribution of Oral Surgery Experience



**Figure 4.6** Respondent's Oral Surgeries Experience



**Figure 4.7** Reason the Respondent Attend the Treatment

ค่าตอบแทนที่มีภาระเจ้อหรือสบายน้ำกันโรคและการรักษา/ผ้าตัดข้างด้าน  
107 responses

- 平淡พื้น
- เพิ่มความน่าสนใจในสิ่งที่จะต้องสอนลูก
- ไม่มี
- การผ่านคุณเจ้มใหม่
- จำเป็นมากก่อนแต่ในที่ส่องผ่านคุณ
- เข้มข้น
- ผ่านคุณเจ้มน้ำ, จดหมายเจ้มน้ำ
- รองไฟฟ้ามีน้ำลอดลง
- ใช้เวลาครั้งชั่วโมง

**Figure 4.8** Common Questions and Concerns About Surgeries and Treatment

ค่าตอบแทนที่มีภาระเจ้อสบายน้ำกันโรคและการรักษา/ผ้าตัด  
107 responses

- 
- ไม่มี
- ใช้เวลาพยายามนานใหม่
- ต้องกัดผ้าก่อชานนานขนาดไหน
- ใช้การฉุดและหลังผ้าตัด
- 平淡น้ำนี้ กันช้ำได้ยัง
- มีกลิ่นปากเหมือนปากน้ำ
- ไม่นาน, ไม่ต้องปลอกตัว
- กัดผ้าก่อช้ำ 20 นาที

**Figure 4.9** Post-Treatment Frequently Asked Questions

ค่าตอบแทนที่มีภาระเจ้อช้ำตัว

หากมีว่าใช่ต่อสำหรับการลดความด้านที่น้อยลงและสามารถลดความด้านที่น้อยลงได้ คิดอย่างไรเมื่อเริ่มใช้ตัวน้ำ

98 responses

- ไม่มี
- 
- แนะนำคลินิกน้ำที่คุณภาพดี
- อ่านรายวิธีดูเองจาก
- ไม่เอาแล้ว
- ถ้าไม่รู้ใช่ตัวคือรับจะใช้ตัวน้ำ, มีความรู้ด้วยตัวเองพื้น
- สภาพพื้นเป็นอย่างไร
- Real time chat กับมูลเชิงวิชาการ
- บริการทางด้าน

**Figure 4.10** Recommendations for Website Development and Features

## 4.2 Follow-Up Procedure Interview

Since the follow-up process is one of the project's main features, we must examine every important aspect in order to emphasize the post-surgery follow-up in the context of dental healthcare, understand the importance of comprehensive patient care, as well as the details of the follow-up process. This will allow us to imitate the actual medical staff procedure. This section explains how we conducted interviews with the dental clinic's medical staff in order to gain important insights into the techniques used for post-surgery tracking.

#### 4.2.1 Interviewing Dental Clinic Around the University

To gain an insight and understand post-surgery follow-up procedure, we have first conducted an interview at the dental clinic around the university. The interview question include question such as ขั้นตอนการติดตามอาการผู้ป่วย, โดยปกติแล้วจะทำการโทรศัพท์ตามอาการคนไข้กี่ชั่วโมงหลังผ่าตัด, คำถามที่มักจะถามผู้ป่วยตอนติดตามอาการ, คำถามที่ผู้ป่วยมักจะถามกลับมา. After these interviews, we have gained invaluable insights and a deeper understanding of the follow-up procedures, enhancing our research with firsthand perspectives on patient care in the post-surgical phase within the local dental healthcare landscape.

#### 4.2.2 Interviewing and Survey at Faculty of Dentistry at Chulalongkorn University

According to the important requirement for an in-depth understanding of the practicalities involved with the follow-up procedure, we needed to familiarize ourselves with the patient's involvement following surgery. This includes an in-depth investigation of complexity of questions, symptom assessment, patient interaction during the follow-up phase, and response to particular concerns. Regarding the complexity of these interactions, we think it is important to have discussions and obtain advice from professionals, especially those who have experience with the follow-up procedure, and patient communication.

In order to capture the view of the expert and match our project with the actual demands of both medical professionals and patients, we conduct an on-site observation and interviews at the Faculty of Dentistry, Chulalongkorn University.



**Figure 4.11** Our team and the call-center representative

The call-center representative works at the OPD Instant Clinic's call center. The department is in charge of answering questions and helping out OPD patients.



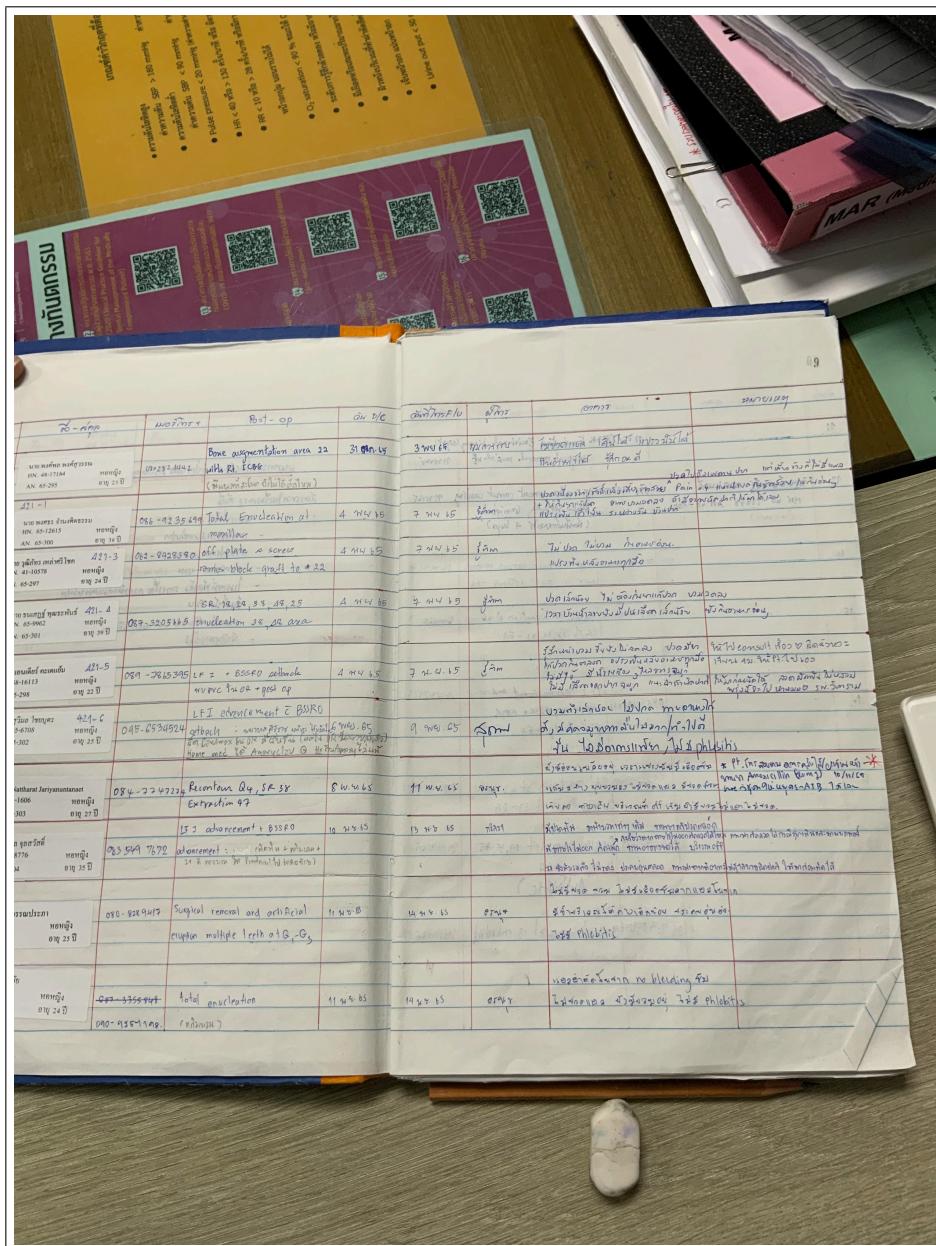
**Figure 4.12** Working environment of the OPD Instant Clinic's call center

The OPD Instant Clinic's call center is following-up with their patient a day after the surgeries.



**Figure 4.13** Conversation with the nurse who is experienced in the patient follow-up process

The follow-up process usually happens three days following a patient's discharge. The nurse will follow-up with the patients and give them advice if needed.



**Figure 4.14** Document that the nurse has documented patient information during follow-up sessions

The nurse records details such as the operation, discharge date, follow-up date, contact person, symptoms, and any additional notes. This approach is a comprehensive and accurate way of tracking patient data gathered during follow-up calls.