BRAND2C: AN ANALYTICAL TOOL FOR BRAND SENTIMENT ANALYSIS BASED ON TWITTER DATA

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ABSTRAK

Analisis sentiment boleh juga dikenali sebagai "kecerdasan buatan emosi" atau "perlombongan pendapat", merujuk kepada proses menentukan sama ada teks mengandungi emosi positif, negatif atau neutral dengan memberikan skor sentimen wajaran. Media sosial kini telah menjadi penyelesaian perniagaan yang penting dan satu kemestian untuk kehadiran digital dalam dunia yang terhubung secara digital hari ini. Analisis sentimen adalah penting bagi syarikat untuk mengetahui tentang keperluan pelanggan mereka dan arah aliran pasaran. Masalah utama syarikat dan pengguna awam adalah kekurangan platform untuk syarikat mengetahui reputasi jenama mereka, syarikat dan pengguna awam tidak mempunyai platform untuk melihat gambaran keseluruhan pendapat pelanggan mengenai produk dari media sosial, dan syarikat. tidak dapat mengetahui perasaan pelanggan tentang jenama pesaing. Alat analisis berasaskan web dibangunkan untuk analisis jenama pada rangkaian sosial dalam talian iaitu Twitter untuk mengira skor sentimen tweet tersebut. Aplikasi berasaskan web terdiri daripada data ringkasan analisis, carta pai bagi sentimen, graf untuk tweet sehari, awan perkataan, jadual tweet dengan skor sentimen, graf untuk sentimen positif, graf untuk sentimen negatif, graf untuk sentimen neutral, dan laporan analisis sentimen. Metodologi pembangunan terpilih yang digunakan untuk membangunkan alat analisis berasaskan web ialah Scrum kerana ia merupakan metodologi yang fleksibel. Ia membolehkan pasukan bekerjasama. Sebagai kesimpulan, projek ini melaksanakan VADER untuk menilai pelbagai variasi linguistik dan tatabahasa, selain memberikan skor kepada perkataan. Dengan menggunakan VADER dalam projek ini, julat keupayaan VADER membantu menilai sikap pelanggan berdasarkan tweet untuk membuat ramalan tentang nilai pasaran.

ABSTRACT

Sentiment analysis which can be also known as “emotion artificial intelligence” or “opinion mining”, refers to the process of determining whether a text contains positive, negative, or neutral emotions by assigning the weighted sentiment scores. Social media has now become an essential business solution and a must for digital presence in today’s digitally connected world. Sentiment analysis is important for companies to learn about their customers’ needs and market trends. The main problem for the companies and the public user is lack of platform for company to know their brand reputation, company and public user does not have a platform to observe the overview of the customers’ opinion on the products from the social media, and company could not know how the customers feel about the competitors’ brands. A web-based analytical tool is developed for brand analysis on online social network which is Twitter to calculate the sentiment scores of the tweets. The web-based application consists of summarize data of the analysis, pie chart of the sentiment, graph for tweets per day, word cloud, table of the tweets with sentiment scores, graph for positive sentiment, graph for negative sentiment, graph for neutral sentiment, and report of the sentiment analysis. The selected development methodology that was used to develop the web-based analytical tool is Scrum as it is a flexible methodology. It enables teams to collaborate. To conclude, this project implements VADER to evaluate various linguistic and grammatical variations, in addition to assigning a score to words. By using VADER in this project, VADER’s capabilities range helps to evaluate a customers’ attitude based on the tweet to make predictions about market values.

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LIST OF SYMBOLS

LIST OF ABBREVIATIONS

AI	Artificial Intelligence
API	Application Programming Interface
ASD	Adaptive Software Development
BDD	Behavior Driven Development
CSS	Cascading Style Sheets
DSDM	Dynamic Software Development Method
ERD	Entity Relationship Diagram
FDD	Feature Driven Development
HTML	HyperText Markup Language
NLP	Natural Language Processing
NLTK	Natural Language ToolKit
NPS	Net Promoter Score
RAD	Rapid Application Development
SaaS	Software as a Service
SDD	Software Design Documentation
SDLC	Software Development Life Cycle
SIA	Social Intelligence Advisor
SRS	Software Requirement Specification
UAT	User Acceptance Testing
VADER	Valence Aware Dictionary for sEntiment Reasoning
WBS	Work Breakdown Structure
XP	eXtreme Programming

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, sentiment analysis is becoming increasingly significant. Sentiment analysis which can be also known as “emotion artificial intelligence” or “opinion mining”, refers to the process of determining whether a text contains positive, negative, or neutral emotions by assigning the weighted sentiment scores. Natural language processing (NLP) and machine learning are used in this form of text analytics (Chatterjee, 2021). There are five steps in sentiment analysis which are data collection, pre-processing of datasets, sentiment detection, sentiment classification, and presentation of result (Goel et al., 2017). Sentiment analysis helps in the generalizations of enormous amounts of unstructured text-based data from online sites such as blogs and social media.

Sentiment analysis have been applying to determine the sentiment scores of the text-based data on online social network. Online social network provides people a virtual area with little restrictions or limitations to express their view and being themselves. People can share their opinions and discuss their feelings with others through online social network. The online social network stores a vast quantity of information. The amount of data continuously collected on these sites and analyse people’s opinions or feelings.

Besides, social media has now become an essential business solution and a must for digital presence in today’s digitally connected world. Sentiment analysis is important for companies to learn about their customers’ needs and market trends. Positive reviews of the product help company to maintain a positive brand reputation while negative reviews lead companies to enhance their products so that the products meet their customers’ needs (Chatterjee, 2021). The sentiment of the post can be determined and

delivered in a brand reputation. Sentiment analysis can be used by businesses to assess brand reputation, track marketing campaigns, and understand the needs of the customers.

In this project, a web-based analytical tool is developed for brand analysis on online social network which is Twitter to calculate the sentiment scores of the tweets. The sentiment scores can be classified into positive, negative, or neutral sentiment. The web-based application consists of summarize data of the analysis, pie chart of the sentiment, graph for tweets per day, word cloud, table of the tweets with sentiment scores, graph for positive sentiment, graph for negative sentiment, graph for neutral sentiment, and report of the sentiment analysis. The database server will store clean tweets and sentiment scores. The web-based application will get the data from the database server and display it in the web-based application.

1.2 Problem Statements

The first problem is lack of platform for company to know their brand reputation (Volker et al., 2021). In this competitive world, the importance of brand reputation cannot be overstated. The target market's level of trust in company will reflects in their brand reputation. According to research, 83% of consumers would like to consume from companies they can trust (Markovits, 2021). Company needs a platform to know their brand reputation since consumer loyalty can be increased by ensuring a positive brand reputation. Besides that, trust influenced 39% of consumers' purchasing decisions (Markovits, 2021). The sales market will also be affected by the brand reputation. With the problem which lack of sentiment analysis platform to search their brand reputation, it is tough to analyse whether the company's product is excellent enough.

Company and public user does not have a platform to observe the overview of the customers' opinion on the products from the social media. For company, company could not know more about what customers' needs, correctly understand what customers are expressing and the weakness of own products. The honest voices from customers are less to be heard. Customers nowadays often express their customer experience on social media after using the products. All the comments are crucial which often includes information about the product such as the features that may need to be improved and features that is most desirable among the customers (Ishani Chatterjee, 2021). Hearing the honest voices may sound to be a no-brainer, but there are many companies fall short

of hearing the voices from customers. The emotion is also difficult to recognise from the text. This will cause the company might misunderstand the emotion of the comments from the customers. Hearing the honest voices from customers is essential since it helps the company to view the comments of the products and try to improve the products so that the products meet customer's requirements. It will cause the company could not improve their own products and customer service. For public user, public user could not know if the product is good or not before purchasing the products since there is no platform to observe the overview of the comments by the customers. A platform is needed for the public user so that public user can refer to the comments which gave by the customers before the public user purchase the products. Without a platform, it will cause the public user afraid to buy the product.

Besides that, company could not know how the customers feel about the competitors' brands. Brand analyst of the company is responsible to monitor and analyse market research for the company. In today's highly competitive market, brand analyst of the company lack of an analytic tool to monitor the competitors' brands review from the customers. If the brand analyst can get to view the review of the products from the competitors' customers, company can examine the competitors' misstep, learn, and improve own's product so that do not tread in the competitors' footsteps. Apart from this, company also can refer to the aspects from the competitors that analysed by the brand analyst which are deserved to be learned by the companies so that the company can enhance their products. The reviews are critical for the company's brand to flourish and maintain a positive reputation among the competitors (Chitra et al., 2021). Without viewing the competitors' positive and negative comments from the customers, companies could not know what kind of product customers will like or dislike.

Table 1.1 Summary of problems

No.	Problem	Description	Effect
1.	Lack of platform for company to know their brand reputation.	Company needs a platform to know their brand reputation since consumer loyalty can be increased by ensuring a positive brand reputation. The sales market will also be affected by the brand reputation.	With the problem which lack of sentiment analysis platform to search their brand reputation, it is tough to predict and analyse whether the company's product is excellent enough.
2.	Company and public user does not have a platform	For company, company could not know more about	Without a platform, it will cause the company

	to observe the overview of the customers' opinion on the products from the social media.	what customers' needs, correctly understand what customers are expressing and the weakness of own products. The honest voices from customers are less to be heard. For public user, public user could not know if the product is good or not before purchasing the products.	could not improve their own products and customer service. Besides, it will also cause the public user afraid to buy the product.
3.	Company could not know how the customers feel about the competitors' brands.	Brand analyst of the company lack of an analytic tool to monitor the competitors' brands review from the customers. If the brand analyst can get to view the review of the products from the competitors' customers, company can examine the competitors' misstep, learn, and improve own's product so that do not tread in the competitors' footsteps.	Without viewing the competitors' positive and negative comments from the customers, companies could not know what kind of product customers will like or dislike.

1.3 Objective

The objectives of the project are:

i. To review user requirements for developing a web-based analytical tool for brand sentiment analysis based on Twitter data.

ii. To develop a web-based analytical tool that can visualise the result of brand sentiment analysis of Twitter data.

iii. To evaluate the functionality of the developed web-based analytical tool for brand sentiment analysis based on Twitter data.

1.4 Scope of Project

The scopes of the project are:

1.4.1 User Scope

i. Companies that are about to enter digital marketing field.

ii. Companies that want to ensure positive brand reputation for their products.

iii. Companies that want to monitor competitors' product reviews.

iv. Brand analyst that needs to help the companies to analyse the market research.

v. Public users who want to know more about the product from the customer's comments before purchasing the products.

vi. Public users who need a user-friendly interface to view and understand the sentiment analysis data easily.

1.4.2 System Scope

i. Covered Natural Language Processing (NLP), sentiment analysis and Twitter API.

ii. Covered sentiment scores for the tweets, sentiment analysis which conclude based on different categories, and word cloud.

iii. The system retrieves the data from social media which is Twitter.

iv. The system uses English language for text sentiment analysis.

1.4.3 Development Scope

i. VADER (Valence Aware Dictionary for Sentiment Reasoning) will be used for text sentiment analysis.

ii. The system will be developed by using Laravel software.

1.5 Significance of the Project

1.5.1 Company

Company can have a platform to know their brand reputation and increase the consumer loyalty by ensuring a positive brand reputation. The sales market can increase when the brand reputation is positive. Company can also improve their own products and customer service by observing the overview of the customers' opinion on their products. Company also can get to monitor their competitors' product review.

1.5.2 Public User

Public user uses the sentiment analysis platform to know more about the comments from the customers for the brands or products before purchasing the products.

1.6 Report Organization

This report consists of five chapters. Chapter one will discuss about the introduction of the project. Chapter one contains the introduction, problem statements, objectives, scope, significance, and the report organization.

For chapter two, it will discuss about the literature review of three existing system. The three existing system for the analytical tool will be compared including the advantages and disadvantages of each existing system.

In chapter three, it focuses on the methodology which will be used in developing this project. Agile methodology will be implemented for developing this project. Software Requirement Specification (SRS) and Software Design Documentation (SDD) will record in detail for the project requirements and the system design.

For chapter four, it is discussed about the implementation and testing of the project. Lastly, chapter five is a conclusion of the project.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter covers the review of existing analytical tool in brand sentiment analysis. There are three existing analytical tools in brand sentiment analysis will be explained in detail and compare including the advantages and disadvantages. These three existing systems can be used in business to manage brand reputation and understand the needs of the customers. This comparison of the existing systems suggests the strength and efficacy of the present system, allowing this project to build a superior version of the system.

2.2 Brand Sentiment Analysis

Brand Sentiment is a method of determining how customer feel about the companies' brand, product, or service. It is the simplest method to analyse the brand reputation of the company. Based on the Oxford University Press dictionary, sentiment analysis is described as the technique of computationally recognising and categorising opinions conveyed in a text, usually to assess whether the texts are positive, negative, or neutral (Mishev et al., 2020). Sentiment analysis can be used to track the public's feelings about a specific product or service and turn that information into actionable knowledge (Ligthart et al., 2021). Sentiment analysis is critical in the business sphere since it allows companies to develop strategy and acquire insight into customers opinion on their products (Ligthart et al., 2021). Customers can be contacted directly for information about their reputation, but information can also be collected from indirect reports including newspapers, radio, magazines, magazines, and social content (Arief & Pangestu, 2021). Furthermore, sentiment analysis may appear to be a simple process, it necessitates the consideration of various NLP subtasks such as sarcasm and subjectivity

detection (Birjali et al., 2021). There are three levels of extraction for sentiment classification: aspect level, sentence level, and document level (Dang et al., 2020). Moreover, there are three techniques of dealing with the problem of sentiment analysis now such as lexicon-based techniques, machine-learning-based techniques, and hybrid-based approaches (Dang et al., 2020).

2.2.1 Sentiment Analysis Method

There are several sentiment analysis methods such as VADER, TextBlob, and Flair can be used.

VADER is a lexicon and rule-based sentiment analysis tool that is often used to analyse sentiment in social media. It is part of the Natural Language Toolkit (NLTK) packages. VADER contemplates the polarity of the feelings portrayed in the setting. VADER outputs the polarity in two ways which are in sentiment score between -1 and +1 which calculates the sentiment intensity of the sentence that classified as positive, negative, or neutral and presented text-ratio in three different categories such as positive, negative, and neutral.

TextBlob is a Natural Language Processing (NLP) library based on the Natural Language Toolkit (NLTK) library. It was used for sentiment analysis, part-of-speech tagging, classification, and translation, among other NLP applications (Appelbaum et al., 2021). It consists of two sentiment measures which are polarity and subjectivity. Polarity is a metric that evaluates the sentiment polarity of a statement and ranges from -1 to +1, with +1 denoting positive sentiment, -1 denoting negative sentiment and 0 denoting neutral sentiment. Subjectivity is a metric that measures the value of the words in a statement, such as a viewpoint, feeling, or judgement. The subjectivity score is a number between 0 and 1, with +1 indicating that the statement is subjective and 0 indicating that it is objective.

Flair is a Python library based on PyTorch4, performs NLP tasks using keyword and document semantic similarity (Appelbaum et al., 2021). It is usually applied in NER, parts-of-speech tagging, text categorization, and custom model training (Appelbaum et al., 2021). The sentiment scores for Flair are between -1 and +1. -1 indicates negative

sentence and +1 indicates positive sentence. There are float numbers which represent the model's confidence in predicting emotion.

As result, VADER will be used in this project since it is easy to use and it not only displays the positivity and negativity scores, as well as the degree to which a sentiment is positive or negative. VADER evaluates various linguistic and grammatical variations, such as punctuation, capitalization, and the use of apostrophes, in addition to assigning a score to words ("VADER Sentiment Analysis without and with English Punctuation Marks," 2021). In addition, VADER focuses on the words used in the phrase and then assigns a score to each one based on the word dictionary ("VADER Sentiment Analysis without and with English Punctuation Marks," 2021). The creator of VADER identified five heuristics that rely on linguistic and grammatical characteristics to transmit changes in emotion strength beyond the bundle of known words. The heuristics are punctuation, capitalization, degree modifiers, constructive conjunction, and tri-gram assessment to distinguish negation. By using VADER in this project, VADER's capabilities range helps to evaluate a customers' attitude based on the tweet to make predictions about market values.

2.3 Three Related Existing System

2.3.1 Mentionlytics

Mentionlytics is a web and social media monitoring tool which delivers web and social media monitoring solutions for companies (John Kopanakis, 2015). Mentionlytics provides companies to keep track mentions for companies' brand, product, and competitors on any websites like blogs and social media. The objective of the Mentionlytics is to offer all this massive quantity of data automatically, without the need for complex Google and social media queries and displays all the result in an interface so that companies can have a clear view to view the results. Mentionlytics is not only the web-based application, but also a mobile application for user to download it from Google Play Store or iOS Apple App Store.

Some top trending technologies that used by Mentionlytics for web analytics are Google Global Site Tag, Facebook Analytics, Mixpanel and FullStory. For web

accelerators, Mentionlytics use Cloudflare Website Optimization and Cloudflare Rocket Loader. In Mentionlytics, the interface is attractive and well organized. As shown in Figure 2.1, four data are summarised and display on the top of the interface such as total mentions, social reach, social engagement, and sentiment analysis. There are two pie charts which shows the percentages of positive and negative sentiments and percentages of mentions / channel based on the mentions. Mentionlytics consists of graphs which concludes the number of mentions and sentiment analysis per day. Besides, Mentionlytics provides list of mentions which sort by date from various social media such as Twitter, Facebook, YouTube, web, Instagram and other to let the user view the mentions that had collected. World Map and Keyword cloud also included in Mentionlytics. Moreover, top mentioners from various social media are also listed in this web and social media monitoring tool.

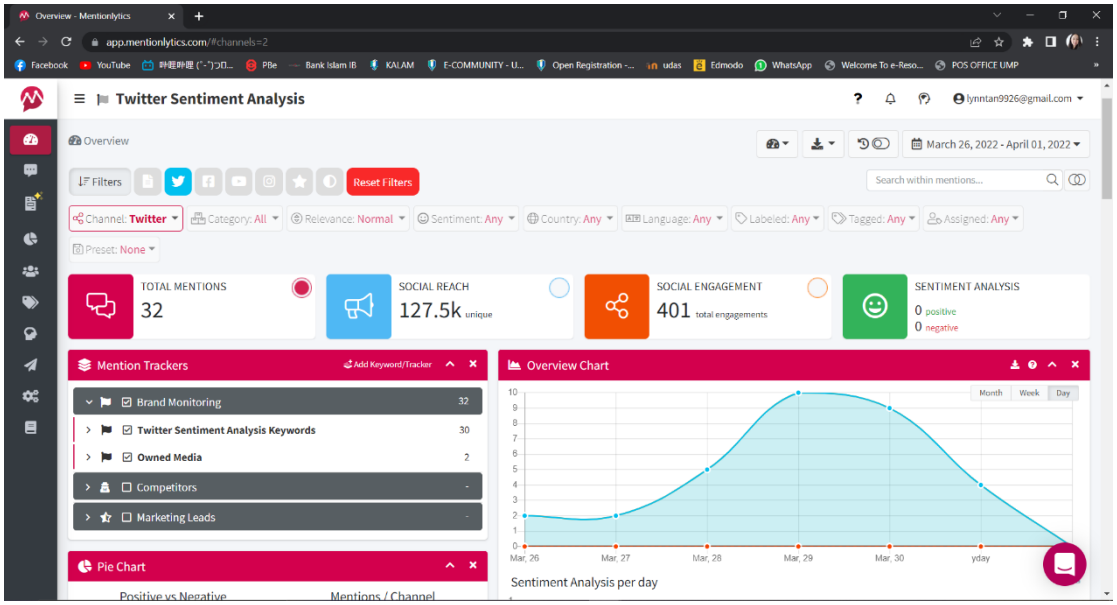

Figure 2.1 Interface of Mentionlytics

2.3.2 Brand24

Brand24 is a social customer relationship management and internet monitoring platform which gather the real-time social data from all around the Internet to enable a better understanding of online conversations and comments about their brand and products (Sadowski, 2011). By using Brand24, user can communicate with customers, conduct brand reputation, acquire vital customer information, measure marketing

effectiveness, and increase sales. Other than web-based application, Brand24 also developed as a mobile application for user to download from Google Play Store or iOS Apple App Store.

There are some Brand24's technologies stacks are used. For instance, Google Global Site Tag, Skilljar, WordPress.org, Google Font API, Sectigo, and Gravity Forms. In Brand24, the interface is well organized. Besides, user can add new project to browse the mentions. There is graph which shows the number of mentions, social media reach, and non-social reach. As shown in Figure 2.2, the graph can be sort based on days, weeks, months, and date that chosen by user. Brand24 provides filters for user to sort what kind of mentions they want to include or exclude in the analysis. Brand24 also displays the mentions which had collected. Besides that, as shown in Figure 2.3 and Figure 2.4, Brand24 provides project comparison function. User can compare the sentiment analysis of different project which can let the companies to compare their own product with other companies' product.

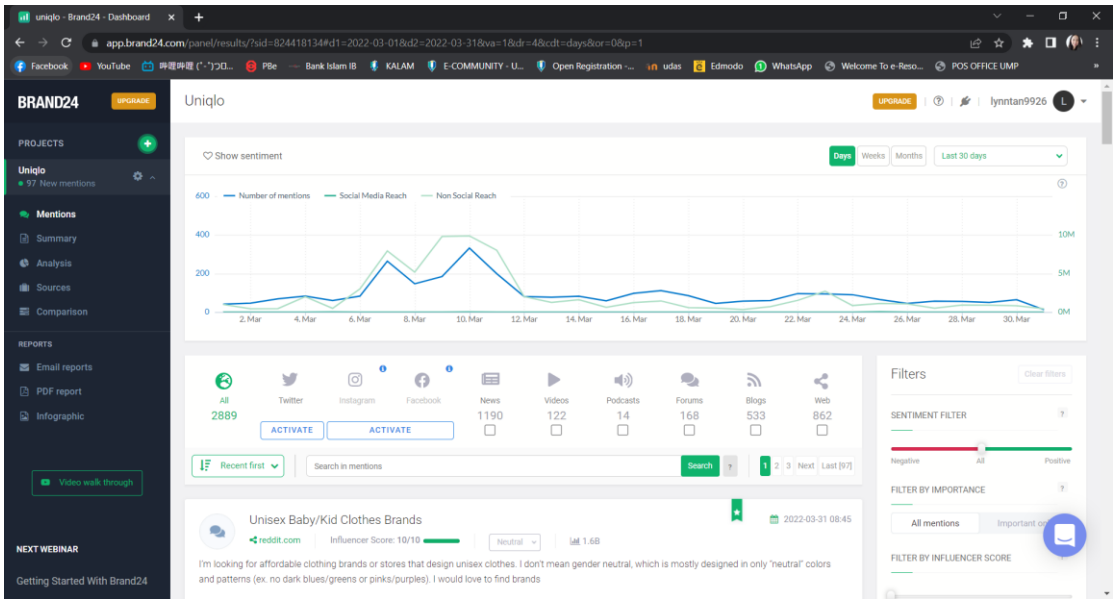

Figure 2.2 Interface of Brand24

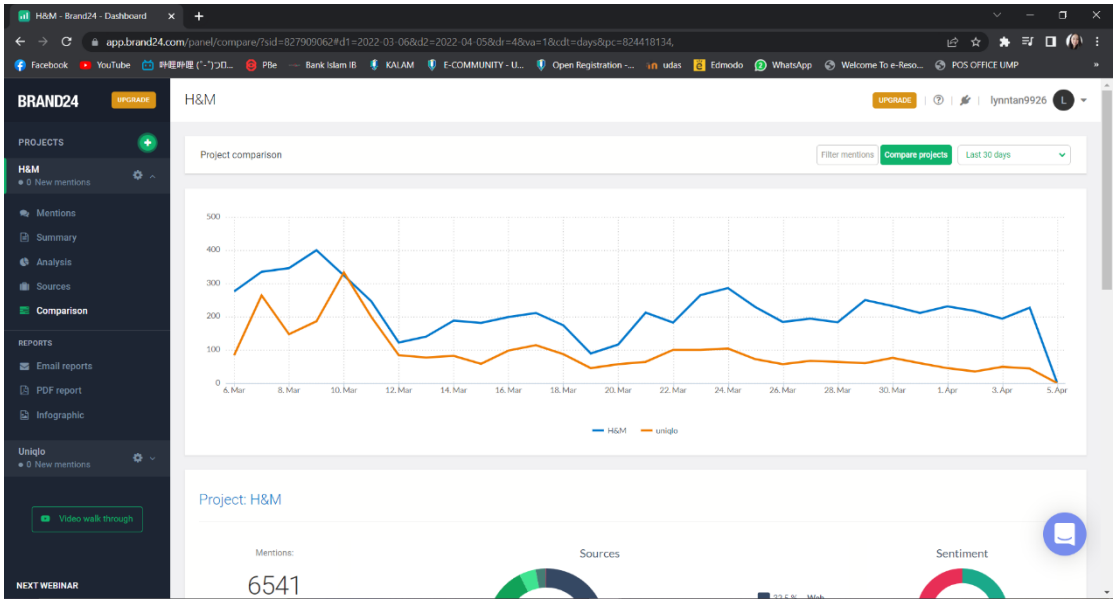

Figure 2.3 Interface of Brand24 for Project Comparison

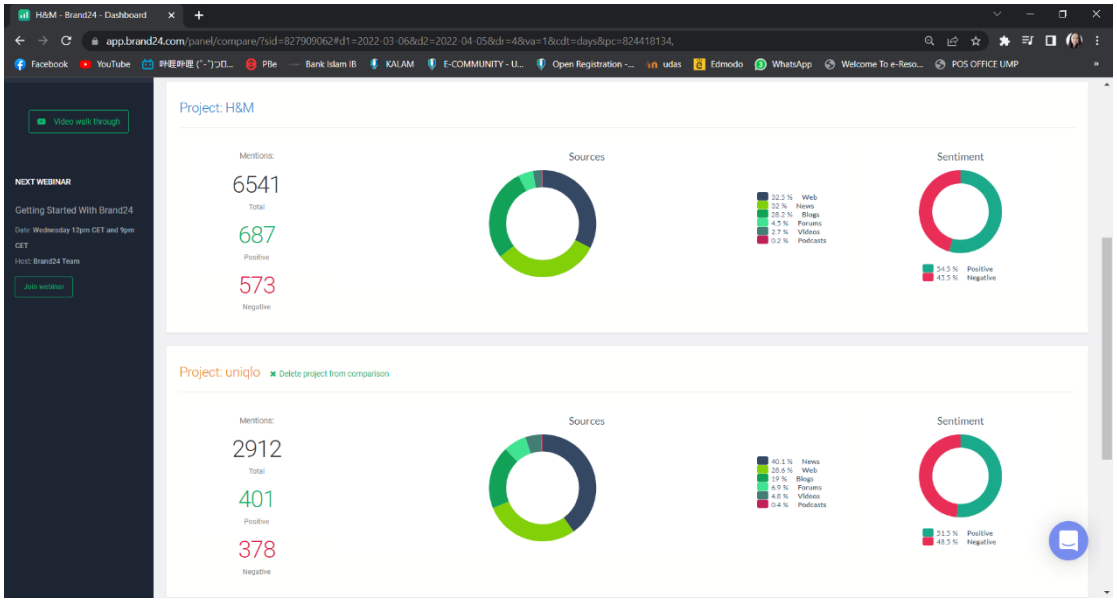

Figure 2.4 Interface of Brand24 for Project Comparison

2.3.3 MonkeyLearn

MonkeyLearn is an easy-to-use platform that supply a simple graphical interface to users which users may train machine learning models such as sentiment analysis, topic recognition, keyword extraction, and more to develop bespoke text categorization and extraction analyses (Rodriguez et al., 2014). MonkeyLearn may relate to hundreds of other applications across its direct connectors and open API. MonkeyLearn can be readily linked via no-code interfaces such as Google Sheets, Zapier, Zendesk, or Rapidminer, as well as API and SDKs. It is a web-based application. MonkeyLearn is developed by Raul Garreta, Ernesto Rodriguez, Federico Pascual, and Martin Alcala Rubi in 2014.

Some technology stacks are used in MonkeyLearn such as Good Audience, Dedoose, Agile CRM, HubSpot, and CustomerSure. In MonkeyLearn, the interface is simple and colourful. It summarizes the important data and display it on the top of the interface. Below the summarized data, there are list of snippets, and the topics are displayed based on the snippets. Besides, the snippets are highlighted which shows the sentences are positive, negative, or neutral. For instance, the green colour highlight represents positive sentiment, orange colour highlight represents neutral sentiment, and red colour highlight represents negative sentiment. MonkeyLearn also provides graph to conclude the topics, sentiment by topic, positive sentiment over time, negative sentiment over time, and topics over time. Word cloud also include in MonkeyLearn dashboard. There is also a graph which generated based on the project. For example, Figure 2.5 shows the graph NPS over time which is only for Netflix NPS sentiment analysis. Moreover, MonkeyLearn supports filter which let user to view the sentiment analysis by set a date range.

Figure 2.5 Interface of MonkeyLearn for Project Comparison

2.4 Comparison Analysis

Table 2.1 Comparison Analysis

Analytical Tool	Mentionlytics	Brand24	MonkeyLearn
Platform	• Web-based application • Mobile application	• Web-based application • Mobile application	• Web-based application
User Interface	The interface is attractive and well organized.	The interface is well organized.	The interface is simple and colourful.
Summarize Data of Analysis	Available	Available	Available
Word Cloud	Available	Available	Available
Graph	• Overview Chart • Sentiment Analysis per day	• Overview Graph • Sentiment Analysis per day	• Positive Sentiment Over Time • Negative Sentiment Over Time

Chart	• Sentiment Chart • Mentions / Channel Chart	• Sentiment Chart • Mentions by Category Chart	• Sentiment Chart • Topics Chart • Topics Over Time Chart
Mentions List	Available	Available	Available
World Map	Available	Not Available	Not Available
Top Mentioners List	Available	Not Available	Not Available

2.5 Advantages and Disadvantages of Existing System

As mentioned in Table 2.1, Mentionlytics is a web and social media monitoring tool which delivers web and social media monitoring solutions for companies. The first advantage of Mentionlytics is it provides AI-powered "Social Intelligence Advisor" feature. Social Intelligence Advisor (SIA) is a personalised AI brand analyst and adviser which connects between data and feedback. There are four main features in SIA which are AI analysis, insights, advice, and reassess. SIA basically gathers and analyses data, then provides the best solutions for the brand based on the insights to assure improved results. Competitive and industry insights from SIA can helps companies become more competitive, grow their market share, and raise brand awareness. The second advantage is the interface is fully customizable. User can rearrange any feature on the page by simply click, drag, and drop the feature where user want. User also can delete the features which is not important. After arranging the features, user need to click on the save button to save their customized dashboard.

There are also disadvantages for Mentionlytics. The first disadvantage is the keywords may be difficult to monitor. Due to the overwhelming large number of results, there are many results are unrelated. The accuracy of the brand analysis also will be affected because of the irrelevant data because there is no boundary for the range of the amount of data. The next disadvantage is Mentionlytics takes time to load the mentions

when handling a large number of outcomes. The server is not capable enough to handle or show a gigantic amount of data in a short time. It would be troublesome for the brand analyst and more time is needed for them to do brand analysis.

Brand24 is a social Customer Relationship Management and Internet monitoring platform which gather the real-time social data from all around the Internet to enable a better understanding of online conversations and comments about their brand and products. Brand24 provide presence score for the specific brand. It will also show the percentage of the brand's popularity which compares the results with other brands, topics, and hashtags that user track daily. Moreover, Brand24 provides fast notification about the mentions. It informs the user in real time about the relevant content mentions and comments to let user can respond fast and grow the user's customer base.

Apart from that, Brand24 also has its disadvantages. Brand24 is not user friendly. There are many features are not displayed in the main dashboard. User needs to take time to learn and know what features are provided and where are the features placed. For instance, the summarized data such as the number of total mentions, social media reach, interactions, positive mentions, and negative mentions are displayed in the "Summary" not in the main dashboard. Besides, user may get mentions that are irrelevant. As there is so much data to collect, the system may provide a large number of spam results or mentions that are utterly irrelevant.

MonkeyLearn is an easy-to-use SaaS platform that supply a simple graphical interface to users which users may train machine learning models such as sentiment analysis, topic recognition, keyword extraction, and more to develop bespoke text categorization and extraction analyses. The first advantage of MonkeyLearn is the mentions are highlighted in different colour based on the sentiment. The mentions can be highlighted in three different colours such as red, yellow, and green. Red colour represents negative sentiment, yellow colour represents neutral sentiment, and green colour represents positive sentiment. The colour of highlight helps the user to differentiate the sentiment of the mentions which collected by the system. Besides, mentions are categorized based on the topics. MonkeyLearn differentiate every mention that gathered in different topics such as general, functionality, reliability, usability, pricing, and support to help user easily understand each of the mentions is about which topic.

Aside from that, MonkeyLearn also has its own disadvantages. There is no AI chatbot for customer service. Without AI chatbot, user is unable to get the solution instantly when user face problems while using the system. AI chatbot is plays a crucial role which the user can find the solution with the AI live agents when they are seeking for helps. Moreover, MonkeyLearn unable to send real-time notification to user about the mentions. User could not get the real-time notification to view the latest result where user need to manually open back the dashboard to view it. There is high possibility the user will missed analyse the essential mentions for the brand analysis. Table 2.2 provides the summary of advantages and disadvantages of Mentionlytics, Brand24, and MonkeyLearn.

Table 2.2 Advantages and Disadvantages of Existing System

Existing System	Advantages	Disadvantages
Mentionlytics	• Provide AI-powered "Social Intelligence Advisor" feature. • The interface is fully customizable.	• Keywords may be difficult to monitor. • Takes time to load the mentions.
Brand24	• Provide presence score for the specific brand. • Fast notification about the mentions.	• Not user friendly. • May get mentions that are irrelevant.
MonkeyLearn	• Mentions are highlighted in different colour based on the sentiment. • Mentions are categorized based on the topics.	• No AI chatbot for customer service. • Unable to send real-time notification to user about the mentions.

2.6 Chapter Summary

In this chapter, it discussed about the sentiment analysis and three existing related system such as Mentionlytics, Brand24, and MonkeyLearn. These three systems are investigated and analysed to determine their characteristics, as well as their advantages and disadvantages. Moreover, this chapter also covered the comparison between these three systems based on the platform, user interface, summarize data of analysis, word cloud, graph, chart, mentions list, world map, and top mentioners list.

CHAPTER 3

METHODOLOGY

3.1 Introduction

A Software Development Life Cycle (SDLC) must be followed to develop the Brand2C, maintaining that the development process is effective and structured. The software development life cycle (SDLC) is a methodology for designing, developing, and delivering high-quality, reliable, economical, and on-time software products in the software development industry (Dwivedi et al., 2022). It is a method for ensuring that over functionalities, along with user needs, objectives, and end goals, are met (Dwivedi et al., 2022). SDLC is a framework that outlines the various activities and tasks that must be completed throughout this software development process (Gupta, 2021). To assure the success of Brand2C development entire process, an appropriate SDLC must be selected. There is various type of SDLC models can be used such as waterfall model, spiral model, V-model, agile model, iterative model, and Rapid Application Development (RAD) model (Gupta, 2021).

Different methods have different procedures and steps for evolution. The Software Development Life Cycle (SDLC) that will be used in this project development is Agile. Agile development is a continuous team-based strategy that emphasises communication and engagement among stakeholders (Pócsová et al., 2020). The method which will used under the agile methodology in this project is Scrum. This chapter will go through the Agile model in further detail, along with the system proposed design, database design, hardware and software used, planning for implementation and testing (UAT), potential use of proposed solution, and proof of prototype.

3.2 Methodology

As previously stated, Agile will be used in this project which involving six phases such as plan, design, develop, test, release, and feedback.

The first phase of the agile methodology is the planning phase. Planning is fundamental to the whole software development life cycle. Generally, this phase establishes the project's system and user requirements, as well as the project's goals and scopes. Initially, the user requirement is collected in this phase which can be determine the project scope more clearly. As these initial requirements are mere, that will most likely change as the phases evolve. The problem statement, objectives, scopes, and significance of the project are distinctly defined in this phase. Moreover, the project schedule is essential in this phase which can ensure the project's progress.

The next phase of the agile methodology is the design phase. The design phase is required before moving on to the develop phase. In this phase, the system is designed based on the user requirements, objectives, and scopes that defined in the planning phase. The existing systems also will be referred to design the user interface of project and enhanced in this project. Besides, this phase will be iterating until the system meets the user requirements, objectives, and scopes.

The third phase of the agile methodology is the develop phase. The develop phase is the phase where the system is completely built by using multiple programming languages for coding. There are various types of programming languages are used in this project such as HTML, CSS, and JavaScript for the web content design and Python is used to implement the sentiment analysis for the tweets by the Twitter user. Fix and figure out the errors and bugs are vital in this phase. The main aim of this phase is necessary to secure the quality of the system.

Furthermore, testing will be conducted after the development phase. This phase is to test the system performance and other inconsistencies. This phase is crucial before releasing the system to users. In the early of this phase, testing can ensure that the system is bug-free, and each function is operational. There are four types of testing such as unit testing, acceptance testing, integration testing, and system testing. All the testing plays an essential role to secure the quality of the system and better user satisfaction.

The fifth phase is release phase. The system will be release and available to the user after the testing is successfully done. In this phase, users able to find bugs and any problems that were missed during the testing. Maintenance can be conducted in this phase to ensure the system is always running smoothly.

Lastly, the final phase of the agile methodology is the feedback phase. All the feedback from the user will be collected and included in the next iteration's requirements during this phase. Problems and potential problems can be easily to identify since the system workflow can be more understandable based on the feedback from the user. The agile methodology will start a new iteration once all the phases are done.

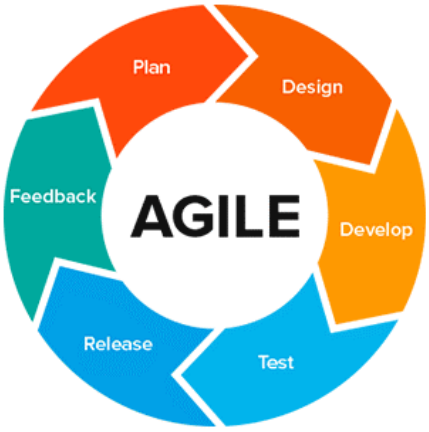

Figure 3.1 Agile Methodology

There are several methods for agile methodology such as Scrum, Extreme Programming (XP), Adaptive Software Development (ASD), Dynamic Software Development Method (DSDM), Feature Driven Development (FDD), Kanban, and Behavior Driven Development (BDD). The method which will used under the agile methodology in this project is Scrum.

Scrum methodology is described as a set of extremely specific procedures and processes that must be followed throughout the software development process. It is a flexible methodology that benefits the product team members that use the 12 agile principles in a context that everyone agrees on. Scrum is carried out in Sprints, which are short and periodic blocks of time. Each Sprint is its own entity, delivering a complete

result, a variant of the product that must be supplied to the user with the least amount of work possible when required. There are 5 phases in scrum methodology which are product backlog creation, Sprint planning and creating backlog, working on Sprint, testing and product demonstration, and retrospective and the next Spring planning.

The first phase is product backlog creation. Epics and user stories are created from huge objects and functional details in this phase. The user stories will be converted from huge objects to smaller objects that can be added to the product backlog. The product backlog is the primary and most important source of requirements for any product updates that may be necessary.

The second phase is Sprint planning and creating backlog. Sprint duration is critical in order to keep the user stories as short as possible. More customer feedback can be collected, and majority of errors and issues can be fixed sooner if the Sprint duration is small. Next is creating Sprint backlog. Scrum team must devise a strategy for completing the assignment and prioritise the task that must be accomplished.

The next phase is working on Sprint. This phase is where the web-based system development starts. A task board which is known as Kanban board is made to describe the task's details. For instance, work details, due date, and duration. Besides, Scrum meetings are crucial to keep track of progress and who is responsible for what during this phase. This phase can be repeated several times until the project is finished.

The fourth phase is testing and product demonstration. A review meeting is needed to be conducted to talk about the Sprint at the phase of the work. This meeting provides a chance to review what performed well and any improvement needed. In this phase, changes also can be made. Every Sprint which is done must be shown to the customer for approval and feedback on the overall solution.

The last phase is retrospective and the next Spring planning. During this phase, it will discuss about the performance and improvement. Identifying areas where things go well and regions where things go wrong can help to figure out what are the objectives are wanted to achieve. Depending on the knowledge which have for the existing processes and previous projects, the next sprint planning must begin.

3.2.1 Work Breakdown Structure (WBS)

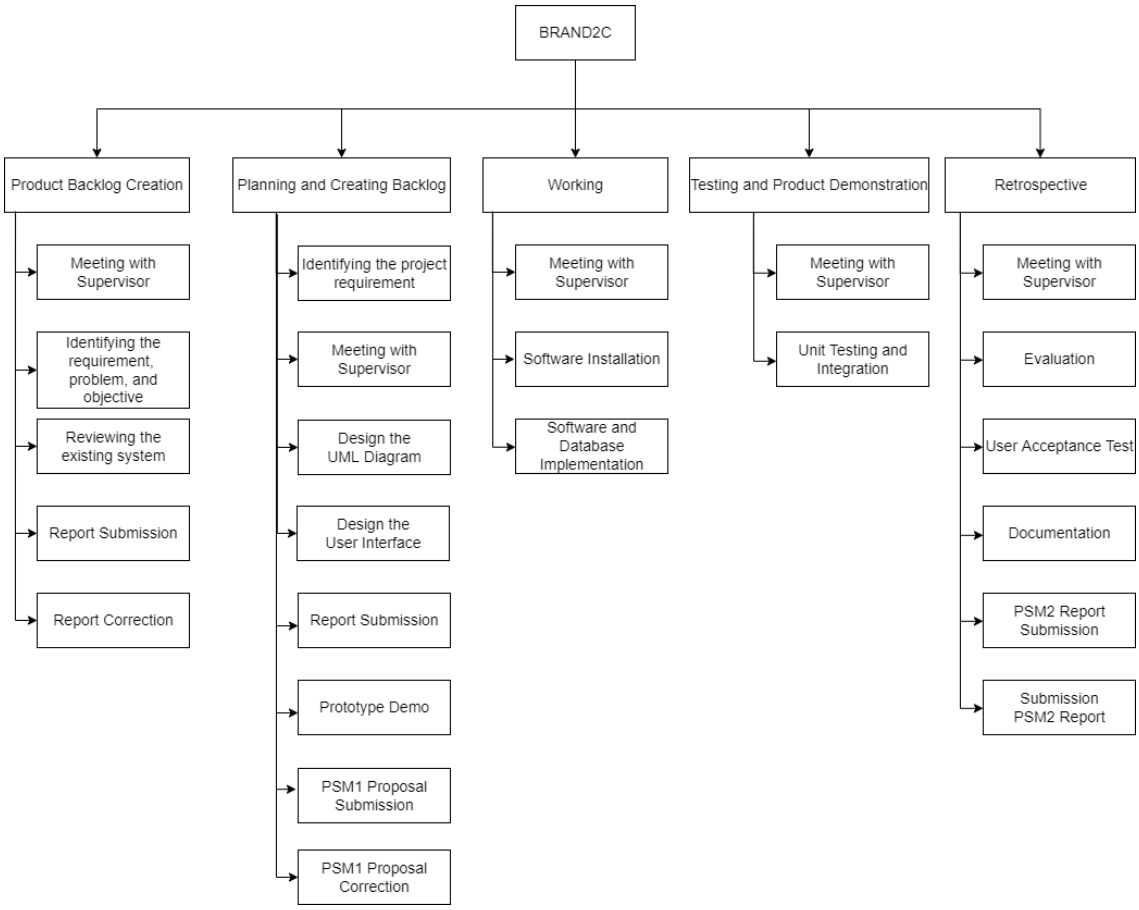

Figure 3.2 Work Breakdown Structure (WBS)

3.3 Project Requirement

3.3.1 Functional Requirement

1. The user shall be able to search brand to view the brand sentiment analysis.
2. The system should collect and display the latest brand sentiment analysis results.
3. The system shall be able to displays the latest tweets with the sentiment scores.
4. The system shall be able to summarize and display the brand sentiment analysis.
5. The company user shall be able to download or print the report of brand sentiment analysis.

3.3.2 Non-Functional Requirement

1. Security

The system should only allow the user who had login to the system to view the brand sentiment analysis.

2. Reliability

The system should conduct the functions without fail on a regular basis.

3. Performance

The system should load the result within 1 minute when user search for the brand sentiment analysis.

4. Operational

The system should be compatible with any Web browser.

5. Usability

The user interface of the system should be easily understood and use.

3.3.3 Constraints and Limitations

1. The user must connect to the internet to access to the system.

2. The user only can search the brand in English.

3.3.4 User Requirement

A user evaluation is conducted to confirm that the design and development perform as expected and fulfil the user's requirements. Questionnaire is used to gather the user's requirements for this project. Figure 3.3 to Figure 3.9 show the questionnaire of this project.

Figure 3.3 Questionnaire

Figure 3.4 Questionnaire

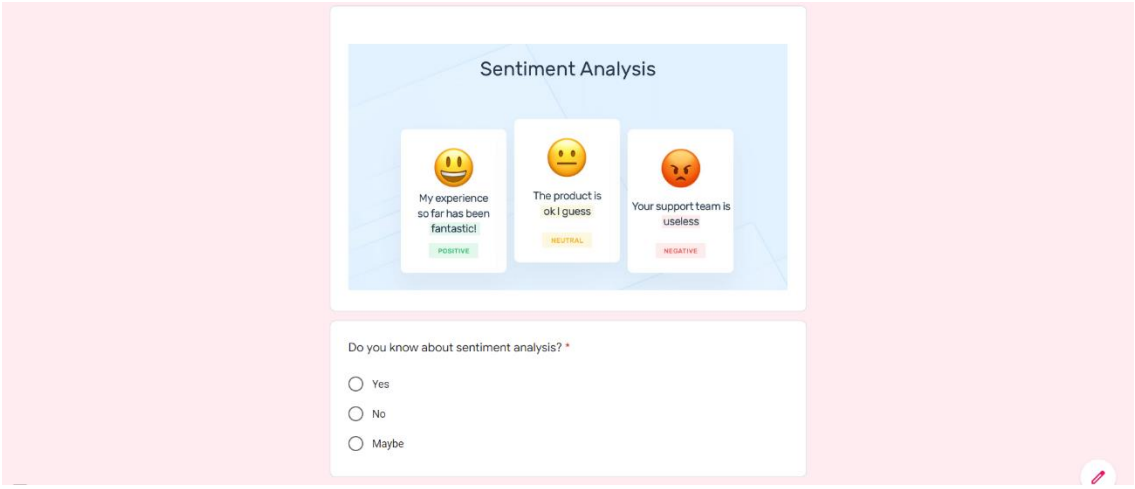

Figure 3.5 Questionnaire

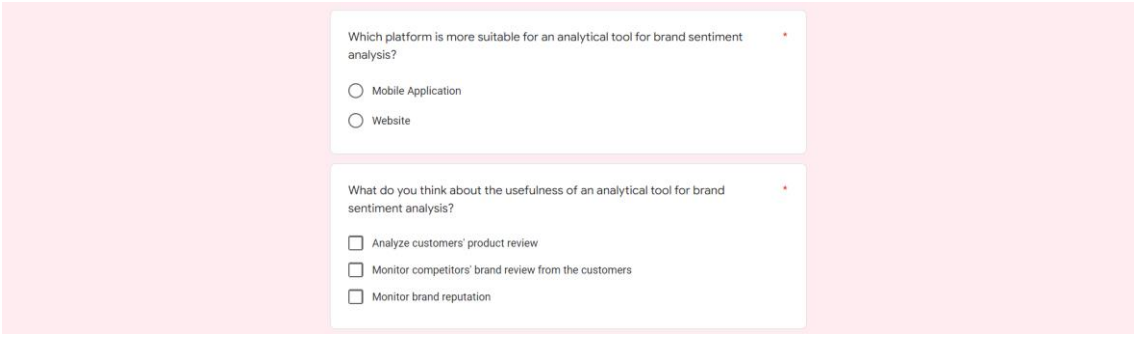

Figure 3.6 Questionnaire

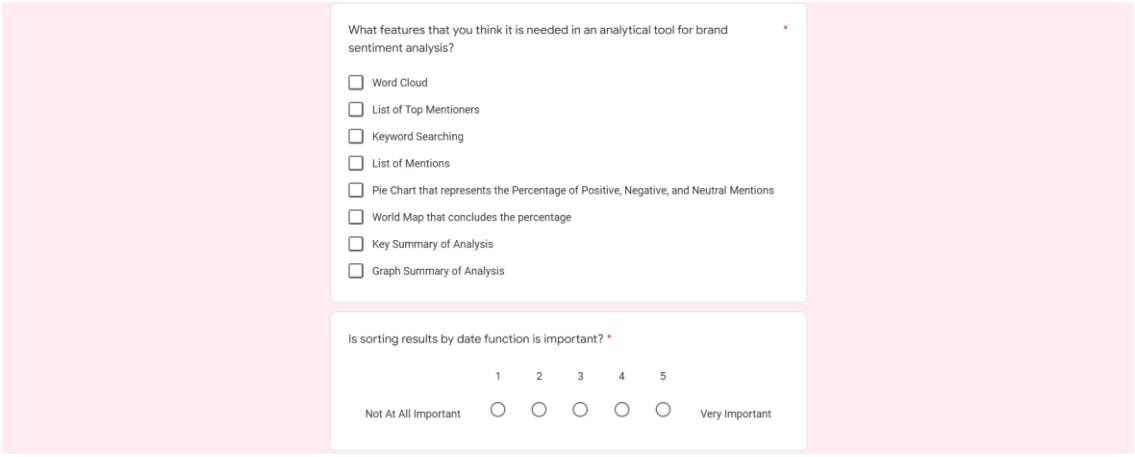

Figure 3.7 Questionnaire

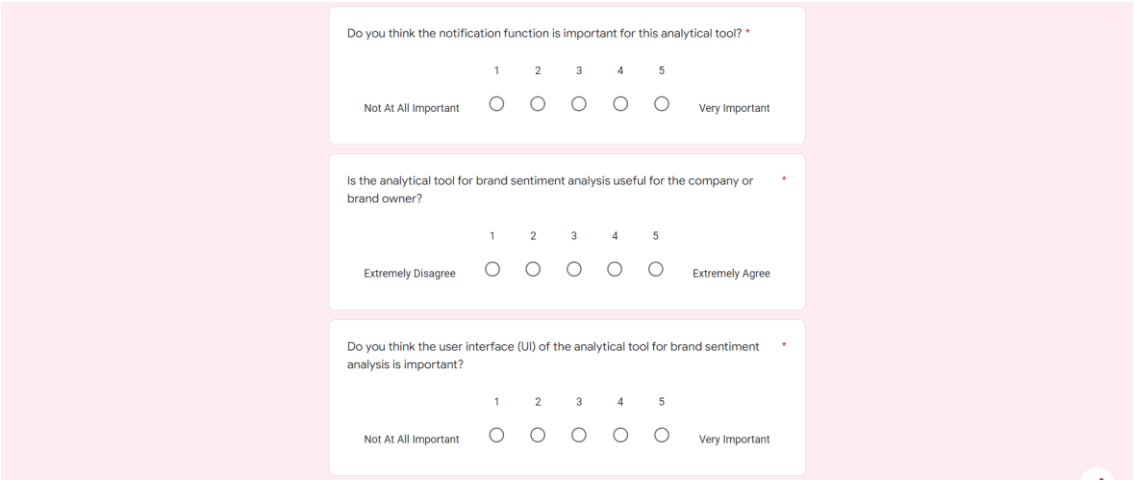

Figure 3.8 Questionnaire

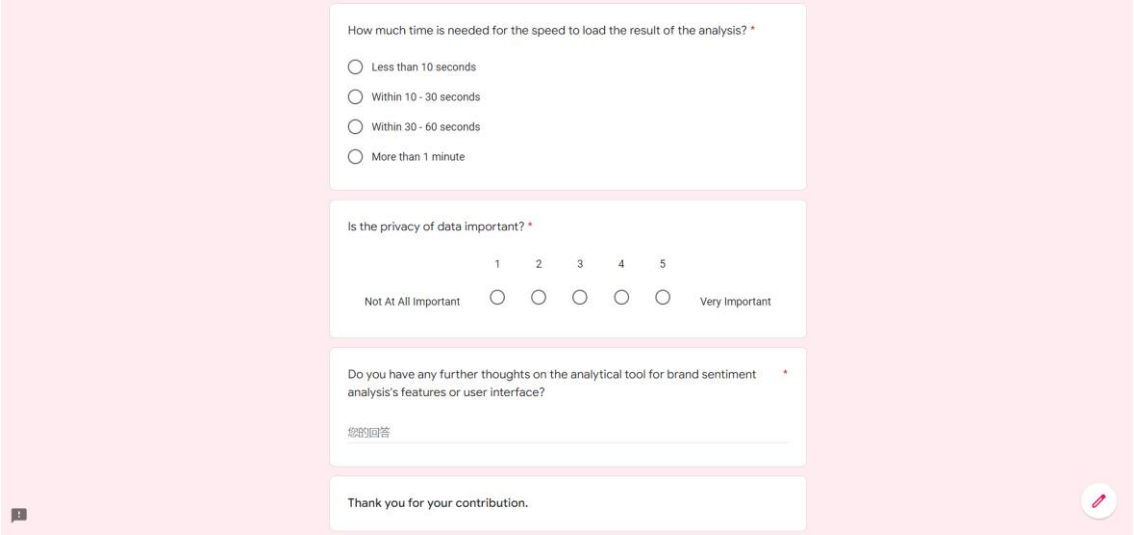

Figure 3.9 Questionnaire

3.3.5 Data Presentation

There are 21 respondents participate in this survey.

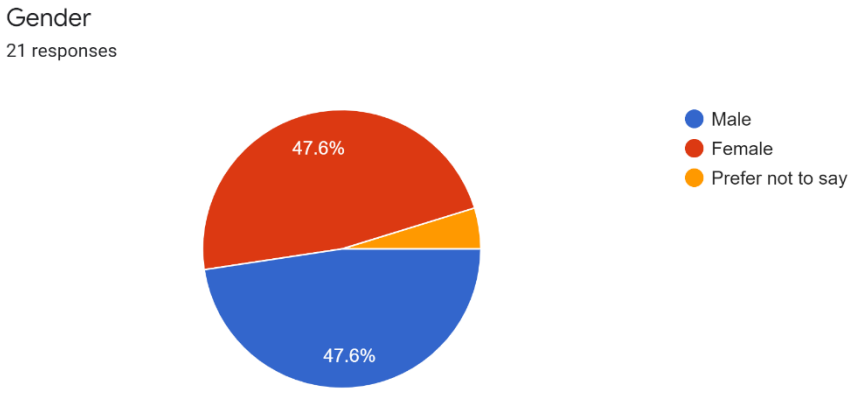

Figure 3.10 Question 1 of Questionnaire

10 out of 21 respondents are females (47.6%), outnumbering the male respondents by 10 (47.6%) and 1 respondent (4.8%) prefer not to say.

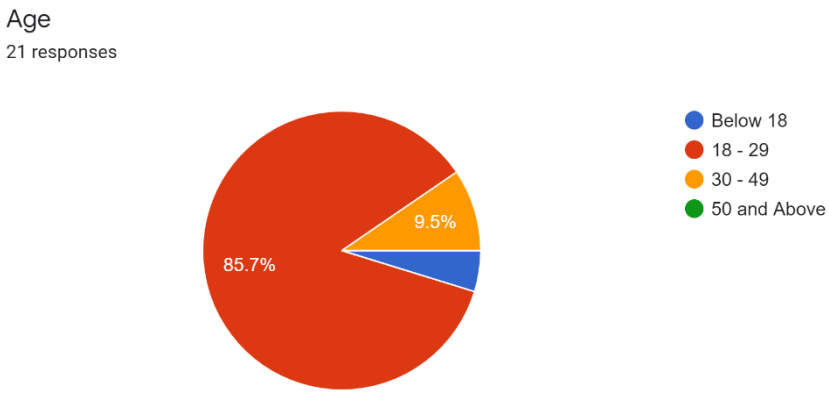

Figure 3.11 Question 2 of Questionnaire

The respondents of this survey are mostly from the age group between 18 to 29 years old (85.7%), whereas 2 of them are age between 30 to 49 years old (9.5%), and only 1 below age 18 (4.8%).

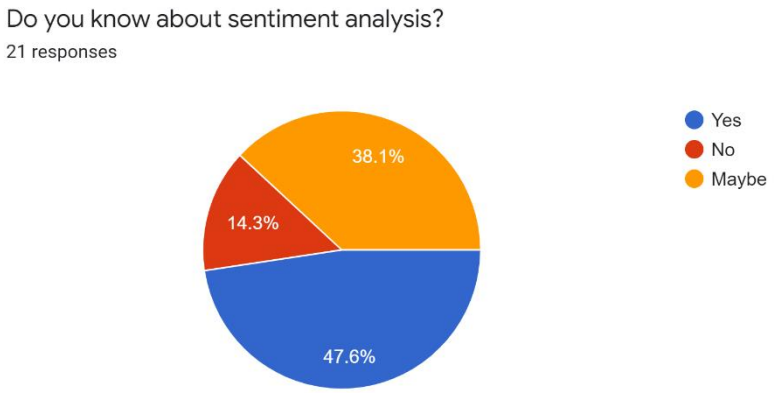

Figure 3.12 Question 3 of Questionnaire

10 out of 21 respondents (47.6%) know about sentiment analysis, 3 out of 21 respondents (14.3%) do not know about sentiment analysis, and 8 out of 21 respondents choose maybe for this question.

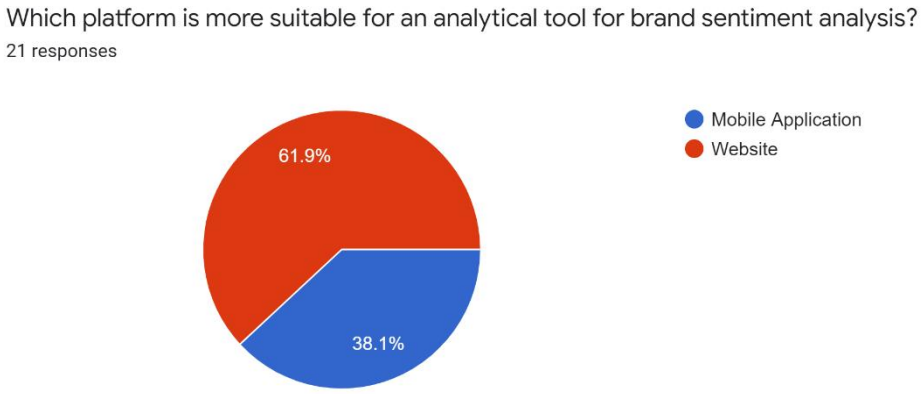

Figure 3.13 Question 4 of Questionnaire

13 out of 21 respondents (61.9%) choose website is more suitable for an analytical tool for brand sentiment analysis, whereas 8 out of 21 respondents (38.1%) choose mobile application.

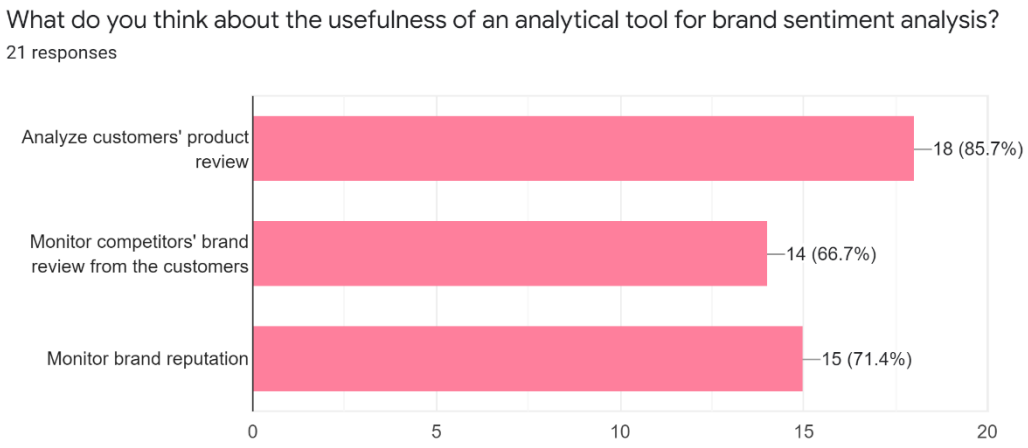

Figure 3.14 Question 5 of Questionnaire

18 out of 21 respondents (85.7%) thinks that analyze customers' product review is one of the usefulness of an analytical tool for brand sentiment analysis and there are 15 out of 21 respondents (71.4%) thinks that monitor brand reputation is one of the usefulness of an analytical tool for brand sentiment analysis. Whereas 14 out of 21 respondents (66.7%) choose monitor competitors' brand review from the customers.

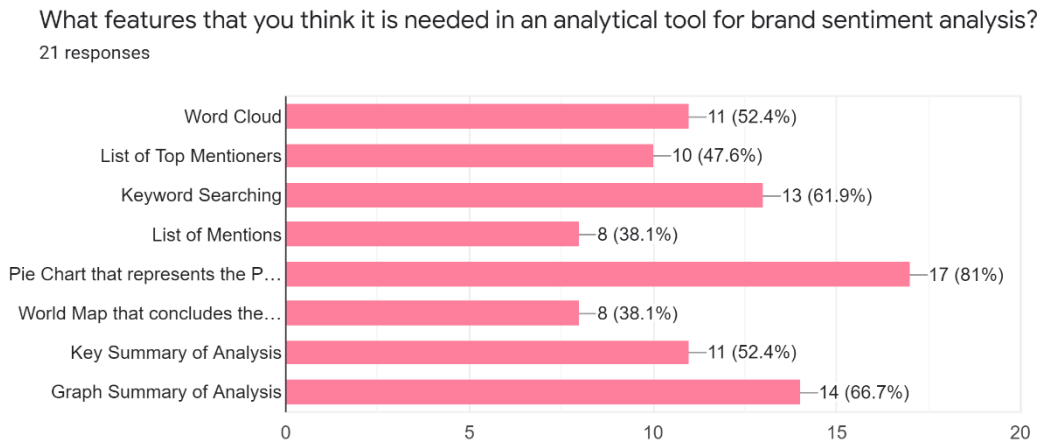

Figure 3.15 Question 6 of Questionnaire

17 out of 21 respondents (81%) think that feature of Pie Chart that represents the Percentage of Positive, Negative, and Neutral Mentions is one of the needed in an analytical tool for brand sentiment analysis. The second highest feature which has been chosen is the Graph Summary of Analysis which consists of 14 out of 21 respondents (66.7%). Only 8 out of 21 respondents (38.1%) for both List of Mentions and World Map that concludes the percentage has been chosen.

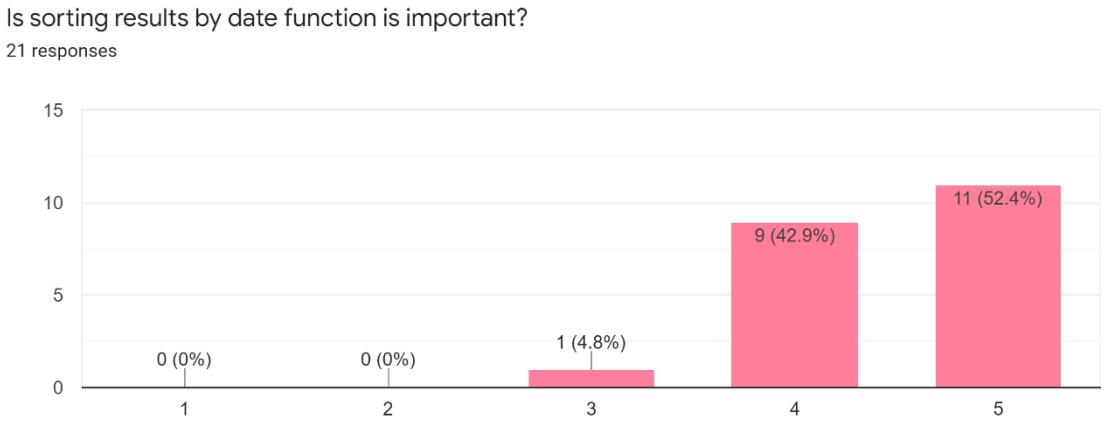

Figure 3.16 Question 7 of Questionnaire

11 out of 21 respondents (52.4%) think that sorting results by date function is very important and 9 out of 21 respondents (42.9%) think that sorting result by date function is important. Only 1 out of 21 respondents (4.8%) is neutral about the opinion.

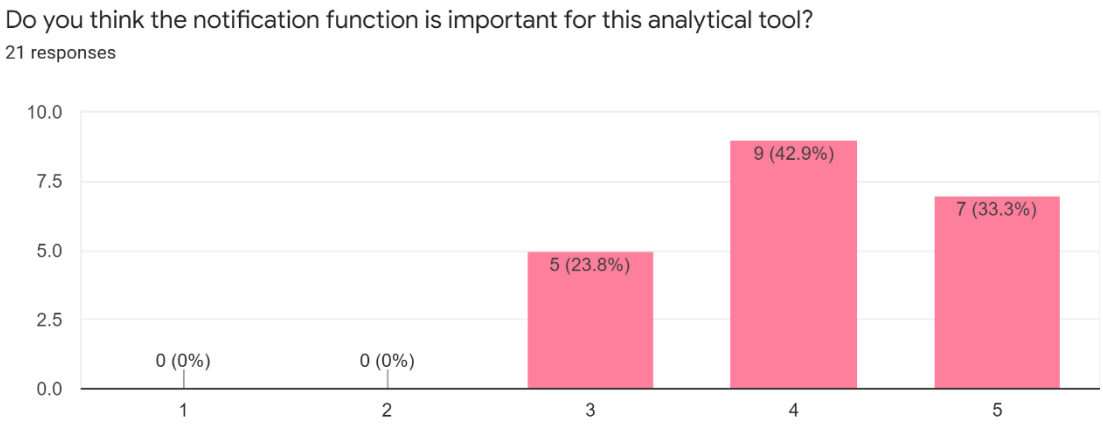

Figure 3.17 Question 8 of Questionnaire

9 out of 21 respondents (42.9%) think that the notification function is important for this analytical tool, 7 out of 21 respondents (33.3%) think that the notification function is very important for this analytical tool, and 5 out of 21 respondents (23.8%) is neutral about the opinion.

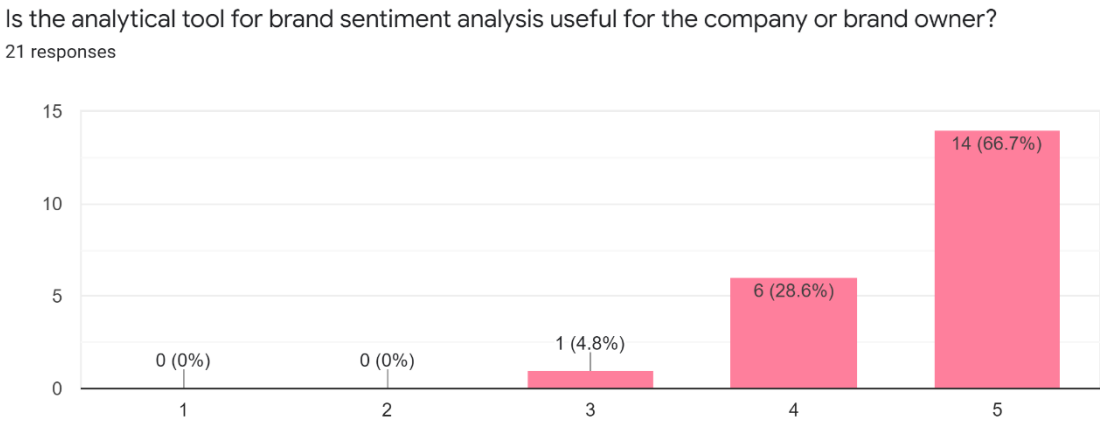

Figure 3.18 Question 9 of Questionnaire

Most of the respondents, which 14 out of 21 respondents (66.7%) extremely agree with the analytical tool for brand sentiment analysis is useful for the company or brand

owner. 6 out of 21 respondents (28.6%) agree with the analytical tool for brand sentiment analysis is useful for the company or brand owner and only 1 out of 21 respondents (4.8%) neutral towards the opinion.

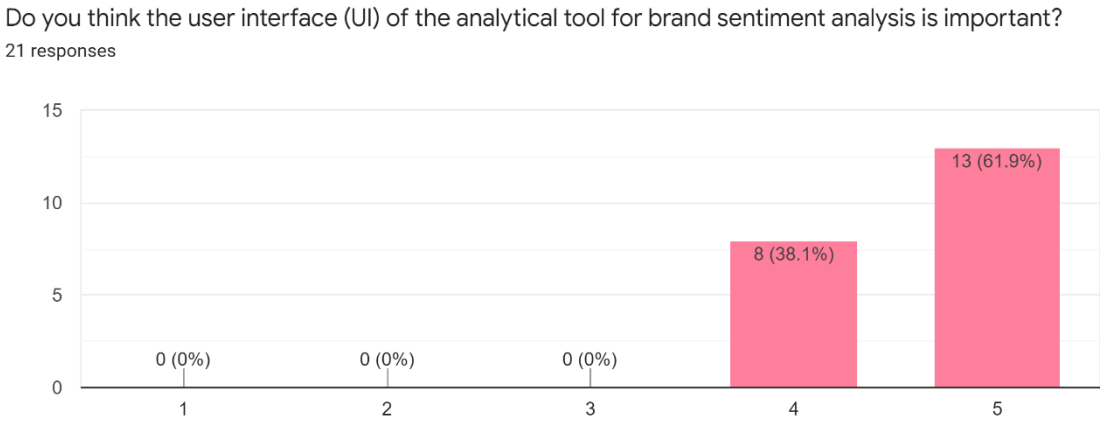

Figure 3.19 Question 10 of Questionnaire

13 out of 21 respondents (61.9%) think that the user interface (UI) of the analytical tool for brand sentiment analysis is very important whereas 8 out of 21 respondents (38.1%) think that the user interface (UI) of the analytical tool for brand sentiment analysis is important.

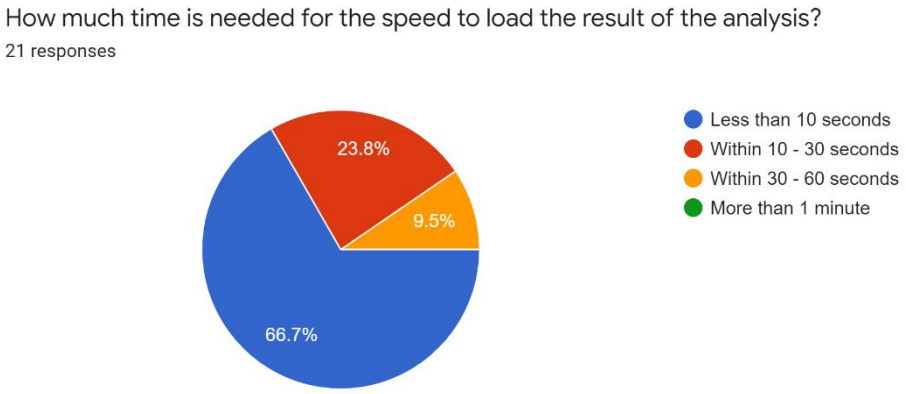

Figure 3.20 Question 11 of Questionnaire

14 out of 21 respondents (66.7%) think that the time needed for the speed to load the result of the analysis should be less than 10 seconds, 5 out of 21 respondents (23.8%) think that the time needed for the speed to load the result of the analysis should be within 10 to 30 seconds, and 2 out of 21 respondents (9.5%) choose within 30 to 60 seconds for the speed to load the result of the analysis.

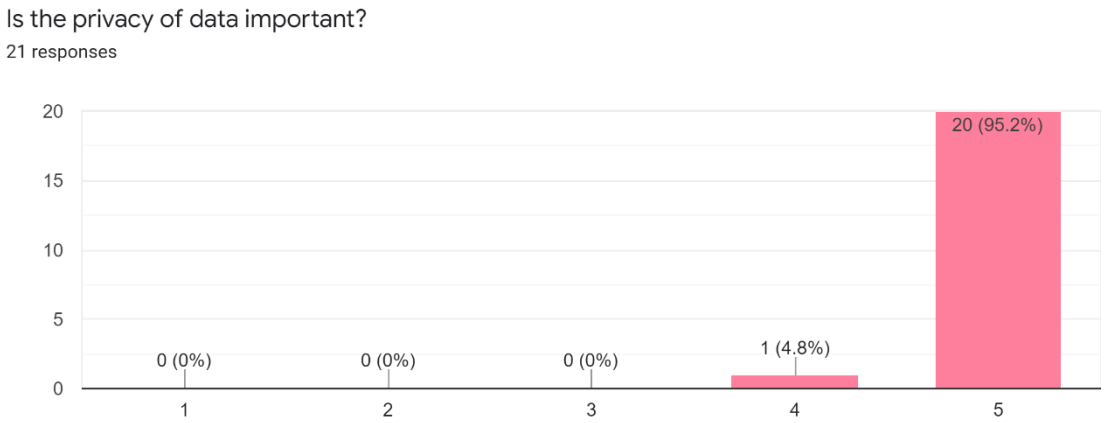

Figure 3.21 Question 12 of Questionnaire

Most of the respondents, which 20 out of 21 respondents (95.2%) think that the privacy of data is very important. Only 1 out of 21 respondents (4.8%) think that the privacy of data is important.

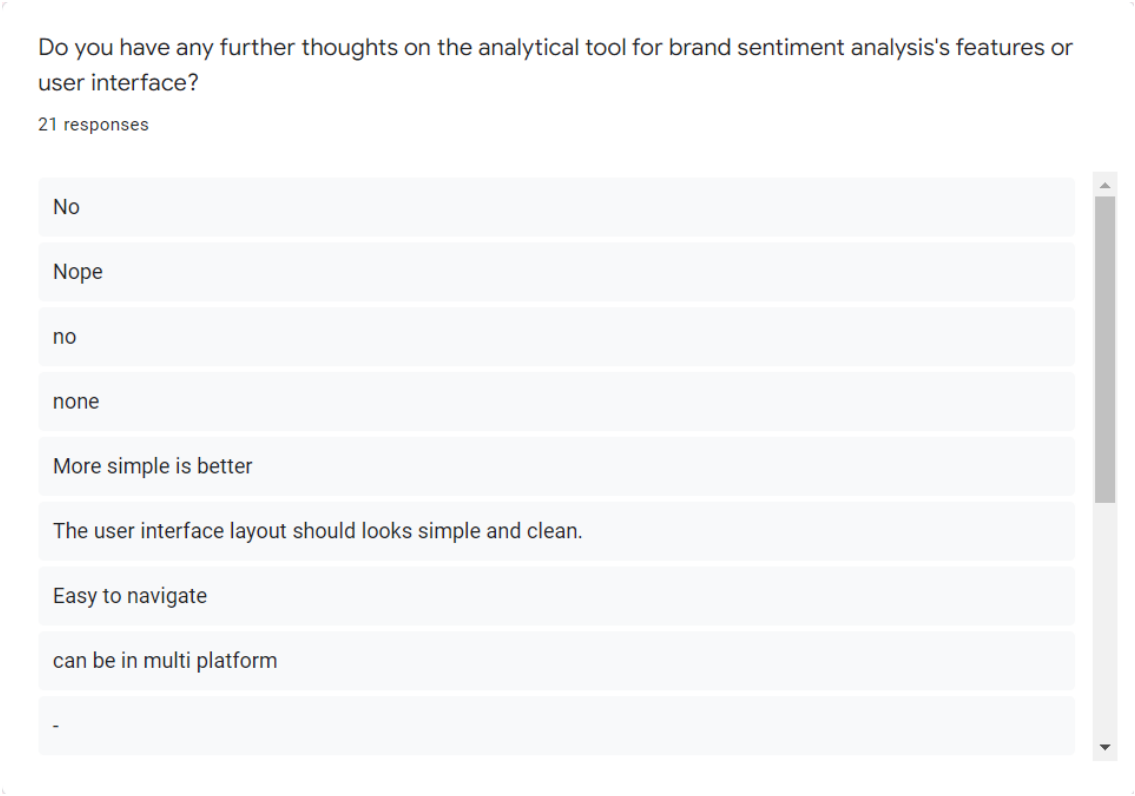

Figure 3.22 Question 13 of Questionnaire

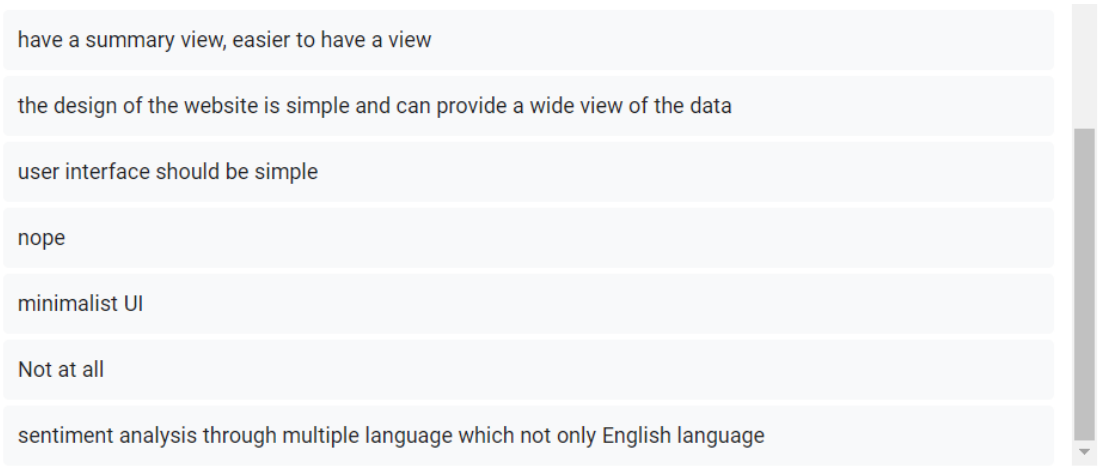

Figure 3.23 Question 13 of Questionnaire

All 21 respondents have given their opinion for further thoughts on the analytical tool for brand sentiment analysis's features or user interface. The user interface should be simple is the opinion which most of the respondents gave.

3.4 Proposed Design

3.4.1 General Architecture

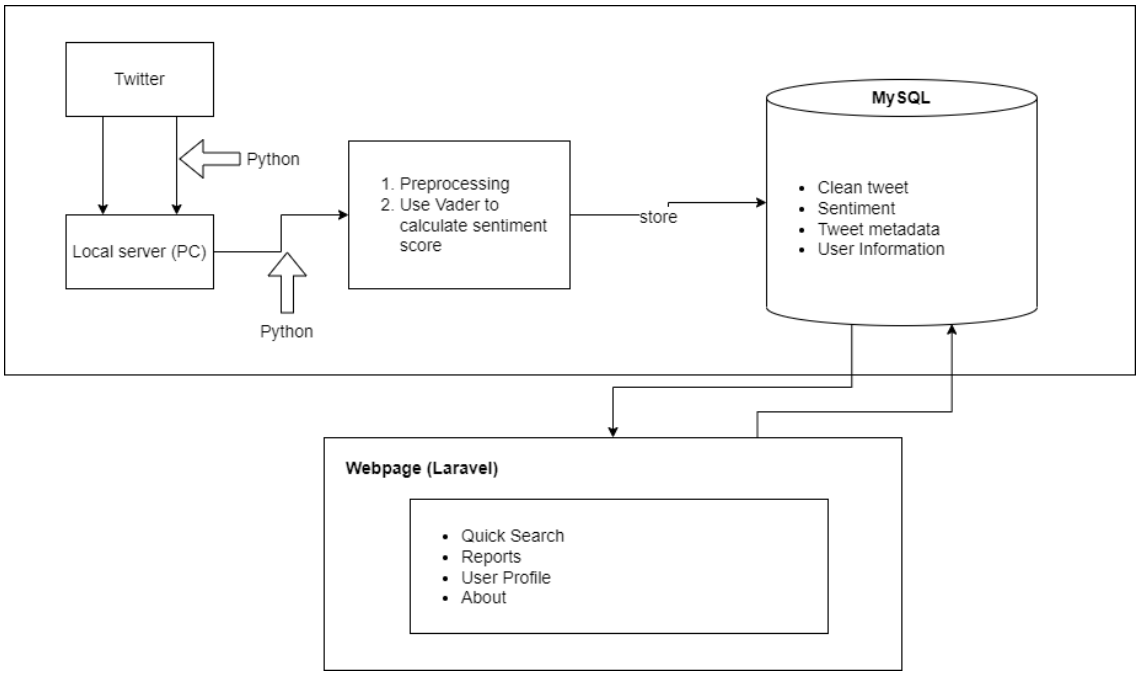

Figure 3.24 General Architecture

Figure 3.24 shows the general architecture for BRAND2C. The user can access to the webpage by using laptop to access the features such as overview, top Twitter mentioners, keywords, reports, and user profile. Twitter API will be implemented in Python on local server (PC) to retrieve the Tweets. Preprocessing and use VADER to calculate sentiment store will be done in Python. Besides, MySQL is the database used for BRAND2C to store all the needed data. For instance, clean tweet, sentiment, tweet metadata, and user information.

3.4.2 Flowchart

Placement in appendix C. The flowchart shows the overall system flowchart of proposed BRAND2C. The user needs to insert email, and password to login the system. The system will check the user login details. If user type is company, the system will bring the user to the Quick Search page. The user can also register an account by choosing to register, inserting name, email, password, confirm password, and user type. After register, the system will bring the user to the Quick Search page. The company can choose to access the Quick Search page, Report page, User Profile page, and About page. In Quick Search page, the company can insert brand to search. The system will retrieve and display the quick search results in the Quick Search page. In Report page, the company can insert brand and search to view the report. The system will retrieve the report data and display in the interface. The company can download the report after the report display in the interface. In User Profile page, the company can edit name to change the profile name. Moreover, the company can choose to change password in User Profile page. The company need to insert old password, new password, and confirm new password. The system will save the user data in the database. Besides, the company can choose to log out the BRAND2C.

If user type is public user, the system will bring the user to the Quick Search page after login to the BRAND2C. The pages that can be accessed by the public user are Quick Search page, User Profile page, and About page. In Quick Search page, the public user can insert brand to search. The system will retrieve and display the search result in Quick Search page. In User Profile page, the public user can edit name to change the profile name. Moreover, the public user can choose to change password in User Profile page. The public user needs to insert old password, new password, and confirm new password to change the password. The system will save the user data in the database. Besides, the public user can choose to log out the BRAND2C.

The detailed design and interface are explained in *appendix A*: Software Requirement Specification (SRS) document and *appendix B:* Software Design Description (SDD) document.

3.4.3 Context Diagram

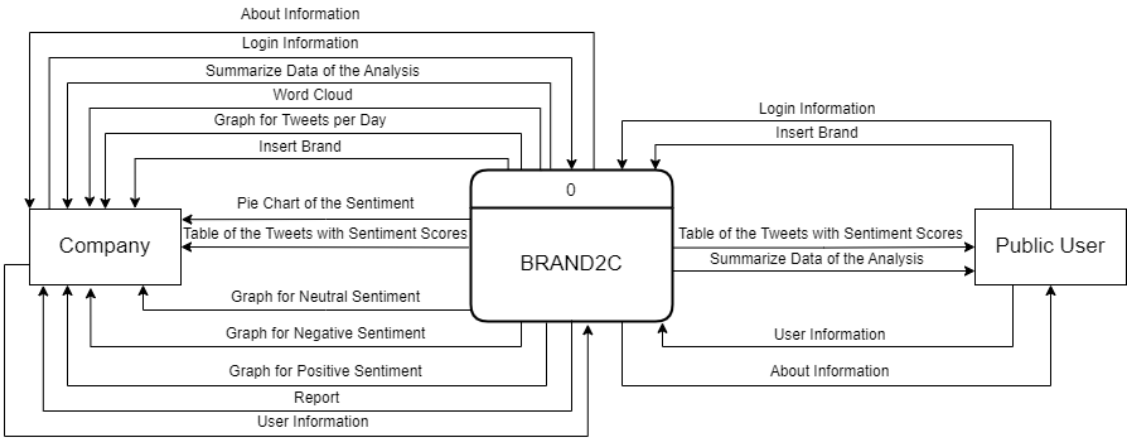

Figure 3.25 Context Diagram

Figure 3.25 shows the context diagram of BRAND2C that described the entities that interact with the system. The BRAND2C consists of two entities which are company and public user. For public user, public user can insert the user information to register an account. The user information can also be updated by update the name or password. Public user needs to insert login information to login to the BRAND2C. Besides that, public user can insert brand to view the summarize data of the analysis and table of the Tweets with sentiment scores. The public user also can view the about information to know more about the BRAND2C.

For company, company can access more features compare with public user. Same as public user, company can insert the user information to register an account and also update the user information by updating name or password. Login information need to be inserted by the company in order to login into the BRAND2C. Moreover, company can insert the brand to view the summarize data of the analysis, table of the Tweets with sentiment scores, word cloud, graph for Tweets per day, pie chart of the sentiment, graph for neutral sentiment, graph for negative sentiment, and graph for positive sentiment. In addition, company can download the report. About information also provided to the company in the BRAND2C.

3.4.4 Use Case Diagram

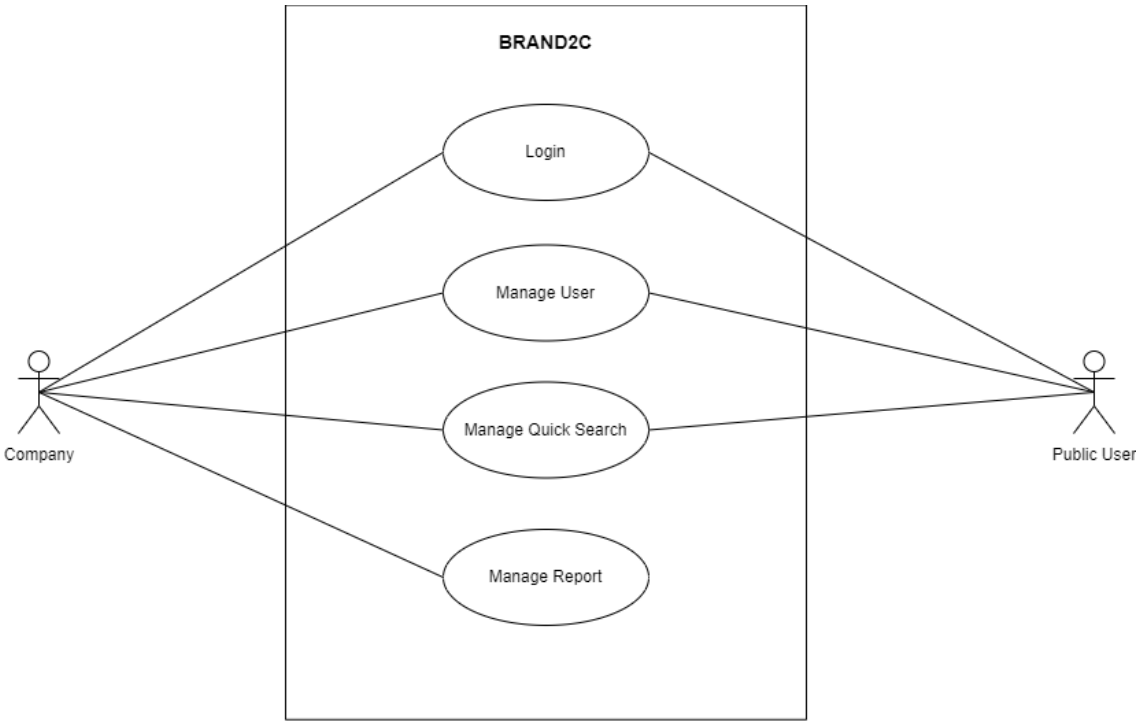

Figure 3.26 Use Case Diagram

Figure 3.26 shows the use case diagram of BRAND2C. The BRAND2C consists of four main functions which are login, manage user, manage quick search, and manage report. The company can access all the functions such as login, manage user, manage quick search, and manage report. However, the public user only can access the functions such as login, manage user, and manage quick search.

3.4.5 Activity Diagram

3.4.5.1 Login

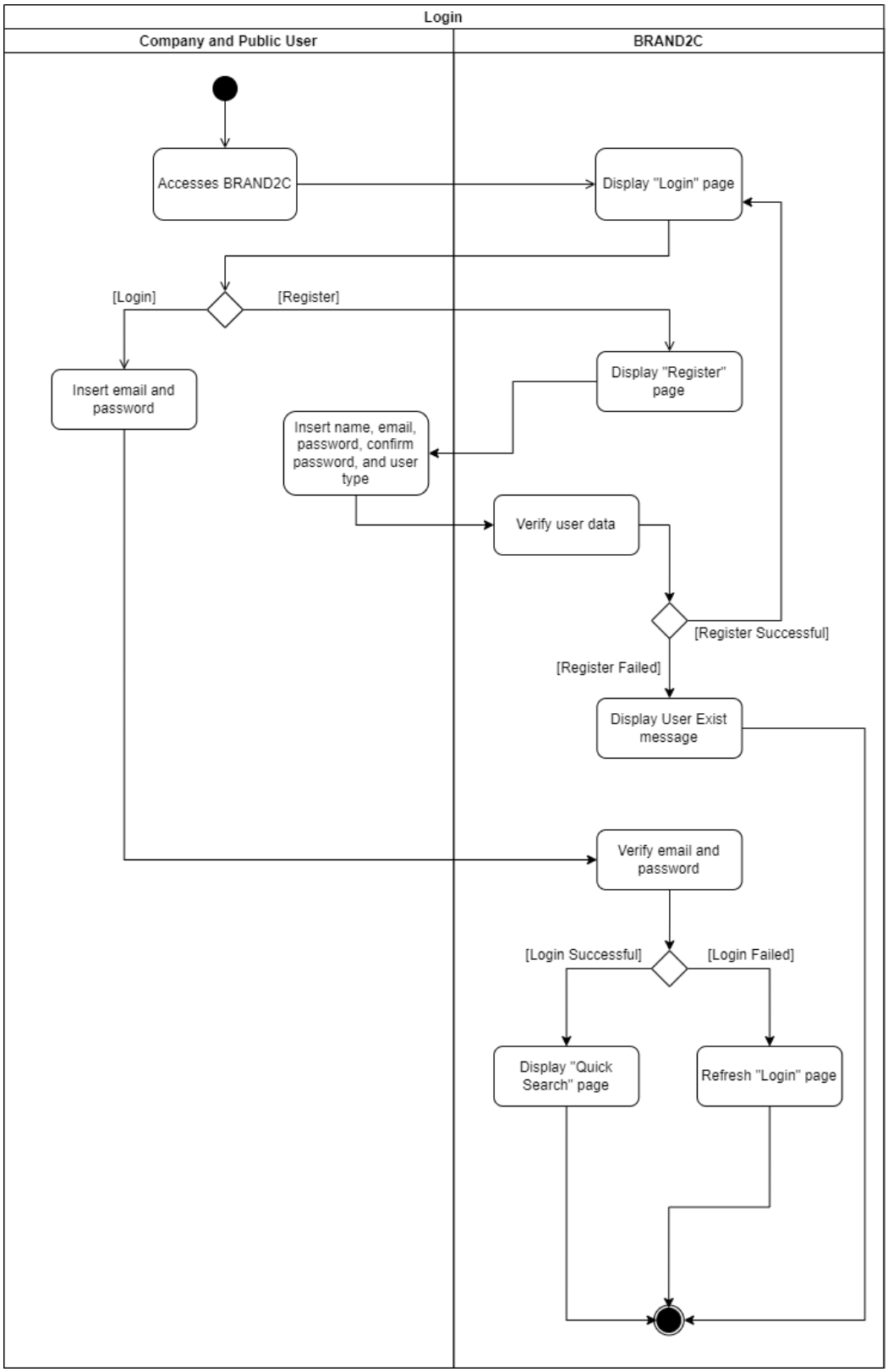

Figure 3.27 Activity Diagram of Login Module

3.4.5.2 Manage User

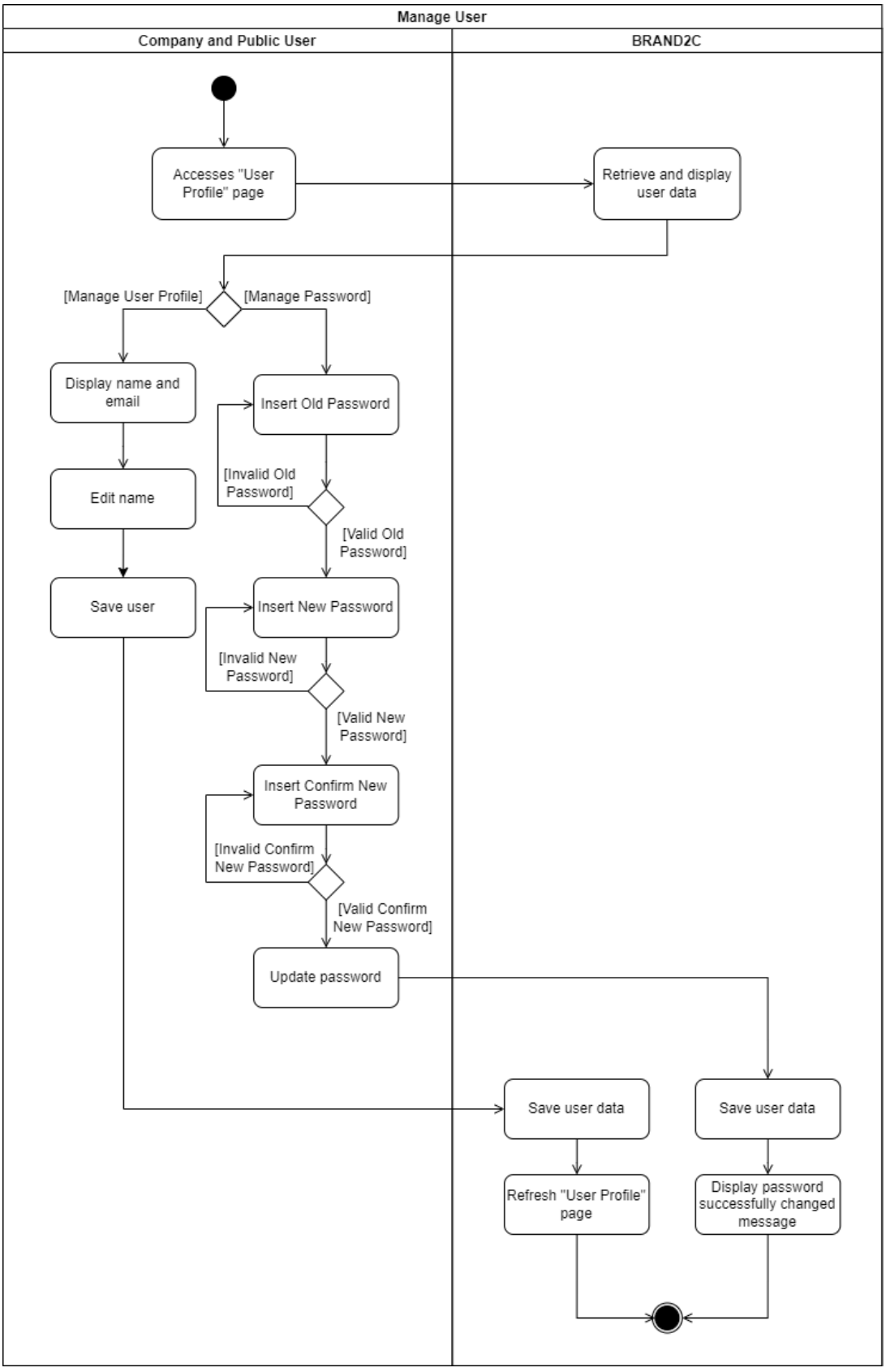

Figure 3.28 Activity Diagram of Manage User Module

3.4.5.3 Manage Quick Search

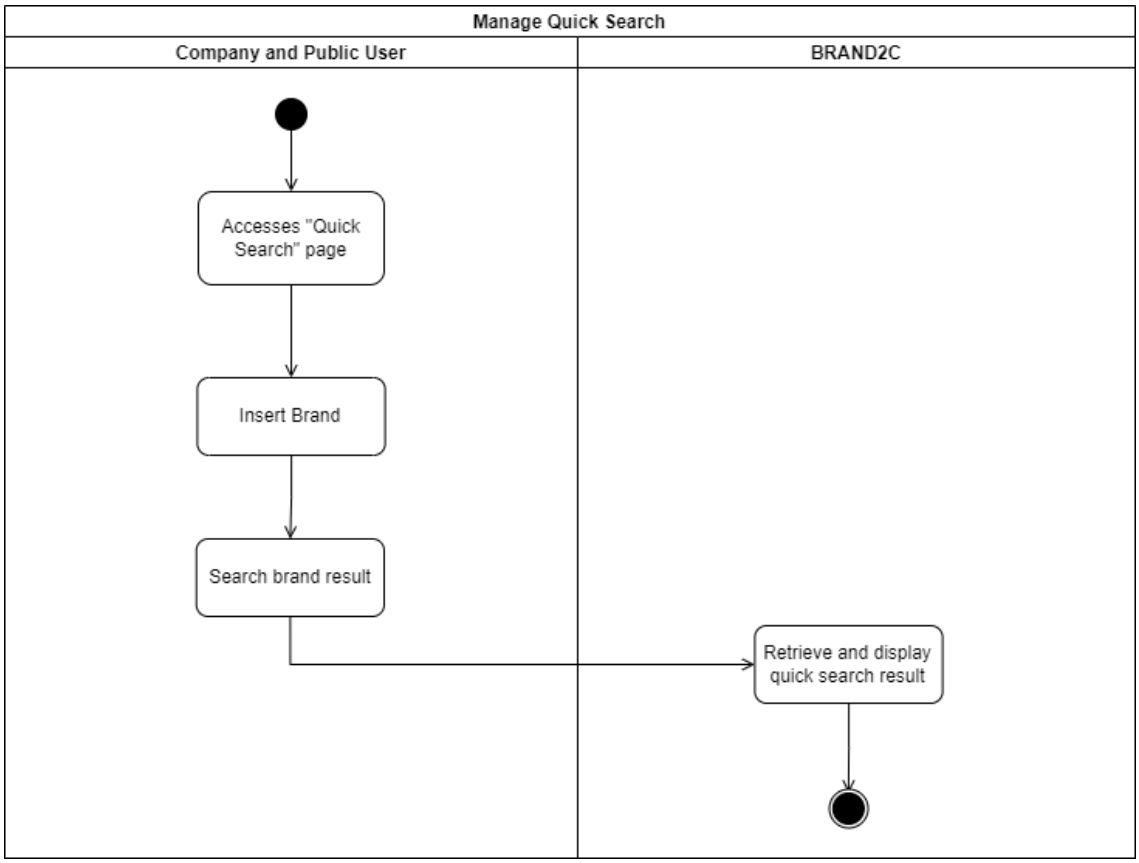

Figure 3.29 Activity Diagram of Manage Quick Search Module

3.4.5.4 Manage Report

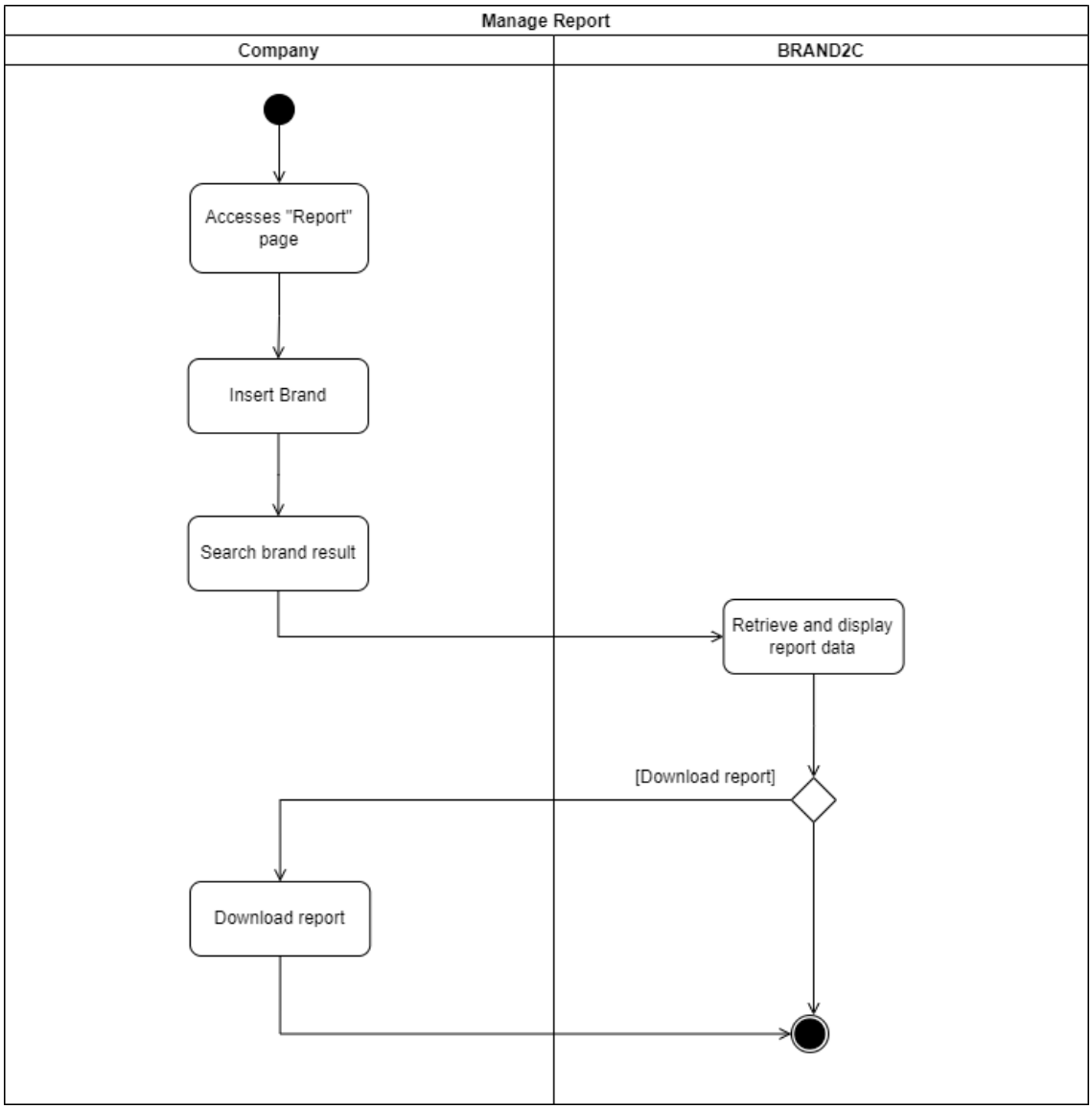

Figure 3.30 Activity Diagram of Manage Report Module

3.5 Data Design

3.5.1 Entity Relationship Diagram (ERD)

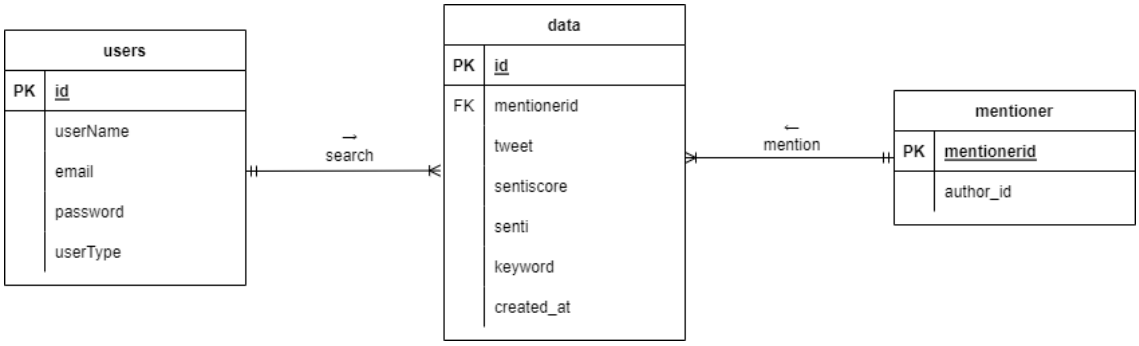

Figure 3.31 Entity Relationship Diagram (ERD)

3.5.2 Data Dictionary

3.5.2.1 users

Table 3.1 Data Dictionary of users

Data Name	Data Type	Description	Constraint
id	BIGINT(20)	Users Identification Number	PK
userName	VARCHAR(255)	Users' username	
email	VARCHAR(255)	Users' email address	
password	VARCHAR(255)	Users' account password	
userType	VARCHAR(255)	User type of the account	

3.5.2.2 data

Table 3.2 Data Dictionary of data

Data Name	Data Type	Description	Constraint
id	INT(10)	Data Identification Number	PK
mentionerid	INT(10)	Mentioner Identification Number	FK
tweet	VARCHAR(255)	Tweets data	
sentiscore	DOUBLE(8,2)	Sentiment Score of Tweets	
senti	VARCHAR(255)	Sentiment of Tweets	
keyword	VARCHAR(255)	Brand of user searched	
created_at	DATETIME	Date of Tweets being created	

3.5.2.3 mentioner

Table 3.3 Data Dictionary of mentioner

Data Name	Data Type	Description	Constraint
mentionerid	INT(10)	Mentioner Identification Number	PK
author_id	VARCHAR(255)	Mentioners' Twitter ID	

3.6 Design Prototype

3.6.1 Login

Figure 3.32 Login Interface

Figure 3.34 shows the login interface which will be shown to the user when the user access to BRAND2C. User needs to insert the email, password, and choose the user type before login to the system. There are two types of user type which are public user and company.

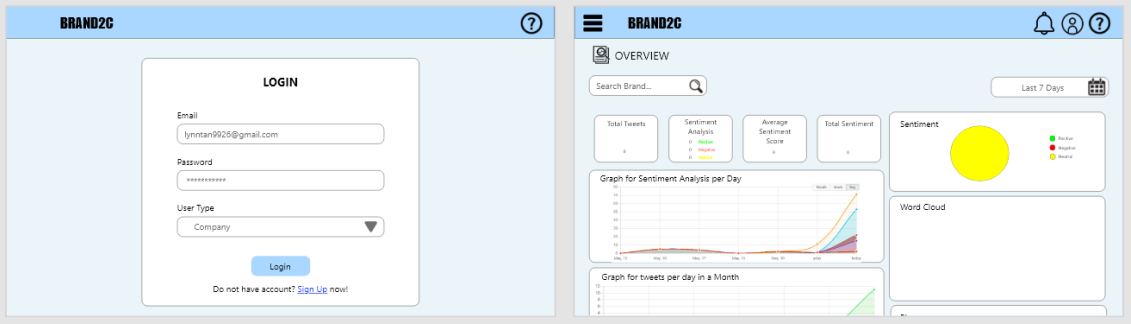

Figure 3.33 Login Interface and Overview Interface for Company

After filling the login details, user needs to click “Login” button to login to the system. As user type for company, it will bring the company to the overview interface after successfully login to the system which shown in Figure 3.35.

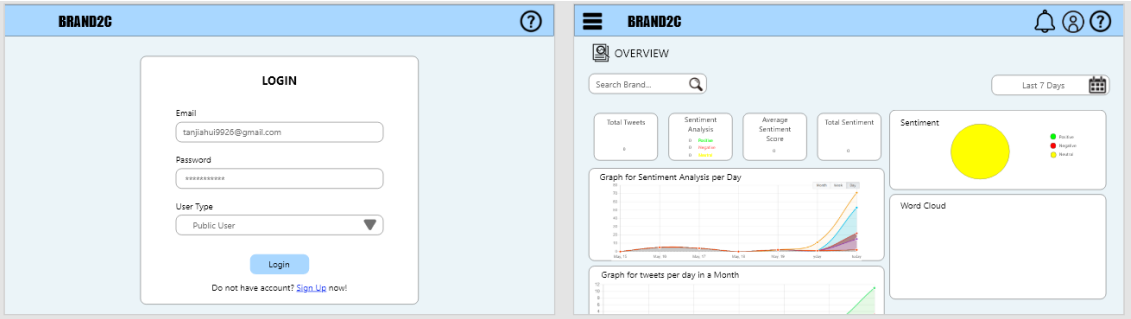

Figure 3.34 Login Interface and Overview Interface for Public User

For user type of public user, the system will bring the public user to the overview interface after successfully login to the system such as Figure 3.36 shown.

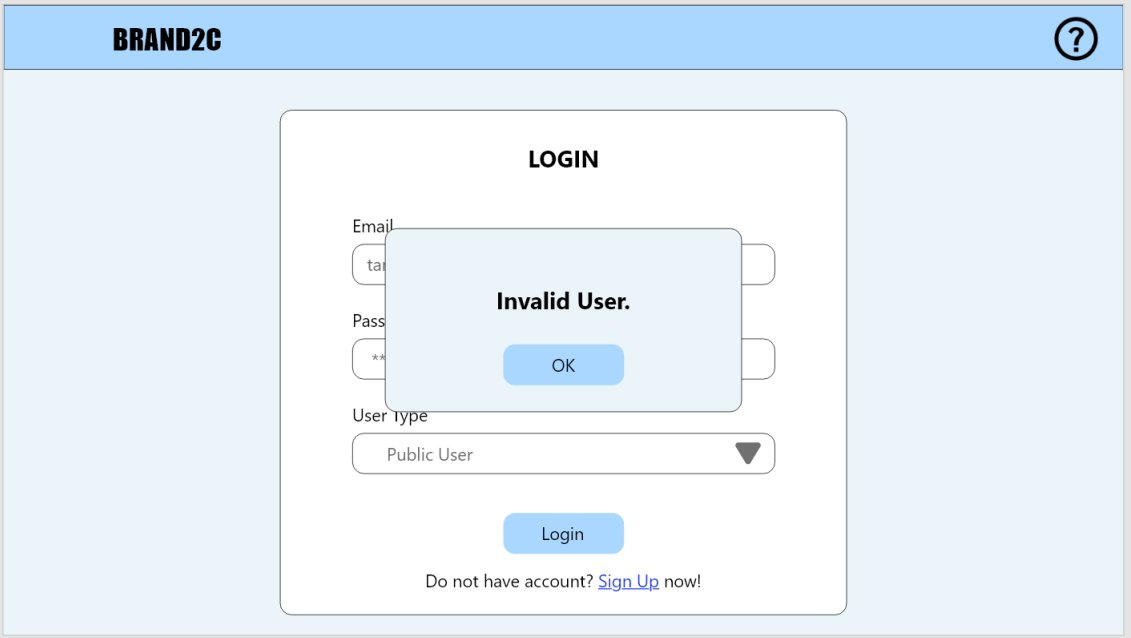

Figure 3.35 Invalid User Message in Login Interface

If the email, password, or user type is inserted wrongly, or the account does not been registered, the system will pop up “Invalid User” message such as Figure 3.37 shown.

Figure 3.36 Login Interface and Sign Up Interface

The user can click the “Sign Up” button to access the sign up interface and sign up for a new account if the user do not have account for BRAND2C. Figure X shows the login interface and it will display the sign up interface after user click the “Sign Up” button in login interface.

Figure 3.37 Sign Up Interface

In sign up interface which shown in Figure 3.39, user needs to insert name, email, password, and choose user type such as public user or company.

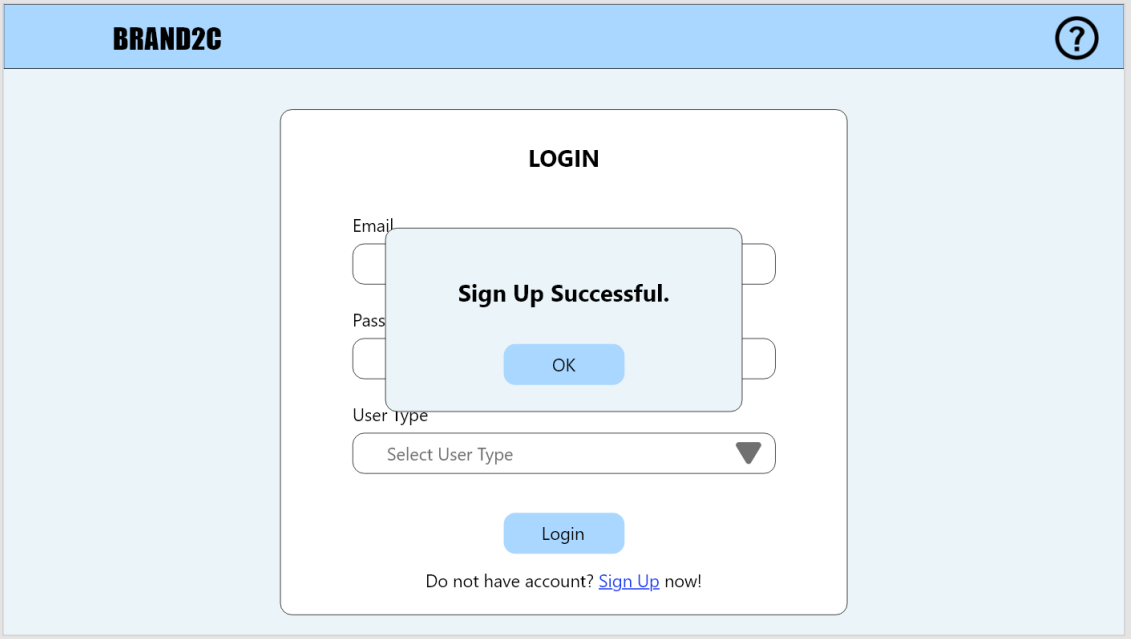

Figure 3.38 Sign Up Successful Message in Login Interface

Figure 3.40 shows the interface after user sign up a new account. If the email has not registered in BRAND2C, it will bring the user back to login interface and pop up a "Sign Up Successful" message.

Figure 3.39 User Exist Message in Sign Up Interface and Login Interface

Figure 3.41 shows the interfaces when the email that user inserted has already registered. The system will pop-up a "User Exist" message in sign up interface and the system will bring the user back to the login interface after the user click "Back" button in the pop-up message.

3.6.2 Manage User

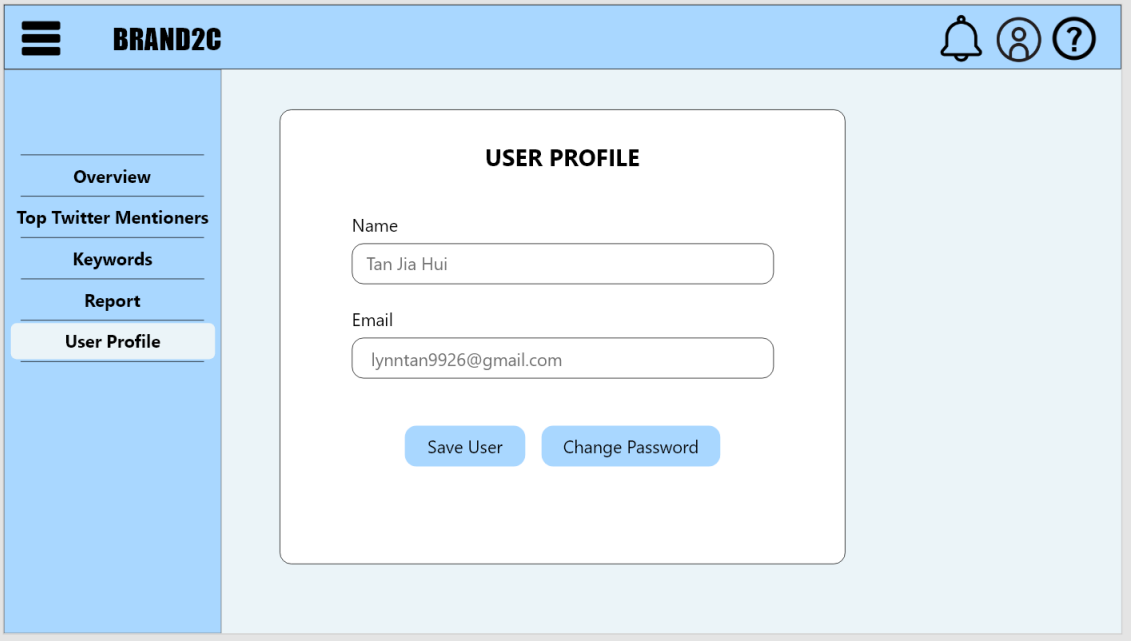

Figure 3.40 User Profile Interface

Figure 3.42 shows the user profile interface when user click the “User Profile” selection in the side menu bar.

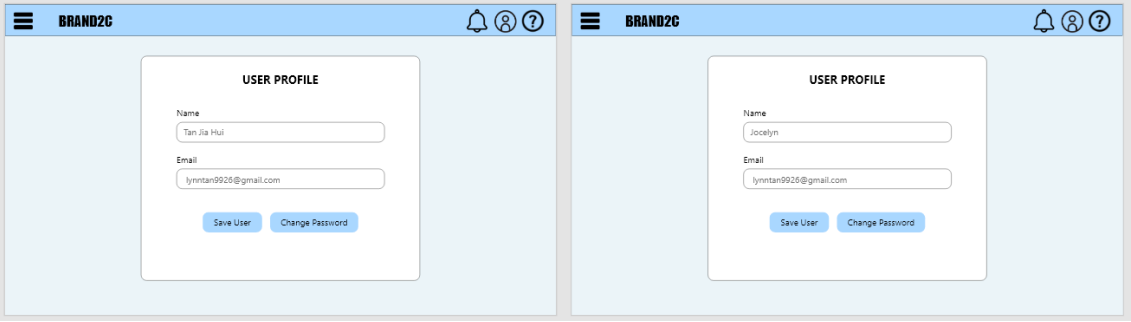

Figure 3.41 User Profile Interface

When the user access to user profile interface, the system will display the user’s name and email. User can edit the name, email, and click the “Save User” button to save

and update the changes of user profile. Figure 3.43 shows the user changes the name of profile.

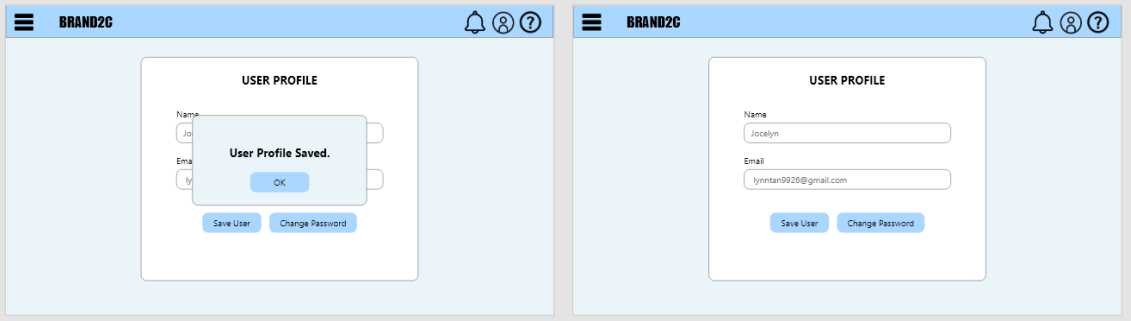

Figure 3.42 User Profile Saved Message and User Profile Interface

After the user click the “Save User” button, the system will pop-up “User Profile Saved” message. The system will show the updated user profile information after user clicks the “OK” button in the pop-up message. Besides, user can click “Change Password” and go to the change password interface to change the account password.

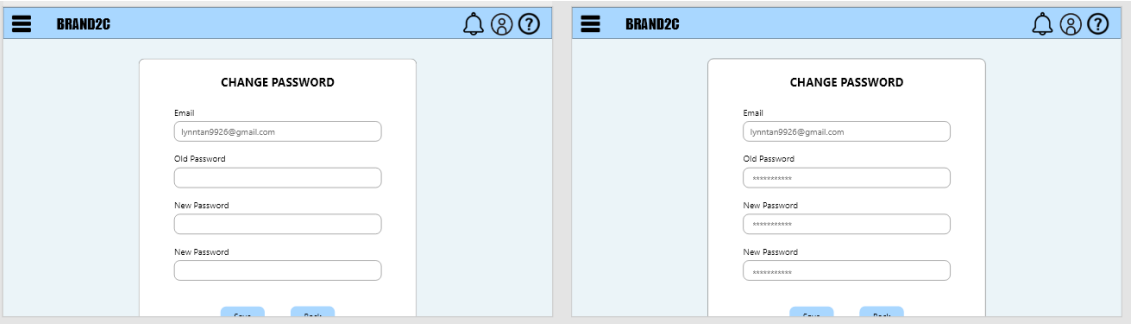

Figure 3.43 Change Password Interface

Figure 3.45 shows the change password interface. When user access to this interface, the system will display the email of the user. User needs to insert the old password, new password, and click the “Save” button to save the changed.

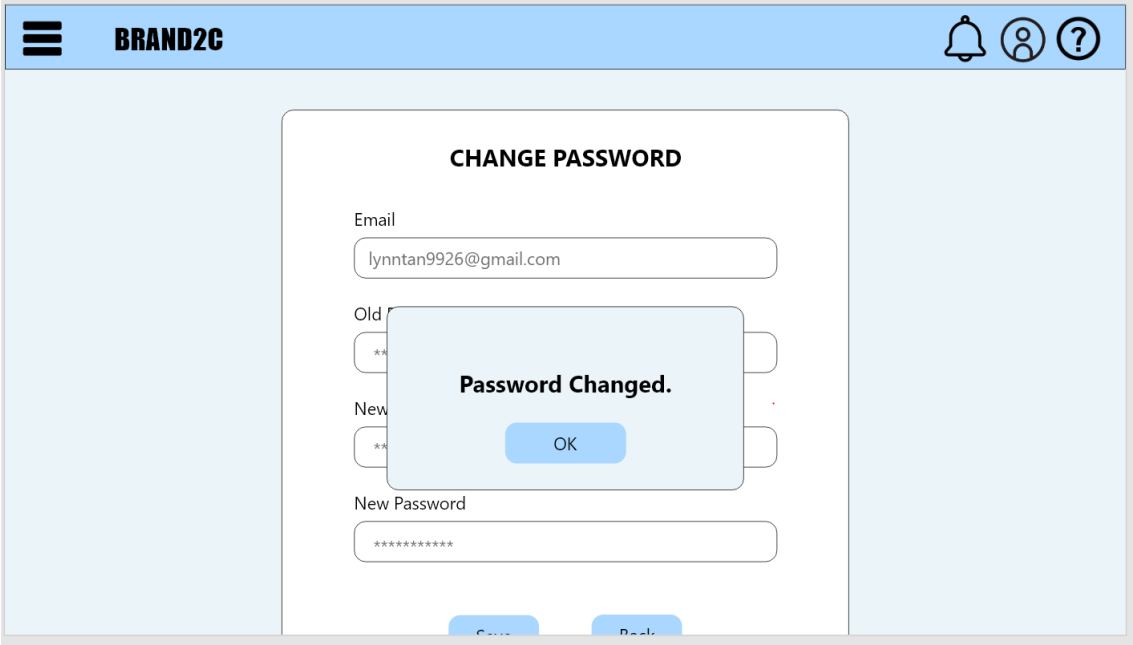

Figure 3.44 Password Changed Message and Change Password Interface

Figure 3.46 shows the pop-up message “Password Changed” after the user successfully change the password.

Figure 3.45 Change Password and User Profile Interface

The “Back” button in change password interface is for the user to back to user profile interface if the user do not want to change password.

3.6.3 Display Overview of Brand Sentiment Analysis

There are two user types: company and public user can access the display overview of brand sentiment analysis module. Company and public user will have different views of overview interface.

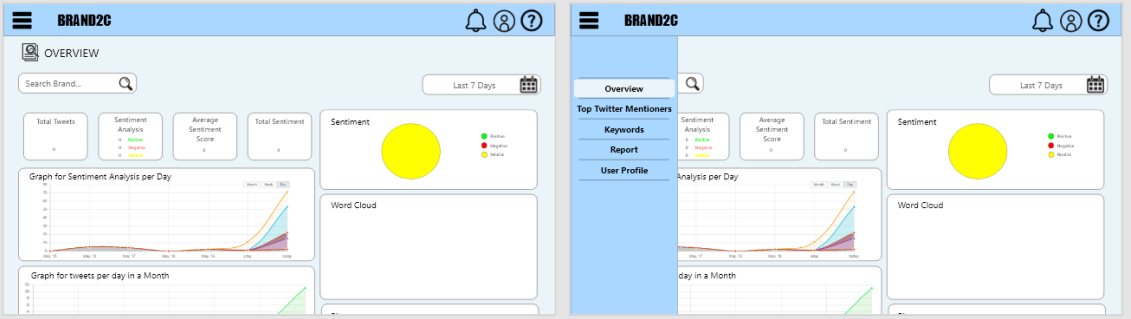

Figure 3.46 Overview Interface for Company

As company, the overview interface can be access by two methods. Figure 3.48 shows the company will access to the overview interface after login to the system successfully or company can choose the “Overview” from the side menu bar.

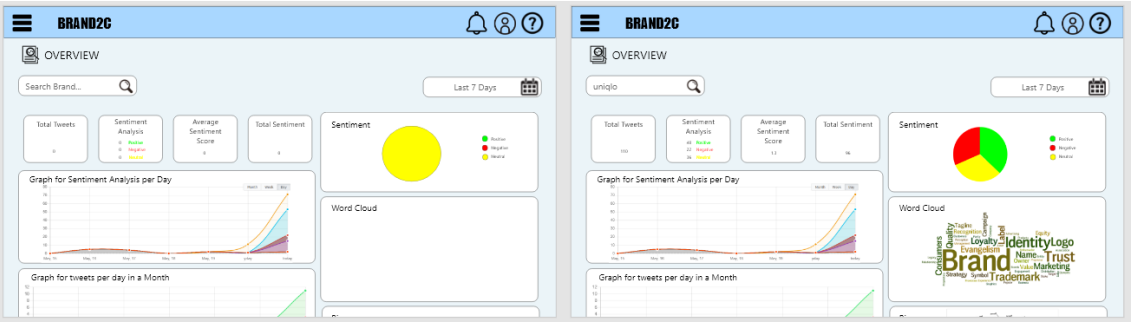

Figure 3.47 Overview Interface for Company

Company can insert brand that they want to search to view the overview analysis in overview interface such as Figure 3.49 shown. The data which will shows in this interface are summarize data of sentiment analysis, graph for sentiment analysis per day, graph for tweets per day in a month, word cloud, pie chart of the sentiment, table of the

tweets with sentiment scores, bigram, trigram, top Twitter mentioners, Twitter mentioned by date, and world map with a pie chart.

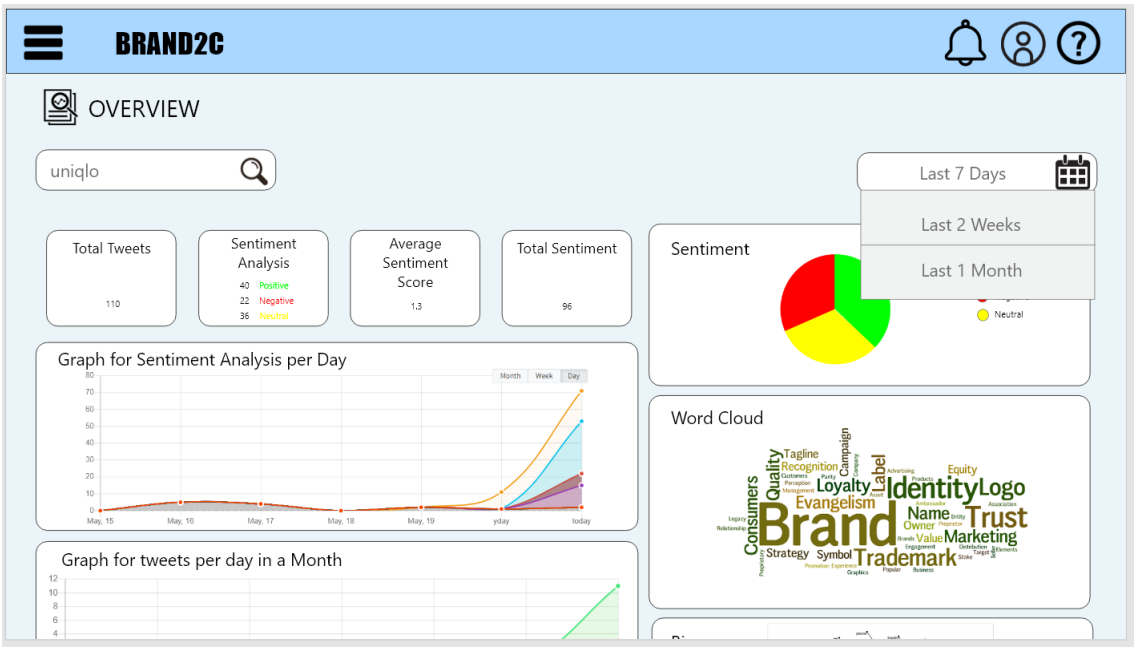

Figure 3.48 Sorting Function in Overview Interface for Company

The result will be shown for the last 7 days. After the overview result display in the overview interface, company can choose the date period such as “Last 7 Days”, “Last 2 Weeks”, and “Last 1 Month”.

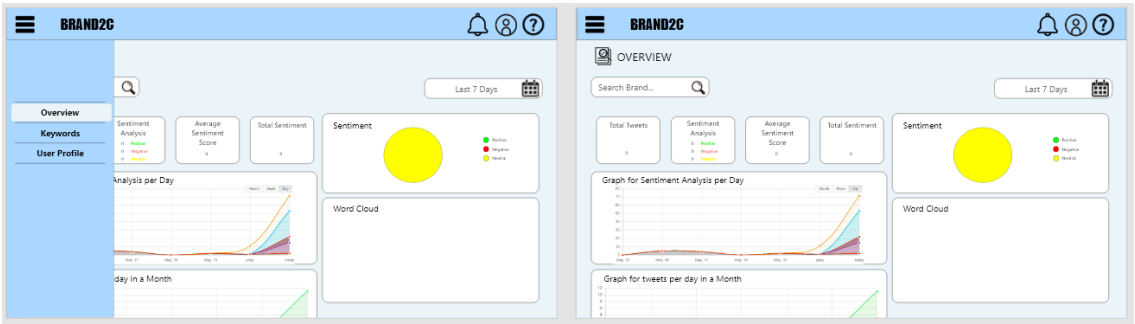

Figure 3.49 Overview Interface for Public User

As public user, the overview interface can be access by two methods. Public user will access to the overview interface after login to the system successfully or public user can choose the “Overview” from the side menu bar.

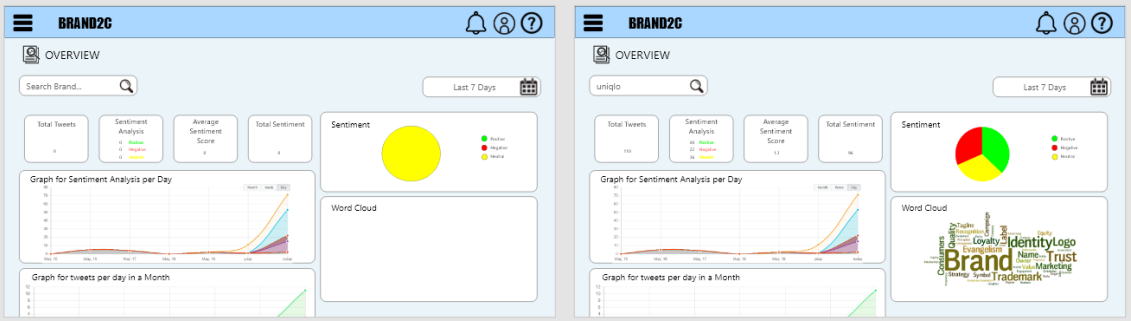

Figure 3.50 Overview Interface for Public User

Public user can insert brand that they want to search to view the overview analysis in overview interface such as Figure 3.52 shown. The data which will shows in this interface are summarize data of sentiment analysis, graph for sentiment analysis per day, graph for tweets per day in a month, word cloud, pie chart of the sentiment, and table of the tweets with sentiment scores.

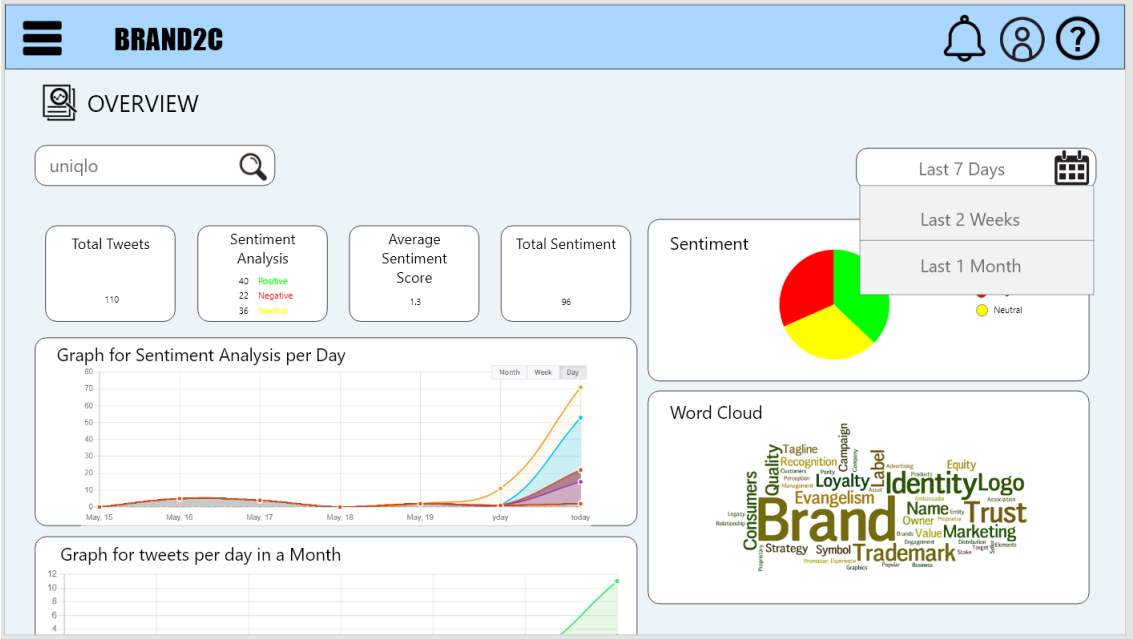

Figure 3.51 Sorting Function in Overview Interface for Public User

The result will be shown for the last 7 days. After the overview result display in the overview interface, public user can choose the date period such as “Last 7 Days”, “Last 2 Weeks”, and “Last 1 Month”.

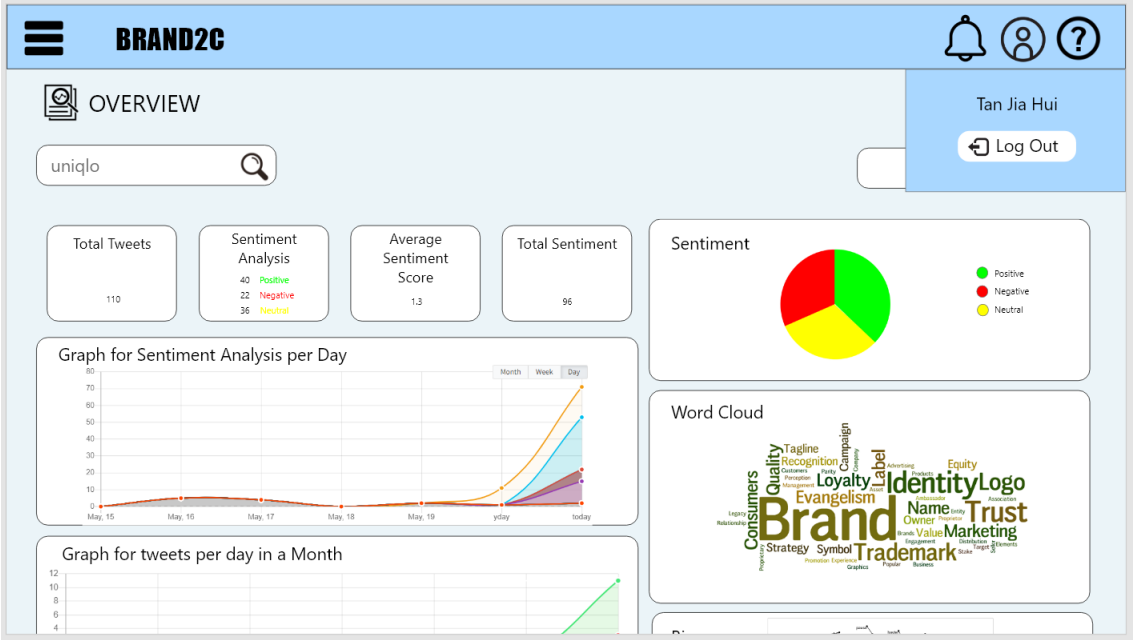

Figure 3.52 Overview Interface for Company and Public User

Both company and public user can click the profile icon in the header. The system will display the user's name and a "Log Out" button such as Figure 3.54 shown. Company or public user can click the "Log Out" button to log out the BRAND2C.

3.6.4 Display Top Twitter Mentioners

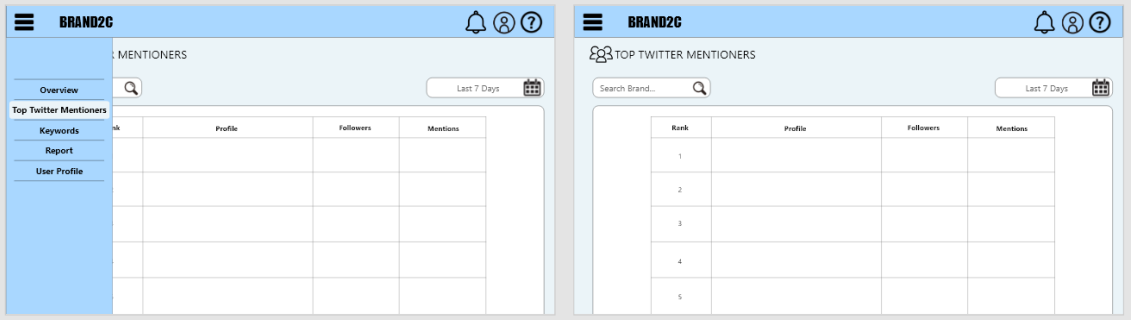

Figure 3.53 Top Twitter Mentioners Interface

The display top Twitter mentioners module only can be access by the company from the side menu bar. Figure 3.55 shows the top Twitter mentioners interface when the company access to this page.

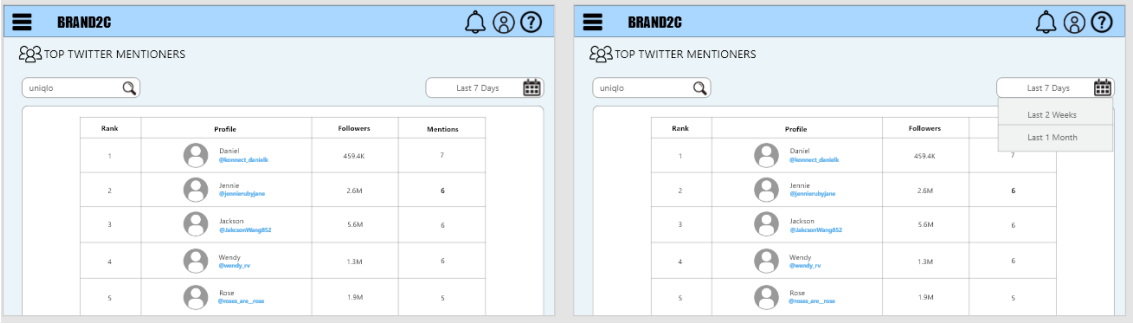

Figure 3.54 Top Twitter Mentioners Interface and Sorting Function in Top Twitter Mentioners Interface

Figure 3.56 shows the company insert the brand to search the top Twitter mentioners and the company can choose the date period such as “Last 7 Days”, “Last 2 Weeks”, and “Last 1 Month” for the top Twitter mentioners result. In this interface, the rank, profile, followers, and mentions will be displayed.

3.6.5 Display Keywords

There are two user types: company and public user can access the display keywords module. Company and public user will have different views of keywords interface.

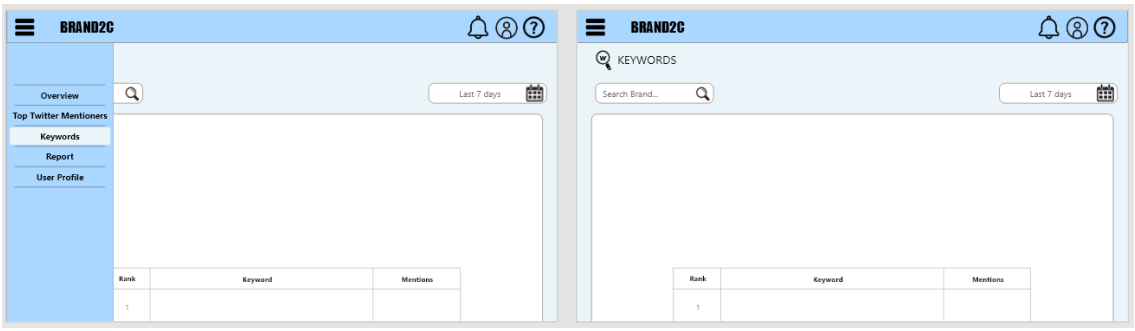

Figure 3.55 Keywords Interface for Company

In company's view, the keywords interface can be access by the company when choose the "Keywords" in the side menu bar. Figure 3.57 shows the keywords interface when the company access to this page.

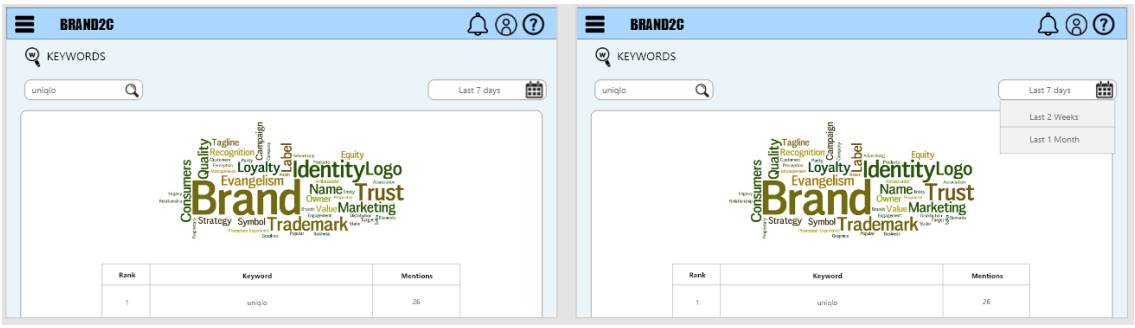

Figure 3.56 Keywords Interface and Sorting Function in Keywords for Company

Figure 3.58 shows the company insert the brand to search the keywords and the company can choose the date period such as "Last 7 Days", "Last 2 Weeks", and "Last 1 Month" for the keywords result. In this interface, it will display a word cloud, rank of the keywords, keywords, and number of mentions for the keywords.

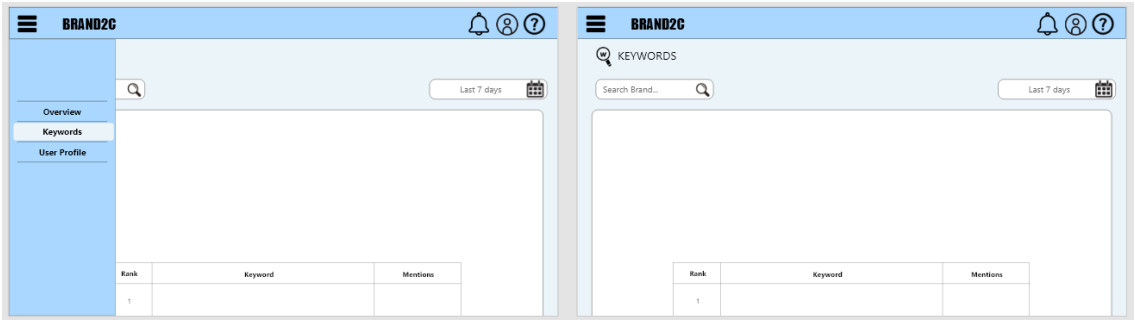

Figure 3.57 Keywords Interface for Public User

In public user's view, the keywords interface can be access by the public user when choose the "Keywords" in the side menu bar. Figure 3.59 shows the keywords interface when the public user access to this page.

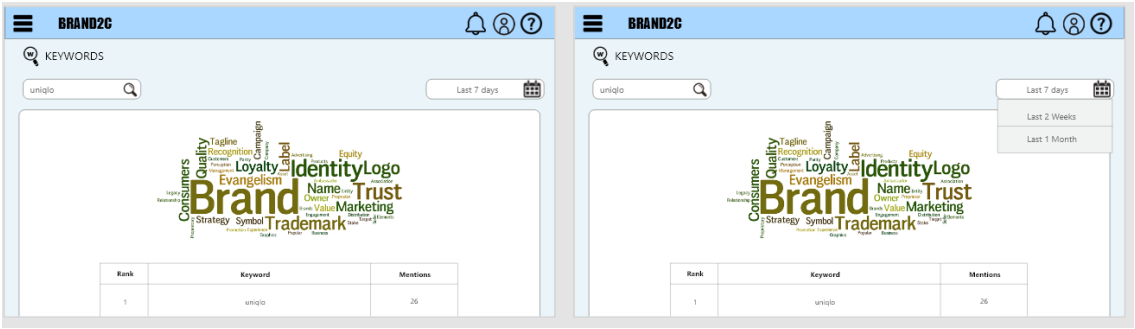

Figure 3.58 Keywords Interface for Public User

Figure 3.60 shows the public user insert the brand to search the keywords and the public user can choose the date period such as "Last 7 Days", "Last 2 Weeks", and "Last 1 Month" for the keywords result. In this interface, it will display a word cloud, rank of the keywords, keywords, and number of mentions for the keywords.

3.6.6 Manage Report

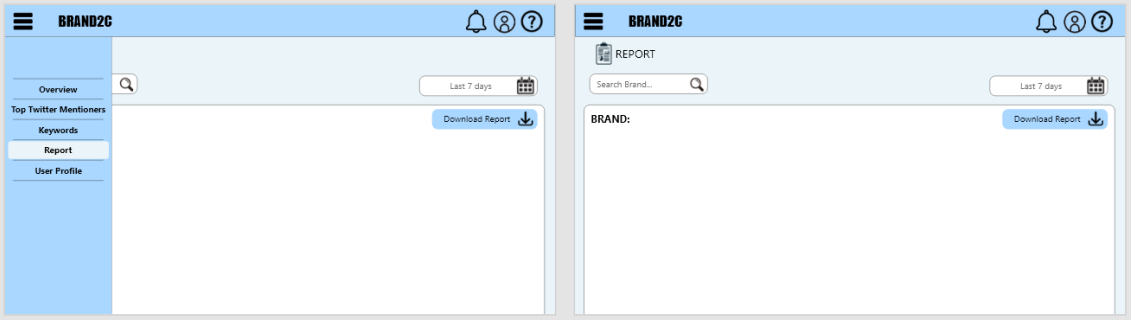

Figure 3.59 Report Interface

The manage report module only can be access by the company from the side menu bar. Figure 3.61 shows the report interface when the company access to this page.

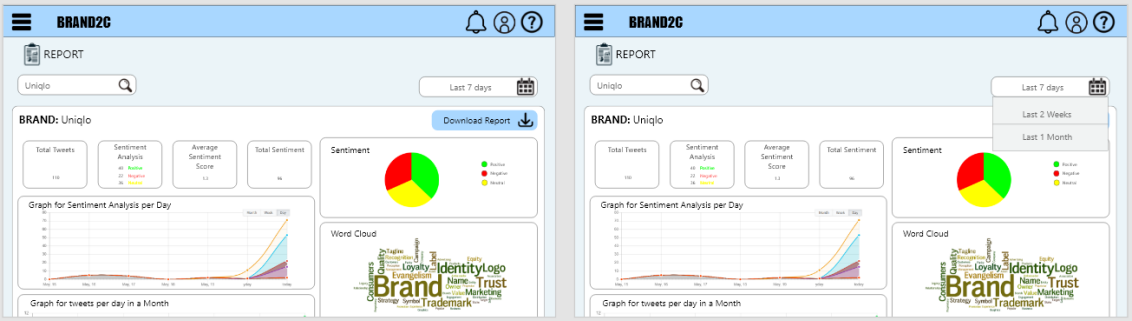

Figure 3.60 Report Interface

Figure 3.62 shows the company insert brand to search the brand report and the company can choose the date period such as “Last 7 Days”, “Last 2 Weeks”, and “Last 1 Month” for the report. In this interface, it will display the brand that company searched and all the data such as summarize data of sentiment analysis, graph for sentiment analysis per day, graph for tweets per day in a month, word cloud, pie chart of the sentiment, and table of the tweets with sentiment scores.

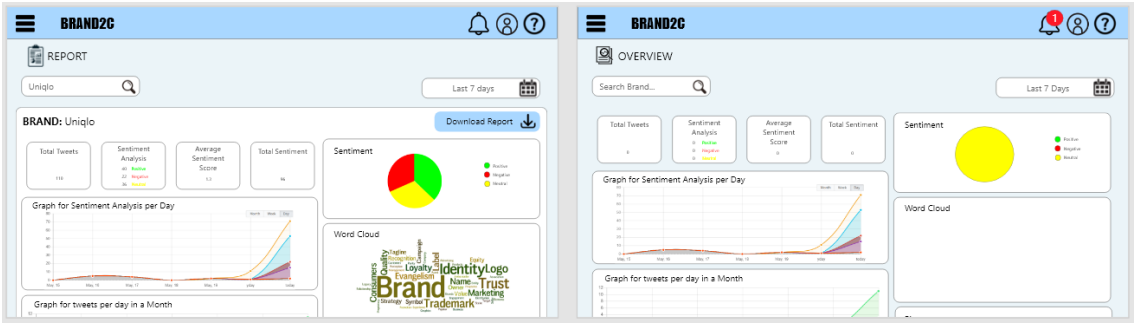

Figure 3.61 Report Interface and Overview Interface

Company can click “Download Report” button to download the report document. The system will bring the company back to the overview interface and it will display a notification on the header.

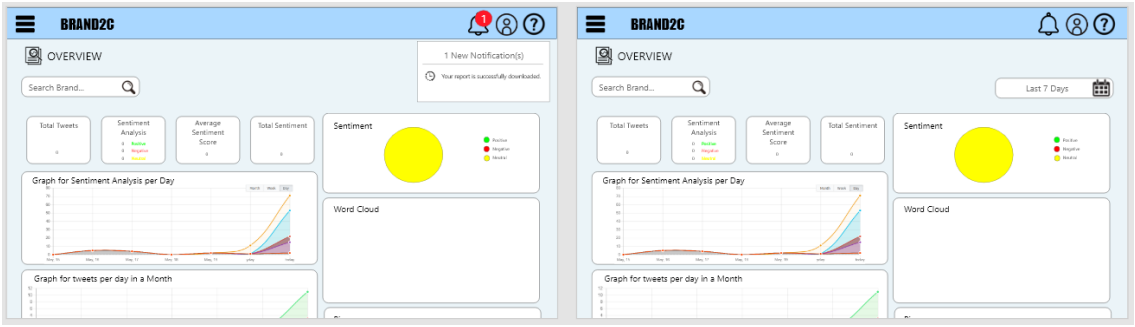

Figure 3.62 Download Report Successful Notification in Overview Interface

When company click the notification icon, the system will show the unread notification. The number of unread notifications will disappear after user click the notification icon again since the notifications have been read.

3.7 Testing Plan

Table 3.4 Testing Plan

No.	Module	Activities	Status		Comments
1.	Login	The user able to register an account.	Yes (/)	No ( )	
2.		The user able to login to the system.	Yes (/)	No ( )	Working
3.		The user able to log out the system.	Yes (/)	No ( )	
4.	Manage User	The user able to view their user profile.	Yes (/)	No ( )	
5.		The user able to edit their user profile.	Yes (/)	No ( )	
6.		The user able to change password.	Yes (/)	No ( )	
7.	Manage Quick Search	The user able to insert brand to search the brand for sentiment analysis.	Yes (/)	No ( )	
8.		The user able to view the brand sentiment analysis results.	Yes (/)	No ( )	
9.	Manage Report	The user able to insert brand to view the brand report.	Yes (/)	No ( )	
10.		The system able to display the report of the brand.	Yes (/)	No ( )	
11.		The user able to download the report document.	Yes (/)	No ( )	

This test has been performed by:

Name : Tan Jia Hui

Signature :

Date :

3.8 Potential Use of Proposed Solution

In this project, a web-based analytical tool which is BRAND2C is developed for brand analysis on Twitter to calculate the sentiment scores of the tweets. The primary target user of BRAND2C is company and public user. The main features in BRAND2C are login, manage user, manage quick search, and manage report.

The potential use of proposed solution is the company can view and know their brand reputation. Since the target market's level of trust in company will reflects in their brand reputation, company can improve their brand reputation after knowing their current brand reputation so that customers trust more on their brand and willing to purchase their brand's products.

Besides, the company can observe the overview of the customers' opinion on their products and public user also can view the analysis of the brand's product review. As company, company can improve their products after viewing the reviews and analysis of the products to retain customers. At the same time, public user can get to know which brand is better and can be trust after viewing the analysis of the brand's product review.

Moreover, company can use this proposed solution to monitor the competitors' brands review from the customers. No competition, no progress. By monitoring the competitors' brand review from the customers helps the company to improve their own product by learning from the competitors' footsteps.

3.9 Gantt Chart

Placement in appendix D.

3.10 Hardware and Software Specification

Table 3.5 Hardware and Software Specification

NAME	VERSION	TYPE	DESCRIPTION
Laravel	9.14.1	Software	Used to create the web application of BRAND2C.
Visual Studio Code	1.66.2	Software	Used to develop the BRAND2C.
Adobe XD	51.0.12	Software	Used to design high fidelity prototype.
Draw.io	-	Software	Used to sketch the diagrams for documentation.
VivoBook_ASUSLaptop X530FN_S530FN	-	Hardware	Used to develop the BRAND2C and complete the documentation.

3.11 Chapter Summary

In this chapter, it discussed about the selected development methodology that used to develop the BRAND2C which is Scrum as it is a flexible methodology. It enables teams to collaborate. Besides, this chapter discussed about the requirements that related to this project. For instance, functional requirement, non-functional requirement, constraints and limitation, and user requirement. Questionnaire is used to collects the user requirements. In addition, proposed design such as flowchart, context diagram, use case diagram, and activity diagram are designed based on the project requirement. Data design such as entity relationship diagram (ERD) and data dictionary are done to explain the data that related to the project. Moreover, design prototype is designed in this chapter. Testing plan is also be planned based on the requirement of the system. The potential use of proposed solution that relate to the current situation is explained. This chapter also consists of the hardware and software specification that need to be used throughout this project. Lastly, Gantt chart is designed in this chapter to depicts the phases of the project from the beginning to the end of the project.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter will explain about the development, implementation, testing, and outcomes of BRAND2C. System design is crucial to the development of the system since it ensures that the overall appearance of the system is clear, preventing misunderstanding during the implementation stage. This web application is implemented to company and public users. The testing phase will be introduced when the implementation phase has met its exit requirements. This is done to make sure the system operates in accordance with the needs and standards for the system.

4.2 Implementation

The exact implementation requirements and processes for implementing BRAND2C are covered in this section. Throughout this section, each step is briefly explained. Additionally, the project's server runs on localhost via XAMPP, and the web application was created using Visual Studio Code with Laravel framework.

4.2.1 Software Development Tools

4.2.1.1 Visual Studio Code

A code editor called Visual Studio Code (VS Code) has been selected as the software development platform to create the BRAND2C web application. Visual Studio Code is a code editor that has been redesigned and optimised for creating and debugging

contemporary web and cloud apps. Programming languages supported by the Visual Studio Code include Java, JavaScript, JSON, PHP, CSS, HTML, Python, Dart, and other programming languages. Visual Studio Code differs from some of the other code editors as its syntax highlighting, parentheses matching, and snippets.

4.2.1.2 XAMPP

XAMPP is an open-source cross-platform web server abbreviated from Cross-Platform, Apache, MySQL, PHP, and Perl. Developers can develop and debug the code on a local web server using the XAMPP. Since it performs PHP, which is a language used for server-side coding, XAMPP was selected for this project. Additionally, XAMPP offers MySQL service via the PhpMyAdmin for managing the database. Figure 4.1, 4.2, and 4.3 shows the XAMPP Control Panel, PhpMyAdmin, and database of the project in PhpMyAdmin.

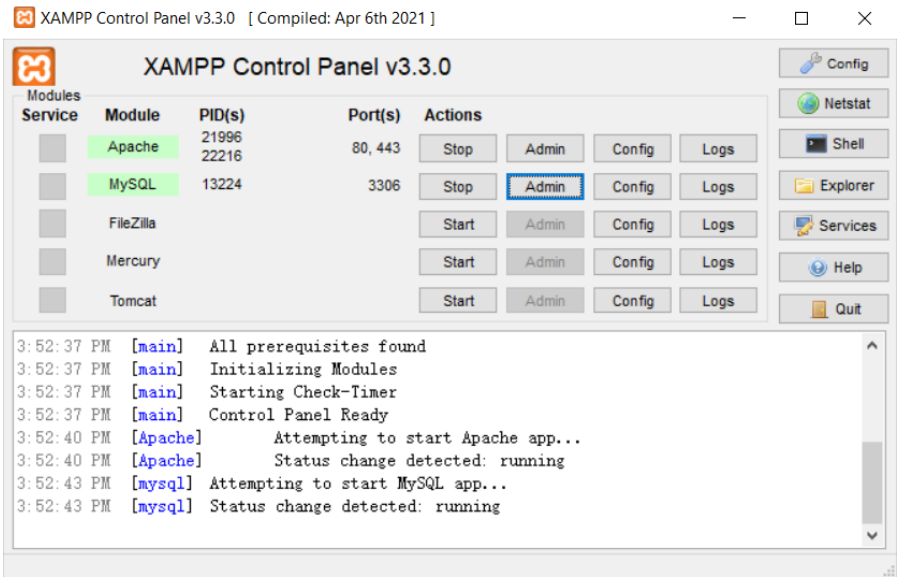

Figure 4.1 XAMPP Control Panel

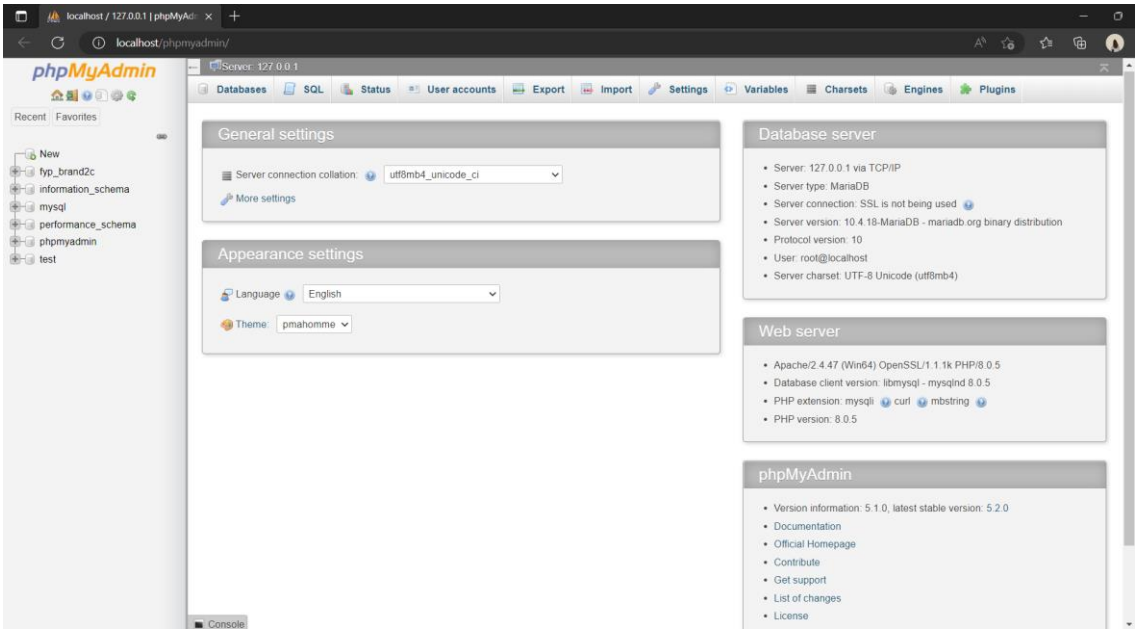

Figure 4.2 PhpMyAdmin Interface

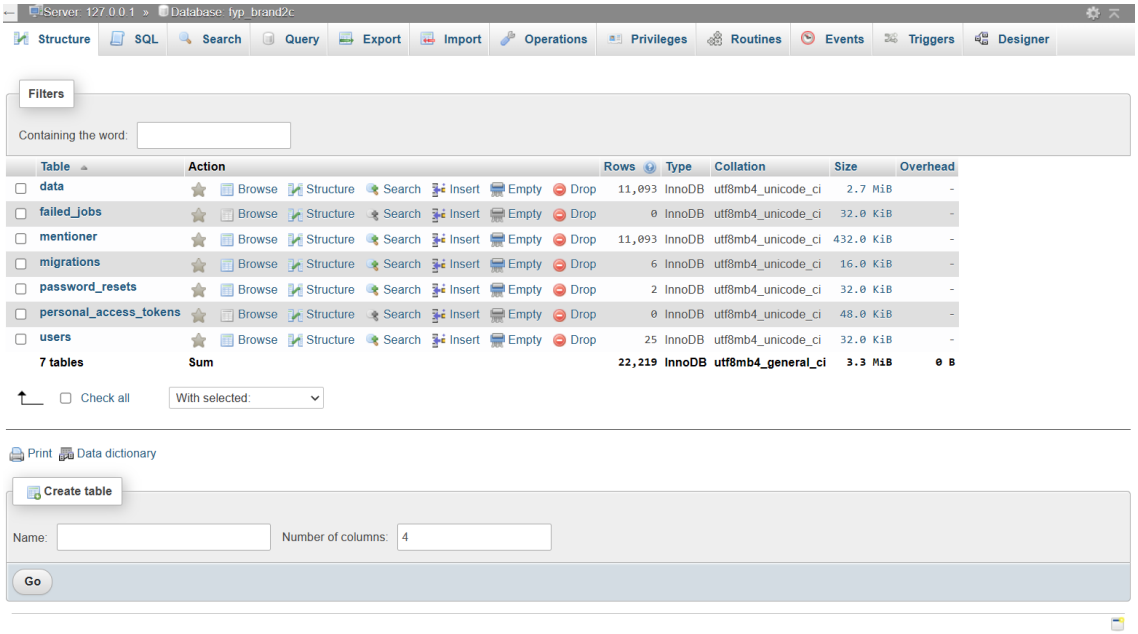

Figure 4.3 Database of BRAND2C in PhpMyAdmin

4.2.2 Software Development Framework

The framework that used to develop BRAND2C is Laravel. Laravel is a PHP framework that makes use of a scripting language. Laravel aims to make development easier by simplifying routine activities like authentication, routing, caches, and sessions that are utilized in the most common web projects. Laravel attempts to make the development experience enjoyable for the developer while compromising the functionality of the application. The version of Laravel framework which is used for developing BRAND2C is Laravel framework 9.23.0.

Figure 4.4 Laravel Logo

4.2.3 Sentiment Analysis Tool

VADER will be used in BRAND2C's development. VADER (Valence Aware Dictionary and sEntiment Reasoner) is a sentiment analysis method that contains rules and a lexicon to manage terms, acronyms, slang, expressions, and emojis often used in social media. A vector of sentiment scores having positive, negative, neutral, and compound polarities is generated for every phrase. VADER will be installed and continue by calling the SentimentIntensityAnalyzer object. The polarity_scores() method is used to calculate the sentiment score for the tweets. The compound score is a measure that has a range with the most extreme values being -1 for a negative score and +1 for a positive score. For positive sentiment, the compound score should be greater or equals to 0.05. For neutral sentiment, the compound score should be more than -0.05 and less than 0.05. For negative sentiment, the compound score should be less or equals to -0.05. Figure 4.5 shows analysing the tweets using VADER. In addition, the sentiment scores for the tweets which in other languages such as Japanese, and Arabic are not accurate due VADER only analyses sentiment in English sentences.

```
def sentiment_scores(sentence):

    # Create a SentimentIntensityAnalyzer object.
    sid_obj = SentimentIntensityAnalyzer()

    # polarity_scores method of SentimentIntensityAnalyzer
    # object gives a sentiment dictionary.
    # which contains pos, neg, neu, and compound scores.
    sentiment_dict = sid_obj.polarity_scores(sentence)

    # decide sentiment as positive, negative and neutral

    senti = sentiment_dict['compound']
    return senti
```

Figure 4.5 Analysing tweets using VADER

4.2.4 Application Interfaces

The web-based application for BRAND2C can be divided into two types, which are company and public user interface. Both company and public user share a variety of interfaces, including the login page, register page, and forgot password page.

4.2.4.1 Login Page

Figure 4.6 shows the login interface for the BRAND2C. The login page will be the first interface that the user will see when the user opens the BRAND2C. User can insert email address and password to login to the system. The system will lead the user to the dashboard of the BRAND2C if the email address and password which insert by the user are valid. The user also can click on the “Register” button to register a new account.

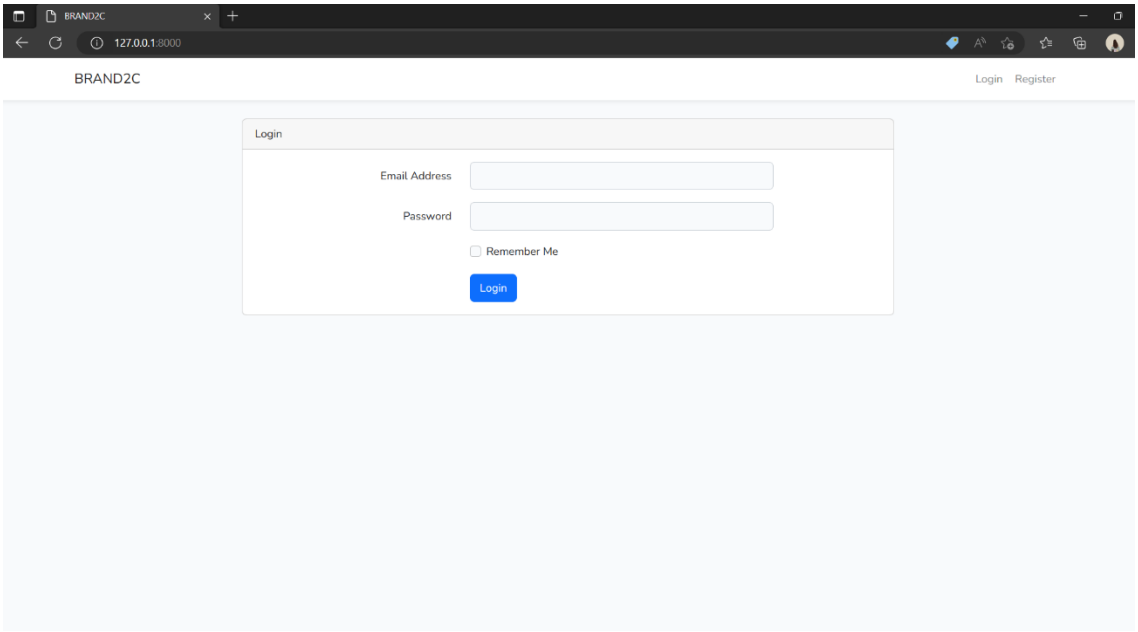

Figure 4.6 Login Interface of BRAND2C

4.2.4.2 Register Page

Figure 4.7 shows the register interface for the BRAND2C. The register page is for the first-time user to register a new account. User needs to insert name, email address, password, confirm password, and user type (company / public user) to register a new account. The system will lead the user to the quick search interface of the BRAND2C when the user successfully registers a new account. If user wants to go back to the login page, user can click on the “Login” button to back to the login page.

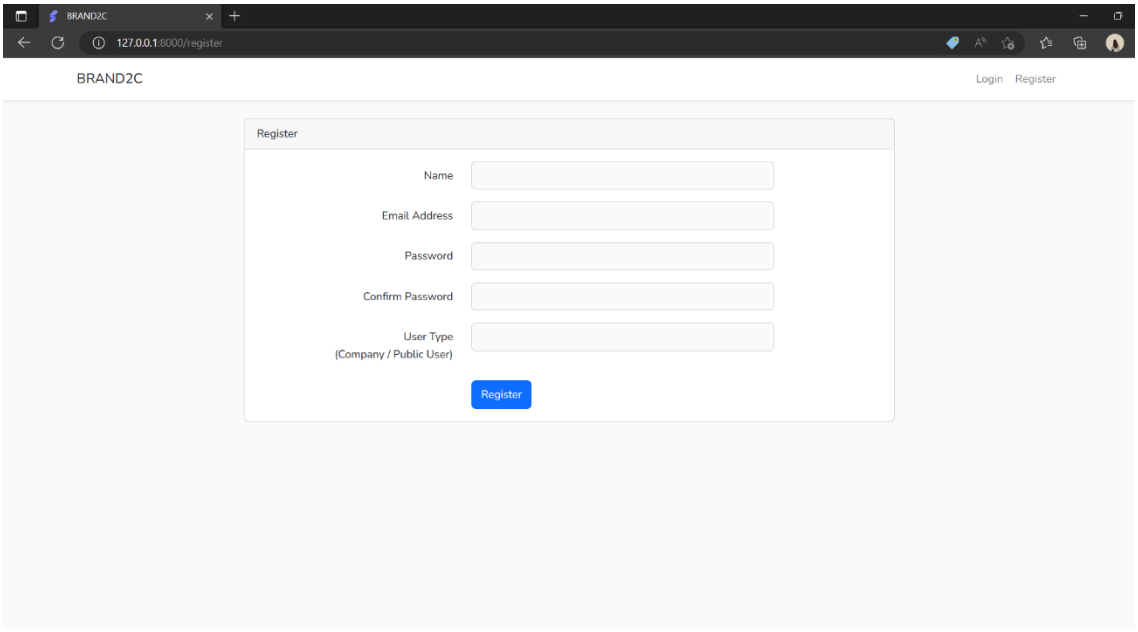

Figure 4.7 Register Interface of BRAND2C

4.2.4.3 Company Interface: Quick Search

Figure 4.8 shows the quick search interface when user successfully login to BRAND2C. The side bar of the interface shows the name and logo of the system, name of the user, a search bar which provide to the user to search the module that can be accessed by the company user. There are four modules can be accessed by the company user, which are quick search, report, user profile, and about. In addition, quick search is used to search the brand and it will search the tweets based on the brand that user had searched. The results will be stored in MySQL database. Company user can insert brand to search the latest 100 data. It will display the table of tweets with the sentiment, date and time, and sentiment score. Figure 4.9 shows the alert message from the system to notify the user it only displays the latest 100 data in the quick search after searched the brand. Figure 4.10 shows the quick search result.

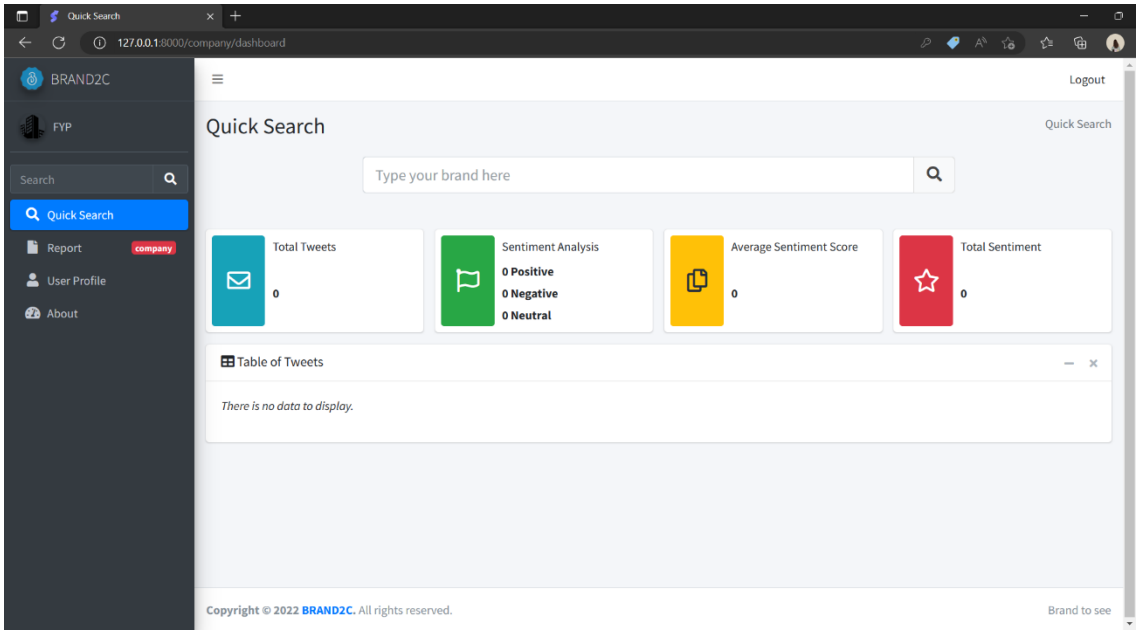

Figure 4.8 Quick Search Interface of BRAND2C

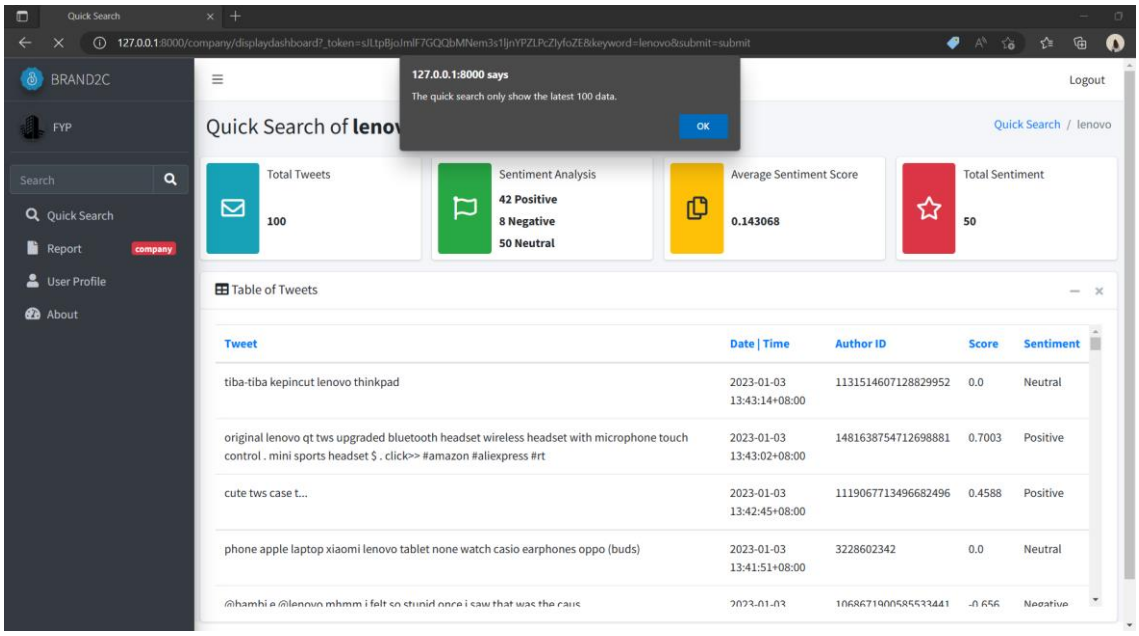

Figure 4.9 Alert Message after User Search Brand

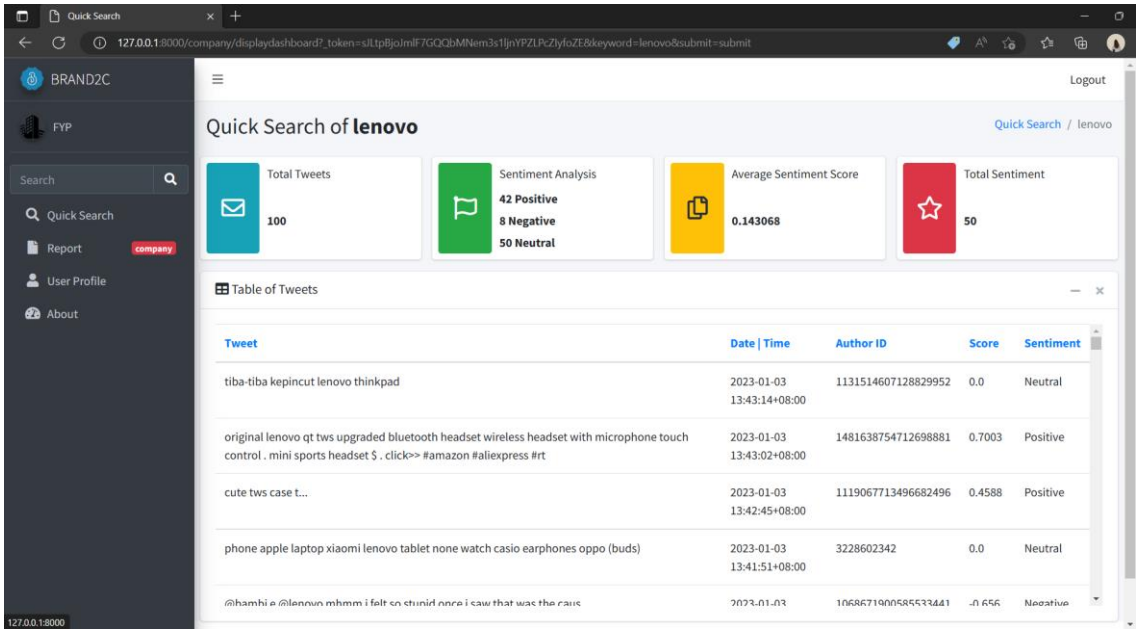

Figure 4.10 Search Result in Quick Search Interface

4.2.4.4 Company Interface: Report

Figure 4.11 shows the report interface of BRAND2C. Report module only can be accessed by company user. This module is to display the total tweets, sentiment analysis, average sentiment score, total sentiment, line graph of total tweets per day, word cloud, pie chart of sentiment, line graph of positive sentiment per day, neutral sentiment per day, and negative sentiment per day based on the brand searched. The data will retrieve from MySQL database. Figure 4.12, 4.13, 4.14, and 4.15 shows the result of the report. Additionally, company user can click on the “Print” button to print the report or download the report as pdf file. Figure 4.16 shows the output after the user click on the “Print” button. If the data is not enough for the brand that had searched by the company, the system will pop out a message to notify the user to search the brand in Quick Search interface such as Figure 4.17 shown.

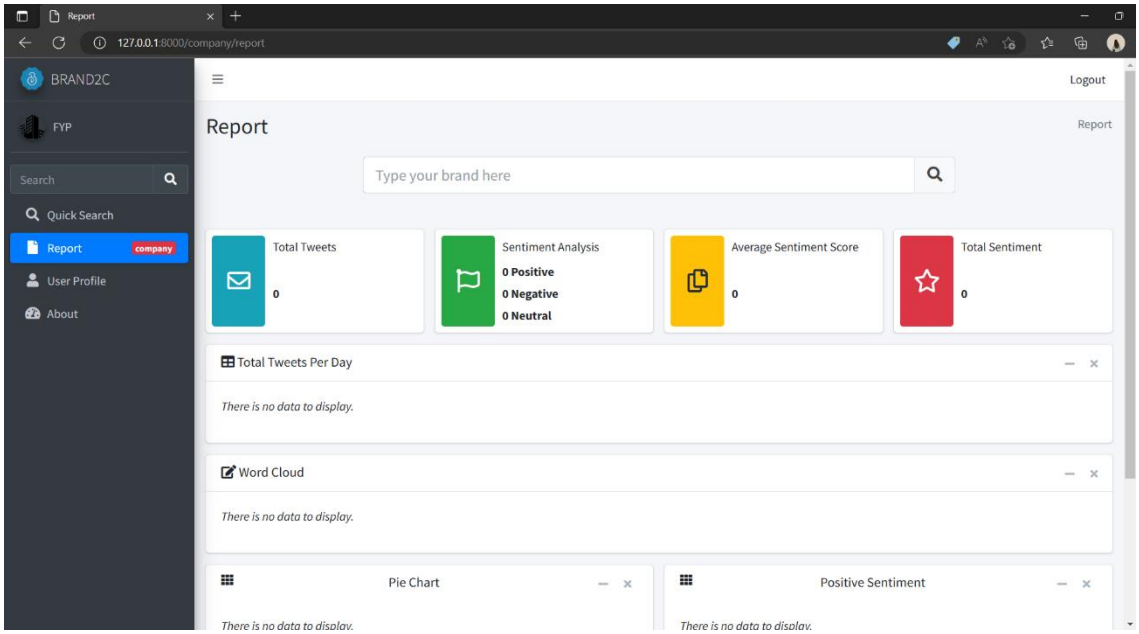

Figure 4.11 Report Interface of BRAND2C

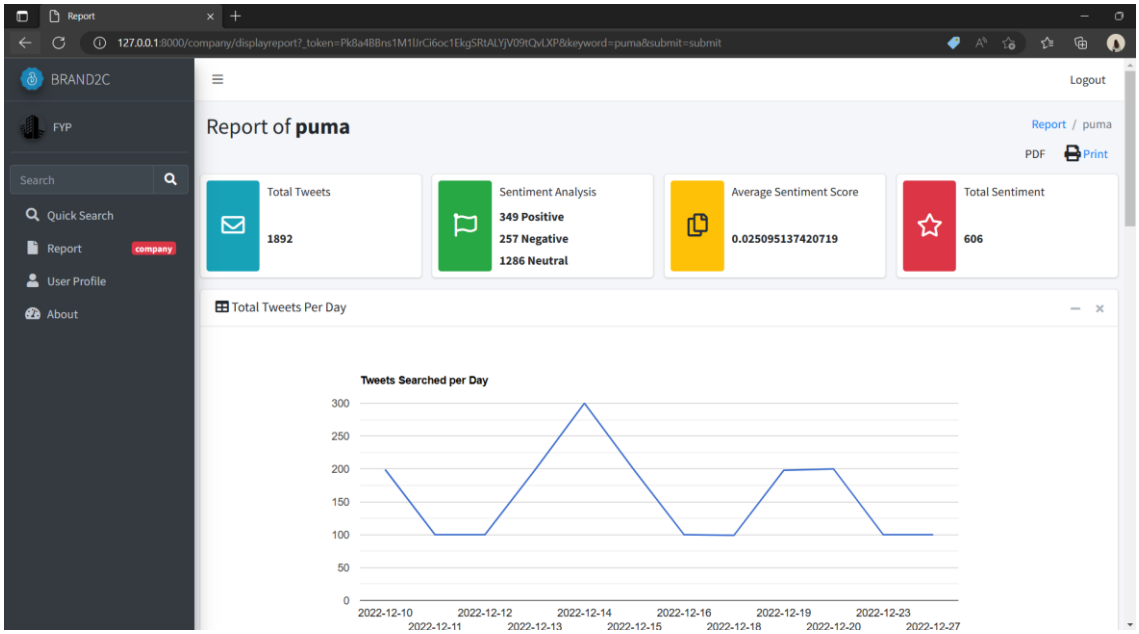

Figure 4.12 Report Result of BRAND2C

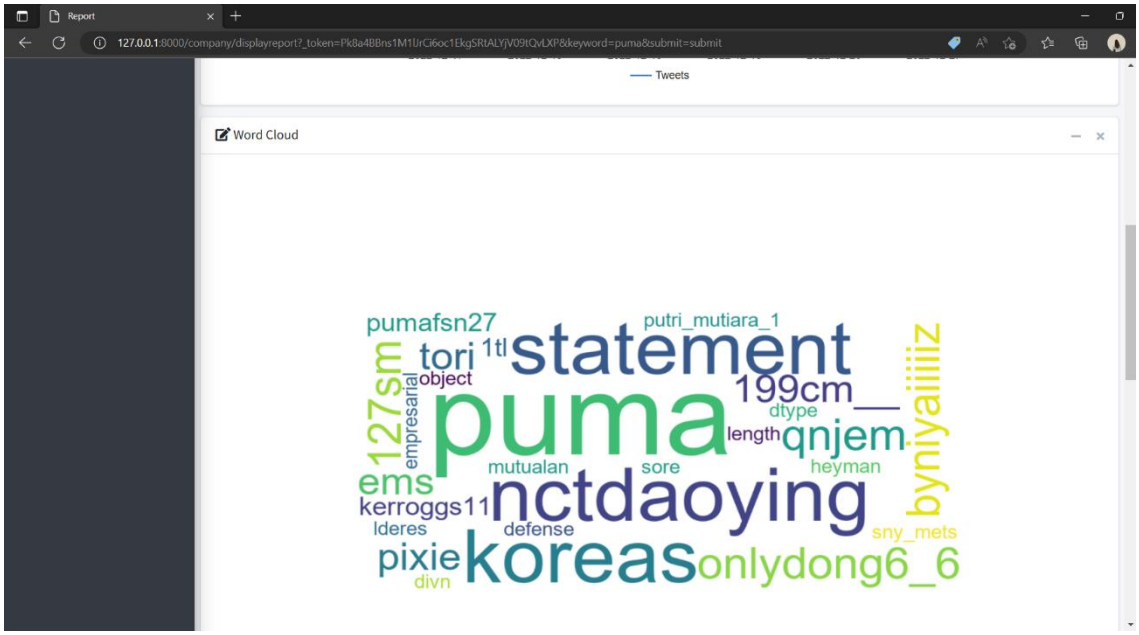

Figure 4.13 Report Result of BRAND2C

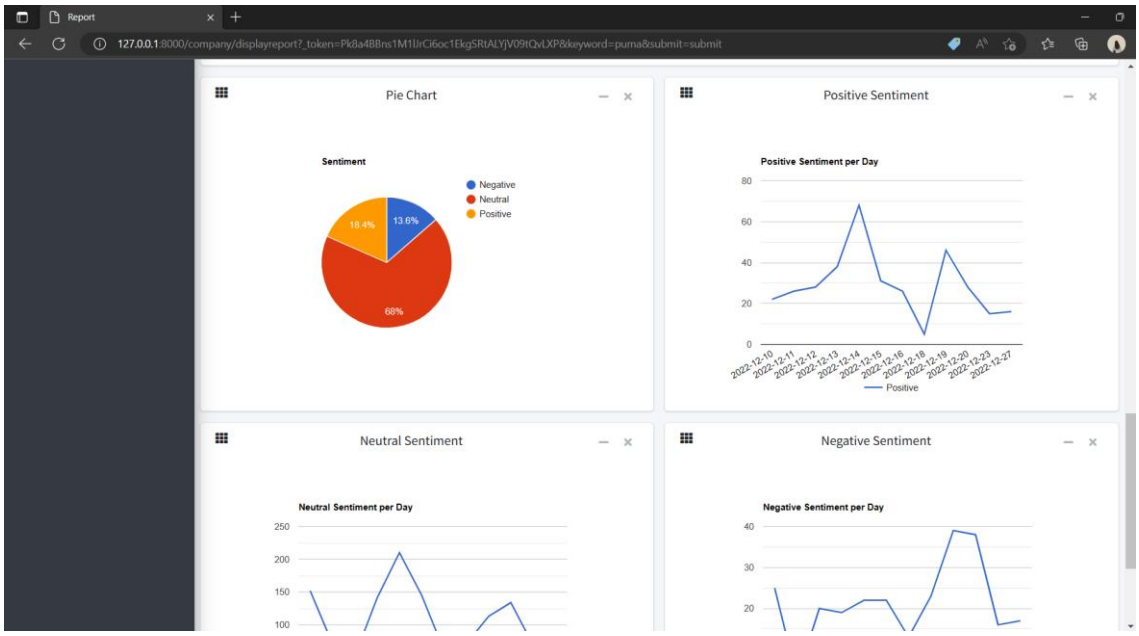

Figure 4.14 Report Result of BRAND2C

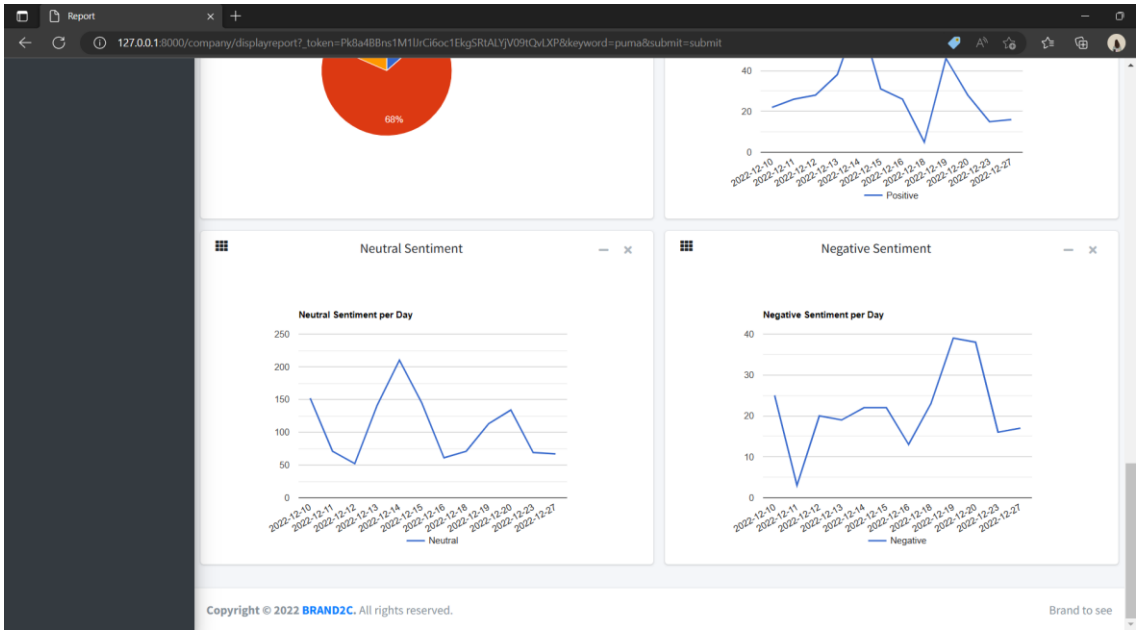

Figure 4.15 Report Result of BRAND2C

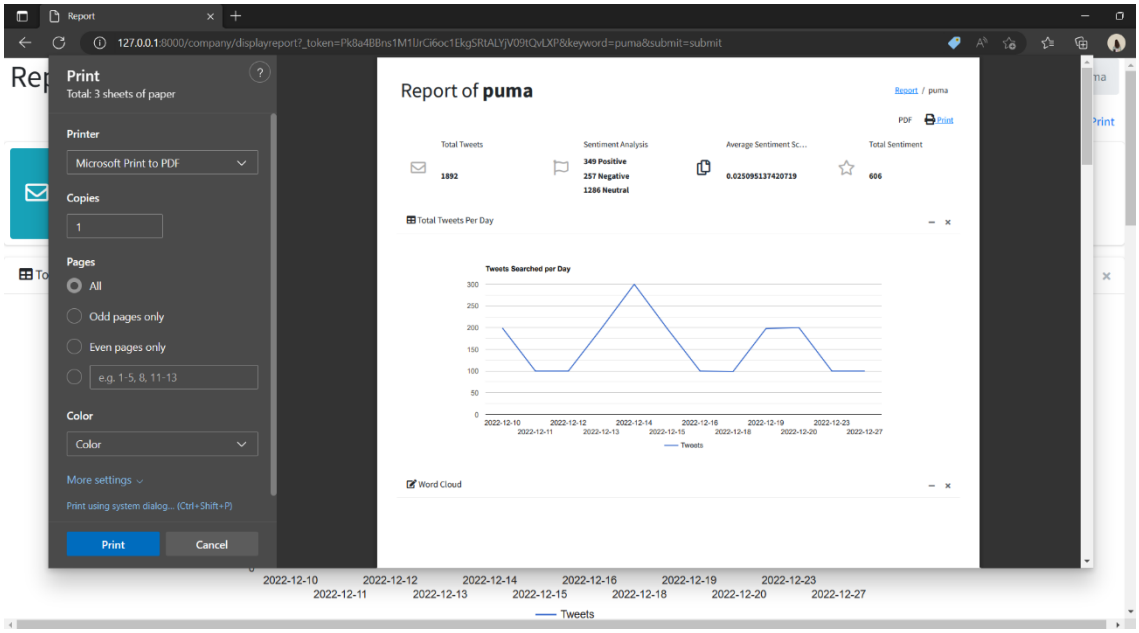

Figure 4.16 Printing Report

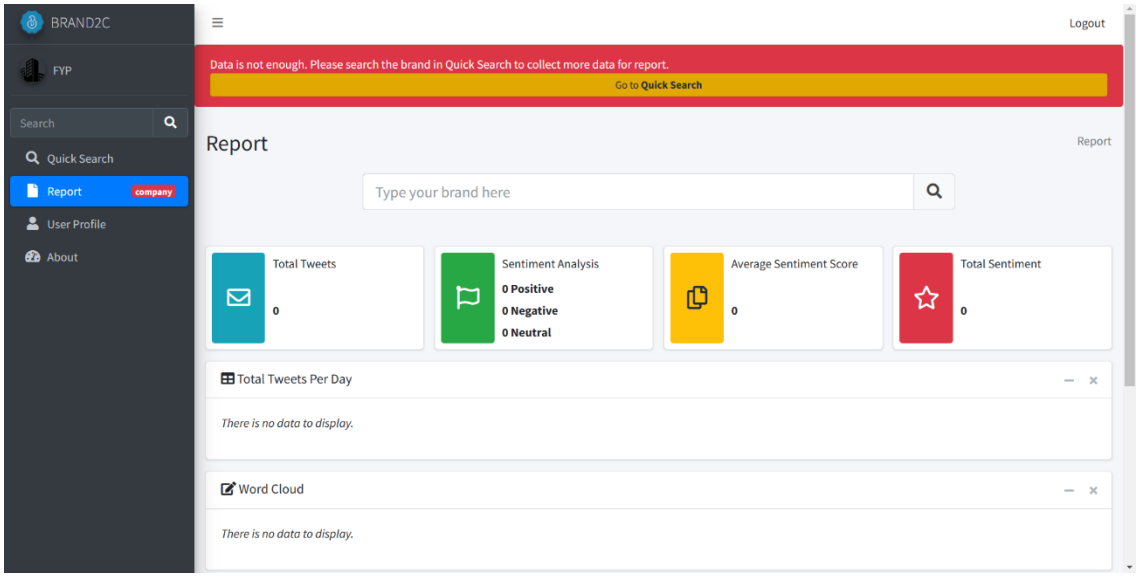

Figure 4.17 Message to notify user that data is not enough for the specific brand

4.2.4.5 Company Interface: User Profile

Figure 4.18 and 4.19 shows the user profile interface of BRAND2C. User will be able to see the personal information that is been set during registering the account. The name and the user type of the account will be displayed. In the personal information section, company user can update the name by inserting the name in the input field and click on the "Save User" button. Besides that, company user can click the "Change Password" to change the account's password. The system will display a successful message to notify the user when the new password is successfully set such as Figure 4.20 shown.

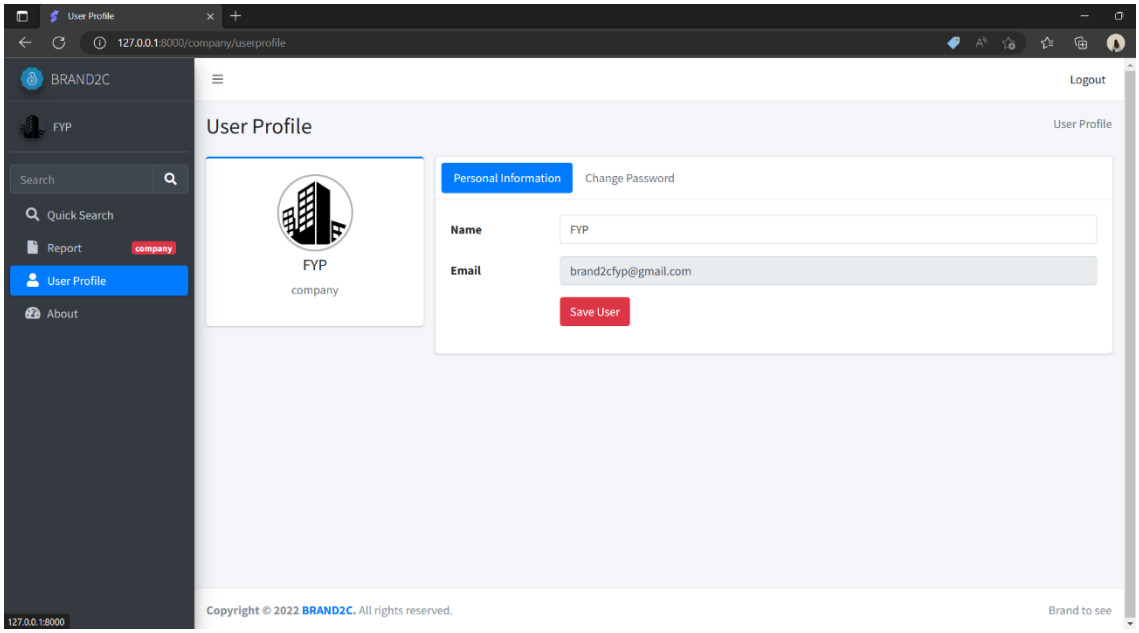

Figure 4.18 User Profile Interface of BRAND2C

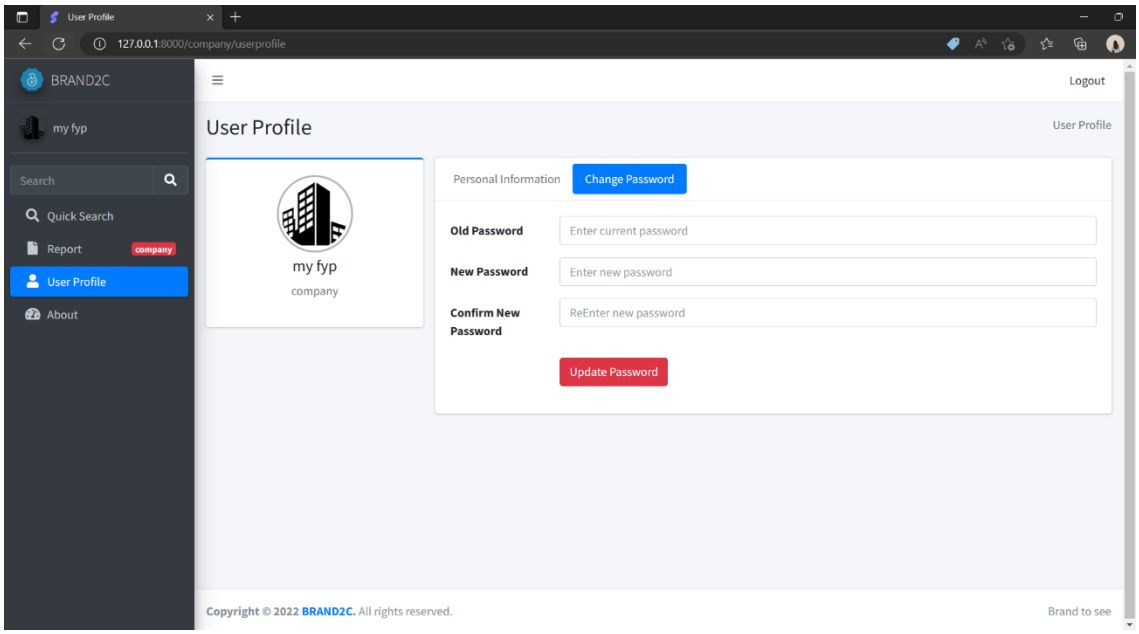

Figure 4.19 User Profile Interface of BRAND2C

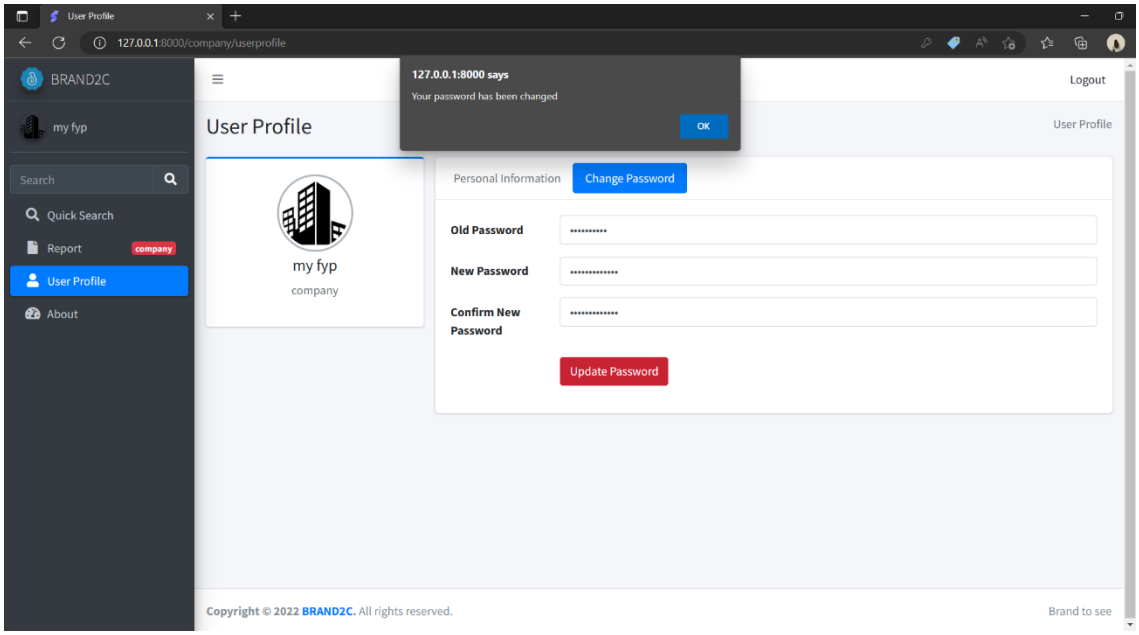

Figure 4.20 Notification of Password Successfully Changed

4.2.4.6 Company Interface: About

Figure 4.21 shows the about interface of BRAND2C. This page will display some information about the BRAND2C. The user can go through this page to understand each page.

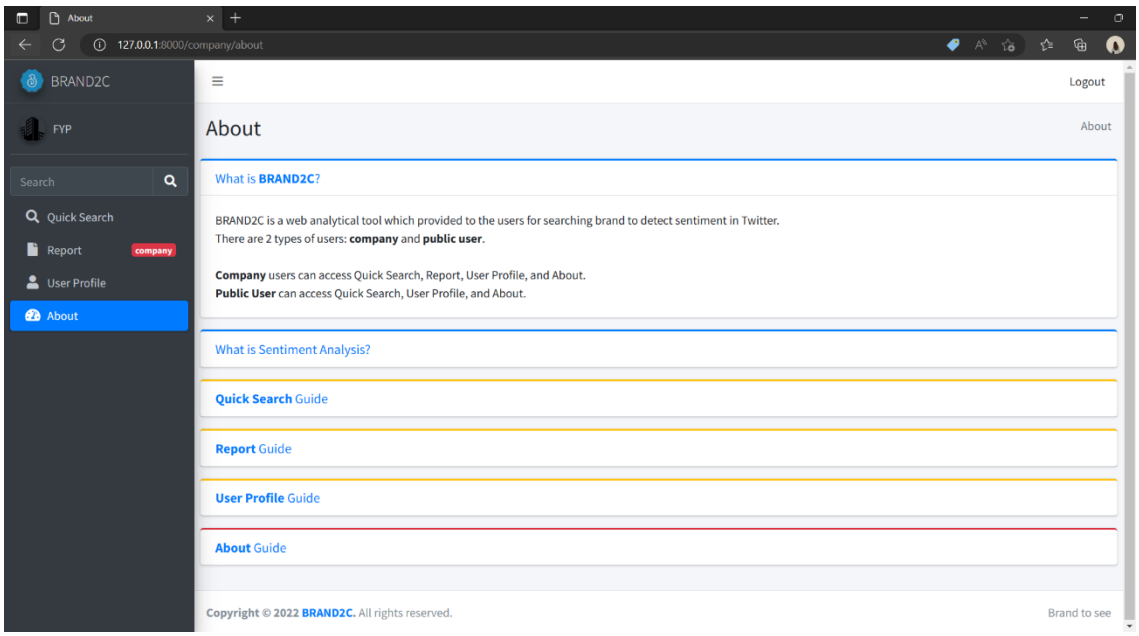

Figure 4.21 About Interface of BRAND2C

4.2.4.7 Public User Interface: Quick Search

Figure 4.22 shows the Quick Search interface when public user successfully login to BRAND2C. The side bar of the interface shows the name and logo of the system, name of the user, a search bar which provide to the user to search the module that can be accessed by the public user. Public user only can access quick search, user profile, and about page. In addition, quick search is used to search the brand and it will search the tweets based on the brand that user had searched. The results will be stored in MySQL database. Public user can insert brand to search the latest 100 data. It will display the table of tweets with the sentiment, date and time, and sentiment score. Figure 4.23 shows the alert message from the system to notify the user it only displays the latest 100 data in the quick search after searched the brand. Figure 4.24 shows the quick search result.

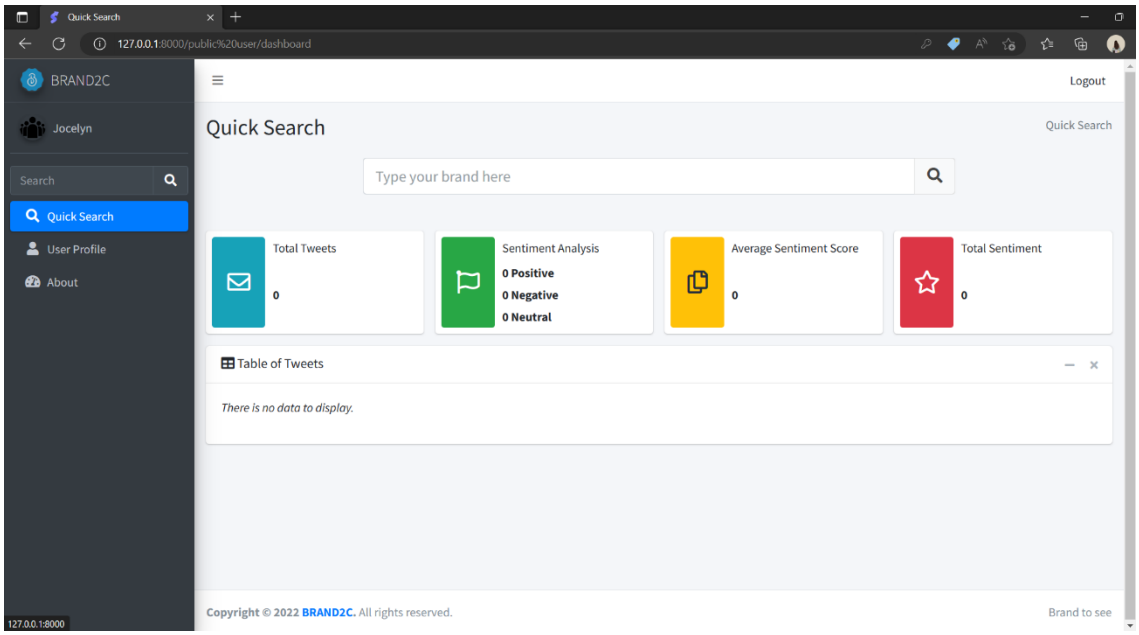

Figure 4.22 Quick Search Interface of BRAND2C

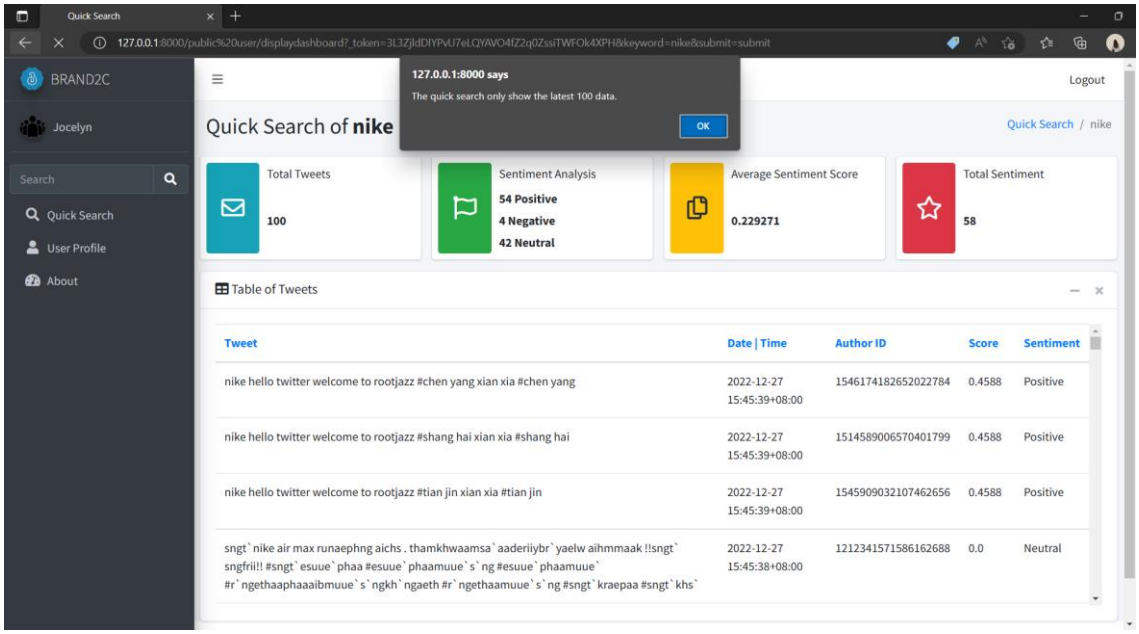

Figure 4.23 Alert Message after User Search Brand

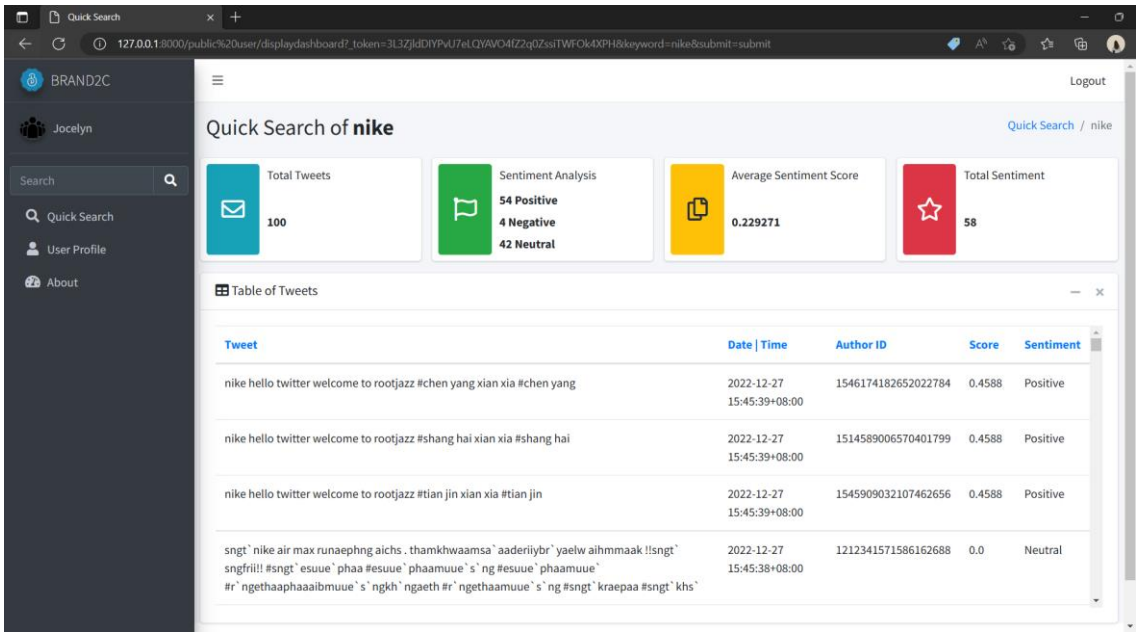

Figure 4.24 Search Result in Quick Search Interface

4.2.4.8 Public User Interface: User Profile

Figure 4.25 and 4.26 shows the user profile interface of BRAND2C. Public user will be able to see the personal information that is been set during registering the account. The name and the user type of the account will be displayed. In the personal information section, public user can update the name by inserting the name in the input field and click on the "Save User" button. Besides that, public user can click the "Change Password" to change the account's password. The system will display a successful message to notify the user when the new password is successfully set as Figure 4.27 shown.

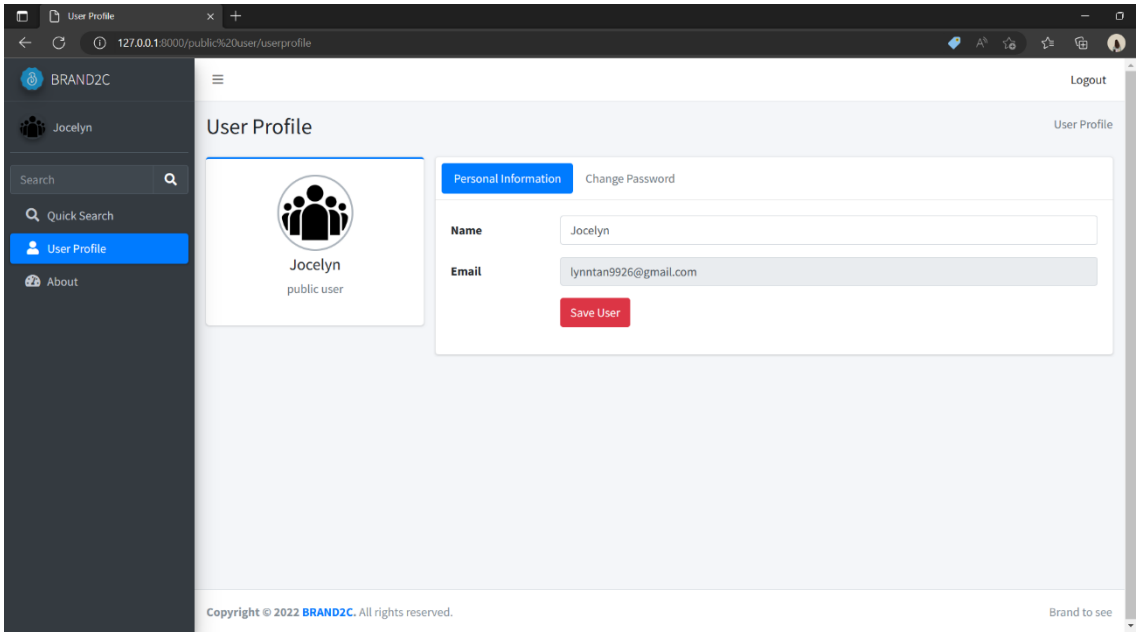

Figure 4.25 User Profile Interface of BRAND2C

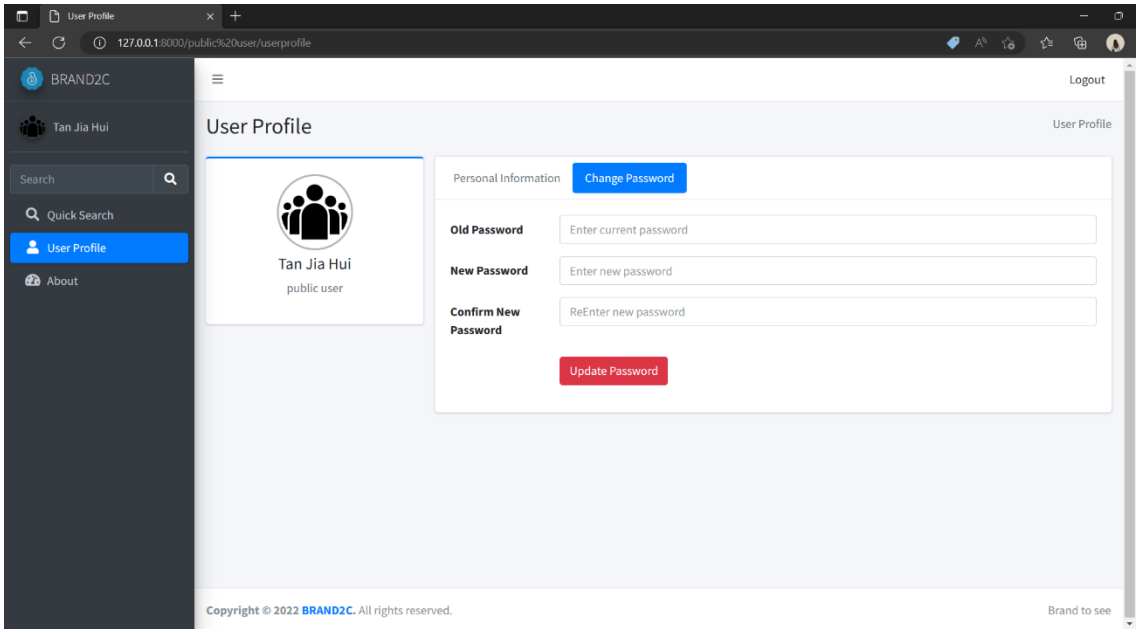

Figure 4.26 User Profile Interface of BRAND2C

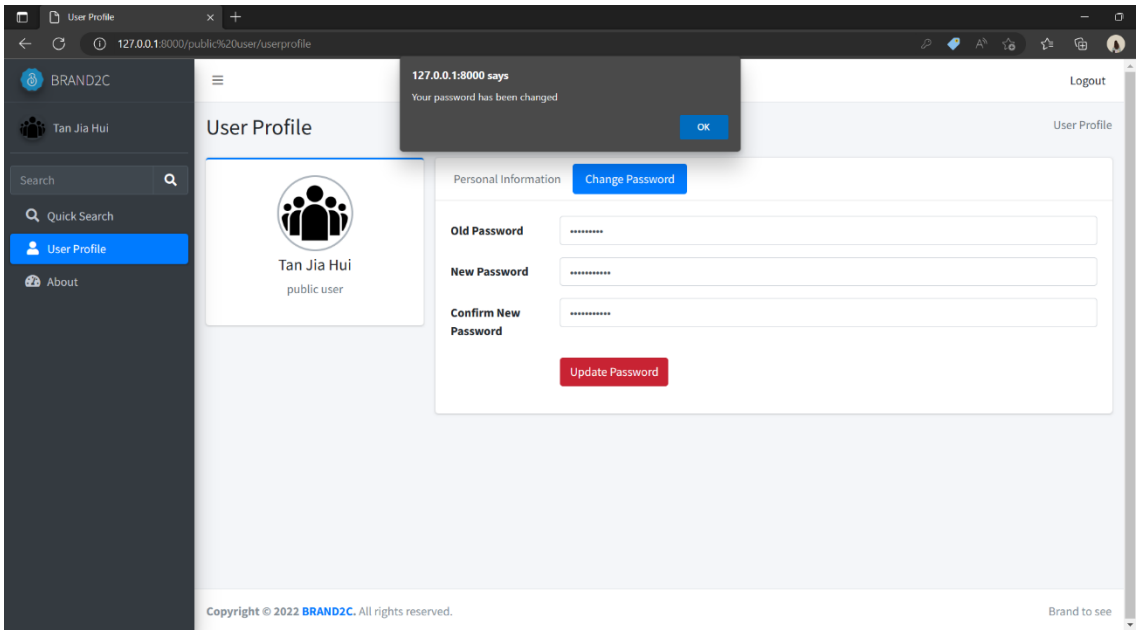

Figure 4.27 Notification of Password Successfully Change

4.2.4.9 Public User Interface: About

Figure 4.28 shows the about interface of BRAND2C. This page will display some information about the BRAND2C. The user can go through this page to understand each page.

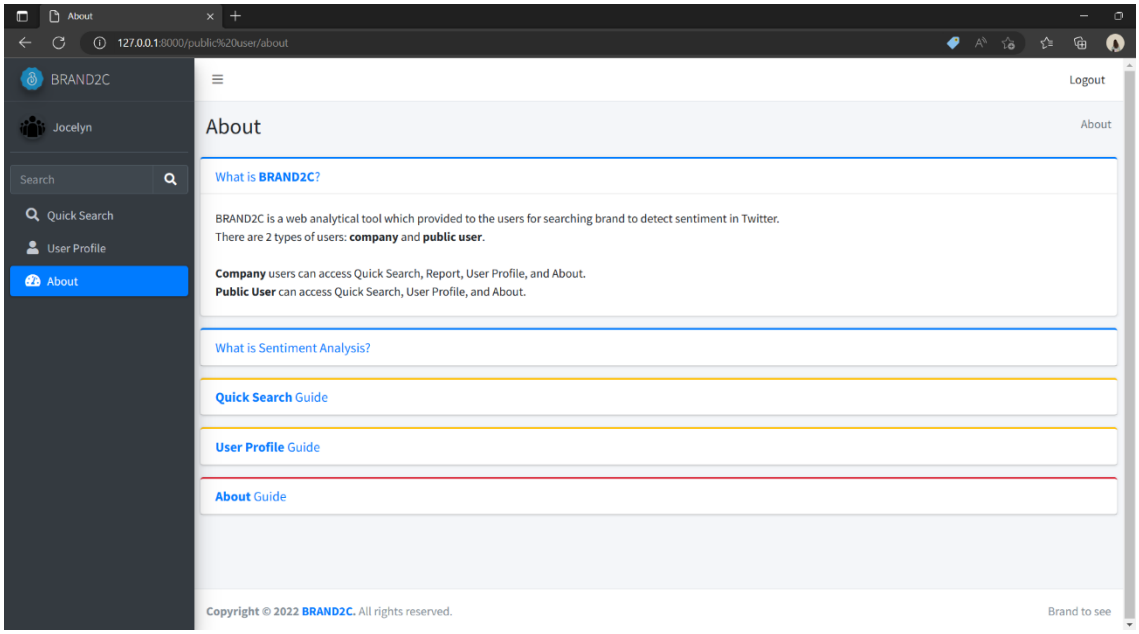

Figure 4.28 About Interface of BRAND2C

4.3 Result

After the development of BRAND2C is finished, testing is done to judge the usability, functionality, and efficiency of the web application. Every single feature of the BRAND2C is tested using user acceptance test (UAT), from start to finish. Any faults will be recorded in this form. The results indicate that all of the tested functions work as intended after the user acceptance test (UAT) has been released.

4.4 Discussion

The outcome of the User Acceptance Test (UAT) for BRAND2C will be covered in this subsection. Details of User Acceptance Test (UAT) are explained in Appendix E. During testing and assessing the usability of the web-based analytical tool, users received a Google form to provide feedback to better comprehend the whole experience of the user.

4.4.1 User Acceptance Test (UAT)

Before the BRAND2C is put into use in a production setting, a method of testing called User Acceptance Test (UAT) need to be done by the users. There are 11 events that users are required to test all of the functionalities offered using BRAND2C. The outcomes of the user acceptance test (UAT) demonstrate the viability of every feature in the BRAND2C. All of the anticipated results were obtained in all of the events listed in the UAT script. A summary of the user acceptance test (UAT) findings is shown in the Figure 4.29 below. Figure 4.30 shows one of the evidence of company user doing the user acceptance test (UAT).

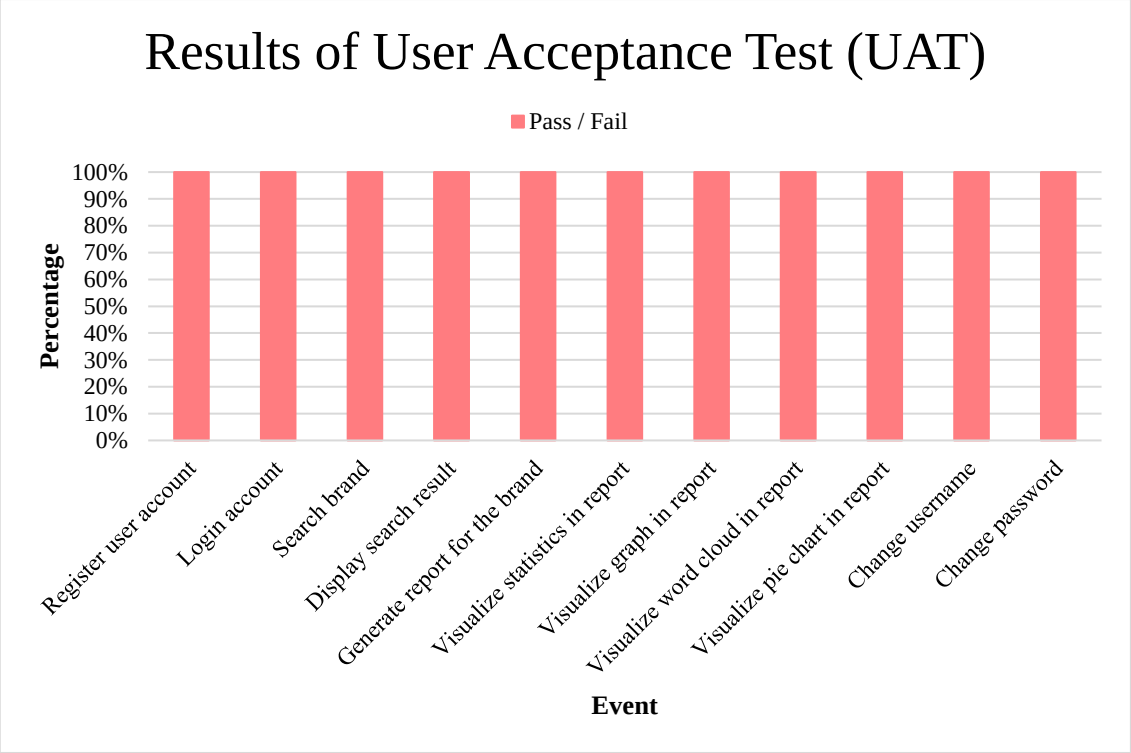

Figure 4.29 Results of User Acceptance Test (UAT)

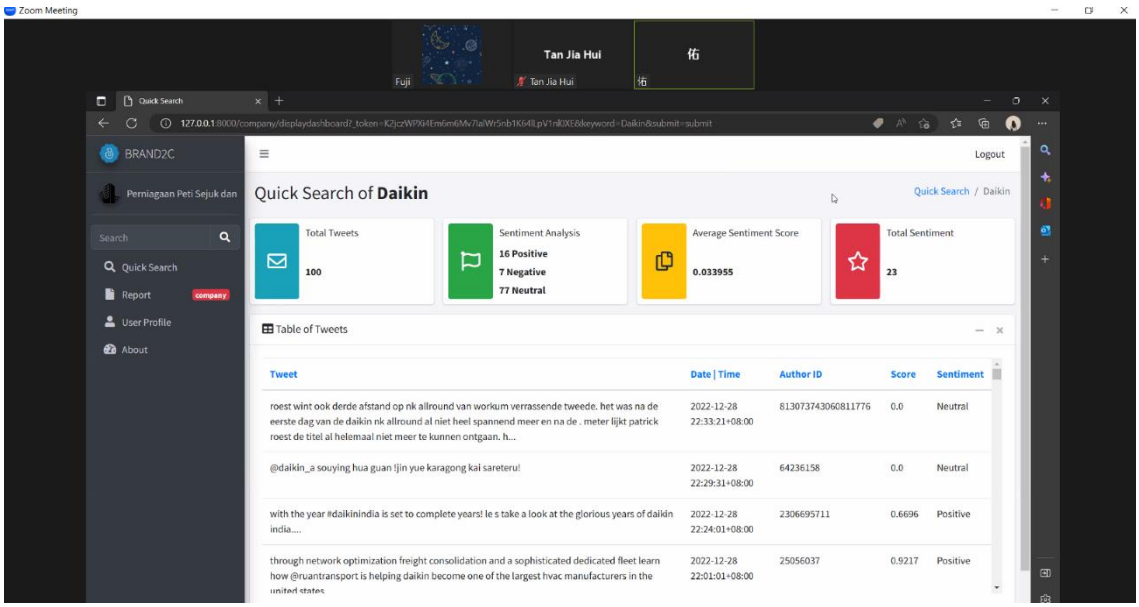

Figure 4.30 Testing Evidence with Company User through Zoom Meeting

4.4.2 User Feedback Form

By providing a user feedback form to the user, the user revies about the BRAND2C can be gathered. In order to discover areas for improvement, the objective is to develop a deeper understanding of the total user experience. There are 20 respondents participate in this feedback form after doing the user acceptance test.

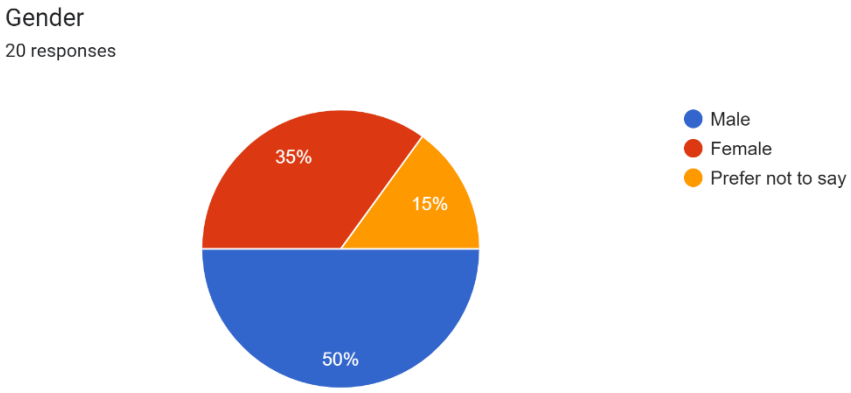

Figure 4.31 Question 1 of User Feedback Form

10 out of 20 respondents are male (50%), outnumbering the female respondents by 7 (35%) and 3 respondents (15%) prefer not to say.

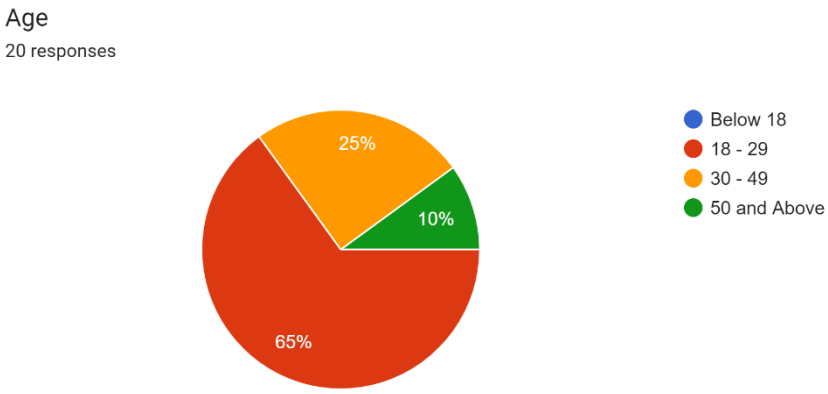

Figure 4.32 Question 2 of User Feedback Form

The respondents of this survey are mostly from the age group between 18 to 29 years old (65%), whereas 5 of them are age between 30 to 49 years old (25%), and 2 of them are 50 years old and above (10%).

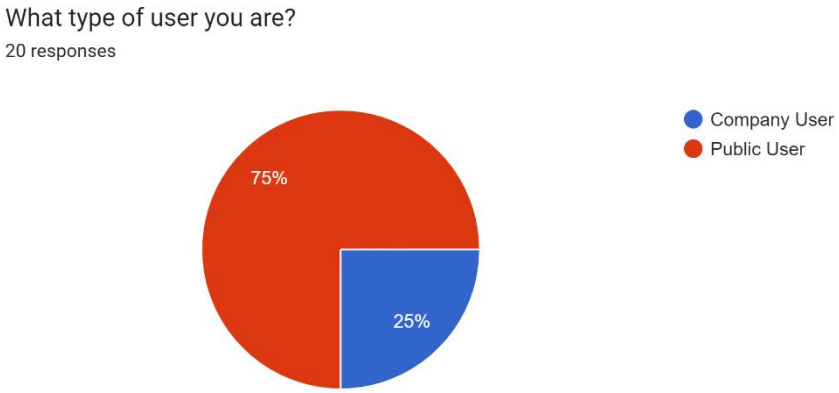

Figure 4.33 Question 3 of User Feedback Form

15 out of 20 respondents (75%) are public user, while 5 out of 20 respondents (25%) are company user.

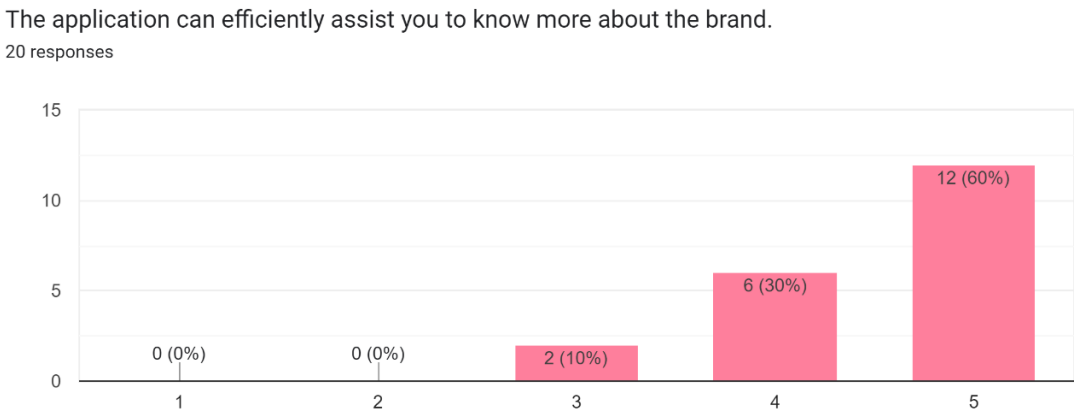

Figure 4.34 Question 4 of User Feedback Form

12 out of 20 respondents (60%) strongly agree that the application can efficiently assist them to know more about the brand and 6 out of 20 respondents (30%) agree that the application can efficiently assist them to know more about the brand. 2 out of 20 respondents (10%) is neutral about the opinion.

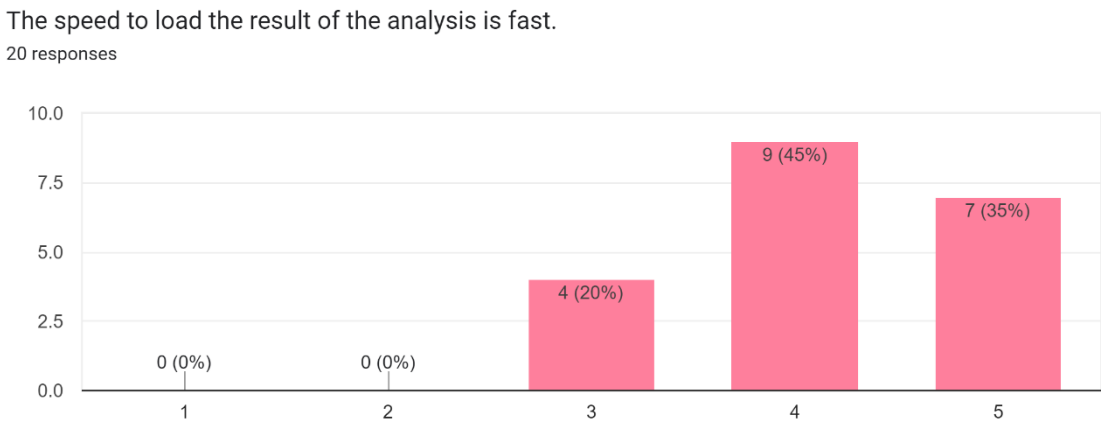

Figure 4.35 Question 5 of User Feedback Form

9 out of 20 respondents (45%) agree that the speed to load the result of the analysis is fast, 7 out of 20 respondents (35%) strongly agree that the speed to load the result of the analysis is fast, and 4 out of 20 respondents (20%) is neutral about the opinion.

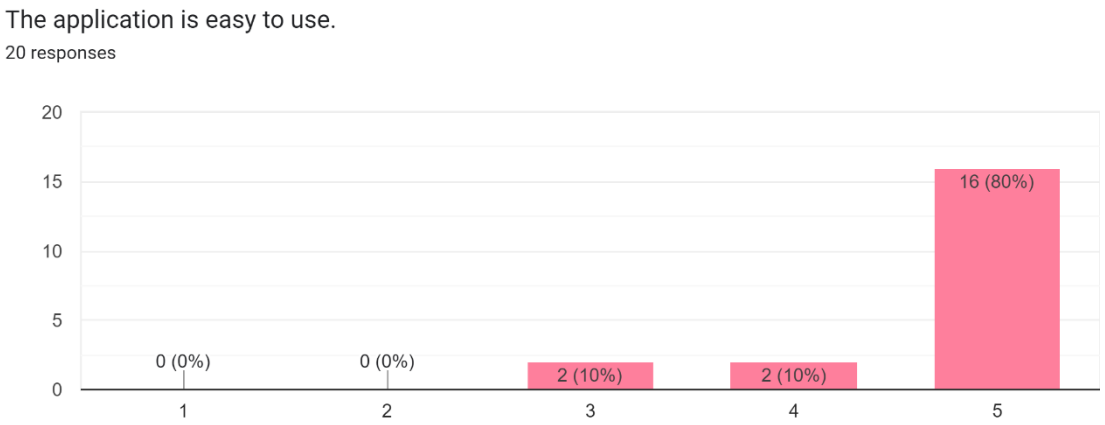

Figure 4.36 Question 6 of User Feedback Form

Most of the respondents, which 16 out of 20 respondents (80%) strongly agree with the application is easy to use. 2 out of 20 respondents (10%) agree with the application is easy to use, and 2 out of 20 respondents (10%) neutral towards the opinion.

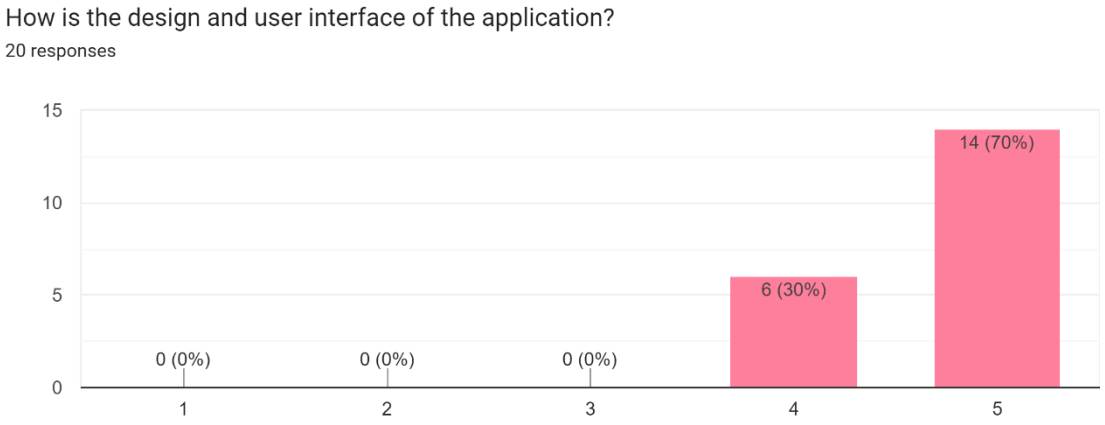

Figure 4.37 Question 7 of User Feedback Form

14 out of 20 respondents (70%) think that the design and user interface of the application is very good, and 6 out of 20 respondents (30%) think that the design and user interface of the application is good.

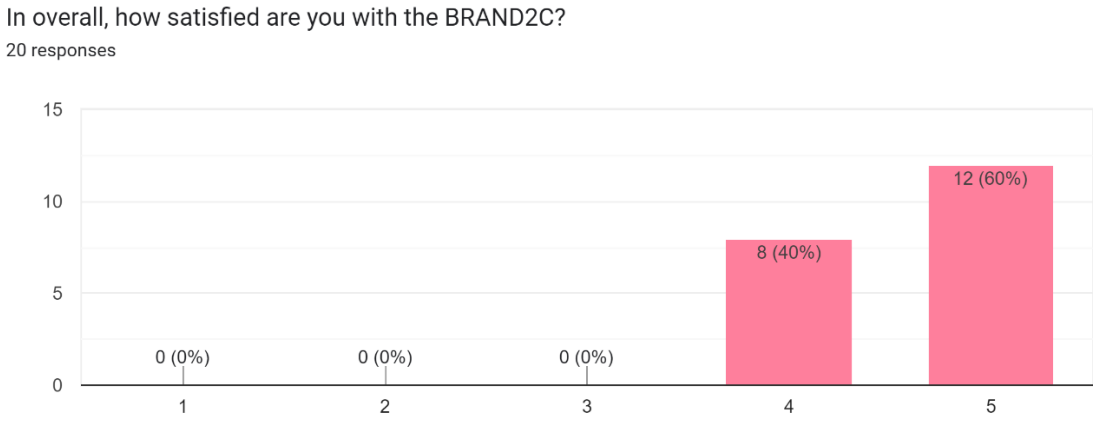

Figure 4.38 Question 8 of User Feedback Form

12 out of 20 respondents (60%) think that the overall of BRAND2C is very good, and 8 out of 20 respondents (40%) think that the overall of BRAND2C is good.

4.5 Chapter Summary

This chapter's discussion of BRAND2C implementation and the system's testing findings concludes. This chapter describes the development tools, framework, and methods. The interface of the BRAND2C is then described, along with a brief summary of it. Last but not least, this chapter has also emphasised the testing outcomes and discussion of BRAND2C, which including the outcome of the UAT.

CHAPTER 5

CONCLUSION

5.1 Introduction

This chapter will present the findings of developing a web-based analytical tool to accomplish the objective outlined in Chapter 1 in summary. There are 4 limitations that apply to this analytical tool, which will be covered. Next, this chapter will also detail the analytical tool's future works that can be done.

5.2 Objective Revisited

There are three objectives are focused when developing the BRAND2C. This project's objectives have all been attained. The three objectives of this project are:

i. To review user requirements for developing a web-based analytical tool for brand sentiment analysis based on Twitter data.

ii. To develop a web-based analytical tool that can visualise the result of brand sentiment analysis of Twitter data.

iii. To evaluate the functionality of the developed web-based analytical tool for brand sentiment analysis based on Twitter data.

For the first objective which is to review user requirements for developing a web-based analytical tool for brand sentiment analysis based on Twitter data. By identifying, analysing, and documenting the requirements in the Software Requirement Specification

(SRS) document and Software Design Document (SDD), this objective has been accomplished. Three existing systems are identified in order to determine the needs.

The second objective is to develop a web-based analytical tool that can visualise the result of brand sentiment analysis of Twitter data. As mentioned in Chapter 4, this objective has been achieved. By adhering to all the specifications and design guidelines in the SRS and SDD, the BRAND2C has been produced successfully. Additionally, the development BRAND2C incorporates the usability principle, making the system simple for all users to utilise.

The third objective is to evaluate the functionality of the developed web-based analytical tool for brand sentiment analysis based on Twitter data. The functionality of BRAND2C is evaluated using User Acceptance Test (UAT). The BRAND2C has passed the user acceptance test. According to the test results, the BRAND2C can work efficiently and perform as expected. The test's findings are available in Chapter 4 and Appendix E.

5.3 Limitation

The BRAND2C has 4 limitations, which are:

1. The web-based analytical tool does not provide sort by date function for the searched result.
2. The web-based analytical tool provides only maximum 100 data for each search.
3. The web-based analytical tool does not provide the user's location information of every tweets.
4. The web-based analytical tool does not provide the users' search history.

5.4 Future Works

There is a tonne of potentials for this project that can be developed. In future version of this analytical tool, the analytical tool will be able to sort the searched result based on the date period set by user. Next, the users' location for every tweet that had searched can be viewed by displaying the location in map chart. It can also summarize the locations in pie chart for the user to easily view most of the results are from which region. Besides that, the system can provide bigram and trigram of the searched results for user to view to know more about the brand which user searched.

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APPENDIX A
SOFTWARE REQUIREMENT SPECIFICATION (SRS)

2022

SOFTWARE REQUIREMENT SPECIFICATION (SRS)

BRAND2C

DOCUMENT APPROVAL

	Name	**Date**
Authenticated by: *Jiahui* _____ Tan Jia Hui	Tan Jia Hui	3/6/2022
Approved by: _____ Client		

Software :

Archiving Place :

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CHAPTER 1

1.1 PROJECT DESCRIPTION

The purpose of doing this Software Requirement Specification (SRS) is used to gather and analyze all of the various concepts that have surfaced in order to create the BRAND2C. This will also give a full understanding of BRAND2C's specifications, scope of operation, and objectives. The intended audience for this system, as well as the user interface, hardware, and software requirements, are all described in this document.

BRAND2C is a web-based analytical tool which is designed primarily to conduct brand sentiment analysis based on Twitter data which can calculate the sentiment scores of the tweets. This analytical tool can help the company to view the brand reputation, observe the overview of the customers' reviews from Twitter, and monitor the competitors' products review from the customers. This web-based analytical tool can summarize all the data of the analysis, provides graph for tweets per day, provides graph for positive sentiment, provides graph for negative sentiment, provide graph for neutral sentiment, provides word cloud, shows the pie chart of the sentiment, and displays the table of the tweets with sentiment scores.

1.2 SYSTEM IDENTIFICATION

SRS-B2C-V01-2022

SRS: Software Requirements Specification

B2C: BRAND2C

V01: Version 1

2022: Documentation Year

1.3 CONTEXT DIAGRAM

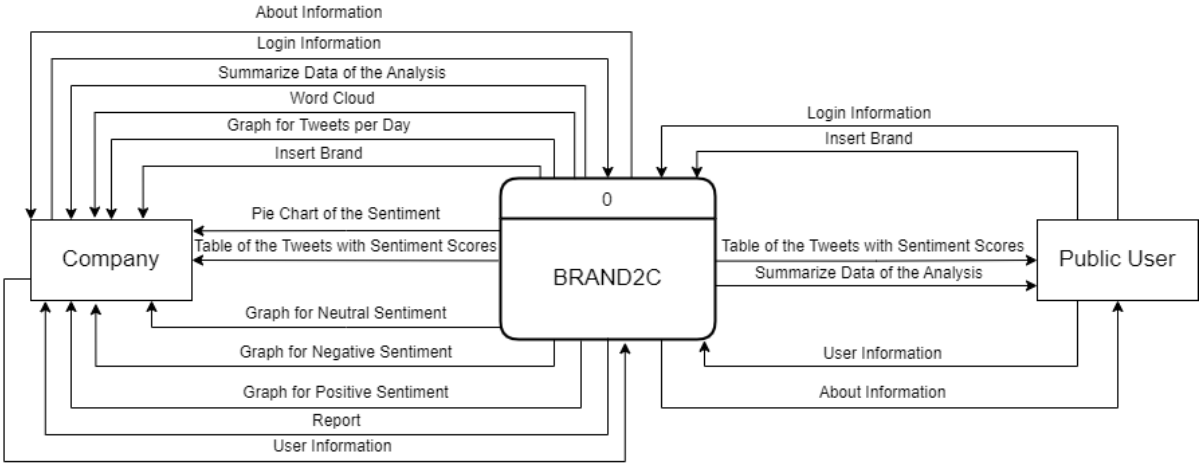

Figure 1.1 Context Diagram

The BRAND2C analytical tool consists of two entities which are company and public user. Public user can insert the user information to register an account. The user information can be managed by the public user to change username or password. The public user will insert the login information to login into the system. Besides that, public user can insert brand to search to search and view the summarize data of the analysis and table of tweets with sentiment scores. Meanwhile, company can access more features compare with public user. Company can insert the user information to register an account and manage the user information with change username or password. The company needs to insert the login information to login into the system. Company can insert brand to search and view the summarize data of the analysis, graph for tweets per day, word cloud, pie chart of the sentiment, table of the tweets with sentiment scores, graph for positive sentiment, graph for negative sentiment, and graph for neutral sentiment. Moreover, the content that is on the report page can be download by the company.

1.4 DATA FLOW DIAGRAM

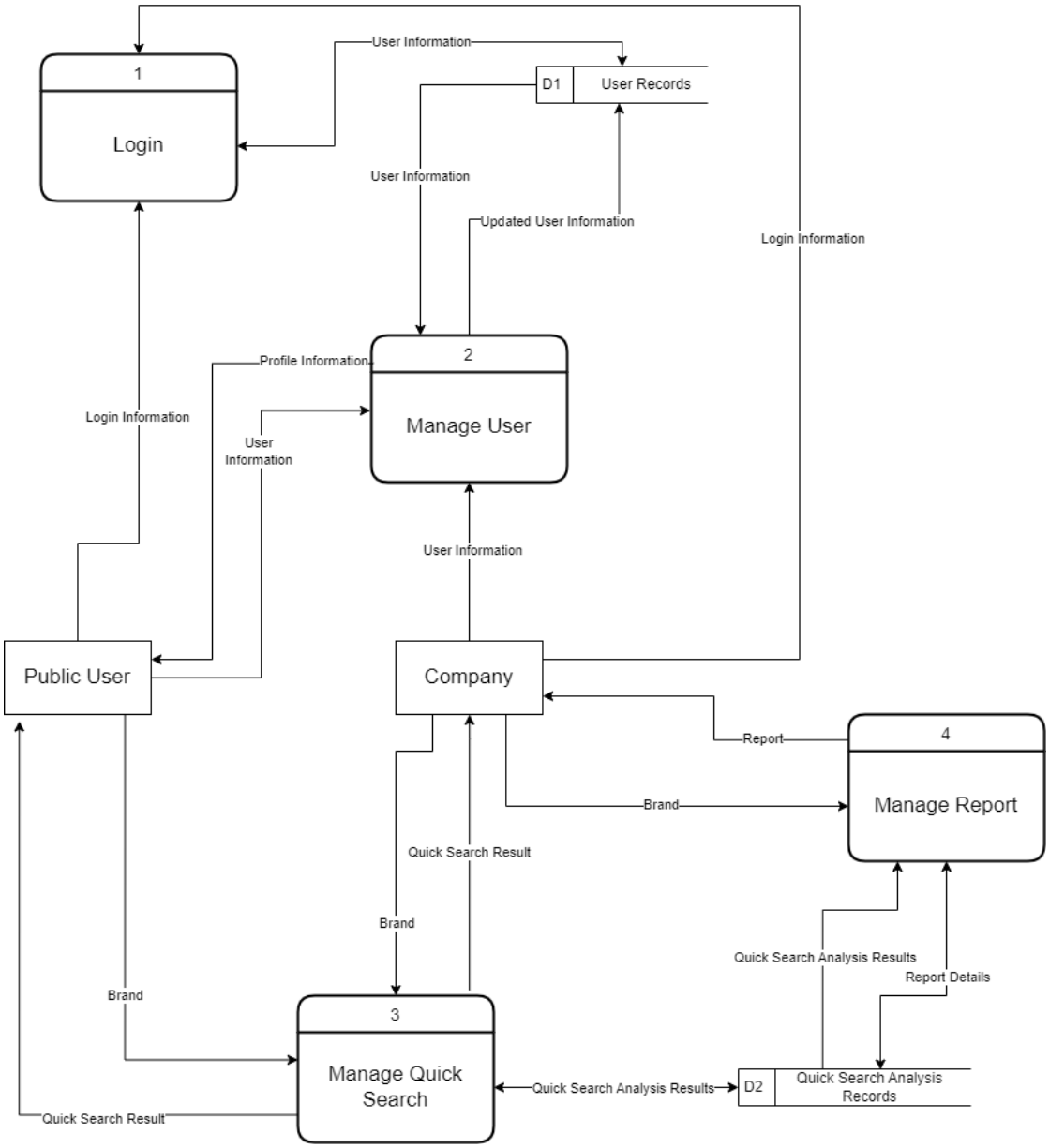

Figure 1.2 Data Flow Diagram

Figure 1.2 shows the Data Flow Diagram Level 0 of the BRAND2C. There are two external entities which are Company and Public User. There are four processes which are Login, Manage User, Manage Quick Search, and Manage Report. In addition, there are two data stores which are User Records and Quick Search Analysis Records. The data stores will store the user information and quick search analysis results.

CHAPTER 2

2.1 USE CASE DIAGRAM AND DESCRIPTION

BRAND2C consists of six main functions which are login, manage user, manage quick search, and manage report. Besides, the two actors of BRAND2C are company and public user.

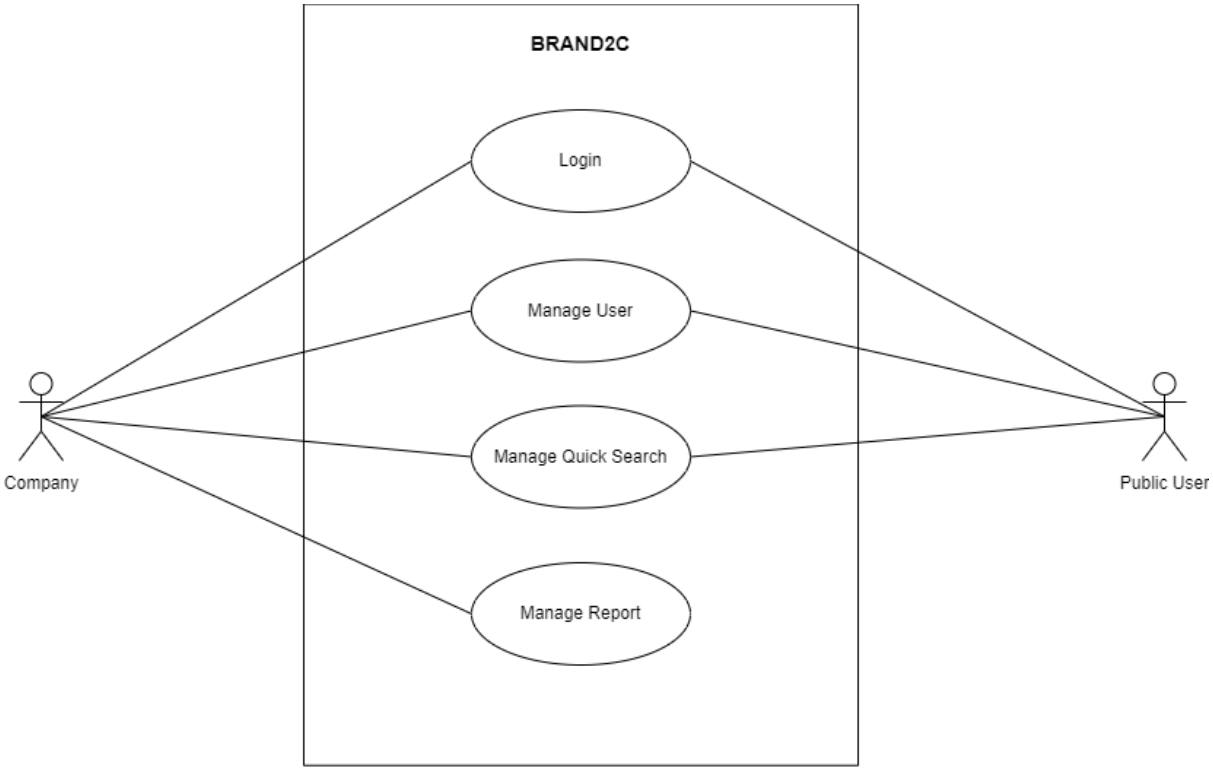

Figure 2.1 Use Case Diagram

Table 2.1 Use Case Module

#	Module Name	Requirement	User
1.	Login	The system should allow the company and public user to login to the BRAND2C.	• Company • Public User
2.	Manage User	The system should allow the company and normal user to manage user profile.	• Company • Public User
3.	Manage Quick Search	The system should allow company and public user to insert the brand to search and view the sentiment analysis results.	• Company • Public User
4.	Manage Report	• The system should allow the company to search and view the brand sentiment analysis's report. • The system should allow the company to download the brand sentiment analysis' report.	Company

2.1.1 Login

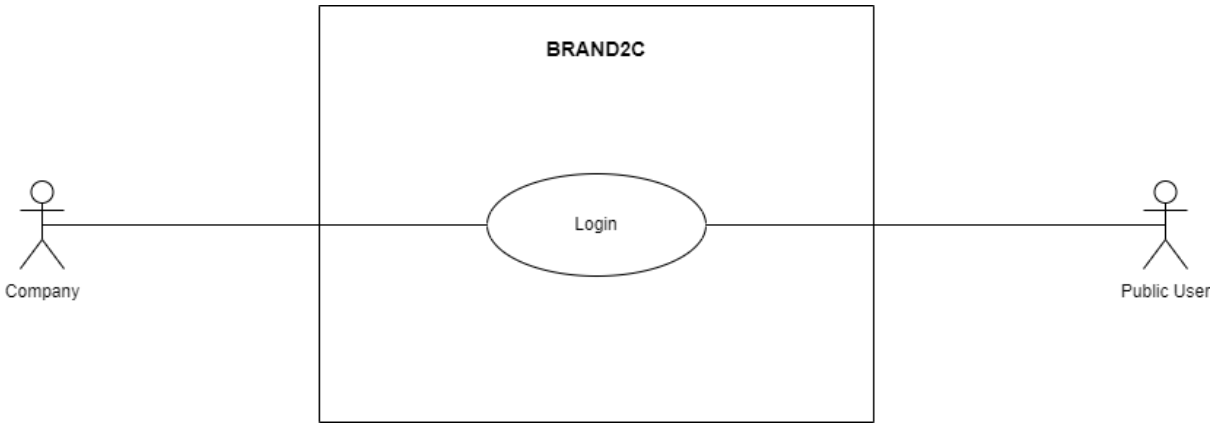

Figure 2.2 Use Case Diagram of Login

Table 2.2 Use Case Description of Login

Use Case ID	B2C-SRS-UC001
Brief Description	This use case describes how the company and public user login to the BRAND2C.
Actor	Company and Public User
Pre-Conditions	The device must be connected to the internet.
Basic Flow	1. The use case starts after the company or public user accesses the BRAND2C. 2. The company or public user insert email, password, and click “Login” button to login to the system. **[A1: Register]** 3. The system verifies the user data. **[E1: Invalid User]**

	4. The system directs the company or public user to the "Quick Search" page. 5. The use case ends.
Alternative Flow	**[A1: Register]** 1. The company or public user inserts name, email address, password, confirm password, user type, and clicks "Register" button. **[R1: Data Entry Restrictions]** **[R2: Valid Password]** 2. The system verifies the user data. **[E2: User Exist]** 3. The system saves the user data in the database. 4. The use case continues to the basic flow step 4.
Exception Flow	**[E1: Invalid User]** 1. The system refreshes the login page. 2. The use case returns to the basic flow step 2. **[E2: User Exist]** 1. The system displays message about user exist. 2. The use case returns to the alternative flow A1 step 1.
Post-Conditions	None
Rules	**[R1: Data Entry Restrictions]**

	1. All the input fields must be filled when submitting the user data to the system. **[R2: Valid Password]** 1. The new password should have at least 8 characters with characters and numbers.
Constraints	None

2.1.2 Manage User

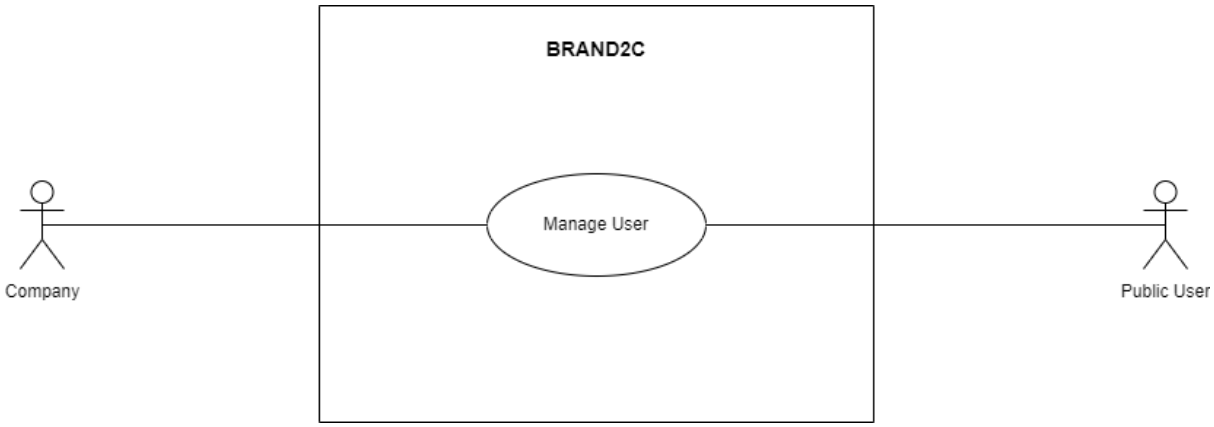

Figure 2.3 Use Case Diagram of Manage User

Table 2.3 Use Case Description of Manage User

Use Case ID	B2C-SRS-UC002
Brief Description	This use case describes how the company and public user manage the user profile.
Actor	Company and Public User
Pre-Conditions	The company and public user must login to the BRAND2C.
Basic Flow	1. The use case starts after the company or public user accesses to the “User Profile” page. 2. The system retrieves the user’s data from the database. 3. The system displays the user’s data. 4. The company or public user edit the username and clicks on the “Save User” button to save the user data. **[A1: Change Password]** **[R1: Data Entry Restrictions]**

	5. The system saves the user data to the database. 6. The system updates the latest username and refreshes the "User Profile" interface. 7. The use case ends.
Alternative Flow	**[A1: Change Password]** 1. The company or public user click the "Change Password" section. 2. The system retrieves the user data from the database. 3. The company or public user insert the old password, new passwords, confirm new password, and click on the "Update Password" button to save the data. **[R1: Data Entry Restrictions]** **[R2: Valid Old Password]** **[R3: Valid New Password]** **[R4: Match Password]** 4. The system displays "Your password has been changed" message. 5. The use case continues to the basic flow step 7.
Exception Flow	None
Post-Conditions	None
Rules	**[R1: Data Entry Restrictions]** 2. All the input fields must be filled when submitting the user data to the system.

	[R2: Valid Old Password] 1. The old password should be the same as the current password. 2. Input for both old passwords should be same. **[R3: Valid New Password]** 1. The new password must have at least 8 characters. **[R4: Match Password]** 1. The new password and confirm password must match.
Constraints	Only company and public user who own the account can manage the user profile.

2.1.3 Manage Quick Search

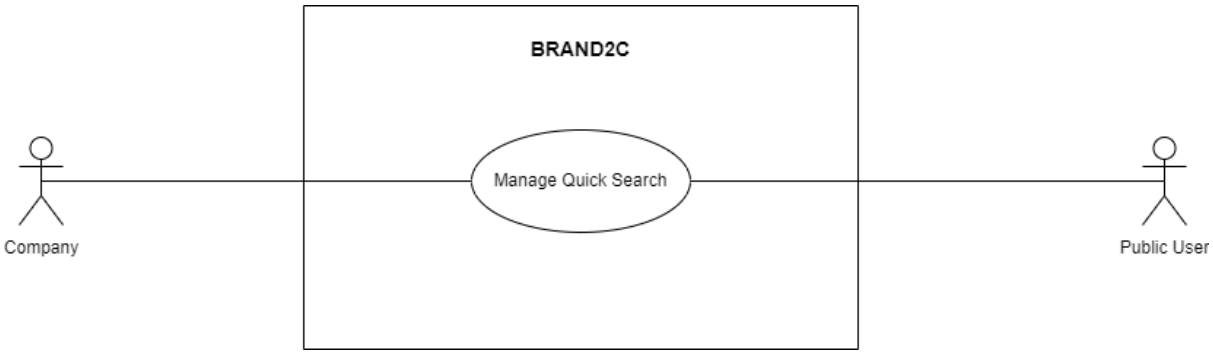

Figure 2.4 Use Case Diagram of Manage Quick Search

Table 2.4 Use Case Description of Manage Quick Search

Use Case ID	B2C-SRS-UC003
Brief Description	This use case describes how the BRAND2C displays the quick search of the brand sentiment analysis results.
Actor	Company and Public User
Pre-Conditions	The company and public user shall login into the BRAND2C.
Basic Flow	1. The use case starts after the company or public user login to the system. 2. The company or public user insert the brand that needs to be searched and click “Search” button. 3. The system searches and retrieves the result of the brand. 4. The system displays the result of the analysis. 5. The use case ends.
Alternative Flow	None
Exception Flow	None
Post-Conditions	None
Rules	None

Constraints	None

2.1.4 Manage Report

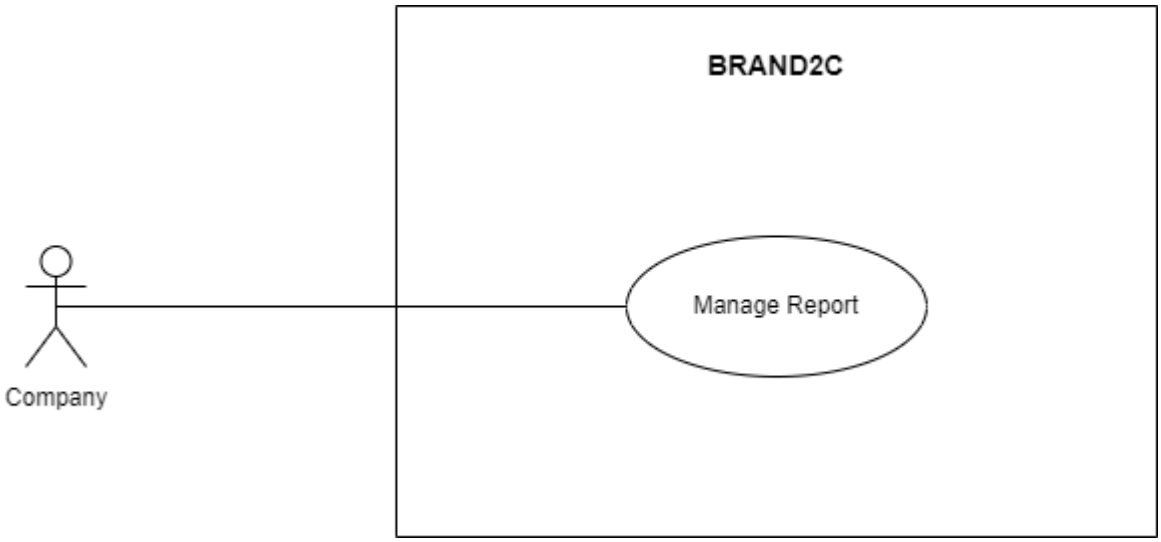

Figure 2.5 Use Case Diagram of Manage Report

Table 2.5 Use Case Description of Manage Report

Use Case ID	B2C-SRS-UC006
Brief Description	This use case describes how the company manage report.
Actor	Company
Pre-Conditions	The company shall login into the BRAND2C.
Basic Flow	1. The use case starts after the company accesses the "Report" page. 2. The company inserts the brand in the search bar and click "Search" button. 3. The system retrieves the data from the database. 4. The system displays the report results. **[A1: Print Report]** **[E1: Insufficient Data]** 5. The use case ends.

Alternative Flow	**[A1: Print Report]** 1. The company clicks the "Print" button. 2. The system displays the print option. 3. The company downloads or print the report. 4. The use case continues to the basic flow step 5.
Exception Flow	**[E1: Insufficient Data]** 1. The system displays a message to tell the user the data is not enough. 2. The company clicks on the "Go to Quick Search" button to search the brand. 3. The system directs to the "Quick Search" interface.
Post-Conditions	None
Rules	None
Constraints	Only user who login as user type with Company can manage report.

2.2 SEQUENCE DIAGRAM

2.2.1 Login

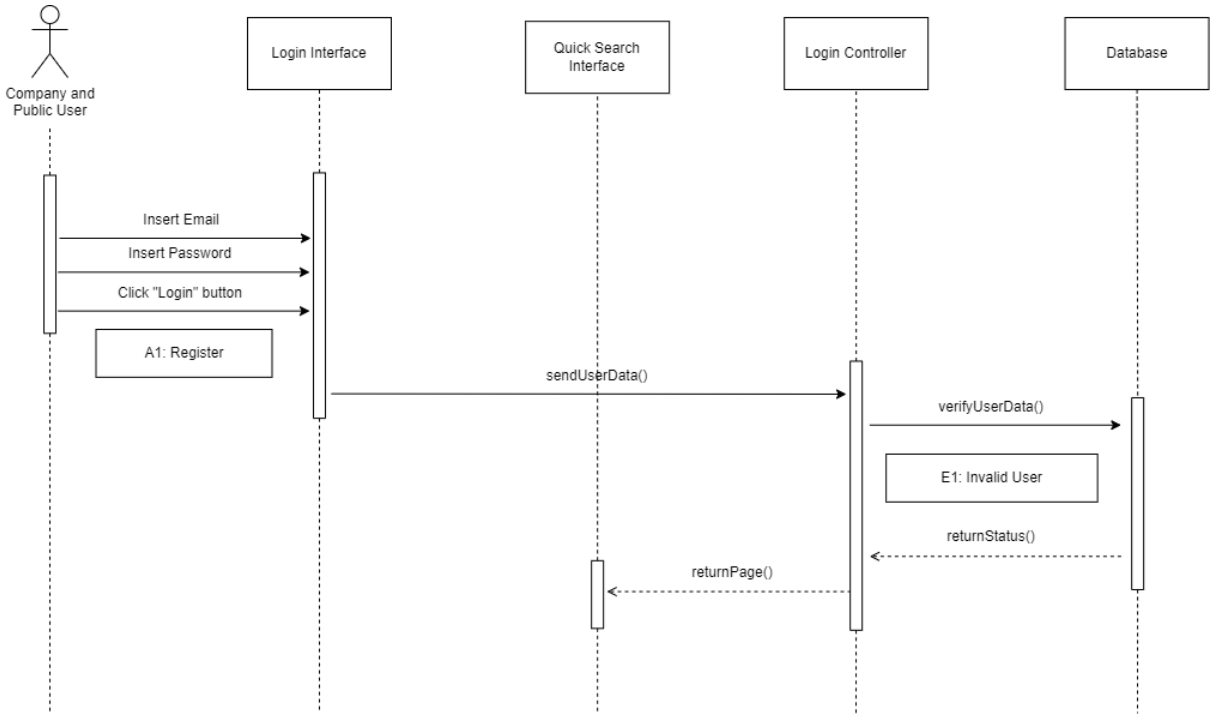

Figure 2.6 Sequence Diagram of Login Basic Flow

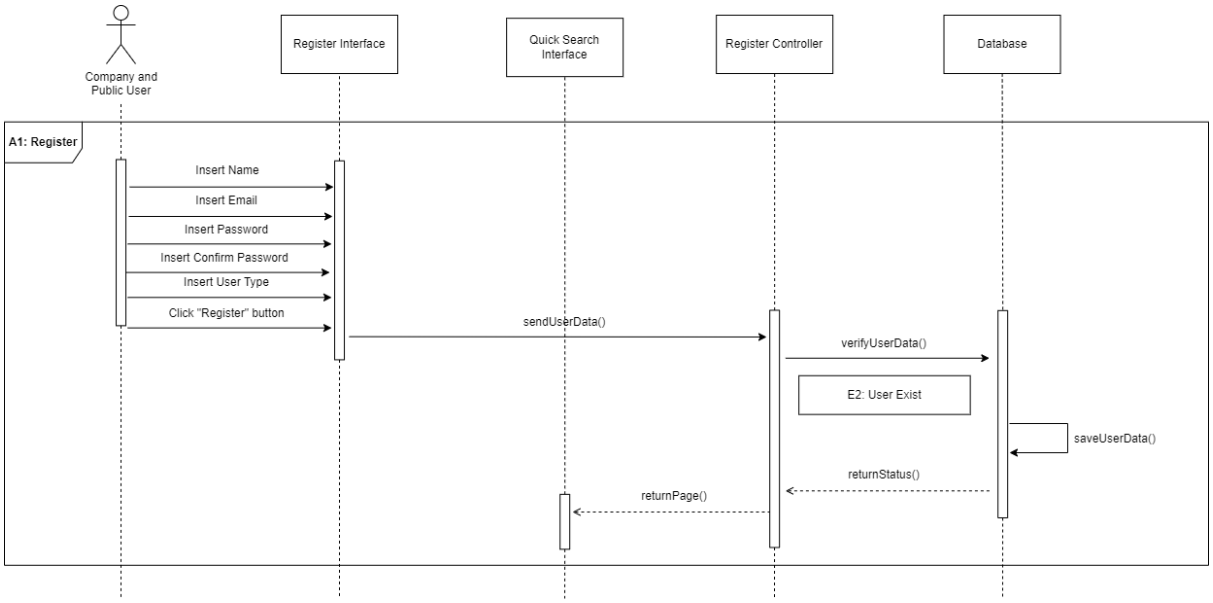

Figure 2.7 Sequence Diagram of Login Alternate Flow A1

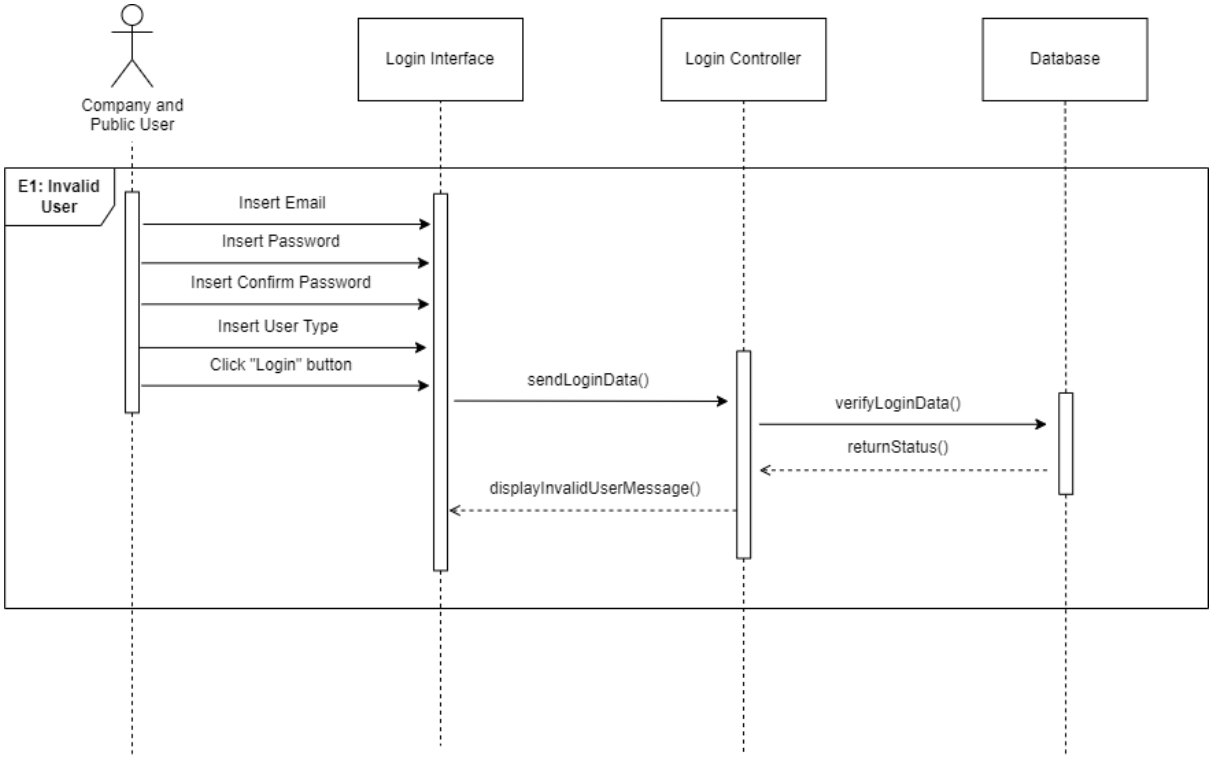

Figure 2.8 Sequence Diagram of Login Exception Flow E1

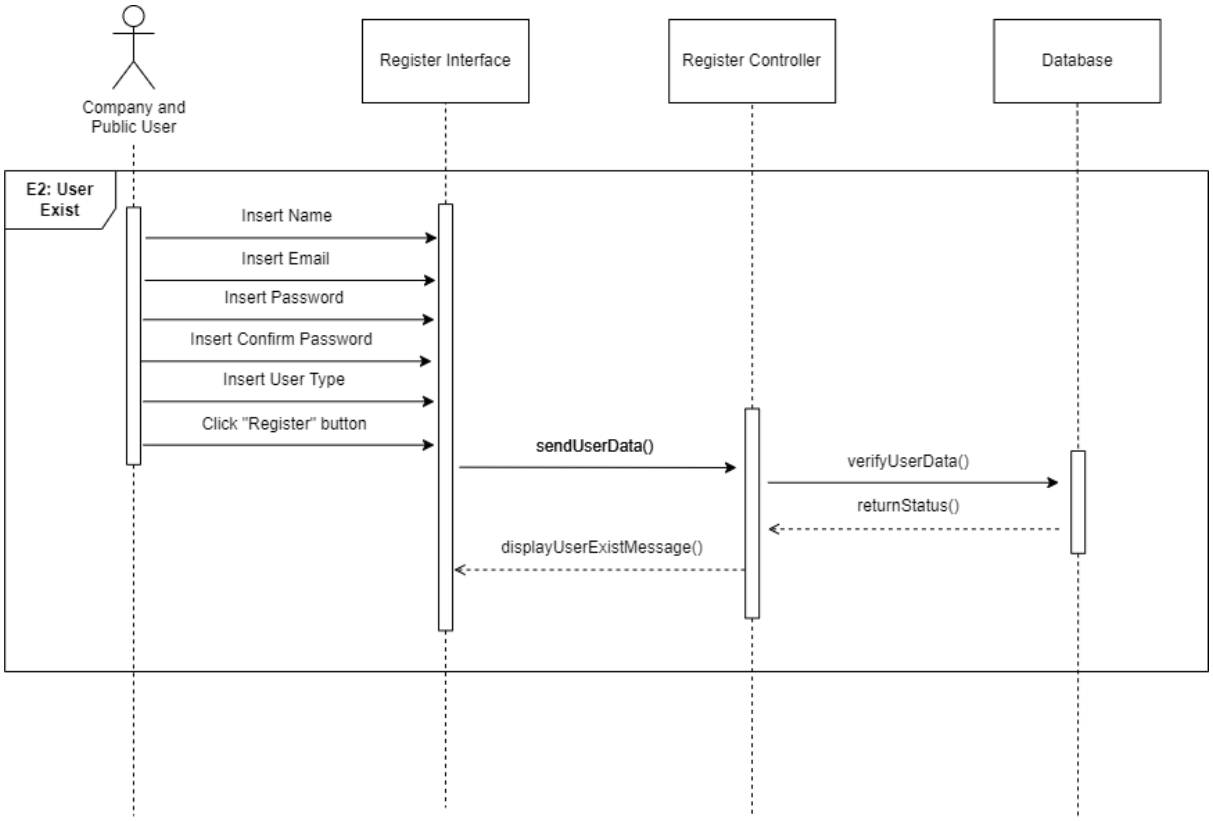

Figure 2.9 Sequence Diagram of Login Exception Flow E2

The first module is Login module. In this module, the company and public user need to insert the email, and password to login into the BRAND2C. The login controller will verify the user data which inserted by company and public user to check whether the user is valid. The company and public user will successfully login into the BRAND2C if user is valid. Besides, the company and public user can choose to register if the company or public user do not have an account. If the account is already exist, the register process will be failed. Figure 2.6, Figure 2.7, Figure 2.8, and Figure 2.9 show the basic flow, alternate flow, and exception flow for Login module.

2.2.2 Manage User

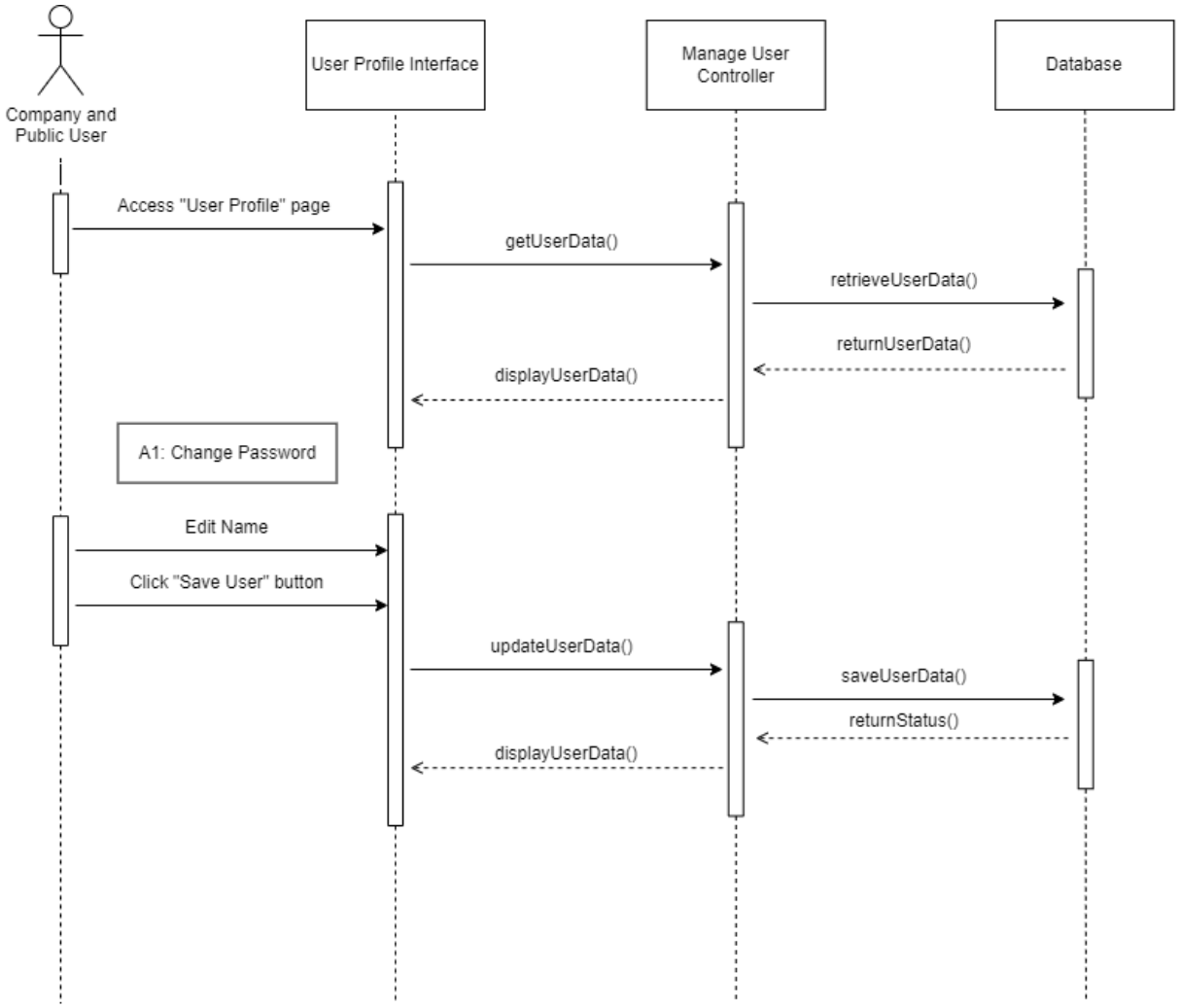

Figure 2.10 Sequence Diagram of Manage User Basic Flow

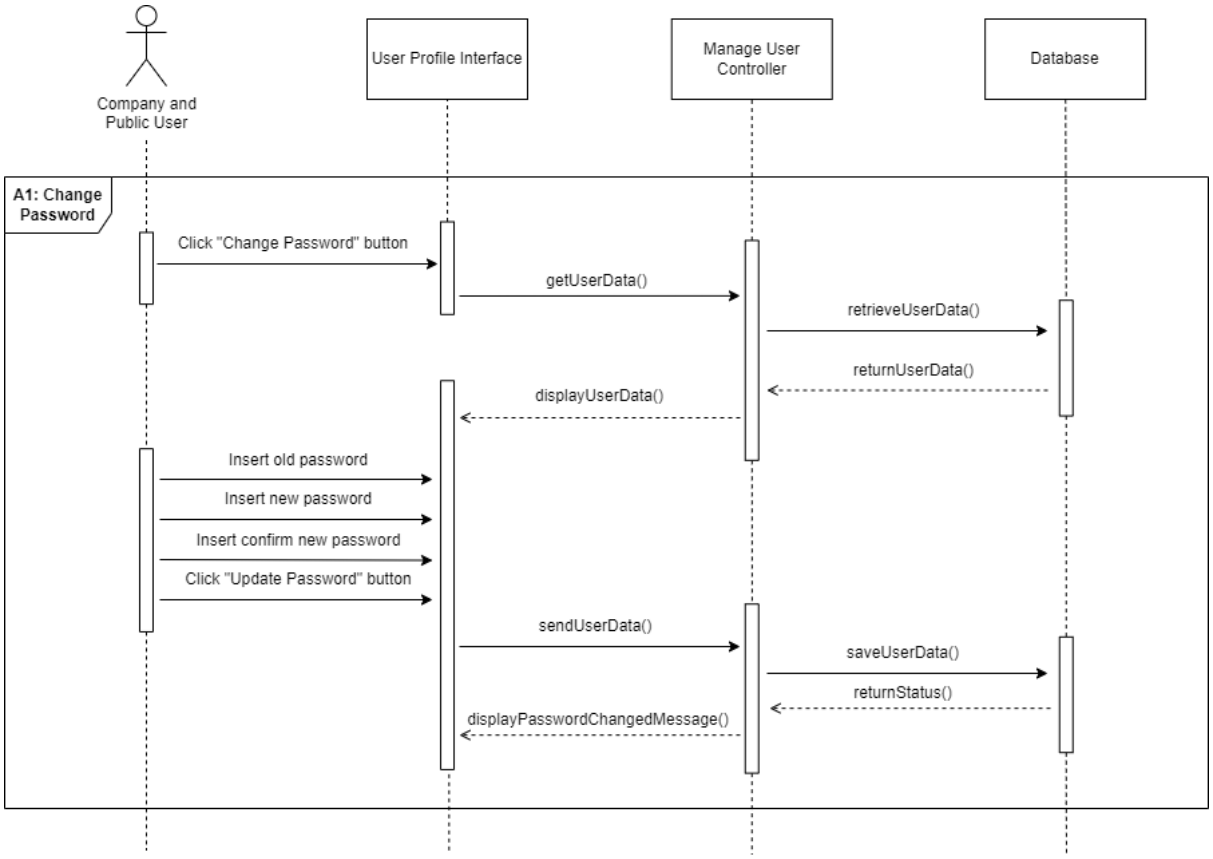

Figure 2.11 Sequence Diagram of Manage User Alternate Flow A1

The second module is Manage User module. In this module, the company and public user are allowed to change their username or password. For changing username, company and public user can edit name of their accounts. If the company and public user choose to change password, they will bring to the change password interface. The company and public user need to insert their old password, new password, and confirm new password. Figure 2.10 and Figure 2.11 show the basic flow, and alternate flow of the Manage User module.

2.2.3 Manage Quick Search

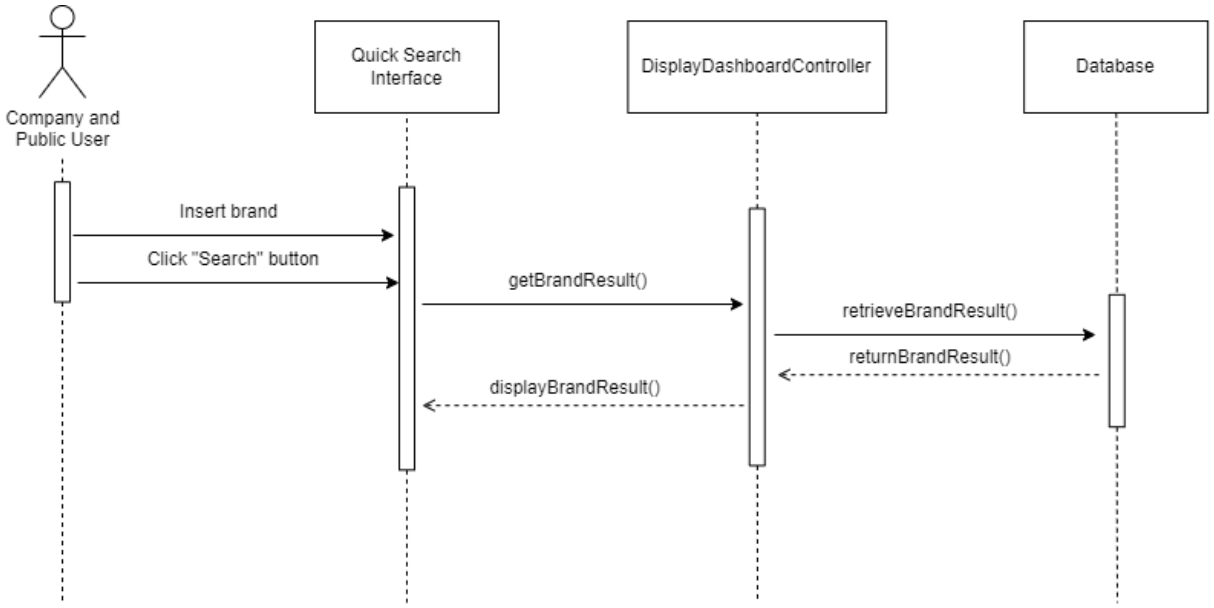

Figure 2.12 Sequence Diagram of Manage Quick Search Basic Flow

The third module is Manage Quick Search. The company and public user will enter this module after they login to the BRAND2C. The company and public user can insert the brand which they want to search to view the brand result. Figure 2.12 show the basic flow the Manage Quick Search module.

2.2.4 Manage Report

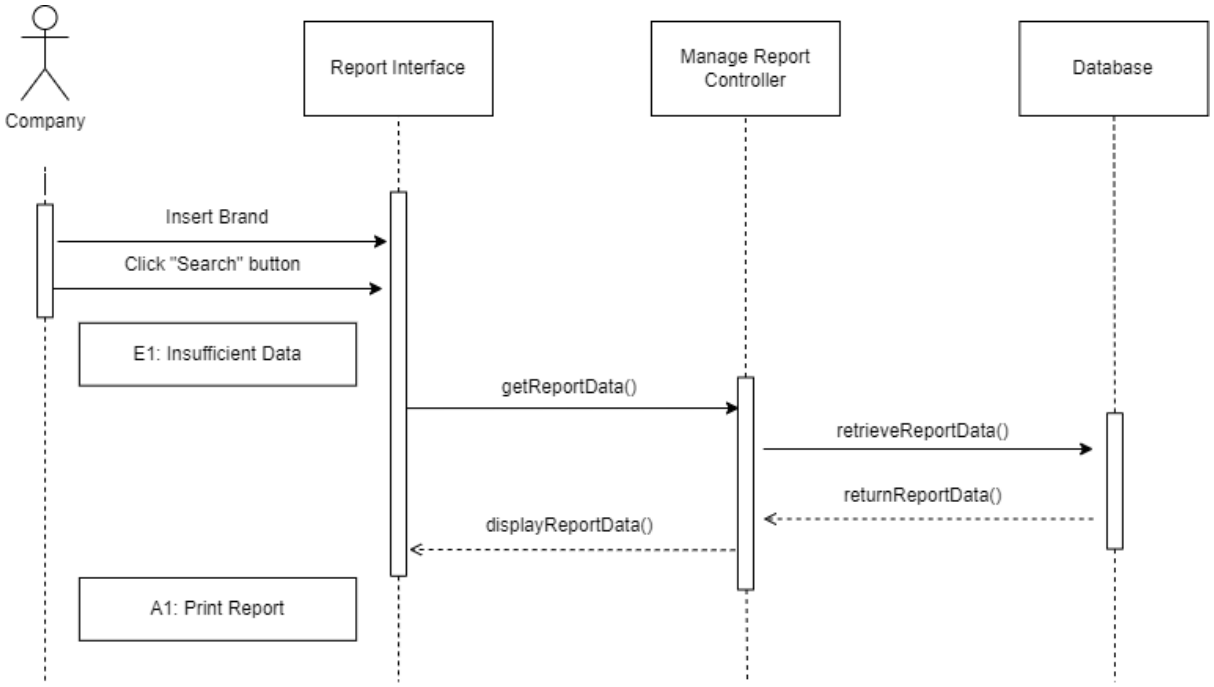

Figure 2.13 Sequence Diagram of Manage Report Basic Flow

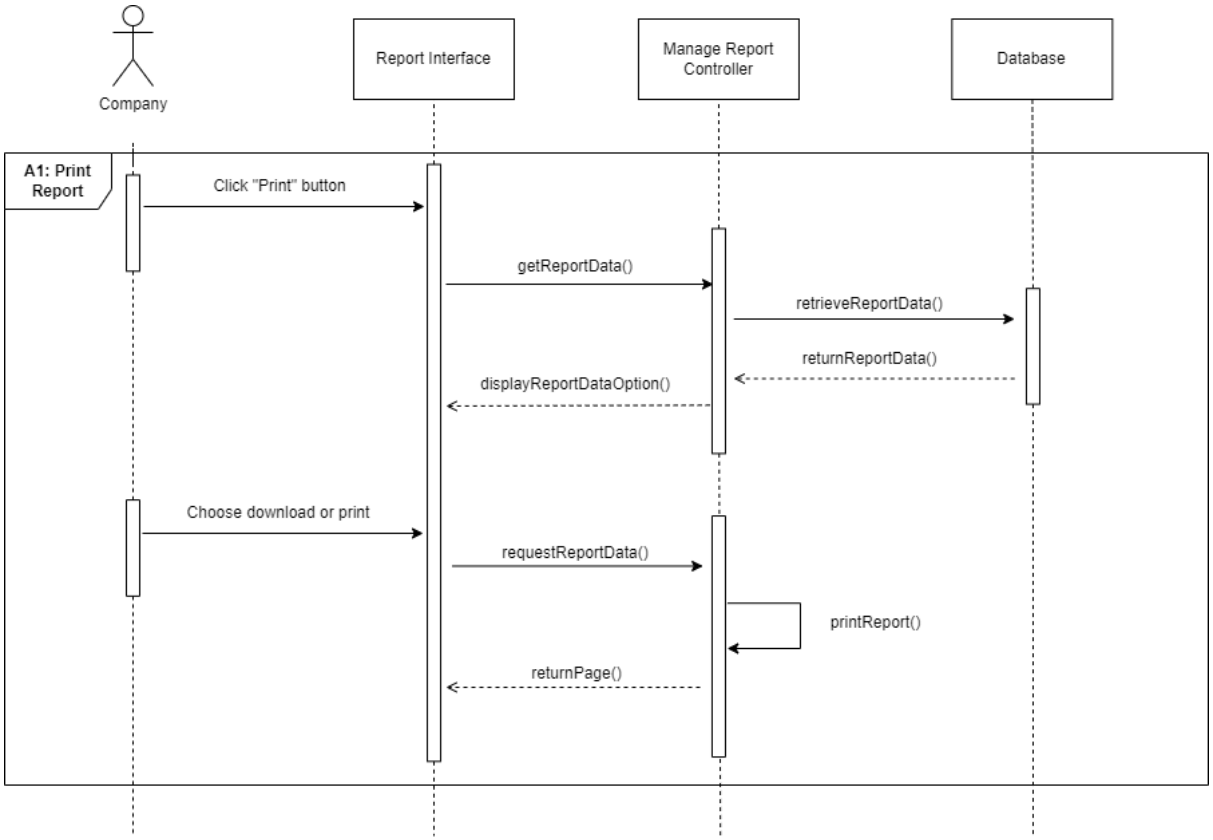

Figure 2.14 Sequence Diagram of Manage Report Alternate Flow A1

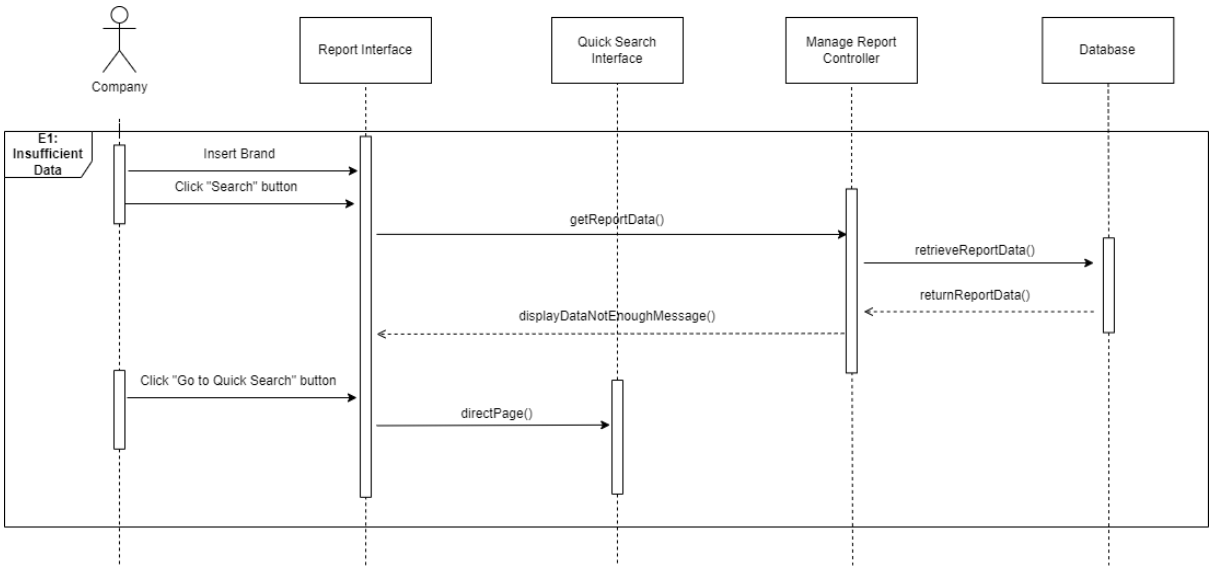

Figure 2.15 Sequence Diagram of Manage Report Exception Flow E1

The last module is Manage Report. This module only allows the company to access. The company can insert the brand to search the report which related to the brand. Besides, the company can choose to print or download the report as PDF file by clicking the “Print” button. The company can clicks the “Download” button to download the report. Figure 2.13, Figure 2.14, and Figure 2.15 show the basic flow, alternate flow, and exception flow of the Manage Report module.

CHAPTER 3

3.1 INTERFACE DESIGN

3.1.1 Login

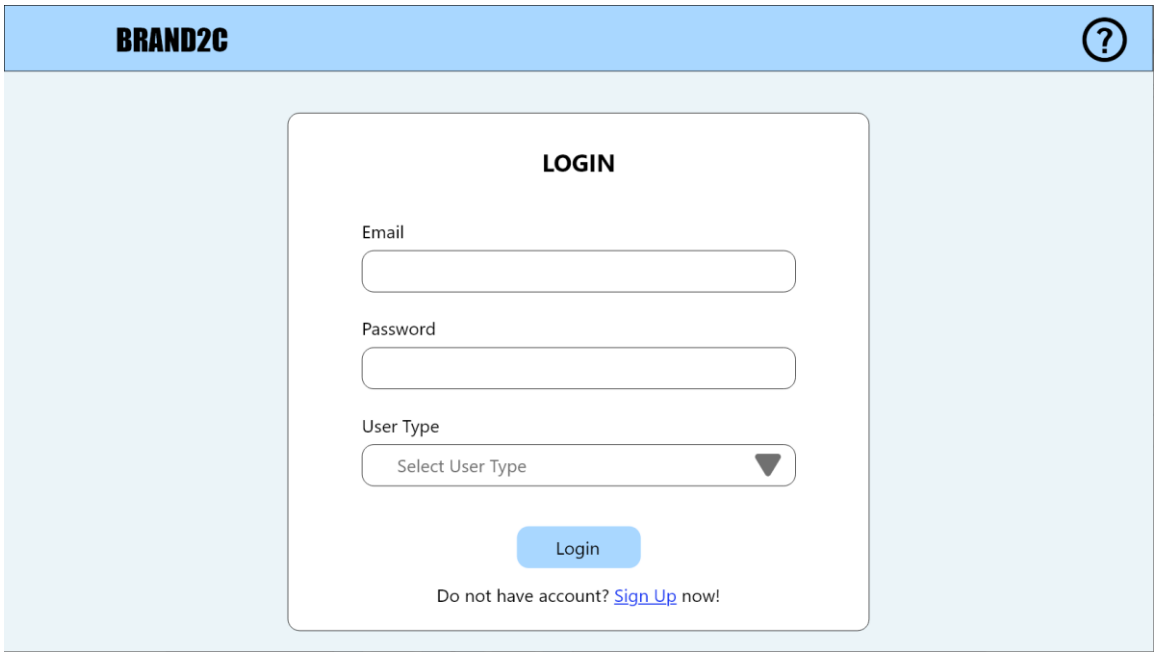

Figure 3.1 Login Interface

Figure 3.1 shows the interface that will be view by the user when access to the BRAND2C which is the “Login” interface. The user needs to enter the Email, password, and choose user type to login to BRAND2C. There are two user type which are company and public user.

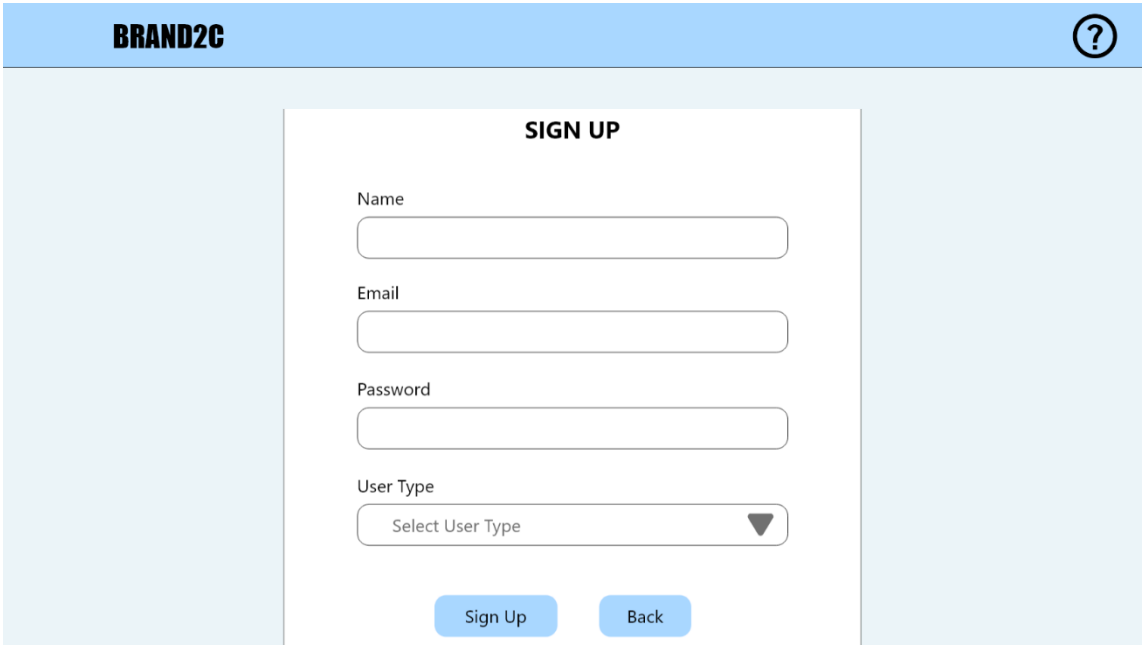

Figure 3.2 Sign Up Interface

User can sign up a new account if do not have an account. Figure 3.2 shows the "Sign Up" interface of BRAND2C. The user needs to enter name, Email, password, and choose user type to sign up an account of BRAND2C. There are two user type which are company and public user.

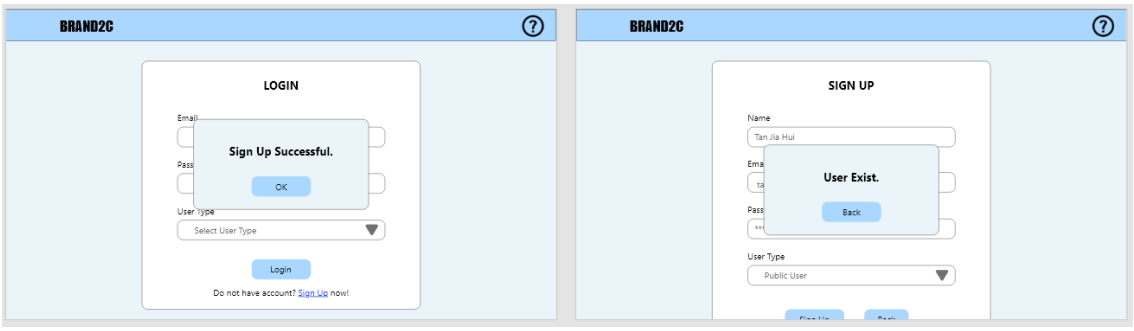

Figure 3.3 Sign Up Successful Message and User Exist Message

Figure 3.3 shows the possible result after the user sign up an account for BRAND2C. If the email has not registered in BRAND2C, it will bring the user back to login interface and pop up a "Sign Up Successful" message else if the email that user inserted has already registered, the system will pop-up a "User Exist" message in sign up

interface and the system will bring the user back to the login interface after the user click "Back" button in the pop-up message.

3.1.2 Manage User

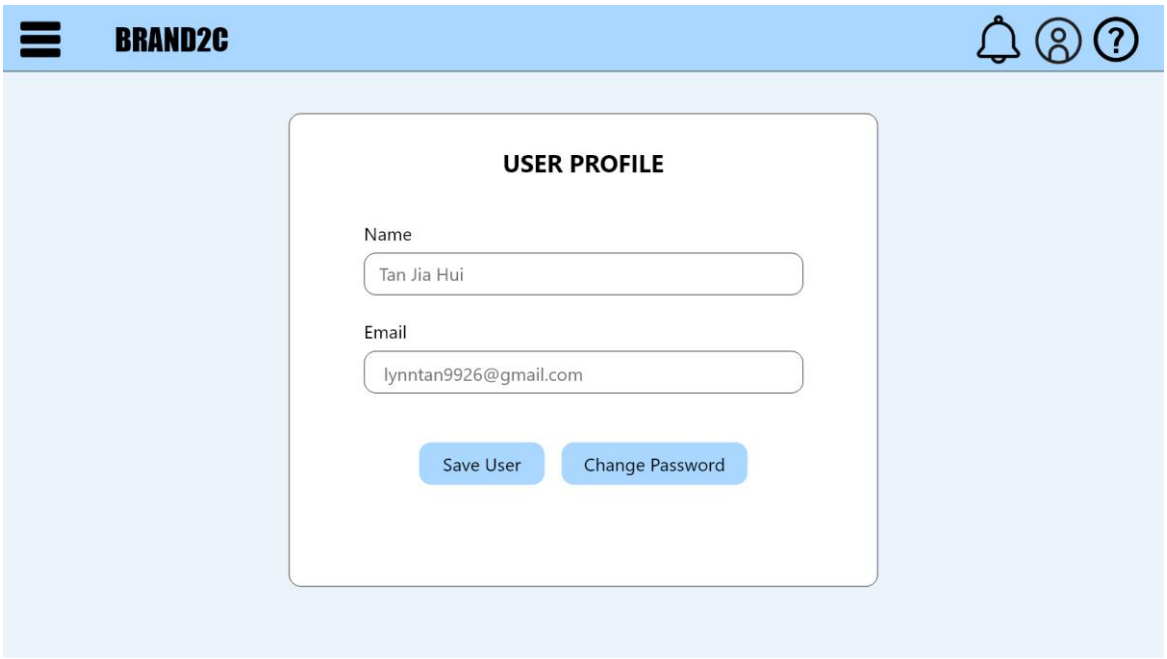

Figure 3.4 User Profile Interface

Figure 3.4 shows the "User Profile" interface of BRAND2C. User can edit the user profile by inserting the name, Email, and click the "Save User" button to save and update the user profile.

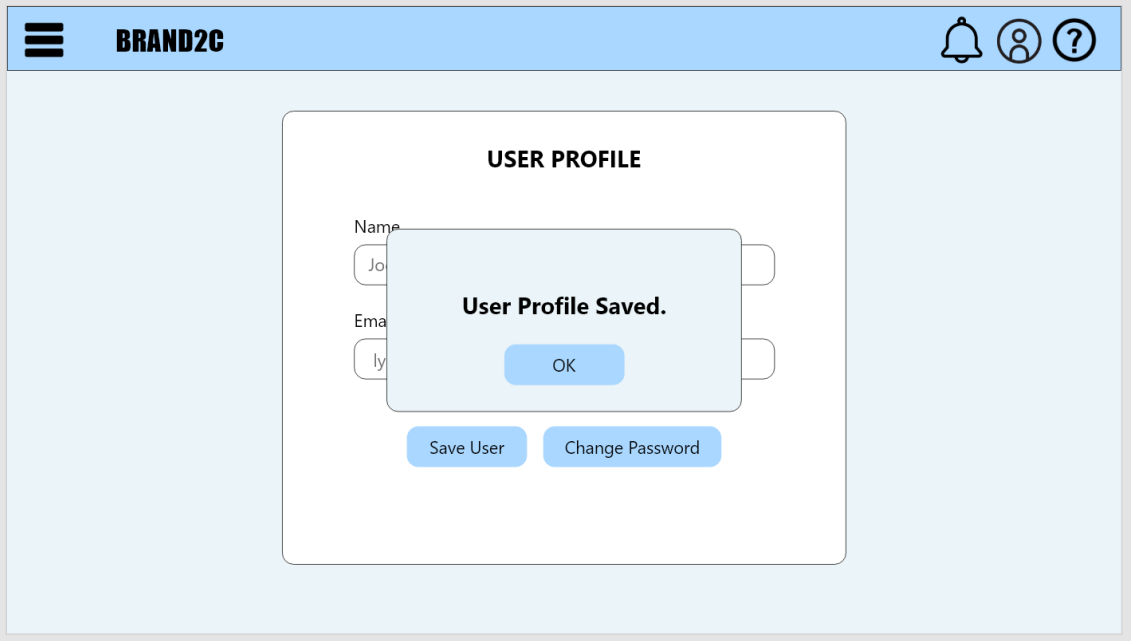

Figure 3.5 User Profile Saved in User Profile Interface

Figure 3.5 shows the pop-up message “User Profile Saved” after the user change the user profile.

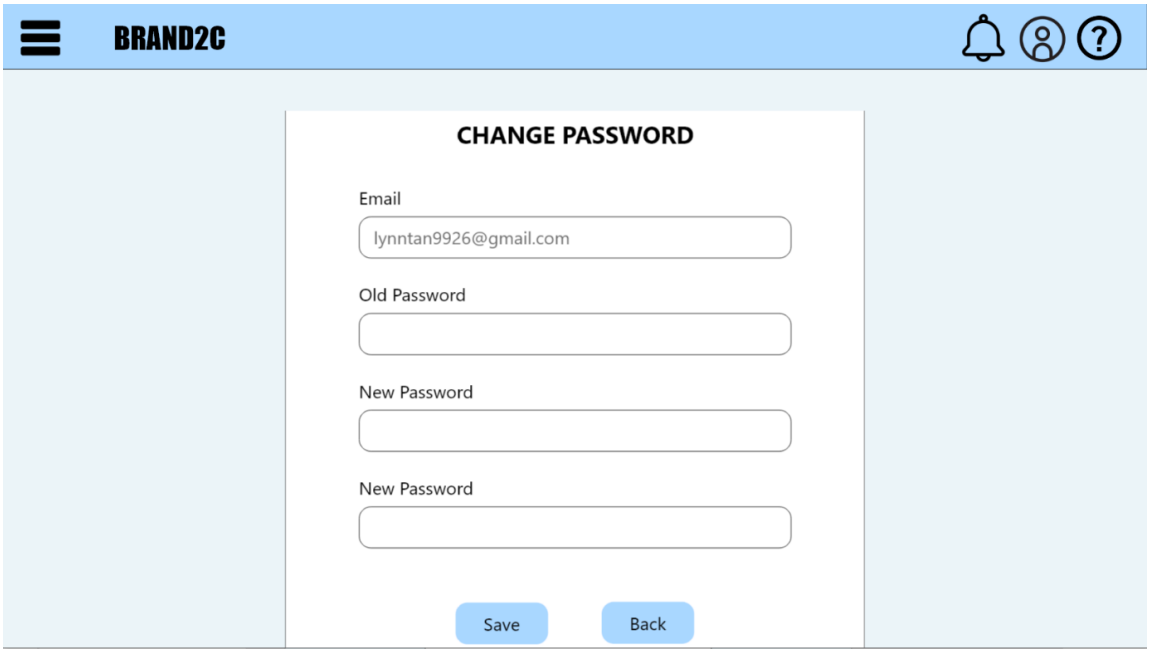

Figure 3.6 Change Password Interface

User also can choose to change the account password by clicking “Change Password” button. Figure 3.6 shows the “Change Password” interface of BRAND2C. The system will display the email of the user. User needs to insert old password, new password and click the “Save” button to save and update the change of the password. The “Back” button in change password interface is for the user to back to user profile interface if the user do not want to change password.

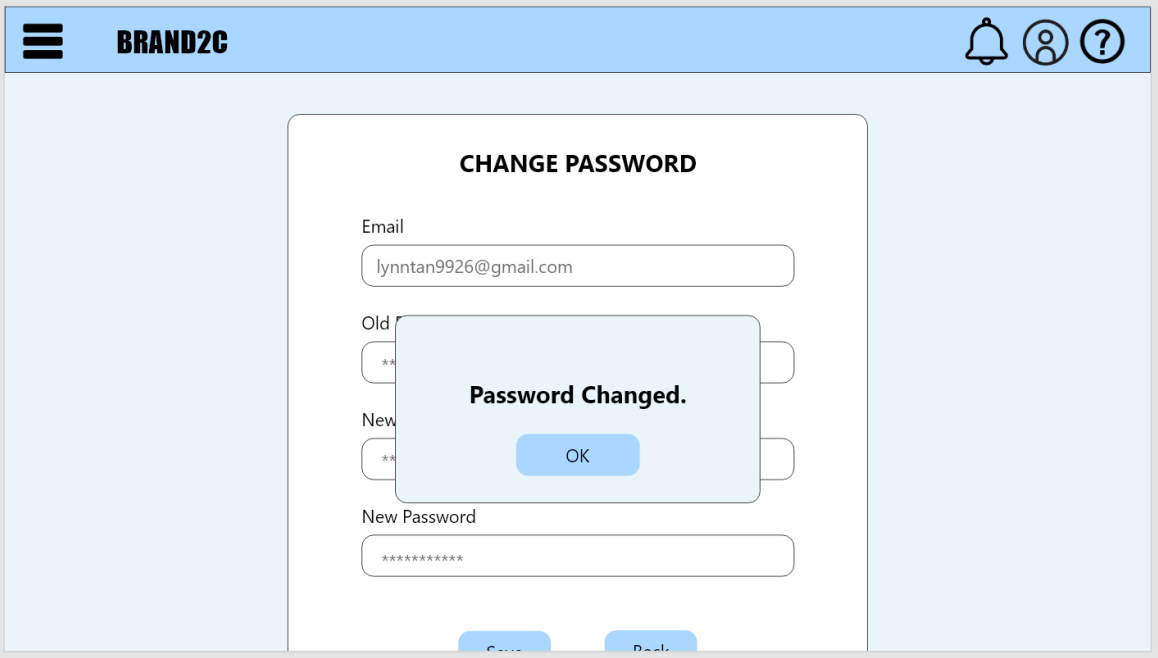

Figure 3.7 Password Changed in Change Password Interface

Figure 3.7 shows the pop-up message “Password Changed” after user successfully change the account password.

3.1.3 Display Overview of Brand Sentiment Analysis

In Display Overview of Brand Sentiment Analysis, it allows company and public user to accesses this module. The company and public user will have different views of overview interface.

Figure 3.8 Overview Interface for Company

Figure 3.9 Overview Interface for Company

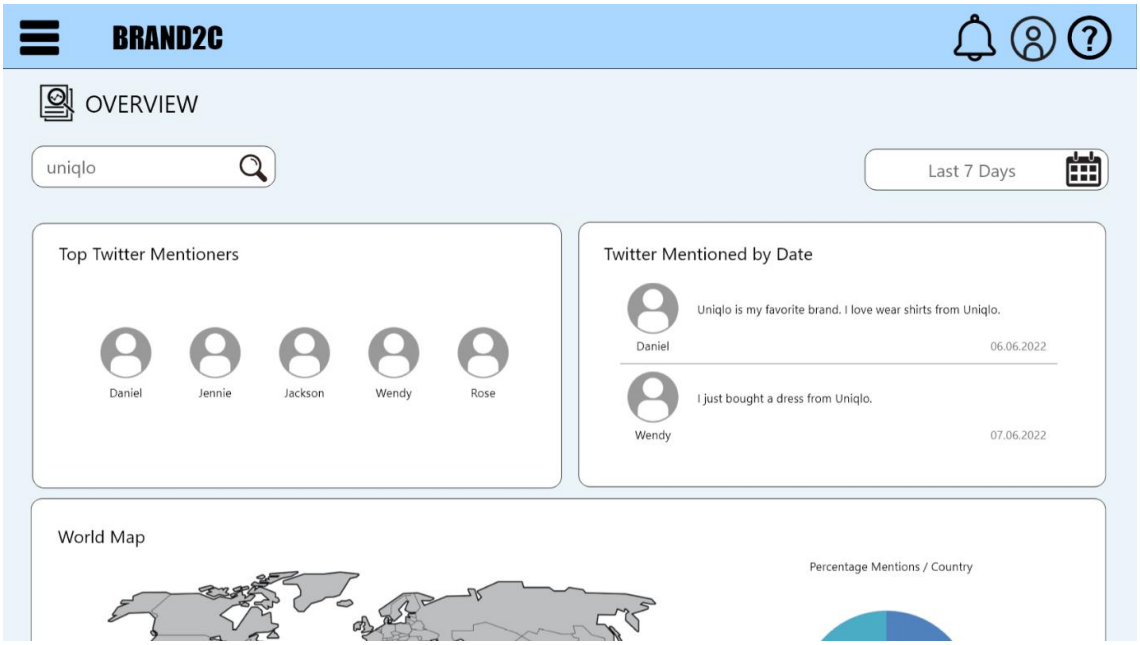

Figure 3.10 Overview Interface for Company

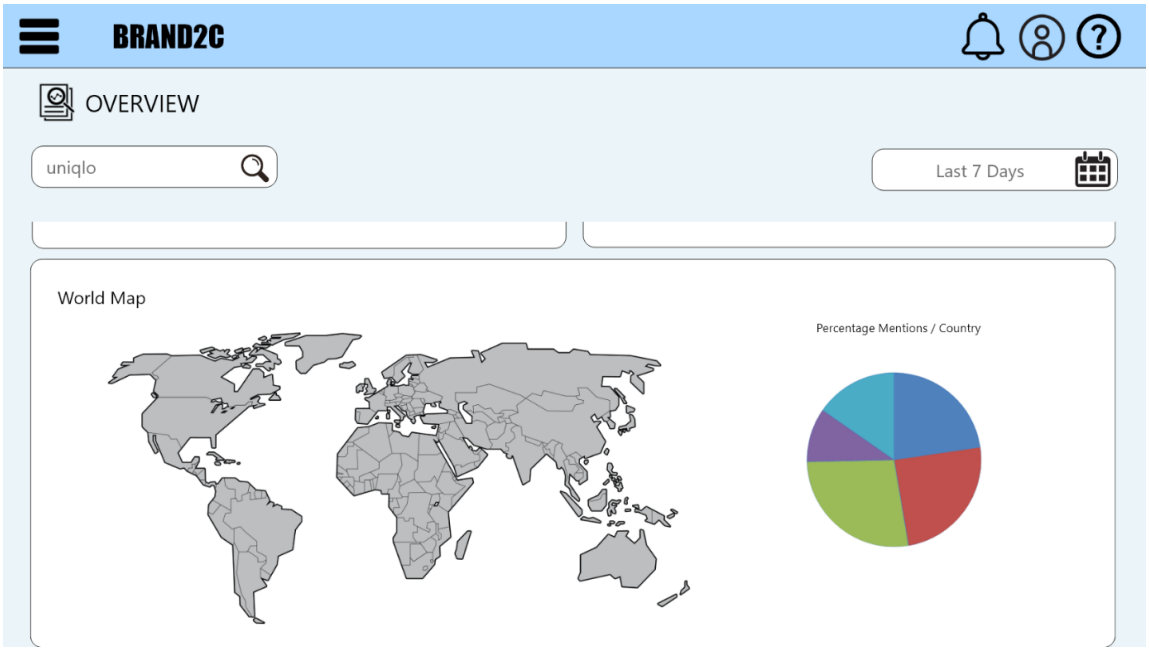

Figure 3.11 Overview Interface for Company

Figure 3.8, Figure 3.9, Figure 3.10, and Figure 3.11 show the "Overview" interface of BRAND2C for user type which is company. Company needs to enter the brand which wants to search to search the overview analysis. Besides, company also can choose a date period to sort the result. The company can choose the date period such as "Last 7 Days", "Last 2 Weeks", and "Last 1 Month". The data which will shows in this module are summarize data of sentiment analysis, graph for sentiment analysis per day, graph for tweets per day in a month, word cloud, pie chart of the sentiment, table of the tweets with sentiment scores, bigram, trigram, top Twitter mentioners, Twitter mentioned by date, and world map with a pie chart.

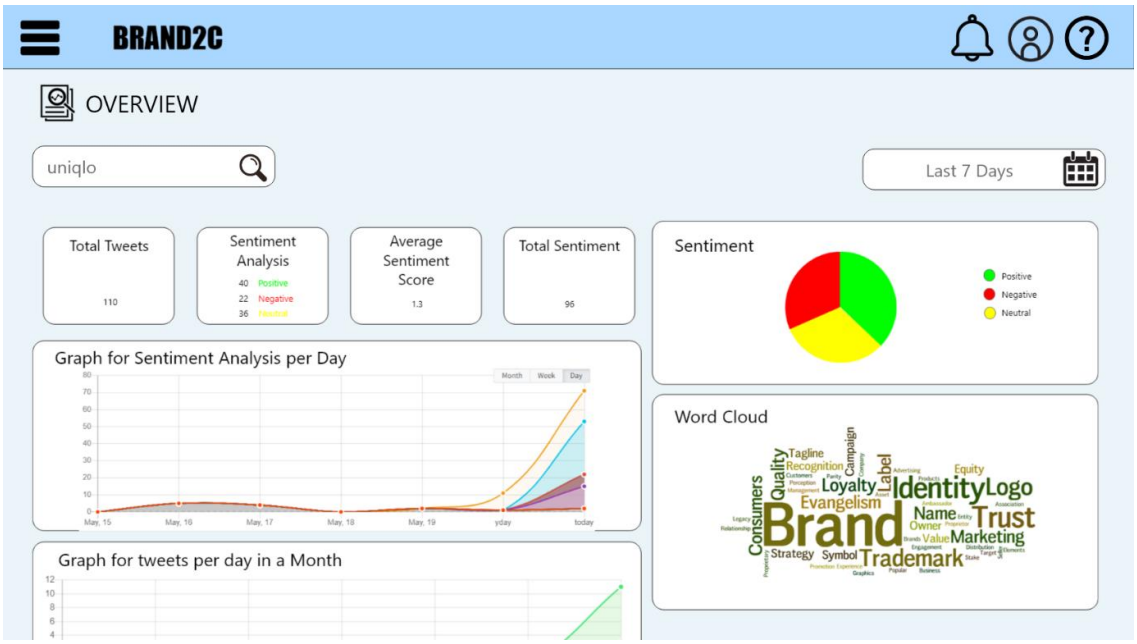

Figure 3.12 Overview Interface for Public User

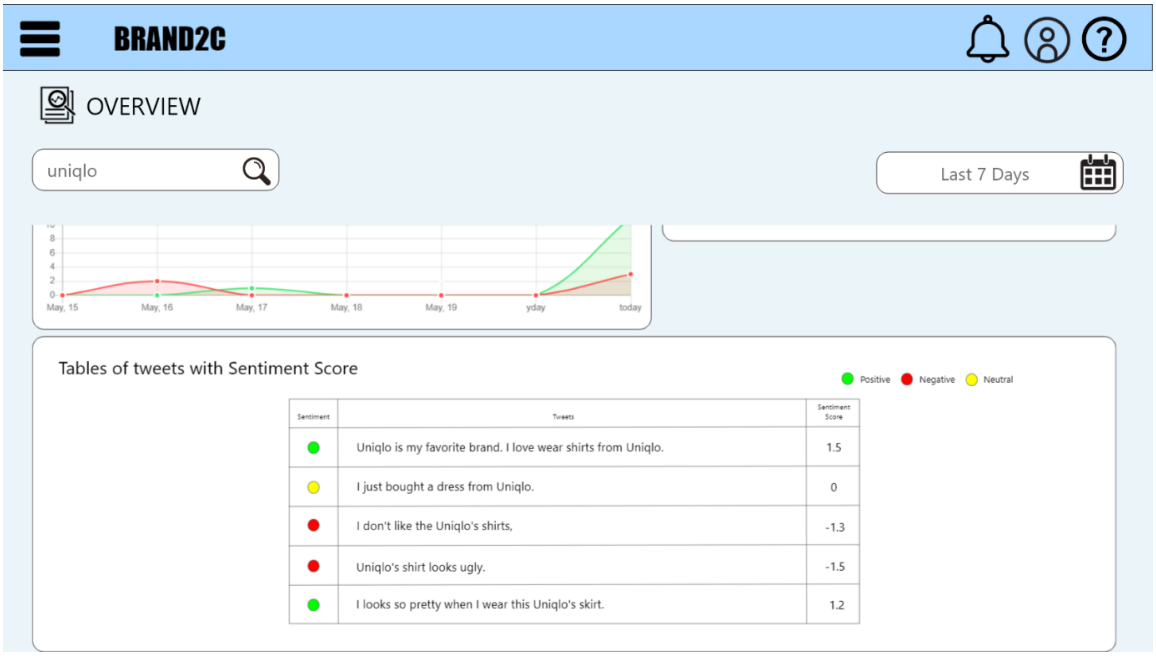

Figure 3.13 Overview Interface for Public User

Figure 3.12 and Figure 3.13 show the "Overview" interface of BRAND2C for user type which is public user. Public user needs to enter the brand which wants to search to search the overview analysis. Besides, public user also can choose a date period to sort the result. The public user can choose the date period such as "Last 7 Days", "Last 2 Weeks", and "Last 1 Month". The data which will shows in this interface are summarize data of sentiment analysis, graph for sentiment analysis per day, graph for tweets per day in a month, word cloud, pie chart of the sentiment, and table of the tweets with sentiment scores.

3.1.4 Display Top Twitter Mentioners

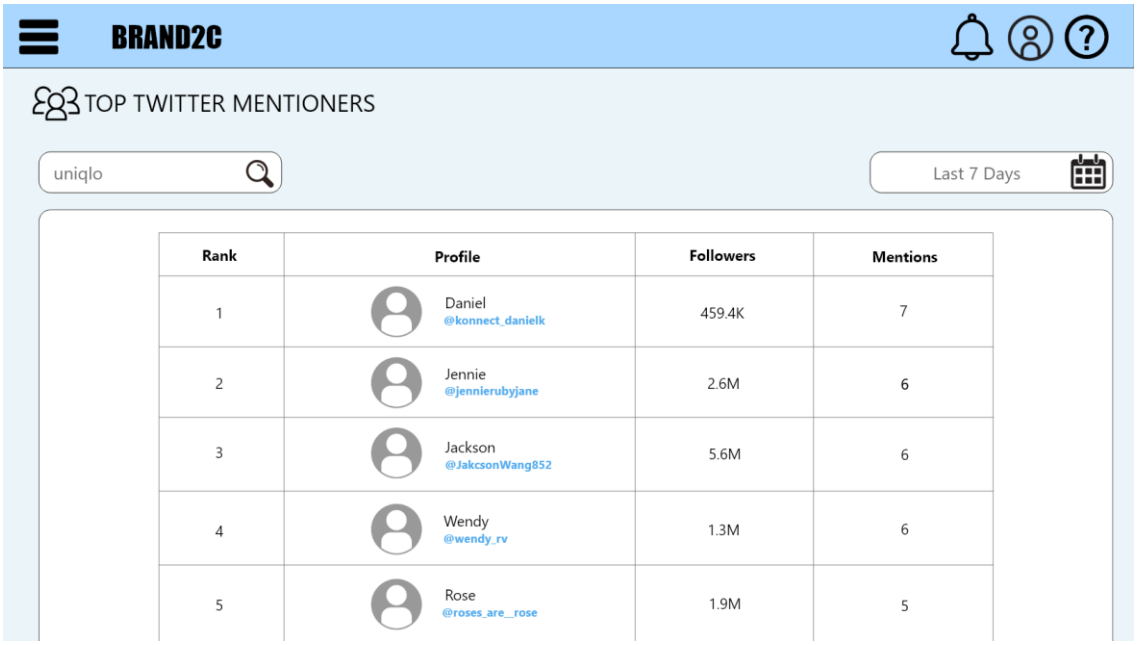

Figure 3.14 Top Twitter Mentioners Interface

In Display Top Twitter Mentioners, it only allows the company to access to this module. Figure 3.14 show the "Top Twitter Mentioners" interface of BRAND2C for user type which is company. Company needs to enter the brand which wants to search to search the top Twitter mentioners. Besides, company also can choose a date period to sort the result. The company can choose the date period such as "Last 7 Days", "Last 2 Weeks", and "Last 1 Month". The rank, profile, followers, and mentions will be displayed in this interface.

3.1.5 Display Keywords

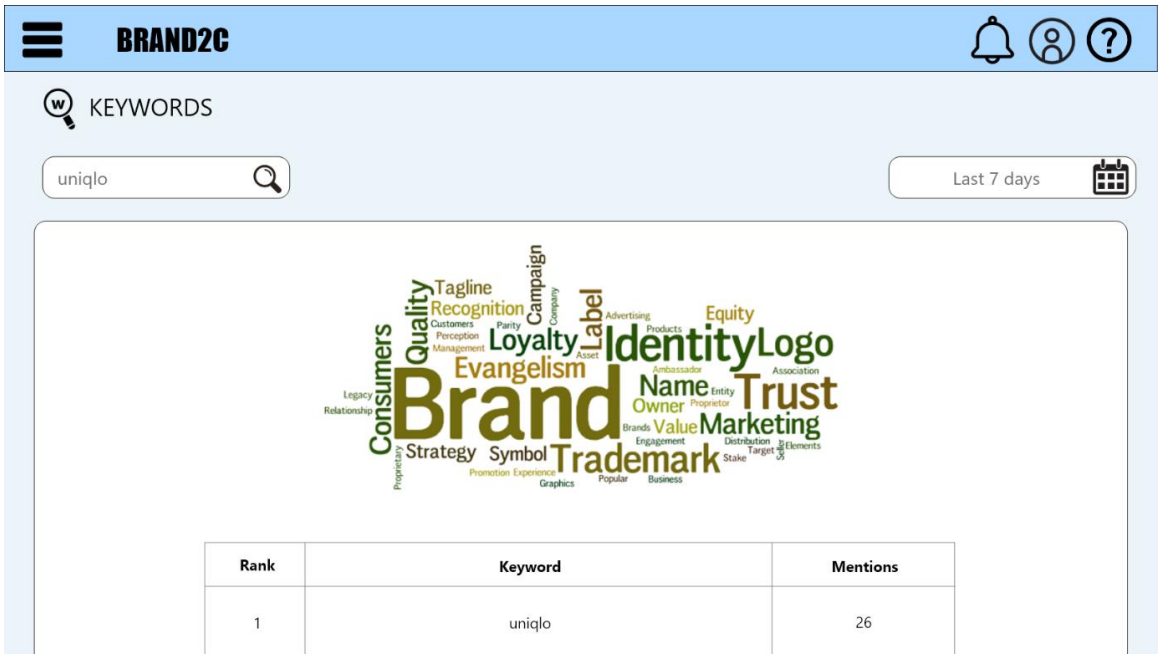

Figure 3.15 Keywords Interface

In Display Keywords, it allows the company and public user to access to this module. Figure 3.15 show the "Keywords" interface of BRAND2C for company and public user. Company and public user need to enter the brand which wants to search to search the keywords result. Besides, company and public user also can choose a date period to sort the result. The company and public user can choose the date period such as "Last 7 Days", "Last 2 Weeks", and "Last 1 Month". This interface will display a word cloud, rank of the keywords, keywords, and number of mentions for the keywords.

3.1.6 Manage Report

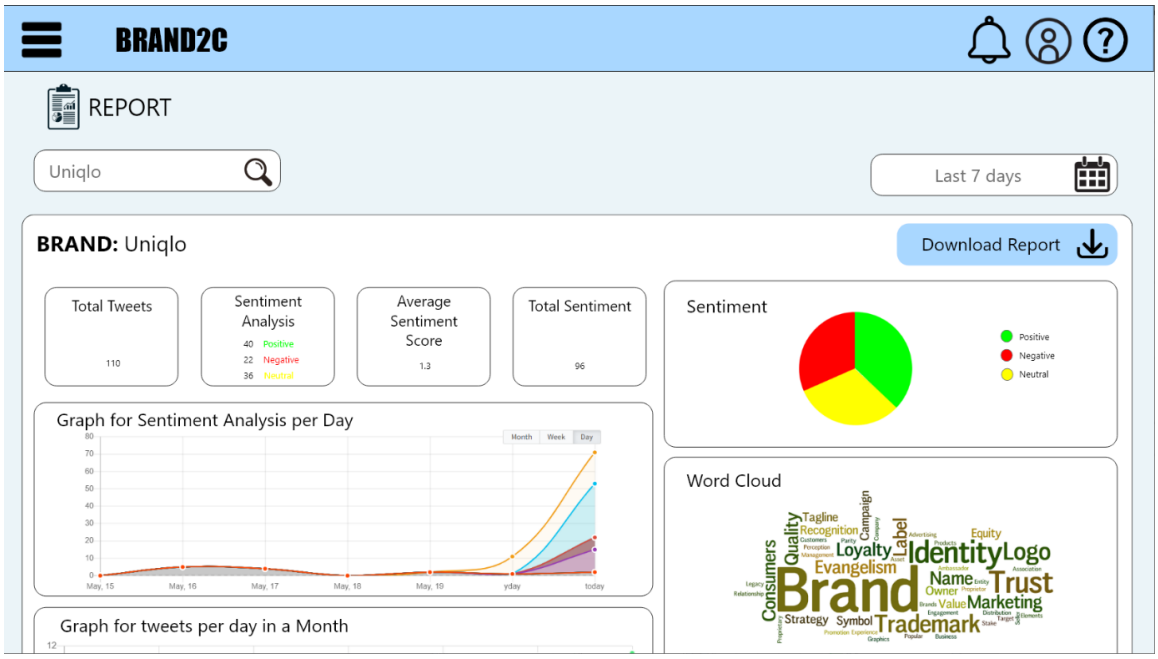

Figure 3.16 Manage Report Interface

In Manage Report, it only allows the company to access to this module. Figure 3.16 show the "Report" interface of BRAND2C for the company. Company needs to enter the brand which wants to search to search the report. Besides, company also can choose a date period to sort the result. The company can choose the date period such as "Last 7 Days", "Last 2 Weeks", and "Last 1 Month". The rank, profile, followers, and mentions will be displayed in this interface. The brand that company searched and all the data such as summarize data of sentiment analysis, graph for sentiment analysis per day, graph for tweets per day in a month, word cloud, pie chart of the sentiment, and table of the tweets with sentiment scores will be displayed in this interface. Besides, company can click "Download Report" button to download the report document.

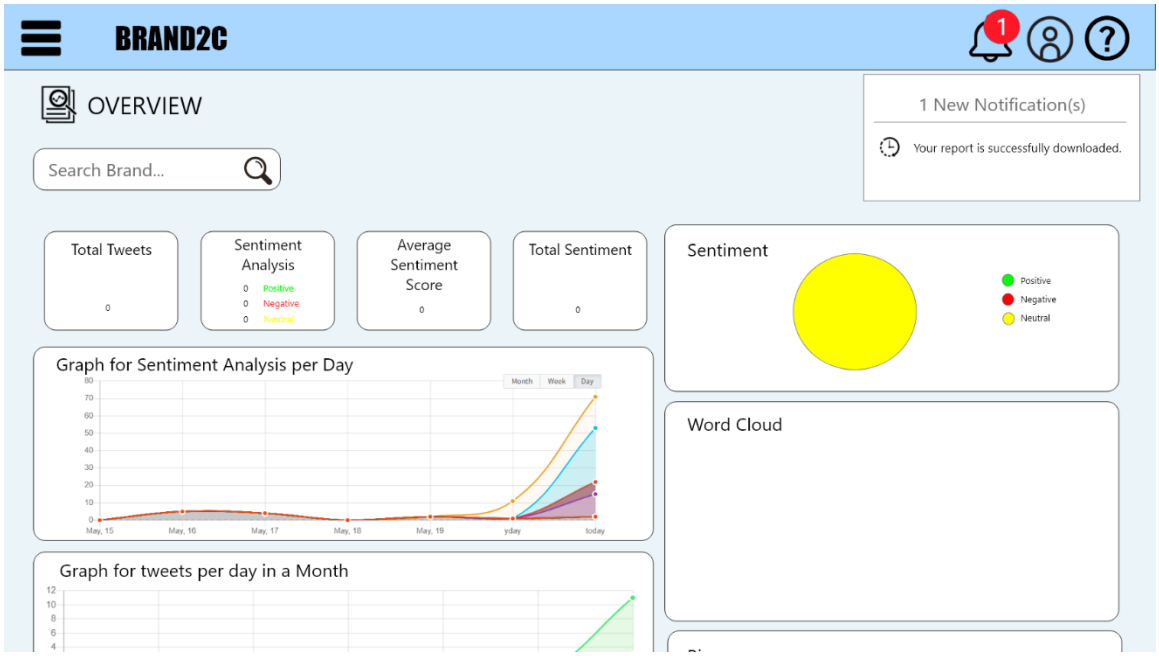

Figure 3.17 Download Successful Notification in Overview Interface

After the company successfully download the report, the system will bring the company back to the overview interface and it will display a notification on the header. When company click the notification icon, the system will show the unread notification.

3.2 HARDWARE AND SOFTWARE SPECIFICATION

Table 3.1 Hardware and Software Specification

NAME	VERSION	TYPE	DESCRIPTION
Laravel	9.14.1	Software	Used to create the web application of BRAND2C.
Visual Studio Code	1.66.2	Software	Used to develop the BRAND2C.
Adobe XD	51.0.12	Software	Used to design high fidelity prototype.
Draw.io	-	Software	Used to sketch the diagrams for documentation.
VivoBook_ASUSLaptop X530FN_S530FN	-	Hardware	Used to develop the BRAND2C and complete the documentation.

APPENDIX B
SOFTWARE DESIGN DESCRIPTION (SDD)

2022

SOFTWARE DESIGN DESCRIPTION (SDD)

[BRAND2C]

DOCUMENT APPROVAL

	Name	**Date**
Authenticated by: *Jiahui* _____ Tan Jia Hui	Tan Jia Hui	3/6/2022
Approved by: _____ Client		

Software :

Archiving Place :

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CHAPTER 1

1.1 PROJECT DESCRIPTION

The purpose of doing this Software Design Description (SDD) is to describe the construction of a software feature to fulfil a list of technical requirements. This will also give a full understanding of BRAND2C's architecture, detailed description, and data dictionary.

BRAND2C is a web-based analytical tool which is designed primarily to conduct brand sentiment analysis based on Twitter data which can calculate the sentiment scores of the tweets. This analytical tool can help the company to view the brand reputation, observe the overview of the customers' reviews from Twitter, and monitor the competitors' products review from the customers. The web-based application consists of summarize data of the analysis, pie chart of the sentiment, graph for tweets per day, word cloud, table of the tweets with sentiment scores, graph for positive sentiment, graph for negative sentiment, graph for neutral sentiment, and report of the sentiment analysis. The database server will store clean tweets and sentiment scores. The web-based application will get the data from the database server and display it in the web-based application.

1.2 SYSTEM IDENTIFICATION

SDD-B2C-V01-2022

SDD: Software Design Description

B2C: BRAND2C

V01: Version 1

2022: Documentation Year

1.3 ARCHITECTURE / BLUE PRINT

1.3.1 Presentation Layer

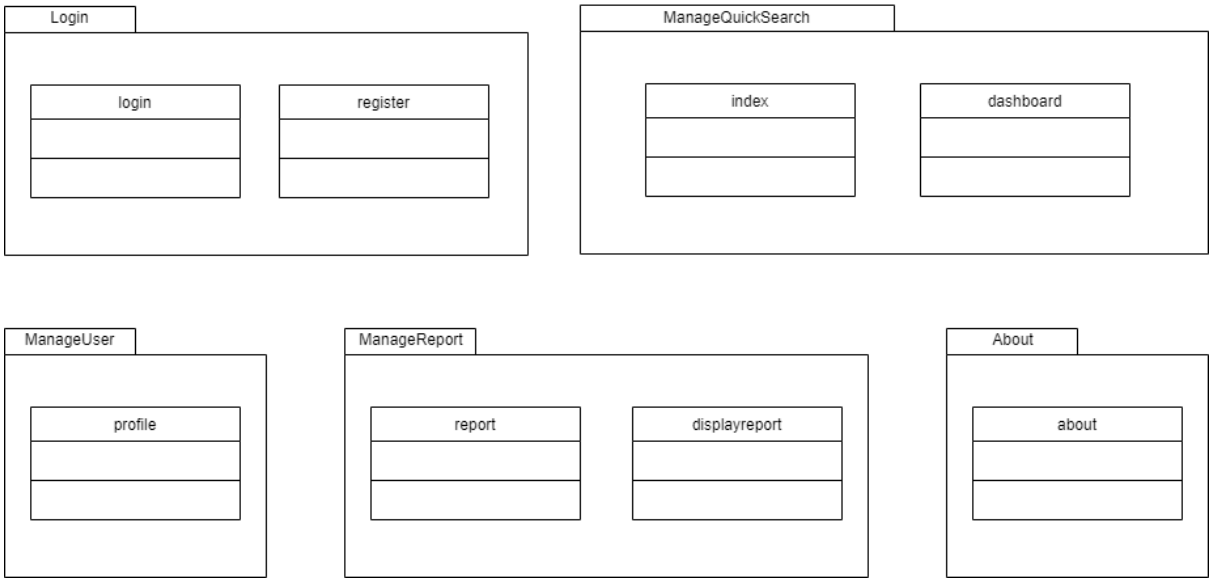


Figure 1.1 Presentation Layer

1.3.1.1 Login

Table 1.1 Presentation Layer - Login

Class Name	Description
login	This class allow the company and public user to insert the login information to login the BRAND2C.
register	This class allow the company and public user to register an account for BRAND2C.

1.3.1.2 ManageUser

Table 1.2 Presentation Layer – ManageUser

Class Name	Description
profile	This class allow the company and public user to edit the user profile.

1.3.1.3 ManageQuickSearch

Table 1.3 Presentation Layer – ManageQuickSearch

Class Name	Description
index	This class allow the company and public user to search the brand.
dashboard	This class allow the company and public user to view the search results for the brand sentiment analysis.

1.3.1.4 ManageReport

Table 1.4 Presentation Layer – ManageReport

Class Name	Description
report	This class allow the company to search the report of brand sentiment analysis.
displayreport	This class allow the company to view and download or print the report of brand sentiment analysis.

1.3.1.5 About

Table 1.5 Presentation Layer – About

Class Name	Description
about	This class allow the company and public user to view the information about the BRAND2C.

1.3.2 Business Service Layer

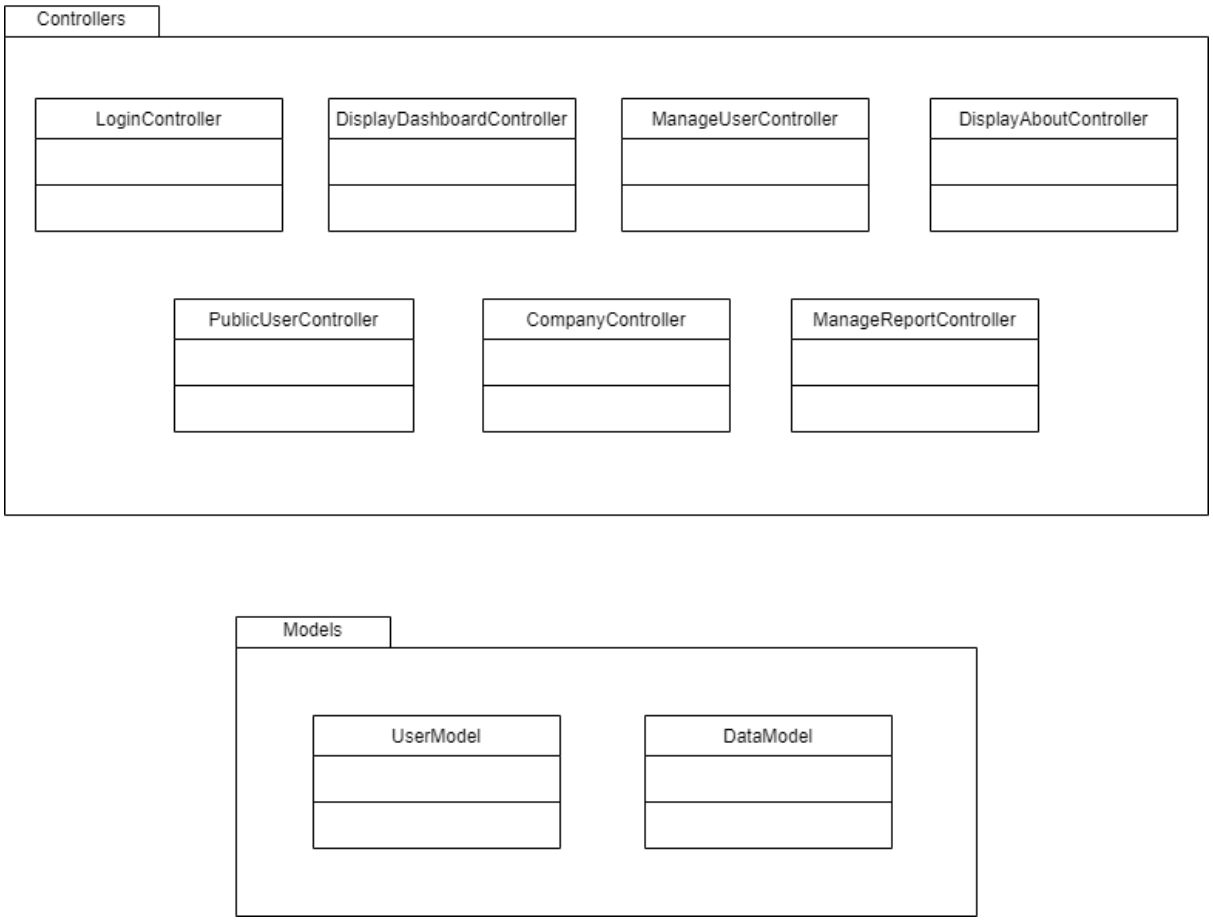


Figure 1.2 Business Service Layer

1.3.2.1 Controller

Table 1.6 Business Service Layer – Controller

Class Name	Description
LoginController	This controller helps the Login interface to communicate with the model. All requests from the interface will be handled by this controller.
RegisterController	This controller helps the Register interface to communicate with the model. All requests from the interface will be handled by this controller.
DisplayDashboardController	This controller helps the Quick Search interface to communicate with the model. All requests from the interface such as retrieve quick search result will be handled by this controller.
ManageUserController	This controller helps the User Profile interface to communicate with the model. All requests from the interface such as update user data to the model will be handled by this controller.
CompanyController	This controller helps to direct the company user to the page which is only for company user.
PublicUserController	This controller helps to direct the public user to the page which is only for public user.
ManageReportController	This controller helps the Report interface to communicate with the model. All requests from the interface such as retrieve the report's data from the model will be handled by this controller.

DisplayAboutController	This controller helps the About interface to display the information about the BRAND2C.

1.3.2.2 Model

Table 1.7 Business Service Layer – Model

Class Name	Description
UserModel	This model helps the controller to manage the user data in the database.
DataModel	This model helps the controller to manage the data of the quick search result in the database.

1.3.3 Middleware Layer

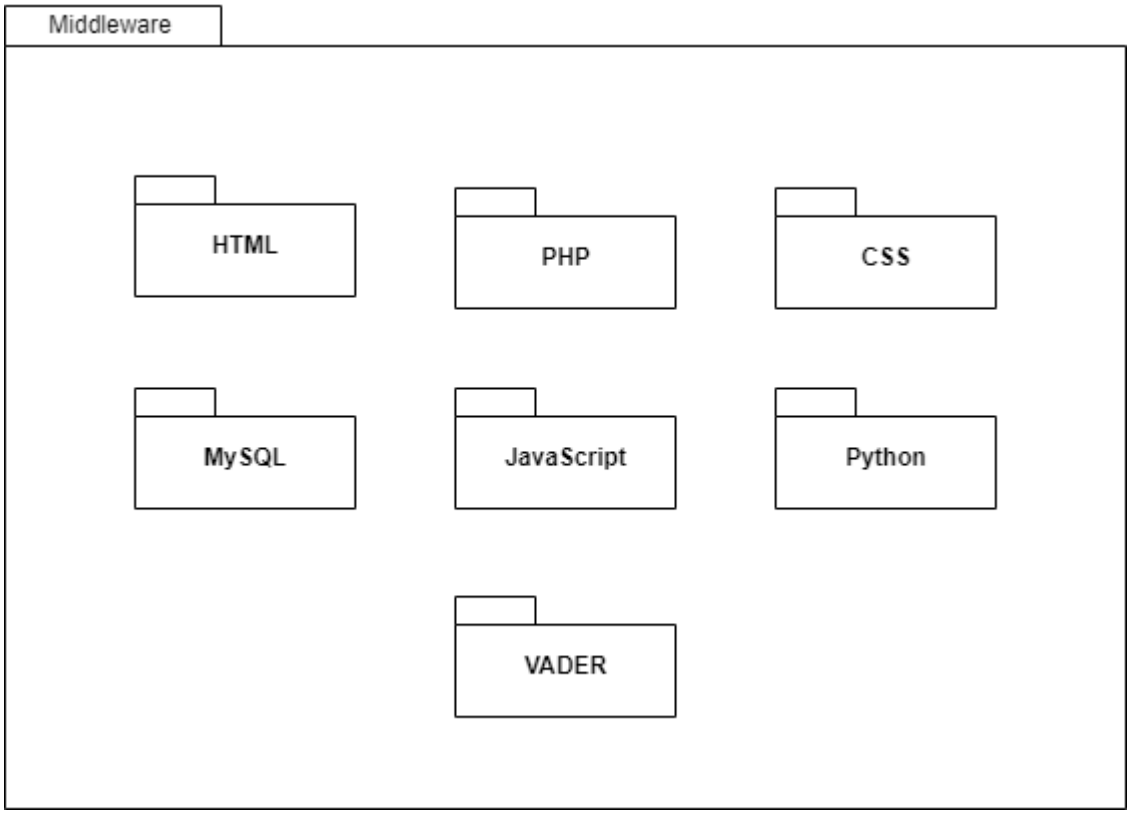


Figure 1.3 Middleware Layer

Table 1.8 Middleware Layer

Package Name	**Description**
HTML	Hypertext Markup Language (HTML) is a client-side scripting language. It enables web users to employ components, tags, and attributes to build and construct sections, links, and paragraphs.
PHP	PHP is a server-side scripting language that can be used to create static or dynamic web-based applications.
CSS	Cascading Style Sheet (CSS) is a design language which is used to describe the presentation of elements in HTML. It determines a webpage's visual organization, layout, and aesthetics.
MySQL	MySQL is an open-source relational database used to store the BRAND2C data.

JavaScript	JavaScript is a text-based programming language which is a client-side script that interoperates and creates dynamic pages.
Python	Python is a dynamically semantic, interpreted, object-oriented high-level scripting language which is used for server-side.
VADER	Valence Aware Dictionary for sEntiment Reasoning (VADER) is a text sentiment analysis model which is also attentive to both emotion polarity such as positive and negative, and intensity.

1.4 ARCHITECTURE / BLUEPRINT DESCRIPTION

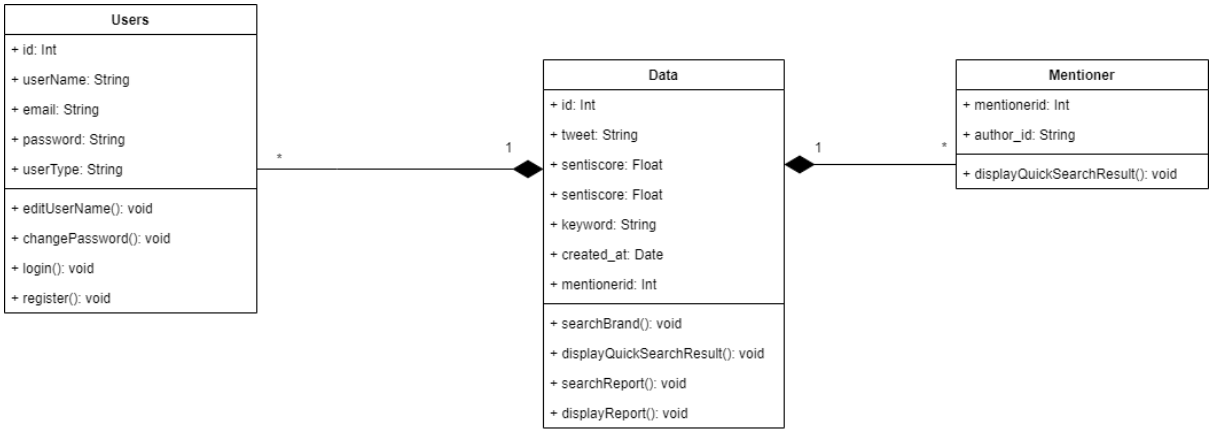


Figure 1.4 Business Service Layer

Figure 1.4 shows the Class Diagram of BRAND2C. The BRAND2C consists of three classes which are Users, Data, and Mentioner. The Users class and Mentioner class are connect to Data class with a composition relationship and one to many multiplicity.

CHAPTER 2

2.1 DETAILED DESCRIPTION

2.1.1 Login Package

2.1.1.1 login Class

Table 2.1 login Class Detailed Description

Class Type	**Boundary Class**	
Responsibility	This class is responsible to allow the user to login to the BRAND2C.	
Attributes	**Attributes Name**	**Attributes Type**
	email	String
	password	String
Methods	**Method Name**	**Description**
	login()	Company and Public User can login to the system.

Algorithm	**login()**
	START
	ENTER email
	ENTER password
	IF (click= “Login”)
	THEN
	IF (user is found && userType = “Company”)
	THEN to “Quick Search” page for company
	IF (user is found && userType = “Public User”)
	THEN to “Quick Search” page for public user
	ELSE
	RETURN to “Login” page with status “Invalid	

	User” END IF END IF END

2.1.1.2 register Class

Table 2.2 register Class Detailed Description

Class Type	**Boundary Class**	
Responsibility	This class is responsible to allow the user to sign up an account.	
Attributes	**Attributes Name**	**Attributes Type**
	email password userName userType	String String String String
Methods	**Method Name**	**Description**
	register()	User can sign up an account to the system as company or public user.

Algorithm	**register()**
	START
	ENTER userName
	ENTER email
	ENTER password
	ENTER password
	ENTER userType
	IF (click = “Register”)
	IF (userType = “Company”)
	THEN
	STORE new user details as userObject
	IF (userType = “Public User”)
	THEN
	STORE new user details as userObject	

	IF (email is found)
	THEN
	RETURN to register page with status “User Exist”
	END IF
	END IF
	END

2.1.2 ManageUser Package

2.1.2.1 profile Class

Table 2.3 profile Class Detailed Description

Class Type	**Boundary Class**	
Responsibility	This class is responsible to allow the user to manage the user profile.	
Attributes	**Attributes Name**	**Attributes Type**
	userName email password password id	String String String String Integer
Methods	**Method Name**	**Description**
	editUserName()	Company or public user can edit the username.
	changePassword()	Company or public user can change password.
Algorithm	**editUserName()** START DISPLAY userName DISPLAY email ENTER userName IF (click = “Save User”) THEN UPDATE new username WHERE (id = “id”) RETURN to “User Profile” page and UPDATE latest username	

	END IF
	END
	
	changePassword()
	START
	DISPLAY userName
	DISPLAY email
	IF (click = “Change Password”)
	THEN
	ENTER password
	ENTER new password as password
	ENTER confirm new password as password
	CLICK “Update Password”
	IF (password = “password entered”)
	UPDATE new password
	DISPLAY successful message
	RETURN to “User Profile” page
	ELSE
	DISPLAY error message
	RETURN to “User Profile” page
	END IF
	END

2.1.3 ManageQuickSearch Package

2.1.3.1 index Class

Table 2.4 index Class Detailed Description

Class Type	**Boundary Class**	
Responsibility	This class is responsible to let the user to search the brand.	
Attributes	**Attributes Name**	**Attributes Type**
	keyword	String
Methods	**Method Name**	**Description**
	searchBrand()	Company or public user can search the brand.

Algorithm	**searchBrand()**
	START
	ENTER keyword
	IF (click = “Search”)
	THEN
	DISPLAY dashboard page
	END IF
	END	

2.1.3.2 dashboard Class

Table 2.5 dashboard Class Detailed Description

Class Type	**Boundary Class**	
Responsibility	This class is responsible to display the quick search results.	
Attributes	**Attributes Name**	**Attributes Type**
	id keyword tweet	Integer String String

	sentiscore senti created_at mentionerid author_id	Float String Date Integer String
Methods	**Method Name**	**Description**
	displayQuickSearchResult()	The system can display the quick search results.
Algorithm	**displayQuickSearchResult()** START DISPLAY keyword DISPLAY tweet DISPLAY created_at DISPLAY author_id DISPLAY sentiscore DISPLAY senti SAVE new data information in data SAVE new mentioner information in mentioner END	

2.1.4 ManageReport Package

2.1.4.1 report Class

Table 2.6 report Class Detailed Description

Class Type	**Boundary Class**	
Responsibility	This class is responsible to search the report of the brand sentiment analysis.	
Attributes	**Attributes Name**	**Attributes Type**
	keyword	String
Methods	**Method Name**	**Description**
	searchReport()	Company search the report of the brand.

Algorithm	**searchReport()**
	START
	ENTER keyword
	IF (click = “Search”)
	IF (keyword is found)
	THEN
	DISPLAY displayreport page
	ELSE
	RETURN report page with “Data not enough”
	Message
	END IF
	END IF
	END	

2.1.4.2 displayreport Class

Table 2.7 displayreport Class Detailed Description

Class Type	**Boundary Class**	
Responsibility	This class is responsible to display the report of the brand sentiment analysis.	
Attributes	**Attributes Name**	**Attributes Type**
	sentiscore keyword senti tweet created_at	Float String String String Date
Methods	**Method Name**	**Description**
	displayReport()	The system display the report of the brand.

Algorithm	**displayReport()**
	START
	DISPLAY report result
	IF (click = “Print”)
	THEN
	SAVE report by download or print
	ELSE
	RETURN displayReport page
	END IF
	END	

2.2 DATA DICTIONARY

2.2.1 users

Table 2.8 users Data Dictionary

Data Name	Data Type	Description	Constraint
id	BIGINT(20)	Users Identification Number	PK
userName	VARCHAR(255)	Users' username	
email	VARCHAR(255)	Users' email address	
password	VARCHAR(255)	Users' account password	
userType	VARCHAR(255)	User type of the account	

2.2.2 data

Table 2.9 data Data Dictionary

Data Name	Data Type	Description	Constraint
id	INT(10)	Data Identification Number	PK
mentionerid	INT(10)	Mentioner Identification Number	FK
tweet	VARCHAR(255)	Tweets data	
sentiscore	DOUBLE(8,2)	Sentiment Score of Tweets	

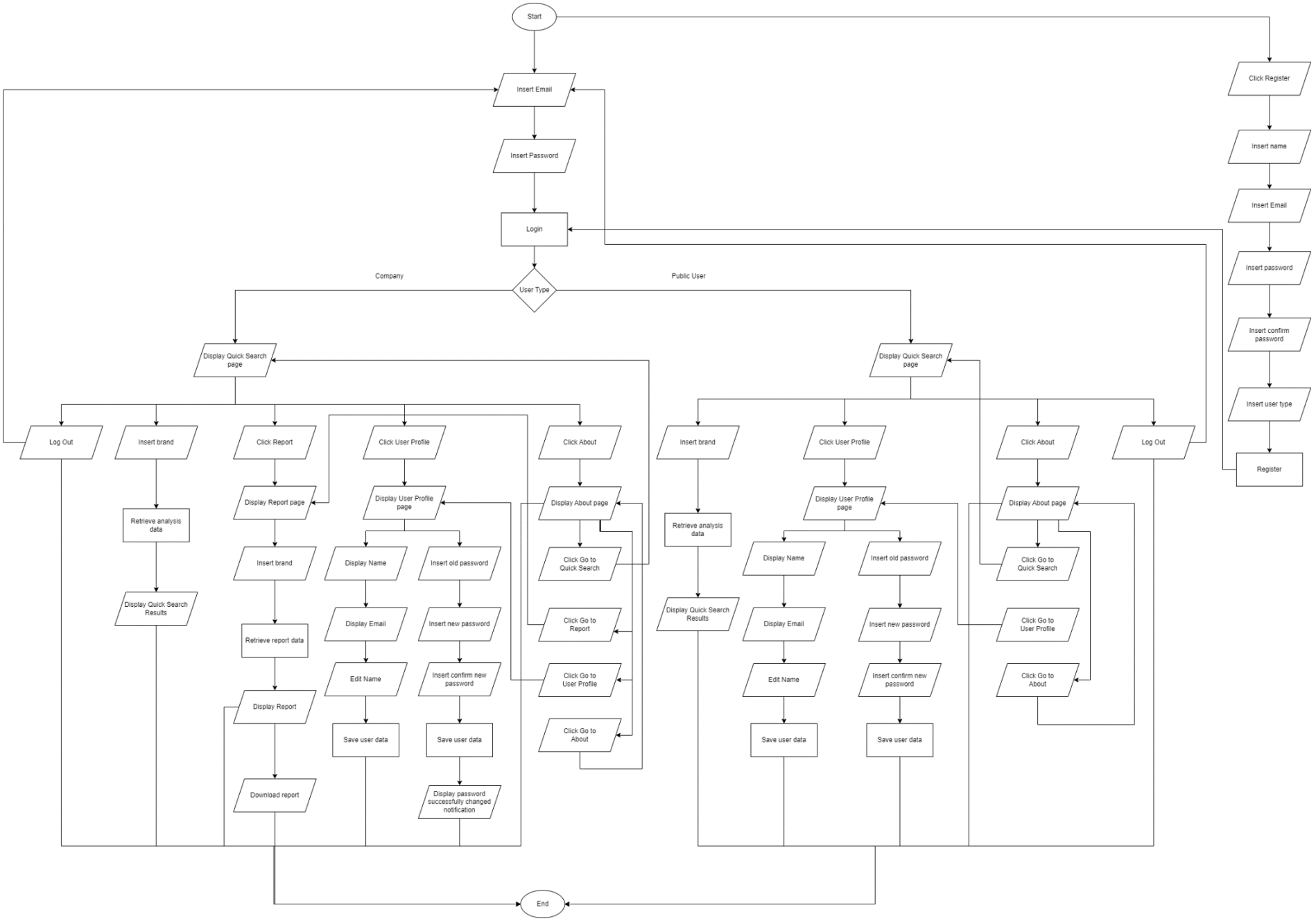
senti	VARCHAR(255)	Sentiment of Tweets	
keyword	VARCHAR(255)	Brand of user searched	
created_at	DATETIME	Date of Tweets being created	

2.2.3 mentioner

Table 2.10 mentioner Data Dictionary

Data Name	Data Type	Description	Constraint
mentionerid	INT(10)	Mentioner Identification Number	PK
author_id	VARCHAR(255)	Mentioners' Twitter ID	

APPENDIX C
FLOWCHART


Start
Insert Email
Insert Password
Login
User Type
Company
Public User
Click Register
Insert name
Insert Email
Insert password
Insert confirm password
Insert user type
Register
Display Quick Search page
Log Out
Insert brand
Retrieve analysis data
Display Quick Search Results
Click Report
Display Report page
Insert brand
Retrieve report data
Display Report
Download report
Click User Profile
Display User Profile page
Display Name
Display Email
Edit Name
Save user data
Insert old password
Insert new password
Insert confirm new password
Save user data
Display password successfully changed notification
Click About
Display About page
Click Go to Quick Search
Click Go to Report
Click Go to User Profile
Click Go to About
Display Quick Search page
Insert brand
Retrieve analysis data
Display Quick Search Results
Click User Profile
Display User Profile page
Display Name
Display Email
Edit Name
Save user data
Insert old password
Insert new password
Insert confirm new password
Save user data
Click About
Display About page
Click Go to Quick Search
Click Go to User Profile
Click Go to About
Log Out
End

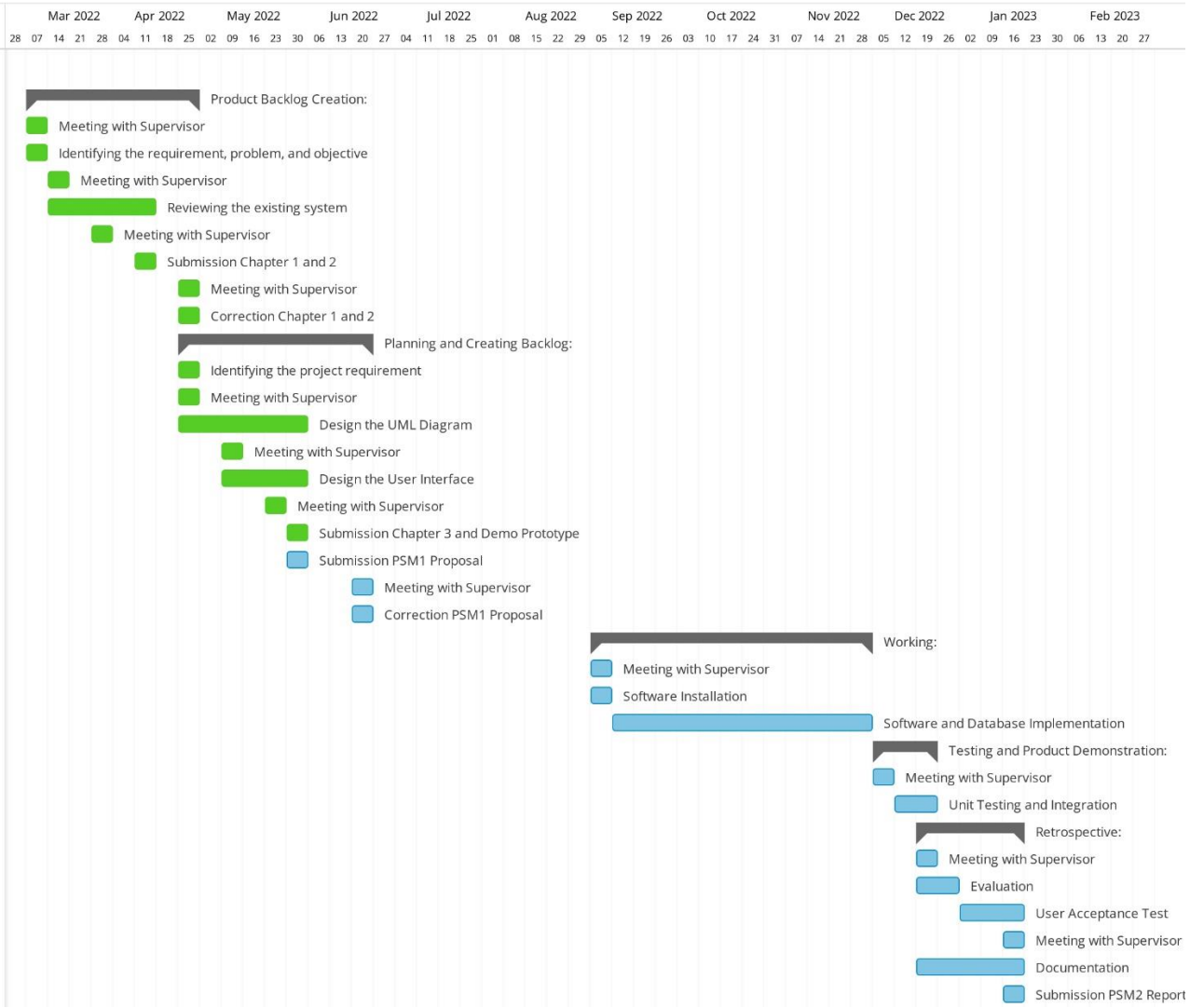
APPENDIX D
GANTT CHART

CB19067_PSM1

Read-only view, generated on 30 May 2022

Instagantt

	ACTIVITIES	ASSIGNEE	EH	START	DUE	%
	Agile (Scrum):		-			0%
	Product Backlog Creation:		-	07/Mar	30/Apr	100%
2	Meeting with Supervisor		-	07/Mar	07/Mar	100%
3	Identifying the requirement, problem, and objective		-	07/Mar	13/Mar	100%
4	Meeting with Supervisor		-	18/Mar	18/Mar	100%
5	Reviewing the existing system		-	19/Mar	15/Apr	100%
6	Meeting with Supervisor		-	01/Apr	01/Apr	100%
7	Submission Chapter 1 and 2		-	15/Apr	15/Apr	100%
8	Meeting with Supervisor		-	25/Apr	25/Apr	100%
9	Correction Chapter 1 and 2		-	26/Apr	30/Apr	100%
	Planning and Creating Backlog:		-	26/Apr	24/Jun	87%
11	Identifying the project requirement		-	26/Apr	29/Apr	100%
12	Meeting with Supervisor		-	29/Apr	29/Apr	100%
13	Design the UML Diagram		-	30/Apr	30/May	100%
14	Meeting with Supervisor		-	11/May	11/May	100%
15	Design the User Interface		-	09/May	30/May	100%
16	Meeting with Supervisor		-	25/May	25/May	100%
17	Submission Chapter 3 and Demo Prototype		-	30/May	30/May	100%
18	Submission PSM1 Proposal		-	03/Jun	03/Jun	0%
19	Meeting with Supervisor		-	20/Jun	20/Jun	0%
20	Correction PSM1 Proposal		-	20/Jun	24/Jun	0%
	Working:		-	09/Sep	04/Dec	0%
22	Meeting with Supervisor		-	09/Sep	09/Sep	0%
23	Software Installation		-	09/Sep	10/Sep	0%
24	Software and Database Implementation		-	12/Sep	04/Dec	0%
	Testing and Product Demonstration:		-	11/Dec	19/Dec	0%
26	Meeting with Supervisor		-	11/Dec	11/Dec	0%
27	Unit Testing and Integration		-	12/Dec	19/Dec	0%
	Retrospective:		-	23/Dec	20/Jan	0%
29	Meeting with Supervisor		-	23/Dec	23/Dec	0%
30	Evaluation		-	23/Dec	30/Dec	0%
31	User Acceptance Test		-	02/Jan	16/Jan	0%
32	Meeting with Supervisor		-	17/Jan	17/Jan	0%
33	Documentation		-	23/Dec	18/Jan	0%
34	Submission PSM2 Report		-	20/Jan	20/Jan	0%



APPENDIX E
USER ACCEPTANCE TEST (UAT) FORM

Login

Test Case ID: TC-B2C-01	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Login	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Register user account	**Test Execution Date:** 28/12/2022
Description: Register new user account by entering name, email address, password, confirm password, and user type.	
Precondition: None	
Dependencies: None	

Steps	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass / Fail)	Comments
1.	Navigate to register interface		System display register interface	Same as expected result	Pass	
2.	Enter the name, email address, password, confirm password, and user type	Name: Perniagaan Peti Sejuk dan Elektrik Fuji Email Address: jinyew5730@gmail.com Password: tan4675730			Pass	

		Confirm Password: tan4675730 User Type: company				
3.	Click the register button		System navigate user to the quick search interface	Same as expected result	Pass	

Test Case ID: TC-B2C-02	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Login	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Login account	**Test Execution Date:** 28/12/2022
Description: Login the application by inserting email address and password.	
Precondition: The email address and password must be registered.	
Dependencies: None	

Steps	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Status (Pass / Fail)**	**Comments**
1.	Navigate to login interface		System display login interface	Same as expected result	Pass	
2.	Enter the email address and password	Email Address: jinyew5730@gmail.com Password: tan4675730			Pass	

3.	Click the login button		System navigate user to the quick search interface	Same as expected result	Pass	

Manage Quick Search

Test Case ID: TC-B2C-03	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Manage Quick Search	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Search brand	**Test Execution Date:** 28/12/2022
Description: Search brand by inserting brand in quick search.	
Precondition: User successful login to the application.	
Dependencies: None	

Steps	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Status (Pass / Fail)**	**Comments**
1.	Navigate to quick search interface		System displays quick search interface	Same as expected result	Pass	
2.	Enter the brand	Brand: Daikin			Pass	

3.	Click the search button		System navigate user to the quick search interface	Same as expected result	Pass	

Test Case ID: TC-B2C-04	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Manage Quick Search	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Display Search Result	**Test Execution Date:** 28/12/2022
Description: Search result displayed in quick search after search the brand.	
Precondition: User successful login to the application.	
Dependencies: None	

Steps	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Status (Pass / Fail)**	**Comments**
1.	Navigate to quick search interface		System displays quick search interface	Same as expected result	Pass	
2.	Enter the brand	Brand: Daikin			Pass	

3.	Click the search button		System navigate user to the quick search interface	Same as expected result	Pass	
4.	Click the OK button		System displays the search results	Same as expected result	Pass	

Manage Report

Test Case ID: TC-B2C-05	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Manage Report	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Generate report for the brand	**Test Execution Date:** 28/12/2022
Description: Generate report by inserting the brand.	
Precondition: User successful login to the application and the user must be company user.	
Dependencies: None	

Steps	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass / Fail)	Comments
1.	Navigate to report interface		System displays report interface	Same as expected result	Pass	
2.	Enter the brand	Brand: Daikin			Pass	
3.	Click the search button		System navigate user to the report	Same as expected result	Pass	

			interface and display the report			
4.	Click the print button		System displays the print option	Same as expected result	Pass	
5.	Click the print button in the print option		System download the report as PDF	Same as expected result	Pass	

Test Case ID: TC-B2C-06	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Manage Report	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Visualize Statistics in Report	**Test Execution Date:** 28/12/2022
Description: Visualize statistics about total tweets, sentiment analysis, average sentiment score, and total sentiment in report after search the brand.	
Precondition: User successful login to the application and the user must be company user.	
Dependencies: None	

Steps	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Status (Pass / Fail)**	**Comments**
1.	Navigate to report interface		System displays report interface	Same as expected result	Pass	
2.	Enter the brand	Brand: Daikin			Pass	
3.	Click the search button		System navigate user to the report interface and	Same as expected result	Pass	

			visualized the statistics of the total tweets, sentiment analysis, average sentiment score, and total sentiment.			

Test Case ID: TC-B2C-07	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Manage Report	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Visualize Graph in Report	**Test Execution Date:** 28/12/2022
Description: Graph of total tweets per day, positive sentiment per day, negative sentiment per day, and neutral sentiment per day are visualized in report after search the brand.	
Precondition: User successful login to the application and the user must be company user.	
Dependencies: None	

Steps	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Status (Pass / Fail)**	**Comments**
1.	Navigate to report interface		System displays report interface	Same as expected result	Pass	
2.	Enter the brand	Brand: Daikin			Pass	
3.	Click the search button		System navigate user to the report interface and	Same as expected result	Pass	

			visualized the graph of total tweets per day, positive sentiment per day, negative sentiment per day, and neutral sentiment per day.			

Test Case ID: TC-B2C-08	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Manage Report	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Visualize Word Cloud in Report	**Test Execution Date:** 28/12/2022
Description: Visualized the word Cloud of the brand in report after search the brand.	
Precondition: User successful login to the application and the user must be company user.	
Dependencies: None	

Steps	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Status (Pass / Fail)**	**Comments**
1.	Navigate to report interface		System displays report interface	Same as expected result	Pass	
2.	Enter the brand	Brand: Daikin			Pass	
3.	Click the search button		System navigate user to the report interface and	Same as expected result	Pass	

			visualized the word cloud.			

Test Case ID: TC-B2C-09	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Manage Report	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Visualize Pie Chart in Report	**Test Execution Date:** 28/12/2022
Description: Visualized pie chart of the sentiment in report after search the brand.	
Precondition: User successful login to the application and the user must be company user.	
Dependencies: None	

Steps	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Status (Pass / Fail)**	**Comments**
1.	Navigate to report interface		System displays report interface	Same as expected result	Pass	
2.	Enter the brand	Brand: Daikin			Pass	
3.	Click the search button		System navigate user to the report interface and	Same as expected result	Pass	

			visualized the pie chart of the sentiment.			

Manage User

Test Case ID: TC-B2C-10	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Manage User	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Change username	**Test Execution Date:** 28/12/2022
Description: Change username by insert name.	
Precondition: User successful login to the application.	
Dependencies: None	

Steps	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Status (Pass / Fail)**	**Comments**
1.	Navigate to user profile interface		System displays user profile interface	Same as expected result	Pass	
2.	Enter the name	Name: Peti Sejuk & Elektrik Fuji			Pass	

3.	Click the Save User button		System refresh the user profile interface and displays the updated name	Same as expected result	Pass	

Test Case ID: TC-B2C-11	**Test Designed By:** Tan Jia Hui
Test Priority (Low/Medium/High): High	**Test Designed Date:** 17/12/2022
Module Name: Manage User	**Test Executed By:** Perniagaan Peti Sejuk dan Elektrik Fuji
Test Title: Change password	**Test Execution Date:** 28/12/2022
Description: Change password by inserting old password, new password, and confirm new password.	
Precondition: User successful login to the application.	
Dependencies: None	

Steps	**Test Steps**	**Test Data**	**Expected Result**	**Actual Result**	**Status (Pass / Fail)**	**Comments**
1.	Navigate to user profile interface		System displays user profile interface	Same as expected result	Pass	
2.	Click the Change Password		System navigate user to the Click Password section of the user profile interface	Same as expected result	Pass	

3.	Enter old password, new password, and confirm new password.	Old Password: tan4675730 New Password: tanshop5730 Confirm New Password: tanshop5730			Pass	
4.	Click the Update Password button		System notify user the password is successfully updated	Same as expected result	Pass	
5.	Click the OK button		System back to the Click Password section of the user profile interface	Same as expected result	Pass	