# Design and Build a Sentiment Prediction System for Public Opinion Regarding the 2024 Presidential Election Using Google Natural Language

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***Abstrak***

*Dalam era digital saat ini, media sosial telah menjadi platform utama bagi masyarakat untuk menyampaikan pandangan dan opini politik mereka. Penelitian ini bertujuan untuk menganalisis sentimen publik menjelang Pilpres 2024 di Indonesia dengan memanfaatkan teknologi Pemrosesan Bahasa Alami. Berdasarkan analisis data media sosial, ditemukan berbagai sentiment positif, netral, dan negatif terhadap pasangan calon presiden, dengan kecenderungan sentimen positif yang lebih dominan. Sistem prediksi yang dikembangkan telah diuji melalui Post-Study System Usability Questionnaire dan pengujian Black Box, yang menunjukkan kemudahan dalam pengambilan data, visualisasi grafik, dan pengelolaan sentimen. Penelitian ini memberikan wawasan penting tentang dinamika opini politik dan merekomendasikan pengembangan lebih lanjut untuk meningkatkan akurasi analisis serta integrasi teknologi terbaru, yang dapat membuka peluang bagi sistem informasi yang lebih canggih di masa depan.*

***Kata kunci:*** *sentimen, pilpres, Bahasa alami, Post-Study System Usability Questionnaire, Black Box*

***Abstract***

*In today's digital era, social media has become the primary platform for the public to express their political views and opinions. This study aims to analyze public sentiment ahead of the 2024 Presidential Election in Indonesia by utilizing Natural Language Processing (NLP) technology. Based on the analysis of social media data, various positive, neutral, and negative sentiments toward the presidential candidates were identified, with a dominant tendency towards positive sentiment. The developed prediction system was tested through the Post-Study System Usability Questionnaire and Black Box testing, which demonstrated ease in data retrieval, graph visualization, and sentiment management. This study provides important insights into the dynamics of political opinions and recommends further development to enhance analysis accuracy and integrate the latest technologies, which could open opportunities for more advanced information systems in the future.*

***Keywords :*** *sentiment, presidential election, natural language, Post-Study System Usability Questionnaire, Black Box*

## 1. Introduction

The development of digitalization has changed the way society shares views and opinions, particularly through social media. Today, these platforms have become the primary channels for the public to voice their political opinions, especially concerning presidential elections [1]. The textual data generated by social media users, such as comments and online discussions, contain various sentiments that can reflect public opinion toward presidential candidates. The main issue that arises is how to analyze these sentiments effectively in order to provide valuable insights for stakeholders such as presidential candidates, political parties, and the government, enabling them to respond more accurately to political issues.

Previously, various studies have used sentiment analysis techniques based on Natural Language Processing (NLP) to understand public sentiment. A study by Maulana Malik Ibrahim

(2023) designed an information dissemination system through online news that is widespread in society, where it is difficult to distinguish between negative and positive news. Therefore, there is a need for classification of public sentiment regarding the implementation of elections using news article data from media X [2]. However, the application of technologies like Google Natural Language to categorize and analyze text data related to the presidential election remains limited. Hence, this study aims to develop a sentiment prediction system using NLP to analyze textual data during the 2024 Presidential Election campaign in Indonesia. This system is expected to provide a deeper understanding of shifts in public opinion, as well as assist in better political decision-making and more effective responses to emerging issues.

## 2. Research Methodology

This study is divided into several stages in its execution. This division is intended to make the development of the integrated web-based population management information system more systematic. The depiction of these stages can be seen in the following figure.

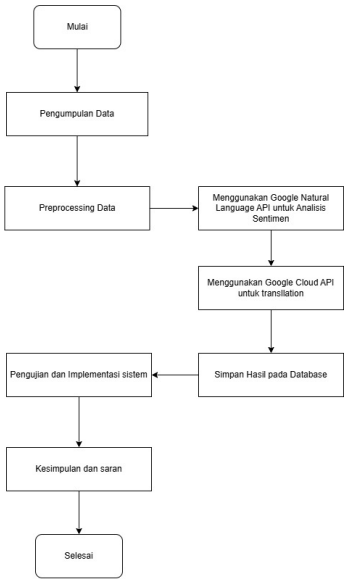



Figure 1 When the user enters a keyword to search

Figure 1 illustrates an overview of the process when the user enters a keyword to search, and the system retrieves data from social media X and the Liputan 6 news site. The obtained data is processed to identify positive, negative, or neutral sentiment. The analysis results are then displayed on the website, which can be accessed by users and admins through the candidate pair menu. All analyzed data is stored in the database, making it easier to monitor public sentiment trends throughout the 2024 Presidential Election campaign to support political decision-making.

This study begins with data collection from Twitter, Facebook, YouTube, and news portals using web scraping and APIs. The collected data is then processed through a preprocessing stage, including tokenization, stopword removal, and stemming. The cleaned text is analyzed using the Google Natural Language API, with the help of the Google Cloud Translation API for non-Indonesian or non-English text. The sentiment analysis results are classified into positive, neutral, or negative, and are then stored in MongoDB. After the system is developed, testing is conducted using Black Box Testing and the Post-Study Questionnaire to evaluate performance and user satisfaction.

### 2.1 Research Overview

The Public Sentiment Prediction System related to the 2024 Presidential Election, using Google Natural Language, is designed to facilitate the modeling and presentation of public sentiment information [3].

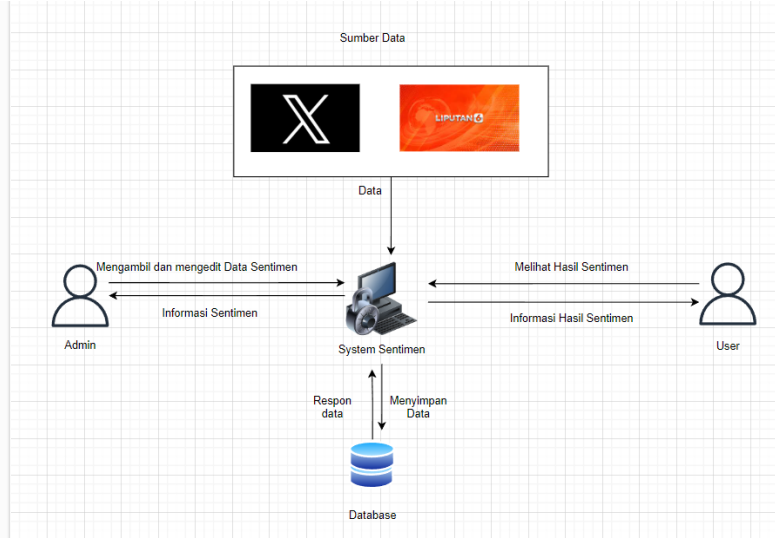



Figure 2 illustrates an overview of the process

Figure 2 illustrates an overview of the process when the user enters a keyword to search, and the system retrieves data from social media X and the Liputan 6 news site. The obtained data is processed to identify positive, negative, or neutral sentiment. The analysis results are then displayed on the website, which can be accessed by users and admins through the candidate pair menu. All analyzed data is stored in the database, making it easier to monitor public sentiment trends throughout the 2024 Presidential Election campaign to support political decision-making.

### 2.2 The Data Collection Methods

Data collection for the development of the Public Sentiment Prediction System related to the 2024 Presidential Election was conducted using two main sources: the X social media API and web scraping techniques on the Liputan 6 news site. The data collection process employed automation methods, where custom scripts were created to extract information from web pages using web scraping techniques [4]. The data collected over a period of three months, from November 1, 2023, to January 1, 2024, focused on primary data related to public sentiment toward the 2024 Presidential Election. This primary data includes tweets posted by X social media users, as well as articles published on Liputan 6, containing relevant information about public opinions on the presidential candidates. This data collection technique aims to ensure the completeness and diversity of the data used in sentiment analysis [5], supporting the development of an accurate and effective system to monitor the dynamics of public opinion during the 2024 Presidential Election campaign.

### 2.3 Testing

This study was tested using the Black Box Testing method, which involved scenario-based testing, and the Post-Study System Usability Questionnaire. The tests were conducted to ensure the system functioned properly and met user expectations, focusing on its performance and usability. The results from both testing methods helped identify areas for improvement, ensuring the system was effective and user-friendly [6].

## 3. Literature Review

The literature review discusses theories related to the writing of research reports.

### 3.1 Website

The World Wide Web (WWW) is an information access system on the internet created in 1991 by Tim Berners-Lee at CERN [7]. Its initial purpose was to facilitate the sharing of information among scientists. The web uses the HTTP protocol over TCP/IP and documents in HTML format stored on web servers, accessed through a browser. The concept of hypertext allows users to click on highlighted text to navigate between documents. Access to web pages is done by specifying a URL (Uniform Resource Locator) [8].

### 3.2 Social Media "X"

Social media platform X is a digital platform that allows users to share information, opinions, and content in the form of text, images, or videos. This platform is known for its ability to accelerate the dissemination of news and trends in real time, as well as enabling direct interaction between users, public figures, and organizations. X offers features such as tweets (for sharing brief thoughts), retweets, and hashtags (#) to categorize specific topics. As a highly popular social media platform, X plays a significant role in shaping public opinion, including in political and social contexts. Users can follow specific accounts to receive updates or participate in global discussions. [9].

### 3.3 Framework Flask

Flask is a lightweight and easy-to-use Python-based web framework for building web applications. Designed with a minimalist approach, Flask provides developers with the freedom to choose various components and libraries based on the application's needs. Flask uses the WSGI (Web Server Gateway Interface) architecture and enables the rapid creation of web applications with basic features such as routing, templating, and form handling. Flask also supports integration with various extensions, such as databases and authentication, to enhance functionality. Due to its simplicity and flexibility, Flask is widely used for prototyping, small applications, large-scale applications, and as a foundation for learning web development. [10].

### 3.4 MongoDB

MongoDB is a NoSQL database management system that uses a document-based data structure in BSON (Binary JSON) format. Unlike relational databases, MongoDB stores data in collections and flexible documents, allowing for easy management of unstructured data. MongoDB supports high scalability and good performance, making it ideal for applications that require the storage of large and complex data, such as modern web applications, big data, and analytics. With features like automatic replication and sharding, MongoDB also provides high reliability and data availability in various distributed environments [11].

### 3.5 Google Natural Language

Google Natural Language is a service from Google Cloud that provides text analysis capabilities using Natural Language Processing (NLP) technology. This service allows users to analyze and understand the structure, meaning, and sentiment of text. Google Natural Language can be used for entity extraction (such as names of people or locations), syntactic analysis, and sentiment classification (positive, negative, or neutral). This technology supports multiple languages and can be applied to various applications, such as public opinion analysis, chatbots, and large-scale text processing. The service also allows easy integration with various Google Cloud platforms [12].

### 3.6 Google Cloud Translation API

Google Cloud Translation API is a service from Google Cloud that enables users to automatically translate text between languages with high accuracy. This service supports over 100 languages and uses machine learning technology to provide fast and reliable translation results. The Cloud Translation API can be used for various applications, including website content translation, mobile applications, and text analysis. Additional features, such as automatic language detection, allow the system to recognize the source language without manual specification. This service is designed for high scalability, making it suitable for applications with large translation volumes [13].

### 3.7 Black-Box Testing Method

Black Box Testing is a software testing method where the tester focuses on the system's functionality without examining the source code or internal structure. This testing concentrates on the inputs provided and the outputs generated by the system to ensure that the application behaves as expected according to the specifications. Testers perform tests based on functional and non-functional requirements, including validation tests, boundary tests, and performance tests. Black Box Testing is often used in the final stages of software development to ensure that the application meets user needs and functions properly in different environments, without considering its internal logic [14].

### 3.8 Post-Study System Usability Questionnaire (PSSUQ)

The Post-Study System Usability Questionnaire (PSSUQ) is a testing method used to evaluate the user experience with a system after they have used it. PSSUQ gathers user feedback through a series of questions designed to assess aspects such as ease of use, satisfaction, effectiveness, and efficiency of the system. Using a Likert scale, users provide ratings for various system features based on their perceptions. The results of the PSSUQ offer valuable insights into how the system can be improved from the user's perspective and help developers identify areas that need improvement in the system's interface and functionality [15].

## 4. Results and Discussion

The research "Design and Development of a Sentiment Prediction System for Public Opinion on the 2024 Presidential Election Using Google Natural Language" has been implemented. Below are the results of the implementation that has been carried out.

### 4.1 Implementation

The research "Design and Development of a Sentiment Prediction System for Public Opinion on the 2024 Presidential Election Using Google Natural Language" in Chapter IV discusses the implementation that has been realized. Below are the results of the implementation that has been carried out.

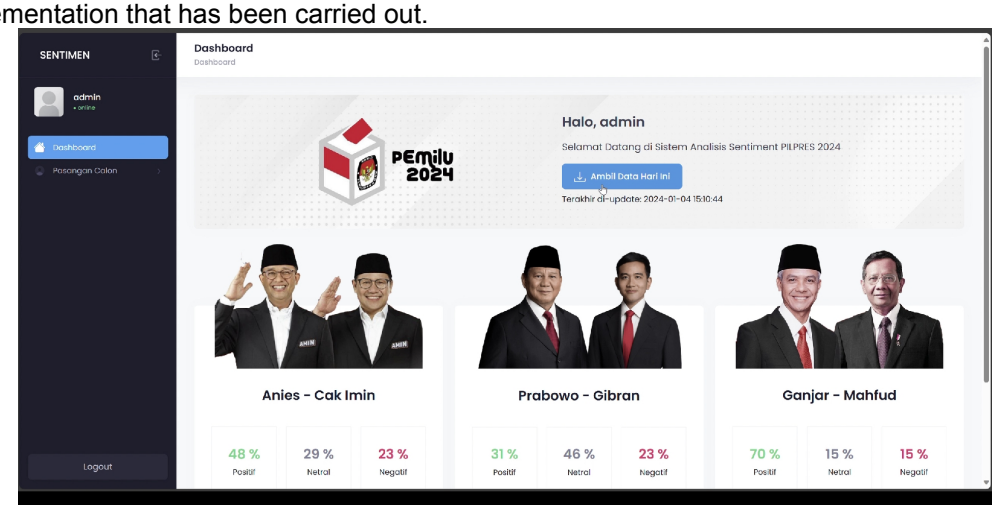



Figure 3 Admin Dashboard

Figure 3 shows the display of the User Dashboard, which contains sentiment prediction results that can be viewed by both the User and the Admin. The Admin is responsible for retrieving data from social media and news websites. The Admin Data Collection Interface is a page used to extract data from tweet sources and news website posts available in the system.

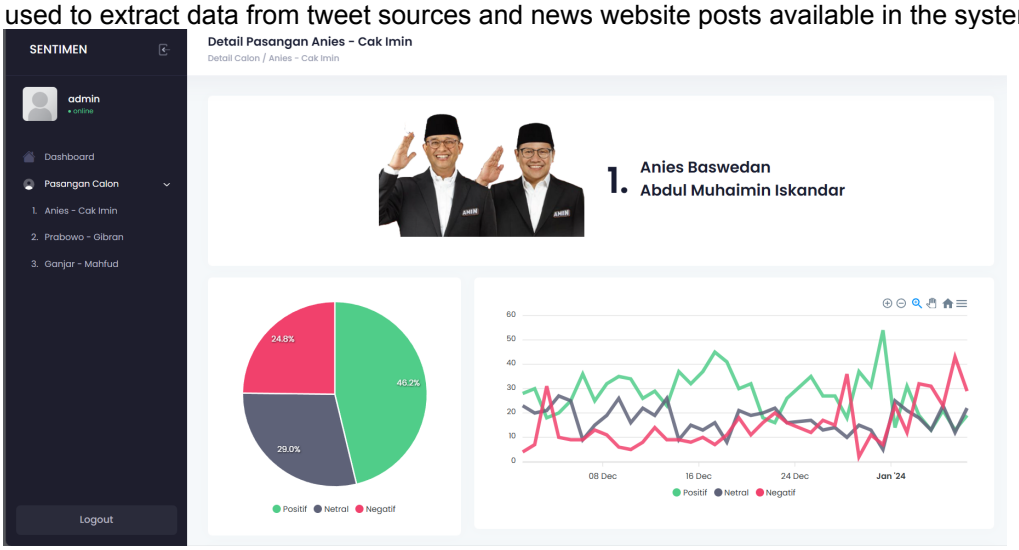



Figure 4 Candidate Pair Interface

Figure 4 shows the display of the Candidate Pair Interface. This interface presents a list of registered presidential candidate pairs, a chart showing the results of public sentiment, and several actions such as editing sentiment data, downloading files, and deleting sentiment data.

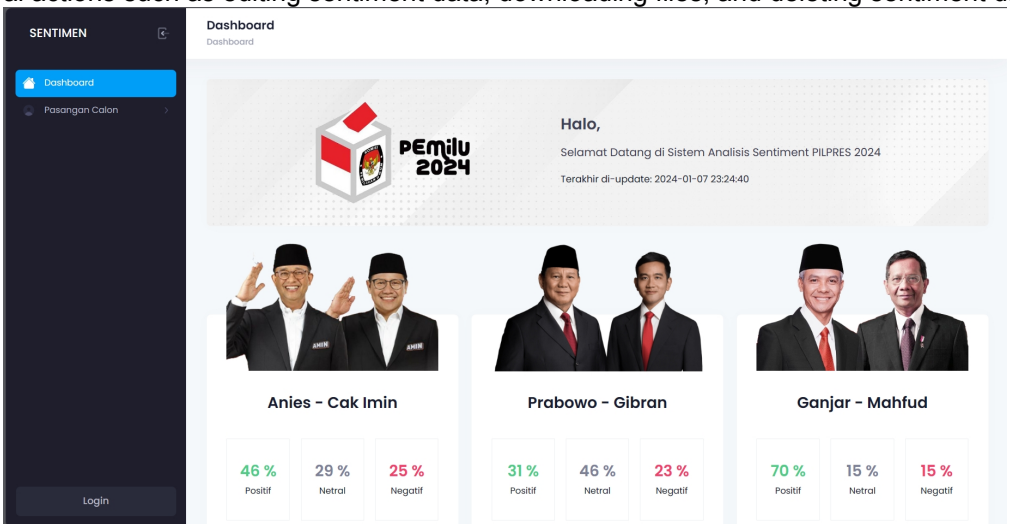



Figure 5 User Dashboard

Figure 5 shows the display of the User Dashboard, which contains the sentiment prediction results that can be viewed by the User. The data available for the user to view includes the names of the 2024 presidential candidate pairs, their photos, and the sentiment percentages displayed on the website.


Figure 6 Candidate Pair Interface for Users

Figure 6 presents the display of the Candidate Pair Interface for the user, which contains data that can be viewed by the User. The data available for the user includes the data source, sentiment posting date, a chart, the sender, and the sentiment data, which is categorized as positive, negative, or neutral.

## 4.2 System Testing

System testing is an essential step to evaluate the readiness of the system and ensure that it operates as intended. The sentiment prediction system for public opinion related to the 2024 Presidential Election was tested using Google Natural Language, along with Black Box Testing and the Post-Study System Usability Questionnaire (PSUQ). Below are the results of the system testing for the 2024 Presidential Election sentiment prediction system.

### 4.2.1 Black Box Testing

The Black Box Testing section discusses the results of testing conducted on all modules within the system for public sentiment related to the 2024 Presidential Election,

specifically the user interface for both users and admins. Below are the results of the tests for each module.

Table 1 Admin Testing on the Sentiment Website

| Test Scenario | Expected Result | Test Result | Conclusion |
|---|---|---|---|
| - Login as Admin<br>- Go to the dashboard page<br>- Click the "Retrieve Data" button on the dashboard | The admin role displays a data retrieval pop-up and the system shows a success confirmation | The admin role successfully displays the data retrieval pop-up and the system successfully shows the success confirmation | Met |
| Login as Admin<br>- Click the "Candidate Pair" menu<br>- Select a candidate pair on the candidate pair page | The system displays data for the selected candidate pair in the admin's menu | The system successfully displays the data for the selected candidate pair in the admin's menu | Met |
| - Login as Admin<br>- Click the "Candidate Pair" menu<br>- Click the "Edit Data" button next to the data table<br>- Click the "Edit" button and the admin can change the sentiment data to positive, negative, or neutral<br>- Click "Save" | The system displays the edited data and shows a success confirmation. | The system successfully displays the edited data and shows a success confirmation. | Met |
| - Login as Admin<br>- Go to the "Candidate Pair" page<br>- Click the "Delete" button next to the sentiment data details | The system displays a success confirmation and removes the data from the sentiment data table. | The system successfully displays the success confirmation and removes the data from the sentiment data table. | Met |
| - Login as Admin<br>- Go to the "Candidate Pair" page<br>- Click the "Filter Data" button on the candidate pair page | The admin role successfully displays filters for positive, negative, and neutral sentiments | The admin role successfully displays filters for positive, negative, and neutral sentiments. | Met |

Table 1 shows the testing of the Sentiment System carried out by the Admin role. Five test scenarios were executed, all of which met the expected results. The test process for the admin role can be seen in Table 1.

Table 2 User Testing on the Sentiment Website

| Test Scenario | Expected Result | Test Result | Conclusion |
|---|---|---|---|
| -Masuk kedalam website sentiment sebagai pengguna<br>-Menuju halaman dashboard | The system successfully displays the candidate pair's image, name, and sentiment percentage on the dashboard | The system successfully displays the candidate pair's image, name, and sentiment percentage on the website | Met |
| - Log into the sentiment website as a user<br>- Go to the "Candidate | The system displays data for the selected candidate pair in the | The system successfully displays data for the selected candidate pair | Met |

| | | | |
|---|---|---|---|
| Pair" page<br>- Display data on the candidate pair page | user's menu. | in the user's menu. | |
| - Log into the sentiment website as a user<br>- Go to the "Candidate Pair" page<br>- Click the "Filter Data" button on the candidate pair page | The system successfully displays filters for positive, negative, and neutral sentiments selected by the user. | The system successfully displays filters for positive, negative, and neutral sentiments selected by the user. | Met |

Table 2 shows the testing of the Sentiment System carried out by the User role. Three test scenarios were executed, and all of them met the expected results. The test process for the user role can be seen in Table 2.

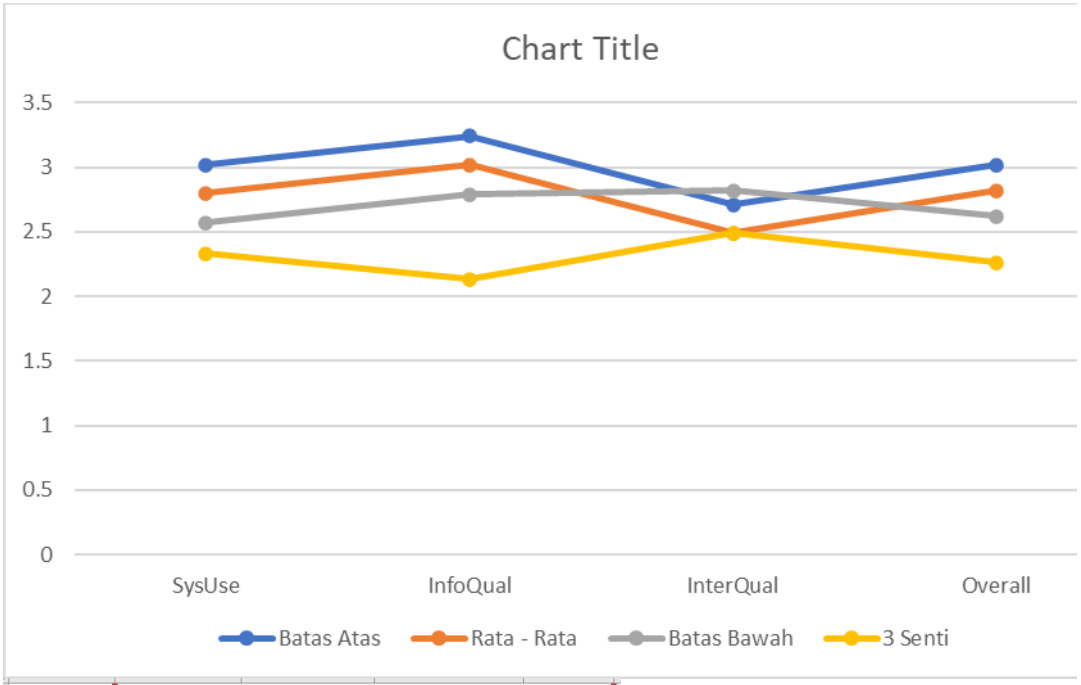
### 4.2.2 Post-Study System Usability Questionnaire Testing

The Post-Study System Usability Questionnaire (PSSUQ) testing discusses the evaluation of the overall features of the Public Sentiment System related to the 2024 Presidential Election using the PSSUQ method. PSSUQ is a questionnaire used to assess and measure the level of user satisfaction with a system. There are three versions of PSSUQ: PSSUQ Version 1 with 18 questions, PSSUQ Version 2 with 19 questions, and the latest PSSUQ Version 3, which consists of 16 questions. The testing for this system was carried out using PSSUQ Version 3.

| Pertanyaan/ Respoden | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | P11 | P12 | P13 | P14 | P15 | P16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| R2 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| R3 | 1 | 2 | 2 | 1 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 2 |
| R4 | 1 | 2 | 2 | 2 | 3 | 6 | 3 | 1 | 3 | 4 | 4 | 3 | 2 | 2 | 1 | 1 |
| R5 | 2 | 4 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 1 |
| R6 | 2 | 2 | 1 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 |
| R7 | 1 | 2 | 2 | 1 | 3 | 2 | 3 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 1 |
| R8 | 2 | 1 | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 3 | 2 | 1 | 2 | 2 |
| R9 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 3 | 2 | 3 | 1 | 2 | 3 | 2 | 2 | 2 |
| R10 | 3 | 2 | 1 | 2 | 4 | 5 | 3 | 2 | 3 | 2 | 3 | 3 | 1 | 4 | 3 | 1 |
| R11 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 3 | 3 | 2 |
| R12 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 4 | 2 | 4 | 2 |
| R13 | 2 | 2 | 5 | 6 | 5 | 5 | 4 | 3 | 3 | 2 | 4 | 2 | 2 | 3 | 2 | 1 |
| R14 | 2 | 1 | 3 | 2 | 3 | 3 | 2 | 1 | 2 | 3 | 4 | 3 | 4 | 2 | 3 | 1 |
| R15 | 2 | 3 | 4 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 |
| R16 | 2 | 3 | 3 | 2 | 4 | 2 | 2 | 2 | 3 | 2 | 4 | 4 | 3 | 3 | 4 | 1 |
| R17 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 4 | 3 | 3 | 2 |
| R18 | 1 | 3 | 4 | 2 | 4 | 2 | 3 | 4 | 3 | 2 | 2 | 3 | 4 | 2 | 1 | 1 |
| R19 | 2 | 4 | 2 | 3 | 2 | 4 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 4 | 2 | 1 |
| R20 | 2 | 4 | 5 | 4 | 4 | 4 | 3 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| R21 | 2 | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 4 | 3 | 1 | 1 |
| R22 | 1 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 2 | 2 | 3 | 1 | 2 | 2 | 3 | 3 |
| R23 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 |
| R24 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 3 | 3 |
| R25 | 3 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 3 |
| R26 | 1 | 2 | 3 | 5 | 2 | 1 | 3 | 2 | 1 | 3 | 1 | 2 | 4 | 2 | 1 | 1 |
| Rata-Rata | 1.96 | 2 | 2.38 | 2.46 | 2.5 | 2.27 | 2.08 | 2.27 | 2.19 | 1.77 | 2.12 | 2.38 | 2.65 | 2.69 | 2.12 | 1.92 |
| SysUse | 2,33 | | | | | | | | | | | | | | | |
| InfoQual | 2.13 | | | | | | | | | | | | | | | |
| InterQual | 2.49 | | | | | | | | | | | | | | | |
| Overall | 2.26 | | | | | | | | | | | | | | | |

Figure 7 Test Results Using the PSSUQ Method

Figure 7 shows the test results of the system using the PSSUQ method. The testing involved 25 respondents, consisting of 10 local residents and 15 students. The test results were then compared with the PSSUQ assessment norms. The comparison between the test results and the PSSUQ evaluation norms can be seen in Figure 6.




| | Batas Atas | Rata - Rata | Batas Bawah | 3 Senti |
|---|---|---|---|---|
| SysUse | 3.02 | 2.8 | 2.57 | 2.33 |
| InfoQual | 3.24 | 3.02 | 2.79 | 2.13 |
| InterQual | 2.71 | 2.49 | 2.82 | 2.49 |
| Overall | 3.02 | 2.82 | 2.62 | 2.26 |

Figure 8 Graph of Test Results Using the PSSUQ Method

Figure 8 illustrates the graphical visualization of the system's test results using the PSSUQ method compared to the PSSUQ evaluation norms. Based on the test graph, there are three scales that received better-than-average scores compared to the PSSUQ evaluation norms: System Usefulness, Information Quality, and Overall Score. One scale, Interface Quality, received a score equal to the average norm. This indicates that the system was viewed positively and considered successful by the test participants.

### 4.2.3 Test Results and Analysis

The testing by users on the sentiment website has proven successful. Users were able to display data, show sentiment charts and details, and apply filters for positive, negative, and neutral sentiment according to the user's needs. The overall sentiment prediction system shows good readiness in accommodating user needs, both in terms of functionality and user interface.

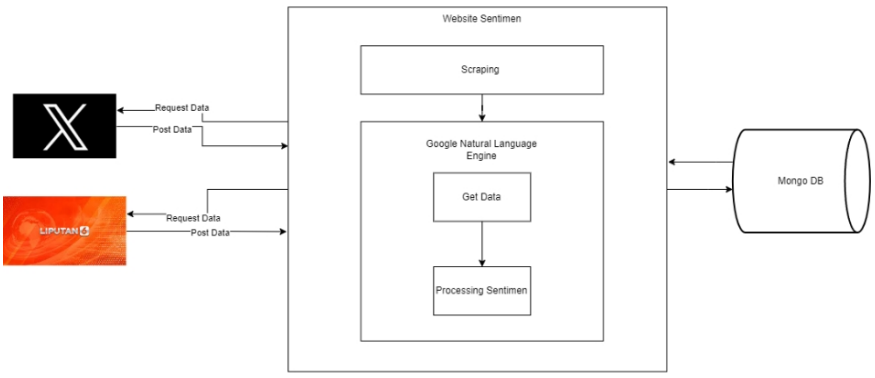



Figure 9 Data Scraping

The obtained HTML data had many distortions, such as ads, service bars, marketing banners, and others. Data cleaning was carried out to retrieve the main content from the body of the HTML. The publication date of the articles was extracted from specific locations within the digital media website's structure. Each digital media website and social media platform has different placements for the publication date. Some are embedded in the URL, while others are

inserted within the content of the article in the HTML body. Therefore, each digital media's structure and characteristics were handled with specific data extraction processes. The scraping process took place over a period of 3 months, from November 1, 2023, to January 31, 2024.

Table 3 Data Scraping Results

| Candidate | Positive Sentiment | Neutral Sentiment | Negative Sentiment | Total Tweets and Articles |
|---|---|---|---|---|
| Anies – Cak Imin | 1107 (45,7%) | 741 (30,6%) | 574 (23,7%) | 2,422 |
| Prabowo – Gibran | 691 (31,4%) | 1025 (46,5%) | 486 (22,1%) | 2,202 |
| Ganjar – Mahfud | 1467 (69,8%) | 312 (14,9) | 322 (15,3%) | 2,101 |
| Total sentiment | | | | 6,728 |

Table 3 shows the sentiment analysis data for the three presidential candidates for the 2024 election: Anies – Cak Imin, Prabowo – Gibran, and Ganjar – Mahfud. From the total of 6,728 tweets and articles observed, the candidate Ganjar – Mahfud received a significant positive sentiment, with 69.8% positive sentiment. Meanwhile, Prabowo – Gibran received a high percentage of neutral sentiment (46.5%). The Anies – Cak Imin pair had a substantial amount of positive sentiment (45.7%).

Based on the research findings, it can be concluded that the sentiment prediction system for public opinion related to the 2024 Presidential Election, developed using Google Natural Language API, has functioned well. Key points from this conclusion include:

a. The system effectively collects public opinion data from platforms like X (Twitter) and Liputan6 using keywords stored in MongoDB.
b. The scraping technique and applied APIs enable data extraction that is relevant to ongoing issues.
c. The data preprocessing steps (tokenization, stopword removal, stemming, and filtering) successfully improved the quality of the text to be analyzed, thus enhancing sentiment prediction accuracy.
d. Google Cloud Translation API was used to translate non-Indonesian or non-English texts, ensuring that all data could be adequately analyzed by the system.
e. Google Natural Language API demonstrated quick and accurate sentiment analysis, categorizing data into three main classes: positive, neutral, and negative. The API was capable of recognizing emotions and context in the text, yielding sentiment values that align with public opinion.
f. MongoDB was used as the primary storage, not only for storing keywords used in data searches but also for storing sentiment analysis results. This allowed the system to manage data more efficiently and flexibly.
g. The system testing using Black Box Testing showed that all features functioned as expected, with no errors in data processing, API integration, or database storage and retrieval.
h. The user evaluation through the Post-Study Questionnaire showed that this system could help understand public opinion on the 2024 Presidential Election in a more systematic and data-driven way.

Overall, this research successfully developed a sentiment prediction system that can automatically analyze public opinion. By leveraging technologies such as Google Natural Language API, Google Cloud Translation API, and MongoDB, the system can aid in monitoring political trends and provide valuable insights for various stakeholders, such as academics, political analysts, and the media.

## 5. Conclusion

The system has also undergone testing using the Google Natural Language Post-Study System Usability Questionnaire (PSSUQ). This testing was conducted to evaluate the system's feasibility in terms of user needs and satisfaction. The test involved 15 participants from the student community and 11 participants from the local Dalung area. The results of the testing revealed that the system scored 2.33 on the System Usefulness (SysUse) subscale, 2.13 on the Information Quality (InfoQual) subscale, 2.49 on the Interface Quality (InterQual) subscale, and 2.26 on the Overall Score (Overall) subscale. These results indicate that three subscales received better-than-average ratings compared to the assessment norms: System Usefulness (SysUse), Information Quality (InfoQual), and Overall Score (Overall), while one subscale,

Interface Quality (InterQual), received a score equal to the average norm. Therefore, it can be concluded that the system is accepted and considered successful by the test participants.

The Public Sentiment Prediction System related to the 2024 Presidential Election has also gone through testing using the Google Natural Language Black Box Testing, which was applied to assess the system's ability to handle varying inputs without exposing its internal details. The results of the black box testing for the sentiment prediction system on the SENTIMEN website presented positive conclusions. The successful testing by the admin role demonstrated that the system was able to meet all testing scenarios effectively. The admin was able to carry out tasks such as data retrieval, displaying charts and sentiment data details, editing sentiment, deleting sentiment data, and applying sentiment filters (positive, negative, and neutral). Testing by users on the SENTIMEN website was also successful, with users being able to smoothly display data, charts, and sentiment details. Users were also able to apply sentiment filters according to their needs.

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