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# Application of the Naive Bayes Algorithm in Twitter Sentiment Analysis of 2024 Vice Presidential Candidate Gibran Rakabuming Raka using Rapidminer

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**Abstract**: In the current era of digital democracy, social media sentiment analysis has become a relevant method for understanding public views of political figures. As one of the leading social media platforms, Twitter provides a public space for sharing opinions and expressions regarding political issues. This research aims to classify and measure the accuracy of people's responses to the positive and negative sides. Sentiment analysis was carried out using the Naïve Bayes method using a dataset of 3223 tweets. The final results of this research show that implementing the Naïve Bayes Method in sentiment analysis regarding political dynasty polemics, especially regarding the 2024 Cawapres Gibran Rakabuming Raka, provides an accuracy value of 82.19%. Of the 1696 negative and 112 positive sentiments predicted, there were 462 harmful and 953 positive predicted data. These results indicate that most public responses tend to be detrimental to the Constitutional Court's (MK) decision, which grants political legitimacy to Gibran Rakabuming Raka as the 2024 vice-presidential candidate.

**Keywords**: Sentiment; Twitter; Vice President; Naïve Bayes; Rapidminer.

## 1. Introduction

Gibran Rakabuming Raka, born in Solo, Central Java, on October 1, 1987, is the eldest son of President Joko Widodo. Since childhood, Gibran has lived in Surakarta, but during middle school, he moved to Singapore to continue his education at Orchid Park Secondary School in 2002. Subsequently, in 2007, Gibran graduated from the Management Development Institute of Singapore (MDIS) with a B . Sc (Hons) degree and pursued further studies in the Insearch program at the University of Technology Sydney (UTS Insearch), Sydney, Australia, graduating in 2010. He was chairman of the Indonesian Culinary Services Association (APJBI) in Solo City. In September, Gibran registered as a member of the PDI-P, the same political party as Jokowi, to run for mayor. The party officially supported Gibran as a mayoral candidate in July 2020, pairing him with the city council chairman, Teguh Prakosa. Gibran won the election after receiving 86.53% of the votes (225,451).

Gibran and his running mate, Teguh Prakosa, spent nearly 30 times more on their campaign. In late 2022, Gibran ran for vice president in the 2024 Indonesian Presidential Election, supported by several Jokowi supporter groups. When Gibran registered as a prospective mayor of Surakarta from the PDI-P for the 2020-2025 mayoral election, he immediately faced criticism from observers regarding allegations of political dynasty practices within the Joko Widodo family, which was then in office as the president. The issue of political dynasty within the Joko Widodo family gained more public attention when Gibran was appointed vice-presidential candidate alongside Prabowo in October 2023. During the confirmation process, the criteria for vice-presidential candidacy required individuals to be at least 40 years old, while Gibran would have been 37 years old at the time of the election. However, on October 17, 2023, the Indonesian Constitutional Court issued a ruling adding an exception to the minimum age requirement for individuals allied with Prabowo Subianto's coalition, declaring Gibran as its official vice-presidential candidate.

Nevertheless, some observers asserted that this could not be termed a political dynasty since the final decision remained in the hands of the people. Sentiment analysis is the process of gauging public opinion about an object. The hashtag Gibran vice president 2024 is lively on the social media platform Twitter amid the political dynasty polemics coinciding with the Constitutional Court's decision (MK) regarding the age requirements for presidential and vice-presidential candidates. This study aims to understand public opinion on the 2024 Vice Presidential Candidate, Gibran Rakabuming Raka, on the social media platform Twitter. One of the algorithms that can be used for sentiment analysis is Naïve Bayes, aimed at classifying and accurately assessing public responses with positive and negative perspectives. Sentiment analysis using the Naïve Bayes method utilized a dataset of 3223 tweets on the social media platform Twitter.

Based on the background described, this research identifies two main problems. First, there is the dissemination of information regarding the 2024 Vice Presidential Candidate (Cawapres), Gibran Rakabuming Raka, in the community. Gibran's presence as a political figure in the race for the vice presidential seat has generated responses and opinions from various segments of society that are worthy of further analysis. Second, busy hashtags regarding political dynasty polemics on Twitter social media. This phenomenon shows widespread concern and discussion regarding political practices associated with influential political families. The problem formulation is then directed at two main questions. First, how can the Naive Bayes algorithm classify public opinion towards the 2024 vice presidential candidate Gibran Rakabuming Raka into positive and negative? Second, how accurate is the Naive Bayes algorithm in analyzing and classifying public opinion? The research aims to gain a deep understanding of the classification and accuracy of sentiment analysis carried out using the Naïve Bayes Method. Hopefully, this research contribution can provide more efficient and in-depth insight into public sentiment towards the 2024 Cawapres, especially Gibran Rakabuming Raka, and provide a better understanding of the dynamics of public opinion in developing politics.

Sentiment analysis on social media, primarily via Twitter, has recently become a rapidly growing research focus. Researchers have used various methods to understand public opinion on relevant topics, including Naïve Bayes Classifier (NBC) and Support Vector Machine (SVM). One exciting study compares sentiment analysis regarding the Social Security Administering Body (BPJS) using NBC and SVM [1]. This research provides a better understanding of effective ways to analyze public opinion on social media regarding BPJS issues. Sentiment analysis was also carried out for other topics, such as Pawang Rain Mandalika [2]. Using SVM and Naïve Bayes methods, this research helps understand people's responses to natural phenomena and environmental conservation efforts. Global conflict issues are also the subject of sentiment analysis research.

There is research that analyzes Twitter users' sentiments towards the conflict between Palestine and Israel [3]. Using Naïve Bayesian Classification and SVM methods, this research provides valuable insight into how society responds to this sensitive conflict. Not only that, political issues are also the focus of sentiment analysis research. A study analyzed Twitter users' sentiments towards the 2020 American presidential election [4]. Using Naïve Bayes and SVM methods, this research identified trends and opinion patterns developed

 

among Twitter users during a critical period in United States politics. Apart from political issues, public services are also essential to sentiment analysis. For example, sentiment analysis was carried out on Twitter for online transportation services [5]. Through the use of Naïve Bayes and SVM classification methods, this research helps understand how Twitter users respond to online transportation services and the problems and concerns they may have. Internet service providers are also the subject of sentiment analysis research. A study analyzed Twitter user sentiment towards internet service providers [6]. Using the SVM algorithm, this research provides valuable insight into how Twitter users respond to internet service providers, including complaints, criticism, and appreciation. Other public services, such as airlines, are also the focus of sentiment analysis. A study conducted sentiment analysis on airlines on the Twitter platform using the SVM algorithm [7]. This research helps understand how customer satisfaction with airline services can be reflected in public opinion on social media.

Inladditionentiment analysis can provide helpful educational insights, such as the Ruang Guru application. A study analyzed sentiment toward the Ruang Guru application on Twitter using a classification algorithm [8]. This research provides valuable insights for application developers and related parties in understanding user responses and feedback to the application. Sentiment analysis can also provide valuable insights into public health, such as opinions on Covid-19 vaccines. A study conducted a sentiment analysis of opinions about the COVID-19 vaccine on Twitter social media using SVM and Naive Bayes [9]. This research provides a better understanding of how people respond to COVID-19 vaccination and the factors influencing their attitudes. Sentiment analysis can provide valuable insights not only in health but also in broader social and political issues. For example, sentiment analysis was carried out on the discourse on moving the Indonesian capital using the SVM algorithm [10]. This research helps us understand how society responded to this essential plan for national development. Sentiment analysis has become a handy tool for understanding public opinion in various fields, from public services to global issues. Using careful methods and appropriate techniques, these studies have provided valuable insights for decision-makers in understanding public views and the potential implications of those public opinions.

Sentiment analysis of various relevant topics in social and political matters is becoming an increasing research focus in the current era of social media. For example, a study was conducted to analyze Twitter users' opinions on the Covid-19 vaccine [11]. This research used the Support Vector Machine (SVM) and Naive Bayes methods to explore people's views and attitudes towards COVID-19 vaccination. The findings from this study provide valuable insight into people's feelings and concerns regarding vaccination in efforts to address this global pandemic [11]. Apart from health issues, political and policy issues are also the subject of sentiment analysis research. For example, a study analyzed sentiment towards plans to move to Indonesia's capital city [12]. This research uses SVM to identify patterns and trends in public opinion regarding this plan. The results of this research provide a better understanding of how this plan was received by society and its potential implications for national development. Political issues, social trends, and phenomena are the subject of sentiment analysis research. For example, research was conducted to analyze the development of Vtubers. This research uses the SMOTE-based Support Vector Machine method to understand the public's response to the Vtuber phenomenon. The results of this study provide valuable insight into the popularity and acceptance of Vtubers among social media users [13]. Educational programs are also the subject of sentiment analysis research. A study analyzed sentiment toward the Independent Campus program [14]. This research used Naive Bayes and SVM to explore people's views and attitudes towards this program. The research results help us understand how this program is viewed by society and its potential impact on higher education in Indonesia [14]. Public services are also the subject of sentiment analysis research. For example, research was conducted to analyze Twitter user sentiment towards services from companies such as Telkom and Biznet [15]. In this research, the Support Vector Machine implementation is used to identify patterns of user opinion and feedback on these services. The findings of this research provide valuable input for these companies in improving the quality of their services [15]. Sentiment analysis has become useful for understanding people's views, attitudes, and feelings towards relevant social, political, and health topics. By using appropriate methods and careful techniques, these studies have provided valuable insights for decision-makers in multiple fields to make better decisions and be responsive to the needs and aspirations of society [1][12][13][14][15].

Sentiment analysis of Gofood services based on data from Twitter has become an interesting research subject in understanding user perceptions and experiences of this platform. In this research, the Naïve Bayes and Support Vector Machine methods are used to analyze tweets related to Gofood. The results of this research provide a deeper understanding of user preferences and complaints about this service and offer valuable insights to GoFood to improve the quality of its services [16]. In addition, sentiment analysis was carried out to understand the impact of the COVID-19 pandemic on online lectures [17]. This research used the Support Vector Machine and Naive Bayes algorithms to analyze tweets related to the post-pandemic online college

experience. The findings from this research provide a better picture of the challenges and opportunities in higher education in this digital era.

On the other hand, the Naive Bayes algorithm is also applied to analyze sentiment towards the National BMKG Twitter data review [18]. In this research, Twitter data is used to analyze the public's views and responses to information and services provided by the Meteorology, Climatology, and Geophysics Agency (BMKG). The findings from this research provide valuable input for BMKG in improving the quality of its services and increasing public trust [18]. Apart from that, Instagram social media is also the subject of sentiment analysis research to understand its role and impact as an educational information medium [19]. This research uses sentiment analysis to explore how users use Instagram as a source of information and knowledge. The findings from this study provide a deeper understanding of social media's role in providing users with educational information [19]. Sentiment analysis was conducted to understand the public's views and support for prospective presidential candidates in 2024 [20]. This research uses the Naïve Bayes algorithm to analyze tweets related to presidential candidates. The findings from this study provide valuable insights into people's political trends and preferences leading up to the presidential election [21].

In Table 1, the researcher presents a PICCO review regarding applying the Naïve Bayes algorithm to Twitter sentiment analysis of the 2024 Vice Presidential Candidates, especially Gibrand Rakabuming Raka, using the RapidMiner platform. This table summarizes the study population, interventions, comparisons, and results obtained from this sentiment analysis. It is hoped that this information will provide a better understanding of how sentiment analysis is carried out in the selection of presidential candidates.

Tabel 1. Review PICCO

| APPLICATION OF THE NAÏVE BAYES ALGORITHM IN TWITTER SENTIMENT ANALYSIS TOWARDS 2022 CAWAPRES 24 GIBRAN RAKABUMING RAKA USING RAPIDMINER | |
|---|---|
| Population | Sentiment Analysis on Twitter social media Using the Naïve Bayes Method |
| Intervention | How to get and manage Tweet Data from Twitter so it can be used for Sentiment Analysis |
| Comparation | - |
| Outcomes | Classification of positive and negative sentiments and the level of accuracy of the modeling used |
| Context | Data in the form of Public Data obtained from Twitter Data Crawling with Google Colab |

Tabel 2. Review Protocol

| Review Survei Protocol | |
|---|---|
| Publication Year | 2018 to 2023 (5 Years) |
| Publication Type | (√) Journal ( ) Conference ( ) Proceedings (√) Book Chapter |
| Search String | Naïve Bayes Sentiment Analysis |
| Final Selected | 20 Journal References |

In Table 2, researchers present a review of survey protocols covering 2018 to 2023. Publications covered include journals and book chapters. The literature search used the string "Sentiment Analysis Naïve Bayes," the final results involved 20 selected journal references. This information provides an overview of the resources used in the data collection process for sentiment analysis.

## 2. Research Method

This research method will be described in several parts, as shown in the following research flow figure.

 

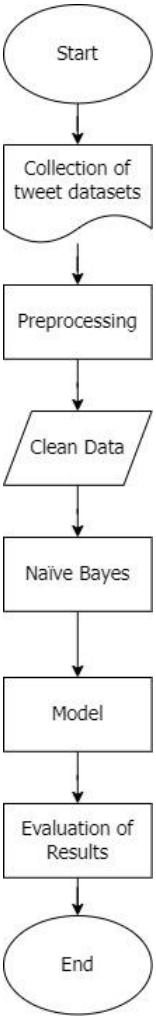


Figure 1. Research Flow

This research method will be divided into several stages, as seen in the research flow image provided. First of all, the research will begin with collecting the tweet dataset, which is the focus of the analysis. After that, the dataset will go through the preprocessing stage, where the data will be cleaned from noise, and initial preparation will be carried out before entering the analysis stage. A data cleaning process will be carried out to ensure optimal data quality before further analysis is carried out. The next stage is applying the Naïve Bayes method as a sentiment analysis model to previously prepared tweet data. This process will produce a model that can be used to classify the sentiment of each tweet in the dataset. After the model is created, the results evaluation stage will be carried out to measure its performance accuracy and reliability in classifying sentiment. Finally, the research will be completed after all analysis and evaluation stages, and the findings can be concluded. The research flow image will be a visual guide that helps in understanding the sequence and stages carried out in this research method.

### 2.1 Test Design

Test design for Twitter Sentiment Analysis of the Bromo Fire with the RapidMiner Studio application. The initial stage is collecting data in the form of tweets from Twitter users; then the data will be cleaned from unnecessary words such as Mention and Hashtag, then the data will go through several stages in the Preprocessing stage to convert the data into data that is ready to be processed. Next, each word will be weighted using the TF-IDF method. Next, classification modeling will be created using the Naïve Bayes algorithm to apply the model. The following is a research roadmap.

 

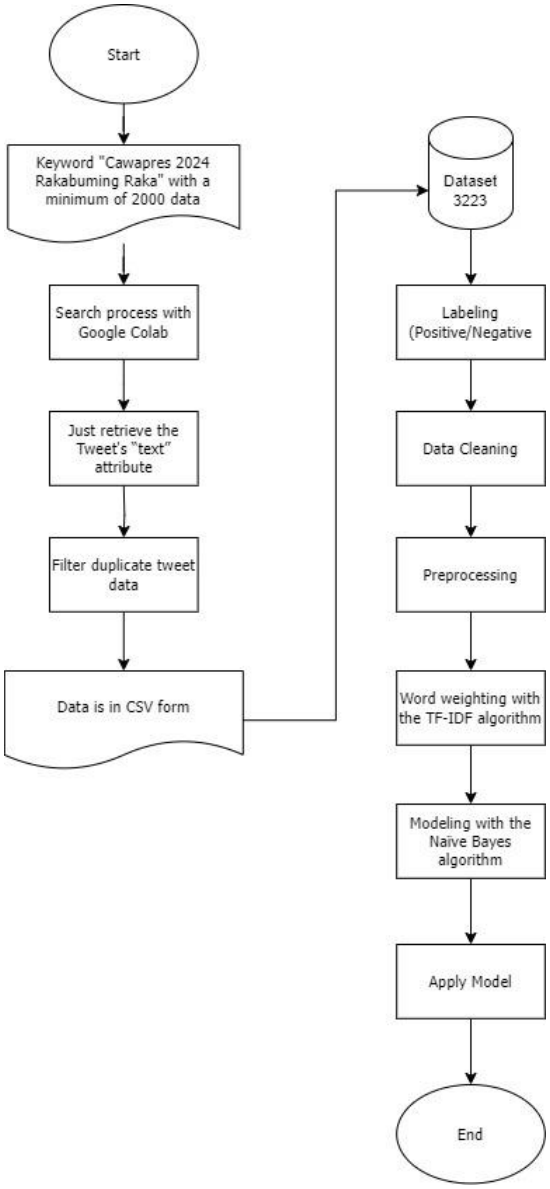


Figure 2. Research Roadmap

## 3. Result and Discussion

### 3.1 Results

This research shows that using the Naïve Bayes method in sentiment analysis on tweet datasets related to specific topics provides satisfactory results. In the tweet dataset collection stage, researchers use tools to retrieve data directly from the Twitter platform, ensuring that the dataset researchers have covers a relevant and representative time range. After the dataset is collected, the researcher proceeds to the preprocessing stage, where the researcher cleans the data from noise and performs initial preparation for analysis. The data cleaning is crucial to ensure optimal data quality before further analysis. After the data was clean, researchers applied the Naïve Bayes method as a model for sentiment analysis. This method was chosen because of its proven ability to classify sentiment based on relevant features of the text. Using Naïve Bayes, researchers can produce a model that can differentiate between positive and negative sentiment in the tweet dataset that researchers have. The model-building process involves training the model using a predefined dataset, where the model learns to identify patterns in text that relate to a particular sentiment. After the model is created, the researcher evaluates the results to measure the model's performance.

 

3.1.1 Testing

The results of calculating dataset accuracy using the Naïve Bayes method obtained an Accuracy value of 82.19%, a Positive Recall value of 89.48%, a Negative Recall value of 78.59%, a Positive Precision value of 67.35%, a Negative Precision value of 93.81%. The author labels the data as positive sentiment and negative sentiment manually.

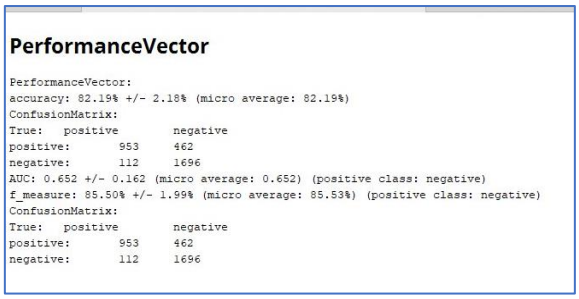


Figure 3. Results of Naïve Bayes Model Testing

From the sentiment analysis process with 3,223 datasets, predictions of 1696 Negative Sentiments and 112 Positive Sentiments were produced for the prediction results from Negative Sentiments. There are 462 data predicted to be Negative and 953 data predicted to be Positive below the author presents this data in a Pie Chart.

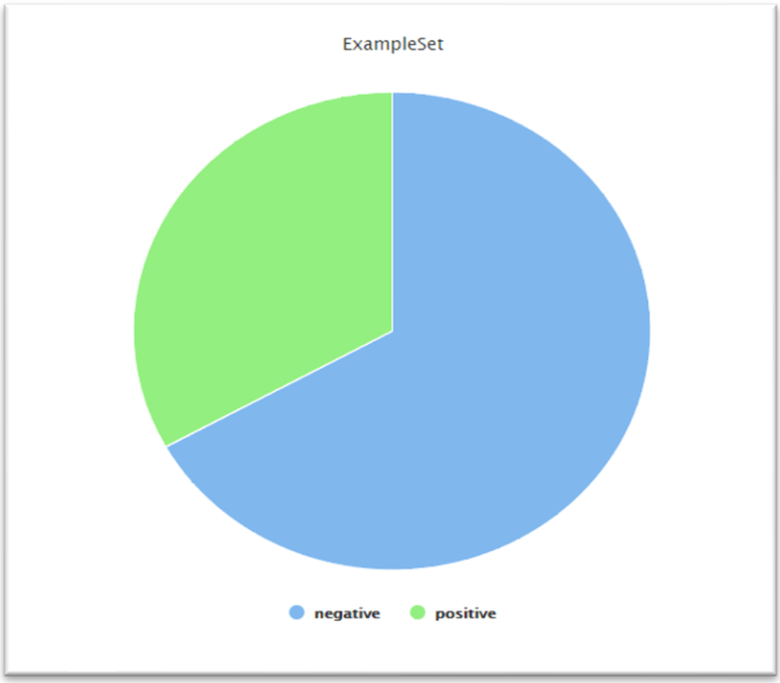


Figure 4. Sentiment Analysis Results

The final results of this testing method, namely the results of the prediction of sentiment towards the 2024 vice presidential candidate, Gibran Rakabuming Raka, the political dynasty polemic based on data obtained from Twitter and implemented using the Naïve Bayes method shows an accuracy value of 82.19% from 1696 negative sentiments and 112 positive sentiments, for prediction results, of Negative Sentiment. Are 462 data predicted to be negative and 953 are expected to be positive.

### 3.2 Discussion

This research shows that using the Naïve Bayes method in sentiment analysis on tweet datasets has provided entirely satisfactory results. The tweet dataset collection stage took data directly from the Twitter platform, ensuring the dataset covered a relevant and representative time range. The preprocessing process is also an essential step in preparing data before further analysis, where cleaning data from noise is crucial to

ensure optimal data quality. The Naïve Bayes method was chosen because of its proven ability to classify sentiment based on relevant text features. Using this method, a model can be created to differentiate between positive and negative sentiment in a tweet dataset. The model-building process involves training using a predefined dataset, where the model learns to identify text patterns related to a particular sentiment. The test results show that the Naïve Bayes method has a good level of accuracy, with an accuracy value of 82.19%. The positive recall value is 89.48%, and the negative recall value is 78.59%, indicating that the model can recognize most positive and negative sentiments well. Likewise, the positive precision value of 67.35% and negative precision of 93.81% show that the model provides accurate predictions, especially in classifying negative sentiment. However, it should be noted that the manual data labeling process can affect the evaluation results, and a review may be needed in determining sentiment labels.

Based on analyzed data, the results of sentiment predictions for the 2024 vice presidential candidate Gibran Rakabuming Raka show that most data tend to have a negative sentiment. This shows a polemic regarding political dynasties involving Gibran Rakabuming Raka. Nevertheless, the developed model can recognize most sentiments accurately, providing valuable insights into understanding public views and opinions. In interpreting prediction results, it is essential to remember that sentiment analysis using tweet data has limitations in representing opinions. The data analyzed is only a larger population sample and may not reflect all existing views. It is also necessary to pay attention to other aspects that may influence sentiment, such as social and political background and media influence.

## 4. Related Work

Several previous studies have applied sentiment analysis methods such as Naïve Bayes and Support Vector Machine (SVM) in various domains, including sentiment analysis of tweets on social media. Several studies have used Naïve Bayes and SVM to analyze sentiment on numerous topics, ranging from online services and airlines to political issues such as presidential elections and international conflicts. The Naïve Bayes method, with its simple assumptions and fast performance, is often used in sentiment classification because of its reliable ability to handle text. On the other hand, SVM is also a common choice because of its ability to handle text data with complex features. Various studies have employed Naïve Bayes and Support Vector Machine (SVM) algorithms for sentiment analysis across multiple topics, including online services, airline companies, presidential elections, and international conflicts. The Naïve Bayes method is favored for its simple assumptions and fast performance, making it a reliable choice for sentiment classification tasks.

Similarly, SVM is famous for its capability to handle complex text features effectively [21][22]. These algorithms have been utilized in diverse contexts, such as analyzing sentiments towards COVID-19 vaccines [23], public opinion on elections [24], the impact of the coronavirus [25], public sentiment towards entertainment content [26], and sentiments related to the new normal during the pandemic [27]. Furthermore, sentiment analysis has been conducted on various platforms like Twitter, focusing on topics such as online learning [28], government policies [29], and healthcare stock market sentiments [30]. The studies above underscore the importance of leveraging machine learning algorithms like Naïve Bayes and SVM in sentiment analysis tasks across different domains. These algorithms have effectively extracted sentiment information from textual data, providing researchers valuable insights into public opinions and attitudes toward various subjects.

Previous research studies have explored specific aspects, such as different preprocessing techniques, diverse text features, or tailored models specific to particular domains or topics Schouten & Frăsincar (2016)-Hamzah, 2021) [31]. These studies have delved into various applications of sentiment analysis, ranging from analyzing sentiments toward COVID-19 vaccines [23], traffic risk management [33], hotel reviews [34], public trust in government policies during the pandemic [35], to sentiments related to the COVID-19 booster vaccine [36]. Moreover, sentiment analysis has been conducted on a wide array of subjects, including sentiments towards airlines [37], academic articles [38], Indonesian general analysis datasets [39], Bali tourism during the pandemic [40], internet service providers [41], work from home policies [42], and technology utilization by local governments [43]. These studies have used algorithms like Naïve Bayes and Support Vector Machine (SVM) to compare public responses and categorize sentiments into positive, negative, and neutral classes [44]. Furthermore, sentiment analysis has been applied to diverse platforms such as Twitter, YouTube, and Instagram, focusing on topics such as public transportation during the pandemic [45], digital wallets [46], COVID-19 vaccine perceptions [47], and politicians' social media posts [48]. These studies have highlighted the importance of using advanced algorithms and techniques to accurately classify sentiments and extract valuable insights from textual data across various domains and social media platforms.

 

In related studies, various previous studies have used sentiment analysis methods such as Naïve Bayes and Support Vector Machine (SVM) in multiple domains, including sentiment analysis of tweets on social media. The Naïve Bayes method is often chosen because of its simple assumptions and fast performance, making it a reliable choice for sentiment classification. On the other hand, SVM is also famous for its ability to handle complex text features. Various studies have applied these algorithms, from sentiment analysis of online services and airlines to political issues such as presidential elections and international conflicts. These studies demonstrate the effectiveness of Naïve Bayes and SVM methods in extracting sentiment information from text data, providing researchers with valuable insights into people's opinions and attitudes toward various subjects. In addition, previous studies have explored multiple aspects, such as using different preprocessing techniques, diverse text features, or models tailored to specific domains or topics. These studies have applied sentiment analysis in various applications, from sentiment analysis towards the COVID-19 vaccine and traffic risk management to hotel reviews and public trust in government policies during the pandemic. Sentiment analysis has also been applied to various subjects, including sentiment towards airlines, academic articles, general Indonesian analysis datasets, Bali tourism during the pandemic, internet service providers, work-from-home policies, and technology used by local governments.

The results of using the Naïve Bayes method in sentiment analysis on tweet datasets related to specific topics are from previous research that used similar methods. The research results show that using the Naïve Bayes method provides entirely satisfactory results, with an accuracy value of 82.19%. These results are consistent with previous studies using the Naïve Bayes method in sentiment analysis on various topics. For example, prior research analyzing sentiment towards issues such as online services, airlines, presidential elections, and international conflicts also found that the Naïve Bayes method could provide reliable results in classifying sentiment. In evaluating the model, this research also reports recall, precision, and confusion matrix values for assessing model performance more comprehensively. These findings align with best practices in sentiment analysis research, where comprehensive evaluation is essential to ensure the reliability and validity of results. Comparison with previous studies using the same method also shows consistency in model evaluation results, confirming that the Naïve Bayes method remains a strong choice in sentiment analysis. However, it should be noted that this study has certain limitations, including limitations in dataset size and variations in sentiment analysis. For example, the dataset size used in this study may be smaller or more specific than in previous studies.

Additionally, variations in the topics or domains analyzed can also influence sentiment analysis results. Therefore, the results of this study need to be considered within these limitations. USE of the Naïve Bayes method in sentiment analysis of tweet datasets and confirms the relevance and effectiveness of this method in various cases. The results show that the Naïve Bayes method remains one of the vital choices in sentiment analysis. However, further research with larger datasets and wider variations can provide deeper insight into the performance of this method in sentiment analysis.

## 5. Conclusion

Based on the results of this research, it can be concluded that using the Naïve Bayes method in sentiment analysis of tweet datasets related to specific topics provides satisfactory results, with an accuracy value of 82.19%. The Naïve Bayes method was proven effective in classifying positive and negative sentiment in tweet datasets, with results consistent with previous studies that used similar methods. Comprehensive model evaluation, including recall, precision, and confusion matrix, also shows good model performance in identifying sentiment patterns in text. However, this research also has certain limitations that need to be considered. Limitations in dataset size and sentiment analysis variations may affect the results' generalizability. Apart from that, this research is also limited to using the Naïve Bayes method, so it does not consider other methods that might provide different results. The results confirm the relevance and effectiveness of the technique in a wide range and confirm that Naïve Bayes remains a strong choice in sentiment analysis.

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