

Research Article

# Implementation of Naive Bayes Algorithm and Support Vector Machine for Public Sentiment Analysis towards Imported Clothing Ban

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**Abstract:** This research was conducted to find out the public's opinion on the Issue of Imported Clothing on Twitter social media. One of the algorithms that can be used to carry out sentiment analysis is Naïve Bayes and Support Vector Machine. In this research the author aims to use the Naïve Bayes Algorithm and Support Vector Machine in analyzing positive and negative sentiment labels. The final result of the comparison with these two test methods, namely the prediction of public sentiment on the issue of imported clothing based on data obtained from Twitter and implemented using the SVM (Support Vector Machine) method, shows an accuracy value of 87.89%. Of the 603 test data, it is predicted that 194 data are Positive Sentiment and 409 data are Negative Sentiment. For prediction results from Negative Sentiment, there are 603 data predicted Negative and 2 data predicted Positive. and the Naive Bayes method shows an accuracy value of 97.01%. Of the 603 test data, it is predicted that 409 data are Negative Sentiment and 194 data are Positive Sentiment.

**Keywords:** Imported Used Clothing; Naïve Bayes; Sentiment Analysis; Support Vector Machine; Twitter.

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## 1. Introduction

The circulation of imported second-hand clothing has become a widely discussed issue in Indonesia due to its economic, social, and regulatory implications. Indonesian trade regulations prohibit the importation of used clothing to protect consumers and maintain fair market competition. Despite these restrictions, the practice of buying and selling imported second-hand clothing, commonly known as thrifting, continues to grow through social media platforms. The popularity of thrifting is driven by several factors, including affordable prices, the availability of international fashion brands, and unique product designs that are rarely found in local markets. These characteristics make imported second-hand clothing particularly attractive to young consumers who seek fashionable products at lower costs. However, the widespread distribution of imported used clothing has raised concerns regarding product quality, consumer safety, and its potential impact on domestic textile industries. In addition, lower-priced imported products may create unequal competition for local clothing businesses that offer new products at relatively higher prices. Consequently, public opinion regarding the prohibition of imported second-hand clothing has emerged as an important issue that requires systematic investigation, particularly through social media platforms that reflect public discourse and opinion dynamics [1], [2].

The rapid growth of social media has provided opportunities for researchers to examine public perceptions and opinions through sentiment analysis techniques. Previous studies have demonstrated that sentiment analysis is effective in identifying public responses toward various social, political, and commercial issues using textual data obtained from social media platforms. Among the most widely used classification algorithms are Naïve Bayes and Support Vector Machine (SVM), both of which have shown promising performance in sentiment classification tasks. Several comparative studies reported that Naïve Bayes offers computational simplicity and efficiency, whereas SVM generally provides stronger classification capabilities when dealing with high-dimensional textual data [3], [4]. Although numerous studies have compared these algorithms in domains such as online learning, product reviews, public services, vaccination programs, and public opinion analysis, limited attention has been given to public sentiment regarding the prohibition of imported second-hand clothing. This gap indicates the need for further investigation to understand how society perceives this issue and to evaluate the performance of classification methods in this specific context.

Based on the identified research gap, this study aims to analyze public sentiment regarding the prohibition of imported second-hand clothing using Twitter data as a source of public opinion. Specifically, this research seeks to classify sentiments into positive and negative categories and compare the classification performance of Naïve Bayes and Support Vector Machine algorithms. The study addresses two primary research questions. First, which algorithm produces higher classification accuracy in analyzing public sentiment toward the prohibition of imported second-hand clothing? Second, what factors influence the classification performance achieved by each algorithm? By answering these questions, the study seeks to provide a comprehensive understanding of public responses to the issue while simultaneously evaluating the effectiveness of machine learning approaches in sentiment classification. The utilization of Twitter data is particularly relevant because the platform enables users to express opinions openly and reflects real-time public discourse on current social issues [5], [6].

This study contributes to both theoretical and practical perspectives. From a theoretical standpoint, the research enriches the growing body of knowledge on sentiment analysis by providing empirical evidence regarding the comparative performance of Naïve Bayes and Support Vector Machine in analyzing social issues related to trade policy and consumer behavior. The findings may also extend previous comparative studies that examined similar algorithms in different domains, including online reviews, public services, and social media discussions [7], [8]. From a practical perspective, the results can assist policymakers, researchers, and stakeholders in understanding public perceptions of imported second-hand clothing restrictions and identifying dominant sentiments circulating within social media environments. Furthermore, the comparison of algorithmic performance offers valuable insights for future sentiment analysis studies seeking effective classification approaches for public opinion mining. Therefore, this research not only investigates public sentiment toward a contemporary social issue but also contributes methodological evidence regarding machine learning-based sentiment classification.

## 2. Literature Review

### Sentiment Analysis on Twitter

Sentiment analysis is a computational approach used to identify, extract, and classify opinions expressed in textual data. In the context of social media, sentiment analysis is commonly applied to understand public perceptions toward a topic, product, service, policy, or social issue. Twitter has become one of the most frequently used data sources because it contains short, direct, and real-time public opinions. Tweets can represent various forms of sentiment, such as positive, negative, or neutral responses. Therefore, Twitter data are considered useful for examining how society responds to public issues, including government policies and consumer-related phenomena. Previous studies have shown that sentiment analysis on Twitter can be applied to various domains, such as public figures, political issues, public services, and social events [4], [9].

In sentiment analysis research, the main variable is public opinion expressed through text. This opinion is usually processed through several stages, including data collection, preprocessing, text transformation, classification, and evaluation. Preprocessing is an important stage because social media text often contains noise, informal words, symbols, URLs, hashtags, and repeated characters. The cleaned text is then transformed into numerical features using methods such as TF-IDF or term frequency. After transformation, classification algorithms are applied to determine whether the text belongs to a positive or negative sentiment category. Evaluation is commonly conducted using accuracy, precision, recall, and F1-score to measure model performance [10], [11].

In this study, sentiment analysis is applied to public opinion regarding the prohibition of imported second-hand clothing. The issue is relevant because imported used clothing is widely discussed on social media due to its relationship with consumer preference, product quality, affordability, and competition with local clothing businesses. Public responses may vary because some users support the prohibition to protect local industries and consumer safety, while others oppose it due to the affordability and uniqueness of thrift products. Therefore, tweets related to this issue can be used as indicators of public sentiment. The classification of tweets into positive and negative categories provides a clearer understanding of public perception toward the policy. This approach is consistent with previous Twitter-based sentiment studies that used public opinion data to analyze social and policy-related issues [6], [12].

### **Naïve Bayes and Support Vector Machine**

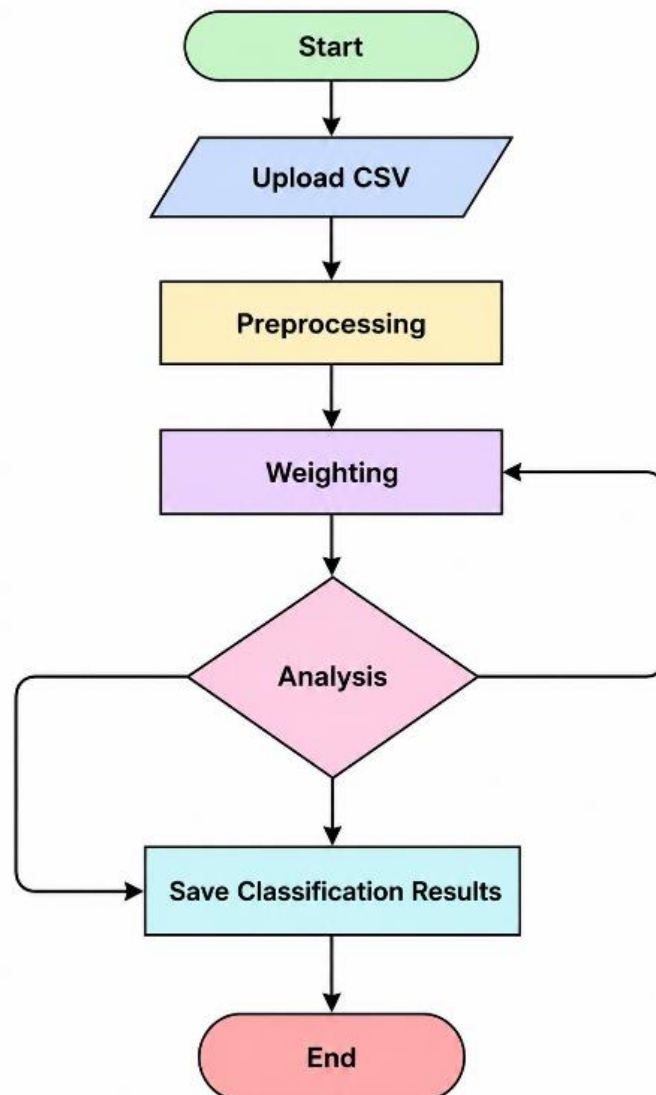
Naïve Bayes is a classification algorithm based on Bayes' theorem with an assumption that each feature is independent of other features. This algorithm is widely used in text classification because it is simple, efficient, and requires relatively small training data to estimate classification parameters. In sentiment analysis, Naïve Bayes calculates the probability of a text belonging to a particular sentiment class based on the occurrence of words in the dataset. Its computational efficiency makes it suitable for processing large amounts of social media text. Several studies have applied Naïve Bayes in sentiment analysis and found that the algorithm can provide competitive results, especially when the dataset has clear word patterns and sufficient preprocessing [13], [14].

Support Vector Machine is another widely used classification method in sentiment analysis. This algorithm works by finding the best separating hyperplane between different classes. In text classification, SVM is considered effective because it can handle high-dimensional data produced by textual features. Compared with simpler algorithms, SVM often provides strong performance in separating positive and negative sentiment categories, particularly when the feature representation is well-prepared. Several previous studies have compared SVM with Naïve Bayes and reported that both algorithms have different strengths. Naïve Bayes is generally efficient and fast, while SVM often produces higher classification performance in complex textual datasets [3], [15].

Based on the reviewed literature, Naïve Bayes and Support Vector Machine are relevant methods for analyzing public sentiment toward the prohibition of imported second-hand clothing. Both algorithms have been widely used in sentiment analysis studies involving Twitter data, product reviews, public services, and social issues. However, previous studies have mostly focused on topics such as COVID-19, online learning, application reviews, and political issues, while sentiment analysis on imported second-hand clothing policies remains limited. Therefore, this study contributes by applying and comparing Naïve Bayes and SVM in a different social context. The comparison is expected to identify which algorithm provides better accuracy and what factors influence model performance, such as preprocessing quality, dataset distribution, feature representation, and classification characteristics [16], [17].

### 3. Proposed Method

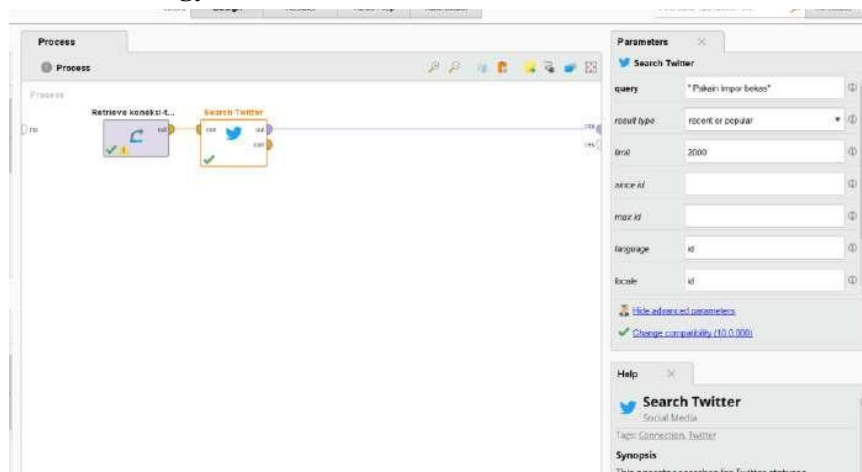
#### Research Data



**Figure 1.** Research Framework.

This study employed a public Twitter dataset collected through a data crawling process using the Twitter API and RapidMiner software. The research began by identifying a relevant topic related to public opinions on the prohibition of imported second-hand clothing, followed by the acquisition of Twitter access tokens required for data extraction. A total of 2,000 tweets were collected and manually labeled as positive or negative sentiments to provide a benchmark for machine learning classification. The dataset consisted of two attributes: tweet text and sentiment label, with 439 positive tweets and 1,330 negative tweets. Prior to classification, the textual data underwent a preprocessing stage that included tokenization, case transformation, stopword removal, and token length filtering to improve data quality. Subsequently, sentiment classification was performed using the Naïve Bayes and Support Vector Machine (SVM) algorithms. The performance of both models was evaluated based on their ability to classify positive and negative sentiments, with the objective of identifying the most effective algorithm for analyzing public opinions regarding the imported clothing prohibition policy.

## Research Methodology



**Figure 2.** Dataset Collection Process.,

The study employed a sentiment analysis framework using the Naïve Bayes and Support Vector Machine (SVM) algorithms. Twitter data were collected through the Twitter API using the Search Twitter operator available in RapidMiner Studio. A total of 2,000 tweets related to imported second-hand clothing were retrieved using the keyword “pakaian impor bekas” (imported used clothing). The collected tweets were filtered to remove duplicate entries and then exported into CSV format for further analysis. To create a reliable training dataset, 585 tweets were manually labeled as either positive or negative sentiments. The labeling process was conducted based on predefined criteria, including the presence of supportive or opposing opinions regarding the imported clothing issue, as well as positive or negative expressions contained within the tweets. Manual labeling was performed to establish a reference dataset for supervised machine learning classification.

Before model development, the dataset underwent several preprocessing stages to improve data quality and reduce noise. These stages included cleaning irrelevant characters such as hashtags, mentions, URLs, and symbols, followed by tokenization, case folding, stemming, stopword removal, and token length filtering. The processed dataset was subsequently used to train both Naïve Bayes and SVM models. Model performance was evaluated using standard classification metrics, including accuracy, precision, recall, and F1-score. In addition, parameter optimization techniques were applied when necessary to improve classification performance. Finally, the trained models were used to predict sentiment classes in unseen data and compare the effectiveness of Naïve Bayes and SVM in identifying positive and negative public opinions regarding the prohibition of imported second-hand clothing.

### Experimental Design

The sentiment analysis experiment was conducted using RapidMiner Studio to evaluate public opinions regarding the issue of imported second-hand clothing. The research process began with collecting Twitter data and storing the retrieved tweets in CSV format. The dataset was then divided into training and testing sets. The training data were manually labeled into two sentiment categories, namely positive and negative. Subsequently, the text data underwent a cleaning process to remove irrelevant elements such as hashtags, mentions, URLs, and other non-essential characters. To prepare the data for machine learning classification, several preprocessing techniques were applied, including tokenization, case folding, stemming, stopword removal, and token filtering. After preprocessing, the textual features were transformed into numerical representations using the Term Frequency–Inverse Document Frequency (TF–IDF) weighting method.

The weighted dataset was then used to develop sentiment classification models based on the Naïve Bayes and Support Vector Machine (SVM) algorithms. The resulting models were trained using the labeled dataset and subsequently applied to unseen testing data to evaluate their classification performance. The experimental workflow consisted of data collection, data preprocessing, model development, model testing, and implementation stages. The overall research activities were conducted sequentially over a five-month period, covering dataset preparation, data processing, experimental design, model evaluation, and implementation.

This experimental design enabled a systematic comparison of Naïve Bayes and SVM in classifying positive and negative sentiments related to the prohibition of imported second-hand clothing.

## 4. Results and Discussion

### Research Tools

This study utilized several tools and techniques to perform sentiment analysis on Twitter data. Microsoft Excel was used for the manual labeling of sentiment categories in the collected tweets, which served as the training dataset. RapidMiner Studio was employed as the primary platform for data preprocessing, text mining, and model implementation. The Term Frequency–Inverse Document Frequency (TF–IDF) method was applied to transform textual data into weighted numerical features, enabling machine learning algorithms to process the tweets effectively. Finally, the Naïve Bayes and Support Vector Machine (SVM) algorithms were implemented as the main classification methods to identify and categorize public sentiments into positive and negative classes regarding the prohibition of imported second-hand clothing.

### Implementation and Testing

The implementation process began with collecting Twitter data related to imported second-hand clothing using the Twitter API integrated with RapidMiner Studio. Initially, 2,000 tweets were retrieved using the keyword “Pakaian Bekas Impor” (imported second-hand clothing). After removing duplicate records and irrelevant entries, a total of 605 tweets were retained for analysis. The dataset was manually labeled into positive and negative sentiment categories to create a supervised learning dataset. Subsequently, a data cleaning process was performed to remove noise, including retweets, mentions, hashtags, URLs, special characters, and unnecessary spaces. The cleaned dataset then underwent several preprocessing stages, namely tokenization, case folding, stemming, stopword removal, and token length filtering. These procedures transformed the raw textual data into a structured format suitable for machine learning analysis and improved the overall quality of the dataset.

Following preprocessing, the textual features were converted into numerical representations using the Term Frequency–Inverse Document Frequency (TF–IDF) weighting scheme. The resulting feature vectors were used to develop sentiment classification models based on the Naïve Bayes and Support Vector Machine (SVM) algorithms. The prepared training dataset was employed to build classification models, while the testing dataset underwent the same preprocessing and TF–IDF transformation procedures before classification. Subsequently, training and testing data were integrated into the evaluation workflow, and both models were applied to predict sentiment labels on unseen tweets. The testing phase aimed to assess the effectiveness of Naïve Bayes and SVM in classifying public opinions regarding the prohibition of imported second-hand clothing and to compare their classification performance based on the selected evaluation metrics.

### Model Implementation and Evaluation

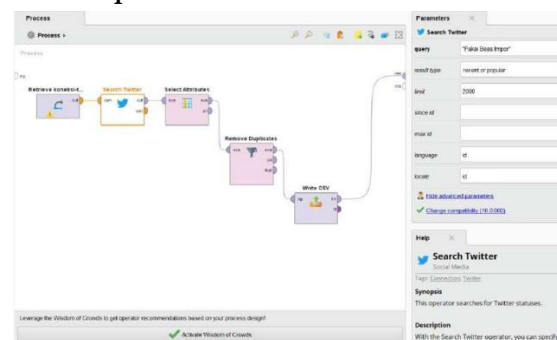


Figure 3. Data Crawling Process.

Row No.	SENTIMENT	Text
1	positif	Kantor Bina Co.
2	negatif	Apn hand dard L.
3	negatif	Pakas Paken...
4	positif	Shenita_Hgll...
5	positif	democrasme...
6	positif	Gilng sepetan...
7	positif	AndSinidigga...
8	positif	Herabekus Co...
9	positif	ditikcom fega...
10	positif	PRC/MS SP
11	positif	PComment K...
12	positif	Arhanahatir J...
13	positif	HidayatHatan I...
14	positif	Justru semaki...
15	positif	bunglard Jack...
16	positif	Wong700 ya...
17	positif	- lampar haas...
18	positif	ZUL_Hasnan pr...

Figure 4. After the Data Cleansing Process.

Baris No.	SENTIMEN	text	aspek	minat	perhatian	dll	dll	dll
1	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
2	negatif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
3	negatif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
4	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
5	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
6	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
7	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
8	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
9	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
10	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
11	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
12	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
13	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
14	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
15	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
16	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0
17	positif	halo ini aku udah udah ke bed... (text truncated)	0	0	0	0	0	0

Figure 5. Word Weighting Results with TF-IDF.

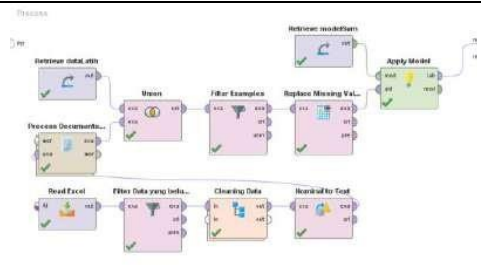


Figure 6. Test Stage.

The implementation process began with collecting Twitter data related to imported second-hand clothing using the Twitter API integrated with RapidMiner Studio. A total of 605 tweets were obtained after filtering duplicate entries and irrelevant records. The collected data were manually labeled into positive and negative sentiment categories to create a supervised learning dataset. Subsequently, a data cleaning process was performed to remove noise, including hashtags, mentions, URLs, special characters, and unnecessary symbols that could affect classification performance. The cleaned dataset then underwent several preprocessing stages, including tokenization, case folding, stemming, stopword removal, and token length filtering. After preprocessing, textual features were transformed into numerical representations using the Term Frequency–Inverse Document Frequency (TF–IDF) weighting scheme, enabling machine learning algorithms to process the textual information effectively.

Following feature extraction, sentiment classification models were developed using the Naïve Bayes and Support Vector Machine (SVM) algorithms. The labeled dataset was divided into training and testing data to evaluate model performance. The training data were used to construct classification models, while the testing data underwent the same preprocessing and TF–IDF transformation procedures before being classified. Subsequently, the processed testing dataset was combined with the trained models to predict sentiment categories and assess classification effectiveness. The evaluation stage focused on comparing the performance of Naïve Bayes and SVM in identifying positive and negative sentiments related to the prohibition of imported second-hand clothing, providing insights into the most suitable algorithm for sentiment analysis in this domain.

**Classification Performance and Sentiment Analysis Results**

The experimental results demonstrate that both classification algorithms were capable of identifying public sentiment regarding the prohibition of imported second-hand clothing; however, their performance differed considerably. The Support Vector Machine (SVM) model achieved an accuracy of 87.89%, with a positive recall of 62.37%, a negative recall of 100.00%, a positive precision of 100.00%, and a negative precision of 84.85%. In contrast, the Naïve Bayes model produced superior results, achieving an overall accuracy of 97.01%, a positive recall of 100.00%, a negative recall of 95.60%, a positive precision of 91.51%, and a negative precision of 100.00%. These findings indicate that Naïve Bayes was more effective in classifying sentiment within the collected Twitter dataset, providing higher predictive performance and better balance across sentiment categories.

Table 1. Comparison of Accuracy Results of NB and SVM

No	Metode	Accuracy Values
1	Naïve Bayes	97.01%
2	Support Vector Machine	87.89%



**Figure 7.** Sentiment Analysis Prediction Data Results.

A comparison of the two models confirmed that Naïve Bayes outperformed SVM by approximately 9.12 percentage points in terms of classification accuracy. Based on the sentiment classification results, the dataset was dominated by negative opinions regarding imported second-hand clothing, with 409 tweets classified as negative and 194 tweets classified as positive. This distribution suggests that a substantial portion of Twitter users expressed concerns related to issues such as product quality, consumer protection, and the impact of imported used clothing on local industries. Overall, the results demonstrate that Naïve Bayes is a more suitable approach for this sentiment analysis task and provide valuable insights into public perceptions of the imported second-hand clothing prohibition policy.

### Final Evaluation Results

The final evaluation results indicate that both classification methods were successfully applied to analyze public sentiment regarding the issue of imported second-hand clothing using Twitter data. However, the Naïve Bayes algorithm demonstrated superior performance compared to the Support Vector Machine (SVM) model. The SVM classifier achieved an overall accuracy of 87.89%, while the Naïve Bayes classifier obtained a significantly higher accuracy of 97.01%. Sentiment classification results revealed that negative opinions dominated the dataset, with 409 tweets categorized as negative and 194 tweets categorized as positive. This distribution suggests that a considerable proportion of Twitter users expressed concerns related to imported second-hand clothing, including issues associated with consumer protection, product quality, and the potential impact on local businesses. Although both models produced comparable sentiment distributions, Naïve Bayes provided more accurate predictions and demonstrated better suitability for the analyzed dataset. Therefore, the findings suggest that Naïve Bayes is a more effective approach for classifying public sentiment on this topic and can be considered a reliable method for similar social media-based sentiment analysis studies.

## 5. Conclusions

This study demonstrated that sentiment analysis can be effectively applied to identify public opinions regarding the prohibition of imported second-hand clothing by utilizing Twitter data as a source of user-generated content. The research workflow consisted of several stages, including data collection through Twitter crawling, manual sentiment labeling, data cleaning, preprocessing, feature extraction using TF-IDF, and sentiment classification using the Naïve Bayes and Support Vector Machine (SVM) algorithms. The implementation was conducted using RapidMiner Studio, which facilitated the development and evaluation of machine learning models for text classification. The results confirm that social media platforms provide valuable insights into public perceptions of policy-related issues and can serve as an effective source of real-time opinion data. Furthermore, the study highlights the importance of preprocessing and feature extraction in improving classification performance, as these stages transform unstructured textual data into meaningful numerical representations that can be processed by machine learning algorithms.

The experimental findings revealed that both Naïve Bayes and Support Vector Machine were capable of classifying sentiments related to imported second-hand clothing; however, their predictive performances differed. Naïve Bayes achieved the highest classification accuracy, outperforming SVM in the analyzed dataset. The sentiment distribution indicated that negative opinions were more dominant than positive opinions, suggesting that many Twitter users expressed concerns regarding the issue. These concerns may be associated with product quality, consumer safety, and the potential impact of imported second-hand clothing on local businesses and industries. The results also demonstrate that Naïve Bayes is particularly suitable for handling sentiment classification tasks involving textual social media data due to its ability to achieve high predictive accuracy with relatively simple computational requirements. Therefore, the study provides empirical evidence that Naïve Bayes can be considered an effective and reliable approach for sentiment analysis in social policy and consumer-related discussions.

Despite the promising results, several opportunities for future improvement remain. First, future studies should increase the size of the dataset to enrich the vocabulary and contextual diversity of the collected tweets, which may improve model generalization and classification performance. Second, a more balanced distribution between positive and negative sentiment labels should be considered to reduce potential classification bias and enhance model robustness. Third, future research may explore additional machine learning and deep learning approaches, such as Random Forest, XGBoost, Long Short-Term Memory (LSTM), or transformer-based models, to compare their effectiveness with traditional classification algorithms. Additionally, incorporating neutral sentiment categories and analyzing larger datasets from multiple social media platforms may provide a more comprehensive understanding of public perceptions. Such improvements are expected to contribute to the advancement of sentiment analysis research and support more accurate decision-making based on public opinion data.

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