Global Research Network Publishing
TECHNOVATE: Journal of Information Technology and Strategic Innovation Management
Vol 2, No 1, January 2025, pp. 59-69
e-ISSN: 3047-2466

Sentiment Analysis of Twitter (X) Comments on the Cyanide Coffee Case Using Comparison of Naïve Bayes and K-NN Method Results

I Gusti Agung Ayu Manik Ulandari[1], I Komang Arya Ganda Wiguna[2*], I Made Dedy Setiawan[3]
[1,2*,3] *Institut Bisnis dan Teknologi Indonesia, Bali, Indonesia*
[1]gunganik786@gmail.com , [2*]kmaryagw@instiki.ac.id , [3]dedy.setiawan@instiki.ac.id

ARTICLE INFO

Article History:
Received 12 January 2025
Revised 27 January 2025
Accepted 31 January 2025

Keywords:
Cyanide Coffee Case;
KNN Method;
Naïve Bayes Method

ABSTRACT

Twitter is a social media platform that is often used by the general public to communicate and gather information. Through this social media, users can express various opinions or comments about a particular issue such as the cyanide coffee case. The methods used in this research are Naïve Bayes and K-NN methods and the purpose of this research is to compare the two methods in sentiment analysis of the cyanide coffee case. In testing this sentiment analysis using 3 stages of scenarios, where the 60:40 ratio is used for scenario number 1, the 70:30 ratio is used for scenario 2 and the 80:20 ratio is used for scenario 3. From the test results that have been carried out, it can be seen that testing the Naïve Bayes method in scenario 3 is superior to other scenarios with 87.76% accuracy, 92.80% precision and 67.09% recall. Meanwhile, the K-NN method in scenario 3 is superior to other scenarios with an accuracy of 80.60%, precision of 89.87% and recall of 61.72%.

1. Introduction

Twitter is one of the largest social media in the world. Twitter, founded by Jack Dorsey and officially launched on July 15, 2006, is one of the number one social media that is often used by people in Indonesia to provide sentiments or opinions to the virtual world public (netizens) (Rahat et al., 2019; Surya & Subbulakshmi, 2019; Wongkar & Angdresey, 2019). Information contained on Twitter is in the form of questions, opinions or comments, both positive and negative. Data from Twitter has unstructured characteristics and makes a lot of noise so that text mining is needed.

On January 6, 2016, 27-year-old Wayan Mirna Salihin died after drinking Vietnamese iced coffee at Olivier Cafe in Grand Indonesia, Central Jakarta. The examination revealed that there was cyanide in the coffee that Mirna drank. The police then named Jessica as a premeditated murder suspect. The trial process of this case lasted quite a long time. In the end, Jessica was convicted and sentenced to 20 years in prison (Jakarta Globe, 2024). In September 2023, Netflix released a documentary titled "Ice Cold: Murder, Coffee and Jessica Wongso". The documentary brought back the cyanide coffee case and sparked public discussion. The documentary highlighted several irregularities in the case, including: the cyanide content in Mirna's coffee that was considered too low to cause death, the allegation that Jessica was not the only person who had access to cyanide, and witness statements that were considered changing.

This renewed public discussion has brought the cyanide coffee case back to the public's attention. The sentiment on Twitter may reflect empathy, sympathy or anger towards the incident. The way to find out whether the comments or tweets are positive, negative or neutral is to perform Sentiment Analysis. Sentiment Analysis has the basic task of classifying the text in a sentence or document and then determining the opinion expressed in the sentence or document whether it is positive, negative or neutral (Udayana & Sudipa, 2022). The purpose of sentiment analysis is to collect information

about a person's feelings towards a particular issue or assumption in the form of sentiment (Armaeni et al., 2024; Arya et al., 2022; Liu, 2022).

The research aims to analyze the Sentiment of Twitter Comments (X) on the Cyanide Coffee Case Using Comparison of Naïve Bayes and K-NN Method Results. The research data is data from Indonesian-language twitter with the keyword "Cyanide Coffee". The amount of data used is 3000 datasets which will produce accuracy values and classifications of positive, negative, and neutral.

2. Literature Review

Sentiment analysis of Twitter comments regarding the Cyanide Coffee case can be effectively conducted using various machine learning techniques, notably Naïve Bayes and K-Nearest Neighbors (K-NN). These methods are widely recognized for their applicability in processing and analyzing social media data, particularly tweets, to extract user sentiments and opinions. Naïve Bayes is a probabilistic classifier based on Bayes' theorem, which assumes independence among predictors. It has been shown to be particularly effective in sentiment analysis due to its simplicity and efficiency in handling large datasets, such as those generated by Twitter (Chouhan et al., 2023; Dhanta et al., 2023; Septiani et al., 2024). Research indicates that Naïve Bayes can achieve competitive accuracy rates in classifying sentiments, often outperforming more complex models in specific contexts (Farhan et al., 2023; Chouhan et al., 2023). For instance, a comparative study found that the Naïve Bayes classifier yielded an average accuracy of 81% when applied to sentiment analysis of tweets, demonstrating its robustness in this domain (Farhan et al., 2023).

On the other hand, the K-NN algorithm operates on the principle of classifying data points based on the majority class among their nearest neighbors. While K-NN is intuitive and easy to implement, it tends to require more computational resources, especially with large datasets typical of Twitter (Chouhan et al., 2023; Farhan et al., 2023). In the context of sentiment analysis, K-NN has been reported to achieve lower accuracy rates compared to Naïve Bayes, with some studies indicating an average accuracy of around 58% (Farhan et al., 2023). This discrepancy can be attributed to K-NN's sensitivity to the choice of distance metric and the curse of dimensionality, which can adversely affect its performance in high-dimensional spaces like those found in text data.

The comparative analysis of these two methods reveals that while Naïve Bayes often outperforms K-NN in terms of accuracy and computational efficiency, the choice of algorithm may depend on the specific requirements of the analysis, such as the need for interpretability versus the desire for a more nuanced understanding of sentiment distributions. Furthermore, the integration of additional features such as word embeddings, n-grams, and sentiment lexicons can enhance the performance of both classifiers (Kumar & Jaiswal, 2020; Rout et al., 2018; Sudipa et al., 2023). In summary, conducting sentiment analysis on Twitter comments related to the Cyanide Coffee case using Naïve Bayes and K-NN provides valuable insights into public sentiment. While Naïve Bayes generally offers superior performance, K-NN can still be a viable option depending on the context and specific analytical goals.

3. Research Methods

In the process of researching this research, steps or processes are carried out to get conclusions from the research conducted by the author. The research flow is as follows:

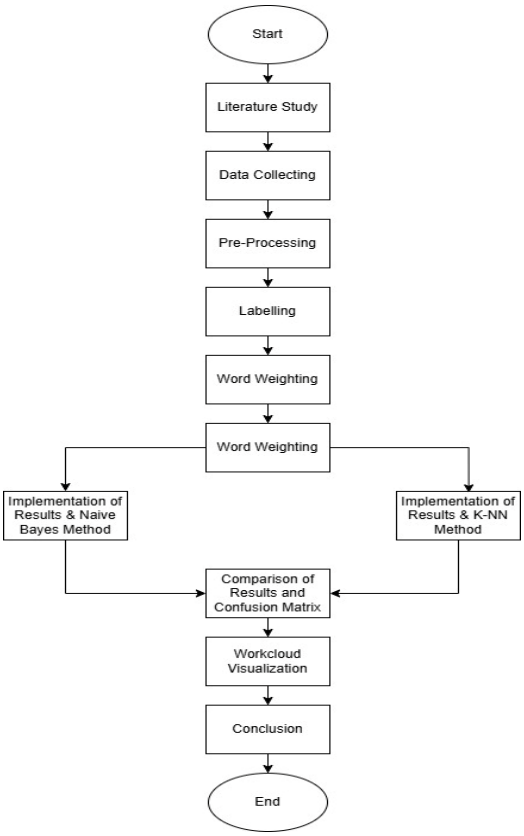


Fig.1. Research flow

Literature studies carried out in the form of observation & literature methods. Observation is carried out in obtaining dataset results, while the literature method is the theoretical basis used in conducting this research.

Fig. 2. Example tweets against coffee

Data collection using google colab with tweet harvest library and python language and processed using Excel application, Rapid Miner. Tweet Harvest uses the Playwright library to open Twitter and interact with the web interface, similar to the way human users browse. This allows Tweet Harvest to bypass the limitations of the Twitter API which limits the amount of data that can be retrieved directly [7]. Rapid Miner is specialized for data mining use. Many methods are provided by Rapid Miner ranging from classification, clustering, association and others

The results of data collection cannot be directly analyzed because there are still many symbols and words that are not needed, therefore text preprocessing is needed so that the data is more structured so that it can be classified.

a) Cleaning is the process of removing unnecessary words, characters and symbols.
b) Case Folding is the process of converting all text to lower case.
c) Tokenization is the process of separating each word of a sentence into word units.
d) Filtering is a process of removing words that are considered unimportant or common words that do not provide much information.

The labeling process is used to categorize the data into three categories, namely positive, negative, and neutral. This labeling is done by matching each word with the lexicon dictionary. The process after labeling is word weighting using TF-IDF (Term Frequency - Inverse Document

Frequency). Term Frequency (TF) is a factor that determines the weight of a term in a document based on the number of occurrences in the document. Inverse Document Frequency (IDF) is a reduction in the dominance of terms that often appear in various documents [8]. The result of word weighting using TF-IDF is the product of TF multiplied by IDF.

Table 1. Example of TF-IDF Calculation

Term	TF			DF	D/df	IDF = log D/df	TF-IDF (w = tf x idf)		
	D1	D2	D3				D1	D2	D3
Teori	1	0	0	1	3	0,477	0,477	0	0
Kopi	1	1	1	3	1	0	0	0	0
Sianida	1	1	1	3	1	0	0	0	0
Bikin	1	0	0	1	3	0,477	0,477	0	0
ketawa	1	0	0	1	3	0,477	0,477	0	0
Mirna	1	0	1	2	1,5	0,176	0,176	0	0,176
cuman	1	0	0	1	3	0,477	0,477	0	0
kena	1	0	0	1	3	0,477	0,477	0	0
gerd	1	0	0	1	3	0,477	0,477	0	0
Sabis	0	1	0	1	3	0,477	0	0,477	0
liat	0	1	0	1	3	0,477	0	0,477	0
dokumenternya	0	1	0	1	3	0,477	0	0,477	0
menarik	0	1	0	1	3	0,477	0	0,477	0
inget	0	0	1	1	3	0,477	0	0	0,477
bapaknya	0	0	1	1	3	0,477	0	0	0,477
mencurigakan	0	0	1	1	3	0,477	0	0	0,477

The next step is to divide the training data and test data. Training data is used to form a classifier model, this model is a representation of knowledge that will be used to predict new data classes that have never existed. The larger the training data used, the better the machine will understand the data pattern. Meanwhile, test data is used to measure the extent to which the classifier succeeds in classifying correctly.

Table 2. Comparison of Training and Test Data Ratio

No	Training Data	Testing Data
1	60%	40%
2	70%	30%
3	80%	20%

The first method used in this research is the Naïve Bayes algorithm. Naïve Bayes is a classification framework based on probabilistic and statistical models derived from Bayes' theorem, which assumes that each attribute has independence. In other words, the algorithm determines whether or not there is a connection between a particular class and another class .

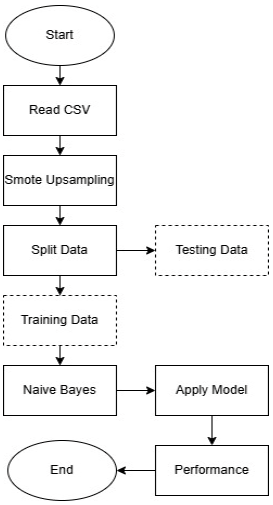


Fig. 3. Naïve Bayes Algorithm Implementation Overview

The second method used is K-NN. K- Nearest Neighbors (K-NN) is a classification method based on basic examples that do not build explicit declarative representations of categories, but

instead rely on category labels contained in training documents that are similar to test documents [10].

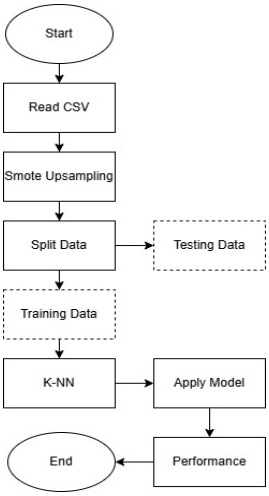


Fig. 4. K-NN Algorithm Implementation Overview

To evaluate the model using the Confusion Matrix method. Confusion matrix is a method used to calculate accuracy in data mining concepts. Evaluation with confusion matrix produces accuracy, precision and recall values [11].

4. Results and Discussions

Data Description

As many as 3000 comment data collected from the twitter data crawling process, then the data shrank to 1697 data. The shrinkage occurred because all data had passed the cleaning process, where the process was carried out to eliminate empty comments or comments that only contained emoticons. The data was deleted because it was not used in this study. All collected data will be labeled with sentiment using a lexicon dictionary, from 1697 data will be divided into 3 scenarios, namely scenario 1 using a 60:40 ratio, scenario 2 using a 70:30 ratio, and scenario 3 using an 80:20 ratio.

Word	Attribute ...	Total ...	Docum...
aaaa	aaaa	2	2
aaaaa	aaaaa	2	2
aaaanya	aaaanya	1	1
aamiin	aamiin	2	2
abad	abad	1	1
abah	abah	1	1
abaikan	abaikan	1	1
abimanyu	abimanyu	1	1
abis	abis	57	56
abisan	abisan	1	1
abisnya	abisnya	1	1

Fig. 5. Tokenize result

The number of scores on a tweet determines the positive, negative or neutral label. A positive label is given if the score is >0, a negative label is given if the score is <0, and a neutral label is given if the score is 0. The lexicon dictionary used is the Indonesian Sentiment (InSet) Lexicon sourced from Koto (2017). InSet lexicon contains approximately 10,250 words that are given a value of -5 to +5.

4	percakapan twitterzen topik data bias data hmmm kopi sianida	netral
5	kalo nonton sianida film nyeritain cewe nati karna minum kopi tuduh temen d...	negatif
6	nonton kopi sianida film istirahat trus istirahat berasa ngikut sidangnya timny...	negatif
7	berdebat orgtua perkara kopi sianida disimpulkan jessica media ngeri ngedok...	positif
8	kyny mirna kondisinya enak perut diet mkny nyobain kopi berasa aneh trus ha...	negatif
9	orang cafe pingsan krna kandungan sianida kalo kena udara menguap kena k...	negatif
10	hasil sampel lambung bebrapa stelah meninggal sianida stelah sampel lambu...	negatif
11	jessica benarbenar membunuh mirna pakai kopi sianida	netral
12	netizen terbawa opini publik kopi sianida hufttt	positif
13	nontonya ambil minum kopi biar keracunan sianida	netral
14	cman budiawan setuju gelgel kepala bpom sepakat sianida kopi bikin warna k...	negatif

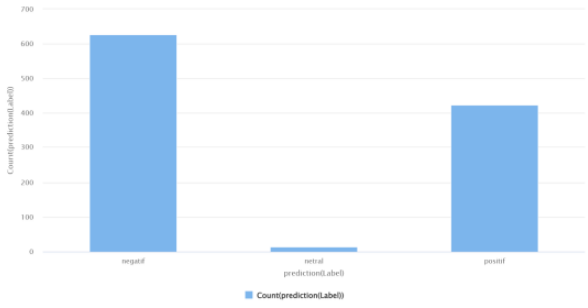
Fig. 6. Labeling Results Using Lexicon Dictionary

TF-IDF is a process to find the number of words we know (TF) after multiplying by how many news articles a word appears (IDF). Testing is done to observe the results of execution through test data and check the functionality of the system test results.

text	abad	abdelachrian	abis	abuwaras	acara
mengenal racun sianida bikin heboh film cold	0	0	0	0	0
film dokumentasi menjelajahi misteri menggantung persindangan j...	0	0	0	0	0
halo sahabatbly sahabat film dokumenter netflix terbaru cold murd...	0	0	0	0	0
tayangan film cold netflik menghadirkan babak pembunuhan mirn...	0	0	0	0	0
tadz kopi sianida	0	0	0	0	0
emang janggal banget simple kalo tubuh mirna gada sianida gada...	0	0	0	0	0
seru urusan politik keluarga kopi sianida	0	0	0	0	0
viral film cold murder coffee jessica wongso film ngangkat jessica ...	0	0	0	0	0
itsurlitlekid kopi sianida nggeh purun	0	0	0	0	0
abuwaras dennysiregar bingung pdip ngga dianggap jokowi dilepe...	0	0	0	0.346	0
piala citra suami mirna salihin membunuh istrinya merebut perusa...	0	0	0	0	0
ngikutin kopi sianida nonton interview nampak blunder argumenny...	0	0	0	0	0
tanyakanri kopi sianida	0	0	0	0	0
dibikin meme kynya protes kopi sianida doang dibecandain	0	0	0	0	0

Fig. 7. TF-IDF Result

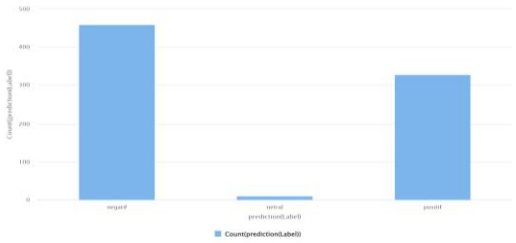
Sentiment prediction results obtained from each method, namely Naïve Bayes and K-NN and performance results with the Confusion Matrix method.



accuracy: 85.31%

	true negatif	true positif	true netral	class precision
pred. negatif	471	50	105	75.24%
pred. positif	0	422	0	100.00%
pred. netral	1	0	13	92.86%
class recall	99.79%	89.41%	11.02%	

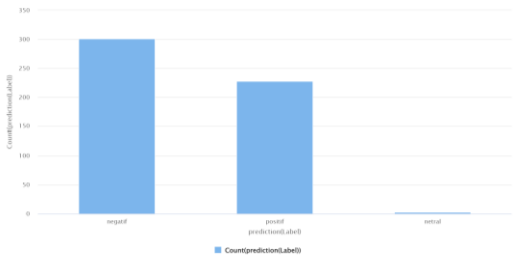
Fig. 8. Naïve Bayes 1 Prediction Results & Confusion Matrix Naïve Bayes 1



accuracy: 86.58%

	true negatif	true positif	true netral	class precision
pred. negatif	353	27	79	76.91%
pred. positif	0	327	0	100.00%
pred. netral	1	0	9	90.00%
class recall	99.72%	92.37%	10.23%	

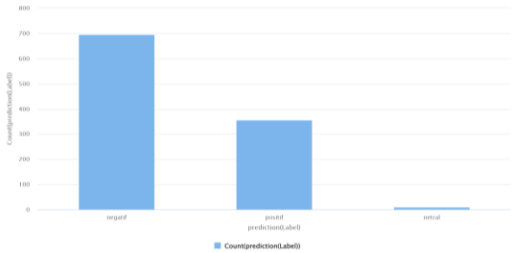
Fig. 9. Naïve Nayes 2 & Prediction Results



accuracy: 87.76%

	true negatif	true positif	true netral	class precision
pred. negatif	236	9	56	78.41%
pred. positif	0	227	0	100.00%
pred. netral	0	0	3	100.00%
class recall	100.00%	96.19%	5.08%	

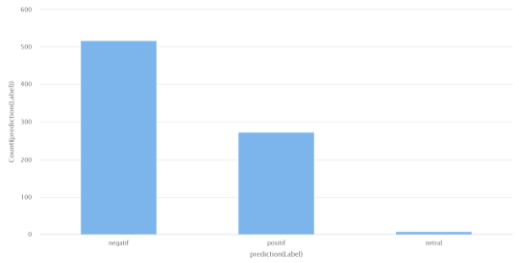
Fig. 10. Naïve Nayes 3 & Prediction Results



accuracy: 79.00%

	true negatif	true positif	true netral	class precision
pred. negatif	472	115	108	67.91%
pred. positif	0	357	0	100.00%
pred. netral	0	0	10	100.00%
class recall	100.00%	75.64%	8.47%	

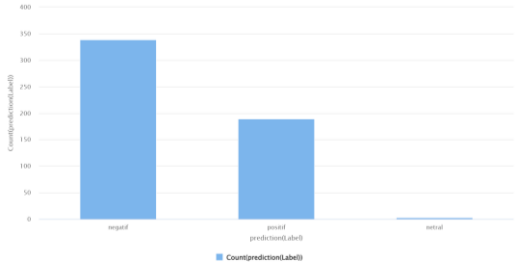
Fig. 11. K-NN 1 Prediction Results & Confusion Matrix K-NN 1



accuracy: 79.52%

	true negatif	true positif	true netral	class precision
pred. negatif	354	82	81	68.47%
pred. positif	0	272	0	100.00%
pred. netral	0	0	7	100.00%
class recall	100.00%	76.84%	7.95%	

Fig. 12. K-NN 2 Prediction Results & K-NN 2 Confusion Matrix



accuracy: 80.60%

	true negatif	true positif	true netral	class precision
pred. negatif	236	47	56	69.62%
pred. positif	0	189	0	100.00%
pred. netral	0	0	3	100.00%
class recall	100.00%	80.08%	5.08%	

Fig. 13. K-NN 3 Prediction Results & K-NN 3 Confusion Matrix

Discussion

From the results of the discussion and implementation of each method on the dataset that the author uses, the accuracy, precision and recall values vary. These varying values are due to the different ratios used.

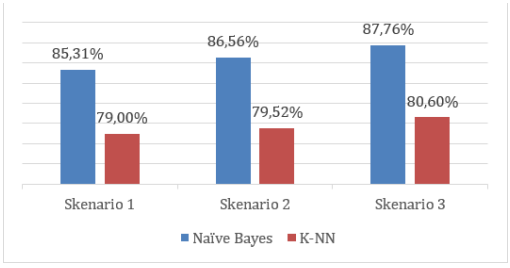


Fig. 14. Accuracy Comparison Chart

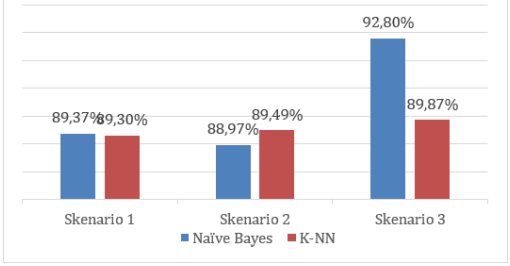


Fig. 15. Precision Comparison Chart

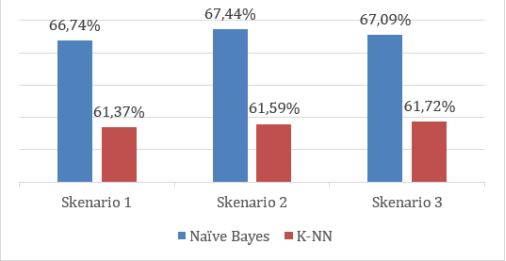


Fig. 16. Recall Comparison Chart

The average performance of the Naïve Bayes & K-NN methods in the test results of each scenario gets the following results

Table 4. Average of Naïve Bayes Method

Scenario	Accucary	Precision	Recall
1	85,31%	89,37%	66,74%
2	85,56%	88,97%	67,44%
3	87,76%	92,80%	67,09%
Average	**85,64%**	**90,38%**	**67,09 %**

Table 5. Average of K-NN Method

Scenario	Accucary	Precision	Recall
1	79,00%	89,30%	61,37%
2	79,52%	89,49%	61,59%
3	80,60%	89,87%	61,72%
Average	**79,71%**	**89,55%**	**61,56%**

The visualization of data from words that often appear in the dataset is:

Fig. 17. Data Visualization

The larger the size of the word, the more frequently the word appears in the dataset

5. Conclusion

The conclusions on the research comparison of Naïve Bayes and K-NN methods for sentiment analysis are: 1) From the research and sentiment analysis that has been done, it shows that negative sentiment dominates twitter comments related to the cyanide coffee case. This reflects the public's anger, disappointment and dissatisfaction with the course of the case and the verdict given. Many comments expressed disappointment with the trial and prosecution process, which was considered slow and unfair. 2) The sentiment analysis of the cyanide coffee case shows the complexity of public opinion and the variety of viewpoints. It serves as a reminder of the importance of fairness, transparency and truth-seeking in the legal process. 3) This case is a reflection of how mass media and social media can influence public opinion, and how narratives and speculation can thrive in the digital age. 4) From the test results that have been carried out, it can be seen that testing the Naïve Bayes method in scenario 3 is superior to other scenarios with an accuracy of 87.76%, precision of 92.80%

and recall of 67.09%. Meanwhile, the K-NN method in scenario 3 is superior to other scenarios with an accuracy of 80.60%, precision of 89.87% and recall of 61.72%. 5) Of the two methods used for twitter sentiment analysis on the cyanide coffee case, it is found that the Naïve Bayes method is better in terms of accuracy and optimal than the K-NN method. 6) Of the 3 scenarios used in this study, namely scenario 1 with a ratio of 60:40, scenario 2 with a ratio of 70:30 and scenario 3 with a ratio of 80:20. The highest accuracy test results for both methods are obtained in scenario 3, meaning that the more training data used will increase accuracy results.

References

Armaeni, P. P., Wiguna, I. K. A. G., & Parwita, W. G. S. (2024). Sentiment Analysis of YouTube Comments on the Closure of TikTok Shop Using Naïve Bayes and Decision Tree Method Comparison. *Jurnal Galaksi*, *1*(2), 70–80. https://doi.org/10.70103/galaksi.v1i2.15

Arya, I. K. A. G. W., Wiguna, G. W., & Sudipa, I. G. I. S. I. (2022). Sentiment Analysis Using Backpropagation Method To Recognize The Public Opinion. *IJCCS (Indonesian Journal of Computing and Cybernetics Systems)*, *16*(4). https://doi.org/10.22146/ijccs.78664

Chouhan, K., Yadav, M., Rout, R. K., Sahoo, K. S., Jhanjhi, N. Z., Masud, M., & Aljahdali, S. (2023). Sentiment Analysis with Tweets Behaviour in Twitter Streaming API. *Comput. Syst. Sci. Eng.*, *45*(2), 1113–1128. https://doi.org/10.32604/csse.2023.030842

Dhanta, R., Sharma, H., Kumar, V., & Singh, H. O. (2023). Twitter sentimental analysis using machine learning. *International Journal of Communication and Information Technology*, *4*(1), 71–83. https://doi.org/10.33545/2707661x.2023.v4.i1a.63

Farhan, M., Manik, R. D. L. R., Jannah, H. R., & Suadaa, L. H. (2023). Comparison of Naive Bayes, K-Nearest Neighbor, and Support Vector Machine Classification Methods in Semi-Supervised Learning for Sentiment Analysis of Kereta Cepat Jakarta Bandung (KCJB). *Proceedings of The International Conference on Data Science and Official Statistics*, *2023*(1), 109–120. https://doi.org/10.34123/icdsos.v2023i1.332

Jakarta Globe. (2024, October). Jessica Wongso Maintains Innocence After Parole, Appeals Supreme Court Verdict in Poisoned Coffee Case. *Https://Jakartaglobe.Id/News/Jessica-Wongso-Maintains-Innocence-after-Parole-Appeals-Supreme-Court-Verdict-in-Poisoned-Coffee-Case*, 1. https://jakartaglobe.id/news/jessica-wongso-maintains-innocence-after-parole-appeals-supreme-court-verdict-in-poisoned-coffee-case

Kumar, A., & Jaiswal, A. (2020). Systematic literature review of sentiment analysis on Twitter using soft computing techniques. *Concurrency and Computation: Practice and Experience*, *32*(1), e5107. https://doi.org/10.1002/cpe.5107

Liu, B. (2022). *Sentiment analysis and opinion mining*. Springer Nature.

Rahat, A. M., Kahir, A., & Masum, A. K. M. (2019). Comparison of Naive Bayes and SVM Algorithm based on sentiment analysis using review dataset. *2019 8th International Conference System Modeling and Advancement in Research Trends (SMART)*, 266–270. https://doi.org/10.1109/SMART46866.2019.9117512

Rout, J. K., Choo, K.-K. R., Dash, A. K., Bakshi, S., Jena, S. K., & Williams, K. L. (2018). A model for sentiment and emotion analysis of unstructured social media text. *Electronic Commerce Research*, *18*, 181–199. https://doi.org/10.1007/s10660-017-9257-8

Septiani, A. T. D., Kuncoro, A. P., Subarkah, P., & Riyanto, R. (2024). Perbandingan Kinerja Metode Naïve Bayes Classifier dan K-Nearest Neighbor pada Analisis Sentimen Ulasan Mobile Banking Jenius. *Jurnal Krisnadana*, *3*(2), 67–77. https://doi.org/10.58982/krisnadana.v3i2.516

Sudipa, I. G. I., Asana, I. M. D. P., Atmaja, K. J., Santika, P. P., & Setiawan, D. (2023). Analisis Data Kepuasan Pengguna Layanan E-Wallet Gopay Menggunakan Metode Naïve Bayes Classifier Algorithm. *Kesatria: Jurnal Penerapan Sistem Informasi (Komputer Dan Manajemen)*, *4*(3), 726–735.

Surya, P. P. M., & Subbulakshmi, B. (2019). Sentimental analysis using Naive Bayes classifier. *2019 International Conference on Vision towards Emerging Trends in Communication and Networking (ViTECoN)*, 1–5. https://doi.org//10.1109/ViTECoN.2019.8899618

Udayana, I. P. A. E. D., & Sudipa, I. G. I. (2022). Sentimen Analisis Inisiatif Vaksin Nasional

Menggunakan Naïve Bayes dan Laplacian Smoothing Pada Komentar Video Youtube. *Jurnal RESISTOR (Rekayasa Sistem Komputer)*, *5*(2), 116–126.

Wongkar, M., & Angdresey, A. (2019). Sentiment analysis using Naive Bayes Algorithm of the data crawler: Twitter. *2019 Fourth International Conference on Informatics and Computing (ICIC)*, 1–5. https://doi.org/10.1109/ICIC47613.2019.8985884