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SENTIMENT ANALYSIS OF PLN MOBILE APPLICATION SERVICES USING NAIVE BAYES, SUPPORT VECTOR MACHINE (SVM) AND DECISION TREE METHODS

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Abstract

The advancement of information technology has driven public service providers such as PLN to introduce digital innovations, one of which is the PLN Mobile application that enables customers to access various services online. As the number of users increases, numerous reviews have been submitted through the Google Play Store platform, which can be utilized to evaluate service quality. This study aims to conduct sentiment analysis on user reviews of the PLN Mobile application using three classification algorithms: Naïve Bayes, Support Vector Machine (SVM), and Decision Tree. A total of 4,992 review data were collected and processed through text preprocessing stages, including case folding, tokenization, stopword removal, stemming, and vectorization using the TF-IDF method. The data were then split into training and testing sets with a ratio of 80:20 and trained using the three classification algorithms. Model evaluation was conducted using precision, recall, f1-score, and accuracy metrics. The evaluation results indicate that the SVM algorithm delivers the best performance with an accuracy of 94%, followed by Naïve Bayes and Decision Tree, each with an accuracy of 91%. However, all three models demonstrated limited effectiveness in detecting neutral sentiments. Based on these findings, the SVM algorithm is recommended as the most effective model for sentiment classification of PLN Mobile application reviews.

Keywords: *Sentiment Analysis, PLN Mobile, Naïve Bayes,* SVM, *Decision Tree*

Abstrak

Perkembangan teknologi informasi mendorong perusahaan penyedia layanan publik seperti PLN untuk menghadirkan inovasi digital, salah satunya melalui aplikasi PLN Mobile yang memungkinkan pelanggan mengakses berbagai layanan secara daring. Seiring meningkatnya jumlah pengguna, banyak ulasan yang diberikan melalui platform Google Play Store yang dapat dimanfaatkan sebagai bahan evaluasi kualitas layanan. Penelitian ini bertujuan untuk melakukan analisis sentimen terhadap ulasan pengguna aplikasi PLN Mobile dengan menggunakan tiga algoritma klasifikasi, yaitu Naïve Bayes, Support Vector Machine (SVM), dan Decision Tree. Sebanyak 4.992 data ulasan dikumpulkan dan diproses melalui tahapan pra-pemrosesan teks seperti *case folding*, tokenisasi, *stopword removal*, stemming, dan vektorisasi menggunakan metode TF-IDF. Data kemudian dibagi menjadi data latih dan data uji dengan rasio 80:20 dan dilatih menggunakan ketiga algoritma tersebut. Evaluasi model dilakukan dengan menggunakan metrik precision, recall, f1-score, dan akurasi. Hasil evaluasi menunjukkan bahwa algoritma SVM memberikan performa terbaik dengan akurasi sebesar 94%, diikuti oleh Naïve Bayes dan Decision Tree dengan akurasi masing-masing sebesar 91%. Meskipun demikian, ketiga model belum optimal dalam mengklasifikasikan sentimen netral. Berdasarkan hasil tersebut, algoritma SVM direkomendasikan sebagai model paling efektif untuk klasifikasi sentimen pada ulasan aplikasi PLN Mobile.*

Kata kunci: Analisis Sentimen, PLN Mobile, Naïve Bayes, SVM, Decision Tree

INTRODUCTION

The advancement of information technology has encouraged companies to present mobile application-based services to improve interaction with customers. PT. PLN (Persero) responded to this through the PLN Mobile application, which provides features such as bill payments, disruption reporting, and electricity consumption information (Faried Vangeran Saragih et al., 2017; Meidick Dias Devasela & Tata Sutabri, 2024). Even though the application is equipped with comprehensive features, user reviews on platforms such as the Google Play Store still voice various complaints ranging from application

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performance to the quality of customer service (Asri et al., 2022; Tanggraeni & Sitokdana, 2022).

Analysis of these reviews is important to reveal users' perceptions and experiences objectively. Sentiment analysis is a widely used approach for this purpose due to its ability to classify opinions into positive, negative, and neutral categories (Cahyaningtyas et al., 2021). Various studies have applied this method to similar domains, such as e-wallet services (Achmad et al., 2023), social media reviews related to public issues (Raksaka Indra Alhaqq et al., 2022), or on the PLN Mobile application itself (Asri et al., 2022; Syafrizal et al., 2023).

A number of common algorithms in sentiment analysis, including Naïve Bayes, Support Vector Machine (SVM), and Decision Tree, have been shown to produce competitive accuracy (Derisma & Febrian, 2020; Desiani et al., 2022; Khusna & Sugiantoro, 2023). However, there is still limited research that directly compares the three algorithms in the context of PLN Mobile application user reviews. Previous research tends to only test one algorithm or does not explore performance differences comprehensively (Syafrizal et al., 2023; Zulfahmi, 2024).

The novelty of this study lies in the comparative approach to measure the accuracy and effectiveness of the three algorithms in classifying the sentiment of PLN Mobile application users. By using actual data from the Google Play Store and preprocessing stages based on best practices (Maulana et al., 2023; Mukti et al., 2023), This research is expected to be able to present strategic insights for the development of PLN digital services. In addition to academic contributions, the results of this study can also be used as a basis for policy in improving the quality and competitiveness of the PLN Mobile application (Faisal et al., 2024; Oktavia et al., 2023).

RESEARCH METHODS

The method used in this study involves a series of stages designed to optimize sentiment analysis of user review data on the PLN Mobile application. These steps include collecting review data from the Google Play Store, text preprocessing (cleansing, case folding, tokenizing, and stopword removal), applying machine learning algorithms (Naïve Bayes, Support Vector Machine, and Decision Tree), and evaluating the performance of each model. The entire process is carried out using Google Colaboratory so that each stage can be well integrated and the results obtained can be reproduced efficiently. The main focus of this methodology is to evaluate the effectiveness of the three algorithms in classifying user review sentiments on the PLN Mobile application.

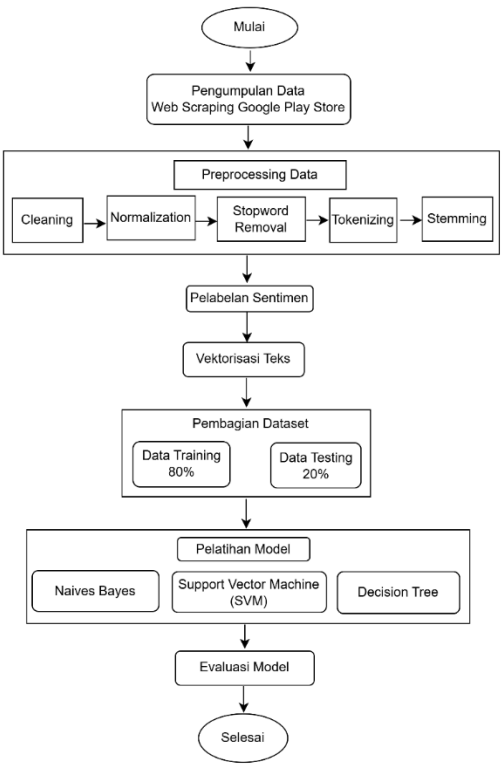

Figure 1. Diagram Alur Penelitian

Based on Figure 1 above, the design flow of this research starts from the data collection stage, where data is collected through web scraping techniques from the Google Play Store to obtain user reviews of the PLN Mobile application. The data obtained is still in raw form, so a data preprocessing process is needed. Then the data obtained through the preprocessing stage, including text cleaning, normalization, stopword removal, tokenization, and stemming.

After the data is cleaned and prepared, the sentiment labeling process is carried out into three categories, namely positive, negative, and neutral. The data that has been labeled is then converted into numeric form through a text vectorization process using the TF-IDF (Term Frequency-Inverse Document Frequency) method.

The next step is to divide the dataset into two parts, namely training data of 80% and testing data of 20%, each of which is used to train and test the model. For the classification model training process using three algorithms: Naïve Bayes, Support Vector Machine (SVM), and Decision Tree.

The final stage is model evaluation using accuracy, precision, recall, and F1-score metrics to compare the performance of each algorithm and draw conclusions and recommendations from the

research results to improve the quality of PLN Mobile application services.

Data Collection

The initial stage in this research process is the collection of data used in this study obtained through web scraping techniques from the Google Play Store platform, with a total of 5,000 user review data on the PLN Mobile application. Data collection was carried out during the period from June 1, 2024 to July 15, 2024. The data collected includes review text, star ratings, review dates, and other related metadata relevant to sentiment analysis. The web scraping technique was chosen because it allows automatic and systematic data retrieval from the PLN Mobile application page on the Google Play Store, so that it can produce a representative dataset for further analysis.

Preprocessing Data

This step aims to prepare raw data into a format that is ready to be analyzed, including:

1. Text Cleaning:
   Removing special characters, URLs, numbers, punctuation, emojis, and irrelevant punctuation.
2. Tokenization:
   Dividing text into individual words.
3. Stop Word Removal:
   Removing common words that do not provide meaningful information (eg: "and", "or").
4. Stemming/Lemmatization:
   Changing words to their base form (eg: "berjalan" becomes "jalan").
5. Vectorization:
   Changing text into a numeric representation that can be understood by computers (eg: Bag-of-Words, Term Frequency-Inverse Document Frequency TF-IDF) that can be used by machine learning algorithms.

Data Visualization Using Word Cloud

In this study, text data visualization was conducted using the Word Cloud package with the aim of identifying words that frequently appear in user reviews of the PLN Mobile application service. This visualization helps researchers understand the most talked about topics or keywords, which can then provide an overview of user perceptions and sentiments towards the application (Arif Chandra & Yusuf, 2024). The data used comes from user reviews of the PLN Mobile application taken through a web scraping process from the Google Play Store platform. These reviews were analyzed to find words that are frequently used by users in expressing opinions, whether positive, negative, or neutral.

Data Splitting

The processed data is divided into two subsets:

1. Training Set: Used to train the model, consisting of 80% of the data.
2. Testing Set: Used to test the model's performance, consisting of 20% of the data.

Implementation of Machine Learning Models

This study uses three machine learning algorithms for sentiment analysis, namely Naïve Bayes, Support Vector Machine (SVM), and Decision Tree.

1. Naïve Bayes

Naïve Bayes is a probabilistic classification algorithm that assumes independence between features. This algorithm works by calculating the probability of the occurrence of words in each sentiment class. The variant used is Multinomial Naïve Bayes, which is suitable for text data. Its advantages are efficiency and good performance on large datasets, although the assumption of feature independence is a limitation in the context of natural language (Efraim, 2023).

2. Support Vector Machine (SVM)

SVM works by finding the best hyperplane that separates the data into sentiment classes with maximum margin. In this study, the processed review data was converted into vectors using TF-IDF, then classified using SVM with a linear kernel. SVM excels in handling high-dimensional data such as text and provides reliable classification results (Hilal et al., 2024).

3. Decision Tree

Decision Tree forms a tree structure based on the selection of features that provide maximum information in dividing the data. The feature selection process uses metrics such as Gini Index and Information Gain. In this study, this algorithm is used to classify reviews into three sentiment classes and is implemented using the Scikit-learn library (Adi et al., 2024).

The three algorithms are compared based on evaluation metrics such as accuracy, precision, recall, and F1-score to determine the best model for analyzing sentiment towards the PLN Mobile application service.

Results Analysis

This study compares the performance of three machine learning models—Naïve Bayes, Support Vector Machine (SVM), and Decision Tree—in analyzing the sentiment of PLN Mobile application user reviews. The evaluation was conducted using accuracy, precision, recall, and F1-score metrics to determine the most effective model

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in classifying positive, negative, and neutral sentiments. In addition to model evaluation, analysis was also conducted on dominant sentiment patterns to identify aspects of the service that users often praise or complain about. These findings provide a comprehensive picture of user perceptions of the PLN Mobile application. The results of this study are expected to be strategic input for PT. PLN (Persero) in improving the quality of application services and responding to user needs and expectations more optimally.

RESULTS AND DISCUSSION

This study uses web scraping techniques to obtain user review data of the PLN Mobile application from the Google Playstore site. The following are the results of the study and a discussion of the stages in conducting sentiment analysis starting from data collection, labeling data, text processing, and algorithm implementation.

Data Collection

The data in this study were collected through web scraping techniques using Python libraries such as requests and google-play-scraper to obtain 5,000 user reviews of the PLN Mobile application from the Google Play Store, within the period from June 1 to July 15, 2024. The data was stored in CSV format and manually labeled by reading each comment to determine positive, negative, or neutral sentiment.

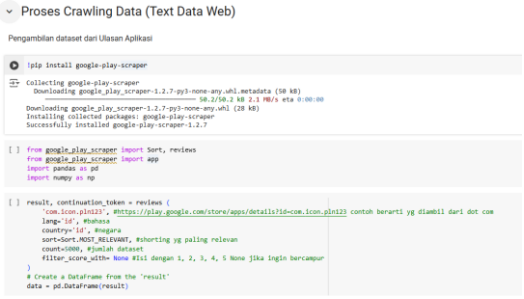

Figure 2. Import Library

After installing the Python library, data updating is done by entering the HTML code in the form of com.icon.pln123 as in Figure 3 below.

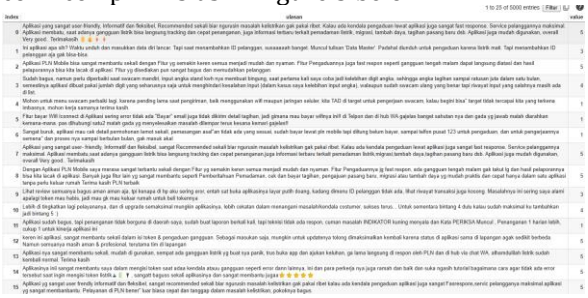
Figure 3. PLN Mobile Review Results from Google Playstore

Preprocessing Data

The next process is preprocessing. This stage has the benefit of producing good input data for the training and testing process. The preprocessing stage is the stage for selecting words in the review so that it produces words that contain sentiment by removing unnecessary words.

Cleaning Data

Table 1. Data Cleaning Process Results

Ulasan	Result Cleaning Data
Aplikasi yang sangat user-friendly, Informatif dan fleksibel, Recommended sekali biar ngurusin masalah kelistrikan gak pakai ribet. Kalau ada kendala pengaduan lewat aplikasi juga sangat fast response. Service pelanggannya maksimal. Aplikasi membatu, saat adanya gangguan listrik bisa langsung tracking dan cepat penanganan, juga informasi terbaru terkait pemadaman listrik, migrasi, tambah daya, tagihan pasang baru dsb. Aplikasi juga mudah digunakan, overall Very good.. Terimakasih 👌👍⚡⚡	aplikasi yang sangat userfriendly informatif dan fleksibel recommended sekali biar ngurusin masalah kelistrikan gak pakai ribet kalau ada kendala pengaduan lewat aplikasi juga sangat fast response service pelanggannya maksimal aplikasi membatu saat adanya gangguan listrik bisa langsung tracking dan cepat penanganan juga informasi terbaru terkait pemadaman listrik migrasi tambah daya tagihan pasang baru dsb aplikasi juga mudah digunakan overall very good terimakasih

1. Normalization

Table 2. Normalization Process Results

Before (Cleaning Data)	After (Normalization)
aplikasi pln mobile bisa sangat membantu sekali	aplikasi pln mobile bisa sangat membantu sekali

dengan fitur yg semakin keren semua menjadi mudah dan nyaman fitur pengaduannya juga fast respon seperti gangguan tengah malam dapat langsung diatasi dan hasil pelaporannya bisa kita lacak di aplikasi fitur yg disediakan pun sangat bagus dan memudahkan pelanggan	dengan fitur yang semakin keren semua menjadi mudah dan nyaman fitur pengaduannya juga fast respon seperti gangguan tengah malam dapat langsung diatasi dan hasil pelaporannya bisa kita lacak di aplikasi fitur yang disediakan pun sangat bagus dan memudahkan pelanggan

2. Stopword Removal

Table 3. Stopword Removal Process Results

Before (*Normalization*)	After (*Stopword Removal*)
aplikasi pln mobile bisa sangat membantu sekali dengan fitur yang semakin keren semua menjadi mudah dan nyaman fitur pengaduannya juga fast respon seperti gangguan tengah malam dapat langsung diatasi dan hasil pelaporannya bisa kita lacak di aplikasi fitur yang disediakan pun sangat bagus	aplikasi pln mobile sangat membantu sekali fitur semakin keren semua menjadi mudah nyaman fitur pengaduannya fast respon gangguan tengah malam langsung diatasi hasil pelaporannya kita lacak aplikasi fitur disediakan sangat bagus

3. Tokenizing

Table 4. Tokenizing Process Results

Before (Stopword Removal)	After (*Tokenizing*)
aplikasi pln mobile sangat membantu sekali fitur semakin keren semua menjadi mudah nyaman fitur pengaduannya fast respon gangguan tengah malam langsung diatasi hasil pelaporannya kita lacak aplikasi fitur disediakan sangat bagus memudahkan pelanggan	['aplikasi','pln','mobile', 'sangat','membantu','sekali','fitur','semakin','keren','semua','menjadi','mudah','nyaman','fitur','pengaduannya','fast','respon','gangguan','tengah','malam','langsung','diatasi','hasil','pelaporannya','kita','lacak','aplikasi','fitur','disediakan','sangat','bagus','memudahkan','pelanggan']

4. Stemming

Table 5. Stemming Process Results

Before (*Tokenizing*)	After (*Stemming*)
aplikasi pln mobile sangat membantu sekali fitur semakin keren semua menjadi mudah nyaman fitur pengaduannya fast respon gangguan tengah malam langsung diatasi hasil pelaporannya kita lacak aplikasi fitur disediakan sangat bagus memudahkan pelanggan	aplikasi pln mobile sangat bantu sekali fitur tambah keren semua jadi mudah nyaman fitur adu fast respon ganggu tengah malam langsung atasi hasil lapor kita lacak aplikasi fitur sedia sangat bagus mudah pelanggan

Labeling Data

The labeling process was carried out on the PLN Mobile application user review data that had gone through preprocessing stages such as cleaning, normalization, stopword removal, tokenization, and stemming. Sentiment labels consist of three classes: positive, neutral, and negative. Of the total 5,000 data, 4,992 were successfully labeled, with details of 4,562 positive sentiments, 77 neutral, and 353 negative.

Table 6. Data Labeling Process Results

No	Preprocessing (Stemming)	Value	Sentiment
1	aplikasi pln mobile sangat bantu sekali fitur tambah keren semua jadi mudah nyaman fitur adu fast respon ganggu tengah malam langsung atasi hasil lapor kita lacak aplikasi fitur sedia	5	positif

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	sangat bagus mudah pelanggan		
2	aplikasi apa sih waktu unduh masuk data diri lancar saat tambah id langgan susah sekali muncul tulis data master padahal unduh adu listrik mati tambah id langgan aja bisa	3	netral
3	mohon menu swacam baik karena pending lama kirim baik guna wifi maupun jaring seluler tadi target kerja swacam kalau begini target capai yang kena imbas mohon kerja sama terima kasih	1	negatif

Word Cloud

WordCloud or word cloud is a visualization technique used to display the most frequently occurring words in text data. The size of each word in the WordCloud is proportional to the frequency of its occurrence; the more frequently a word appears, the larger its font size in the visualization.

Figure 4. Sentiment WordCloud Results

The following are visualization results of words that frequently appear :

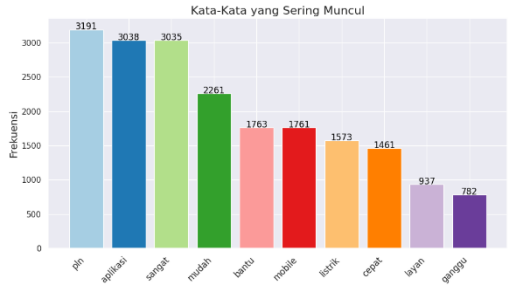

Figure 5. Frequently Appearing Words Visualization Results

After the vectorization process using TF-IDF, the data is divided into two parts: 80% as training data (training set) to build and train the classification model, and 20% as testing data (testing set) to evaluate the model's performance on previously unseen data. Next, the trained model is applied to classify the test data and generate performance evaluations based on metrics such as accuracy, precision, recall, and F1-score. The evaluation results of the three classification models show that the Support Vector Machine (SVM) algorithm provides the best performance with 94% accuracy, 92% precision, 94% recall, and 93% F1-score. Meanwhile, Decision Tree recorded 91% accuracy and 90% F1-score, while Naïve Bayes obtained 91% accuracy and 86% F1-score. Based on these results, SVM was chosen as the best model for sentiment analysis of PLN Mobile application user reviews because it was able to provide consistent and superior performance in all evaluation metrics.

CONCLUSIONS AND SUGGESTIONS

Conclusion

This study analyzes user sentiment towards PLN Mobile application services using the Naïve Bayes, Support Vector Machine (SVM), and Decision Tree algorithms based on 5,000 reviews taken from the Google Play Store. Data were analyzed through preprocessing stages such as cleansing, case folding, tokenizing, and stopword removal. The evaluation results show that the SVM algorithm provides the best performance with an accuracy of 94%, followed by Naïve Bayes and Decision Tree with an accuracy of 91% each. However, all three algorithms still have difficulty in classifying neutral sentiment accurately. This is due to several factors, including neutral sentences generally do not contain clear emotional expressions, the relatively small amount of neutral data causing class imbalance, and text features that are less discriminatory when compared to positive or negative sentiments. In addition, the conventional classification model used has not been able to understand the context of the sentence in depth, so it is difficult to interpret ambiguous or neutral meanings. On the other hand, the results of the analysis also identified several aspects of the service that are often complained about by users, which can be important input for improving the quality of the PLN Mobile application.

Suggestion

For further research development, the following are recommended:

1. Improve classification accuracy, especially in neutral and negative classes, by applying advanced preprocessing such as stemming and sentence context analysis.
2. Use word embedding-based text representation such as Word2Vec, GloVe, or BERT to improve the model's understanding of word context.
3. Apply deep learning models such as LSTM or BERT-based classifiers to overcome the limitations of conventional models.
4. Perform hyperparameter tuning and cross-validation to improve model performance stability.
5. Expand research towards aspect-based sentiment analysis to gain a deeper understanding of user opinions.
6. PT PLN (Persero) is advised to prioritize improving technical aspects that are widely complained about by users, such as application stability, access speed, and bugs.

REFERENCES

Achmad, A. A., Iin, K., & Iska, Y. (2023). Analisis Klasifikasi Sentimen Berbasis Topik pada Ulasan Layanan Dana dan Sakuku dengan Convolutional Neural Network. *INFORMASI (Jurnal Informatika Dan Sistem Informasi)*, *15*(2), 225–236. https://doi.org/10.37424/informasi.v15i2.267

Adi, S. I. R., Bakkara, B., Zega, K. A., Vielita, F. N., & Rakhmawati, N. A. (2024). Analisis Sentimen Masyarakat Terhadap Progress Ikn Menggunakan Model Decision Tree. *JIKA (Jurnal Informatika)*, *8*(1), 57. https://doi.org/10.31000/jika.v8i1.9803

Arif Chandra, M. I., & Yusuf, R. (2024). VISUALISASI KATA KUNCI PEMBERITAAN PEMILU 2024 MENGGUNAKAN SCAPY DAN WORDCLOUD. *TEKNIMEDIA: Teknologi Informasi Dan Multimedia*, *5*(1), 41–46. https://doi.org/10.46764/teknimedia.v5i1.187

Asri, Y., Suliyanti, W. N., Kuswardani, D., & Fajri, M. (2022). Pelabelan Otomatis Lexicon Vader dan Klasifikasi Naive Bayes dalam menganalisis sentimen data ulasan PLN Mobile. *PETIR*, *15*(2), 264–275. https://doi.org/10.33322/petir.v15i2.1733

Cahyaningtyas, C., Nataliani, Y., & Widiasari, I. R. (2021). Analisis Sentimen Pada Rating Aplikasi Shopee Menggunakan Metode Decision Tree Berbasis SMOTE. *AITI*, *18*(2), 173–184. https://doi.org/10.24246/aiti.v18i2.173-184

Derisma, D., & Febrian, F. (2020). Perbandingan Teknik Klasifikasi Neural Network, Support Vector Machine, dan Naive Bayes dalam Mendeteksi Kanker Payudara. *Bina Insani Ict Journal*, *7*(1), 53. https://doi.org/10.51211/biict.v7i1.1343

Desiani, A., Akbar, M., Amran Matematika, A., Matematika dan Ilmu Pengetahuan Alam, F., Sriwijaya Jl Raya Palembang -Prabumlih Km, U., Indah, I., Indralaya, K., & Ogan Ilir Sumatera Selatan, K. (2022). Implementasi Algoritma Naïve Bayes dan Support Vector Machine (SVM) Pada Klasifikasi Penyakit Kardiovaskular. *Jurnal Teknik Elektro Dan Komputasi (ELKOM)*, *4*(2), 207–214. http://jurnal.unmuhjember.ac.id/index.php/ELKOM/article/view/7691

Efraim, D. A. (2023). *Analisis Sentimen Pada Sosial Media Instagram Menggunakan Algoritma Naive Bayes (Studi Kasus : Timnas Futsal Indonesia)*. *April 2012*, 498–509. https://conference.upnvj.ac.id/index.php/senamika/article/view/2574

Faisal, H., Febriandirza, A., & Hasan, F. N. (2024). Analisis Sentimen Terkait Ulasan Pada Aplikasi PLN Mobile Menggunakan Metode Support Vector Machine. *KESATRIA: Jurnal Penerapan Sistem Informasi (Komputer & Manajemen)*, *5*(1), 303–312. https://pkm.tunasbangsa.ac.id/index.php/kesatria/article/view/339

Faried Vangeran Saragih, G., Gata, W., Ilmu Komputer, M., Ilmu Komputer, F., & Nusa Mandiri Jakarta, S. (2017). Terakreditasi SINTA Peringkat 2 Analisis Sentimen Pemindahan Ibu Kota Negara dengan Feature Selection Algoritma Naive Bayes dan Support Vector Machine. *Masa Berlaku Mulai*, *1*(3), 504–512. https://jurnal.iaii.or.id/index.php/RESTI/article/view/1942

Hilal, K. R., Setiawan, N. Y., & Ratnawati, D. E. (2024). *Fakultas Ilmu Komputer ANALISIS SENTIMEN BERBASIS ASPEK UNTUK PENGGUNA PLN MOBILE PADA GOOGLE PLAYSTORE MENGGUNAKAN METODE SUPPORT VECTOR MACHINE (SVM)*. *8 No 7*(1), 2548–2964. https://j-ptiik.ub.ac.id/index.php/j-ptiik/article/view/13927/

Khusna, T. N., & Sugiantoro, B. (2023). Komparasi Algoritma Naïve Bayes Classifier, K-Nearest Neighbor, dan Decision Tree untuk Menganalisis Sentimen Masyarakat terhadap

Kesehatan Mental pada Media Sosial Twitter. *JUMANJI (Jurnal Masyarakat Informatika Unjani)*, *7*(1), 18. https://doi.org/10.26874/jumanji.v7i1.279

Maulana, M. I., Budianita, E., Fikry, M., & Yanto, F. (2023). Klasifikasi Sentiment Ulasan Aplikasi Sausage Man Menggunakan VADER Lexicon dan Naïve Bayes Classifier. *Jurnal Sistem Komputer Dan Informatika (JSON)*, *4*(3), 485. https://doi.org/10.30865/json.v4i3.5854

Meidick Dias Devasela, & Tata Sutabri. (2024). Analisis Tingkat Kepuasan Layanan Aplikasi PLN Mobile Menggunakan Framework ITIL V3 Pada PT PLN Indonesia. *Jurnal RESTIKOM : Riset Teknik Informatika Dan Komputer*, *6*(1), 113–121. https://doi.org/10.52005/restikom.v6i1.292

Mukti, A., Hadiyanti, A. D., Nurlaela, A., & Panjaitan, J. (2023). Sistem Analisa Sentiment Bakal Calon Presiden 2024 Menggunakan Metode NLP Berbasis Web. *Jurikom*, *6*(1), p-ISSN. https://www.poltekstpaul.ac.id/jurnal/index.php/jsoscied/article/view/621

Oktavia, D., Ramadahan, Y. R., & Minarto. (2023). Analisis Sentimen Terhadap Penerapan Sistem E-Tilang Pada Media Sosial Twitter Menggunakan Algoritma Support Vector Machine (SVM). *KLIK: Kajian Ilmiah Informatika Dan Komputer*, *4*(1), 407–417. https://doi.org/10.30865/klik.v4i1.1040

Raksaka Indra Alhaqq, I Made Kurniawan Putra, & Yova Ruldeviyani. (2022). Analisis Sentimen terhadap Penggunaan Aplikasi MySAPK BKN di Google Play Store. *Jurnal Nasional Teknik Elektro Dan Teknologi Informasi*, *11*(2), 105–113. https://doi.org/10.22146/jnteti.v11i2.3528

Syafrizal, S., Afdal, M., & Novita, R. (2023). Analisis Sentimen Ulasan Aplikasi PLN Mobile Menggunakan Algoritma Naïve Bayes Classifier dan K-Nearest Neighbor. *MALCOM: Indonesian Journal of Machine Learning and Computer Science*, *4*(1), 10–19. https://doi.org/10.57152/malcom.v4i1.983

Tanggraeni, A. I., & Sitokdana, M. N. N. (2022). Analisis Sentimen Aplikasi E-Government pada Google Play Menggunakan Algoritma Naïve Bayes. *JATISI (Jurnal Teknik Informatika Dan Sistem Informasi)*, *9*(2), 785–795. https://doi.org/10.35957/jatisi.v9i2.1835

Zulfahmi, I. (2024). *Analisis Sentimen Aplikasi PLN Mobile Menggunakan Metode Decission Tree*. *3*(1). https://doi.org/10.55606/juprit.v3i1.3096