Proceedings of the 3rd Asia Pacific International Conference on Industrial Engineering and Operations Management, Johor Bahru, Malaysia, September 13-15, 2022

The Sentiment Analysis of User Perception on The Peduli Lindungi Application Using Support Vector Machine Algorithm

Yohana Ruth Wulan Natalia Susanto, Aisyah Larasati*, and Vertic EB Darmawan
Industrial Engineering Department
Faculty of Engineering
State University of Malang
Malang, Indonesia
*Corresponding author: aisyah.larasati.ft@um.ac.id

Abstract

The Covid-19 virus has become a global pandemic, including Indonesia. Various efforts have been made by the government to reduce the negative impact of this pandemic, one of which is through the launch of the Peduli Lindungi application. This research was conducted to classify the public feedback towards the Peduli Lindungi application based on the review data on the Google Play site. The data collection period starts from July 1st to November 30th, 2021. This period was chosen because the government requires the public to participate in preventing the spread of Covid-19 through the Peduli Lindungi application. Initial data labeling uses the Textblob library. The sentiment analysis is classified using the Support Vector Machine algorithm based on two classes, namely positive and negative. The results showed that the classification accuracy performance reaching 81.35%. The Sentiment analysis results are sufficient to display public opinion. The association of words on negative sentiment indicates that users are less satisfied with the performance of the Peduli Lindungi application. Especially in terms of applications, vaccines, certificates, locations, check-ins, registers, and service complaints. Thus, the results of this study are expected to be able to provide information to Peduli Lindungi to focus on improving applications based on complaints written by users and it is hoped that decision makers can improve the performance of Peduli Lindungi applications based on this opinion.

Keywords
Sentiment Analysis, Peduli Lindungi, Support Vector Machine, Classification and Grid Search.

1. Introduction

The Covid-19 virus has become a worldwide pandemic, including Indonesia. The spread of the Covid-19 virus in Indonesia has continued to increase drastically since the announcement of the first case in March 2020 (Almutaqqi 2020). As a result of the virus, the death rate in Indonesia has increased to 140,138 with a Case Fatality Rate of 3.4% in September 2021 (Kemenkes 2021). The negative impact of the pandemic continues, thus making the Indonesian government have a big responsibility to help the community resolve the pandemic. The government needs to take action and/or respond more responsively to the community to resolve the Covid-19 virus problem. The World Health Organization (WHO) urges the public to implement health protocols to avoid the spread of Covid-19 by maintaining a minimum distance of one meter, wearing masks, washing hands, limiting mobility, and staying away from crowds. The lack of access to information related to the spread of Covid-19 causes confusion for the public and the central government. In addition, the government is experiencing an inability to manage information and the lack of publicly accessible data related to the spread of the Covid-19 virus. According to WHO, electronic devices and information technology are able to assist contact tracing activities on a large scale (WHO 2020). Therefore, the Ministry of Communication and Information and the Ministry of State-Owned Enterprises of Indonesia designed a Peduli Lindungi mobile app to be used to assist the public and relevant government agencies in tracking to stop the spread of Covid-19. In addition, the Peduli Lindungi application is used for 3 things, namely screening (checking vaccination status and also swab test status), tracing (scan QR Code to start an activity), and ensuring the implementation of health protocols according to the QR Code color results (Peduli Lindungi 2021). Based on the urgency of the need for the Peduli Lindungi application to support people's activities in daily life, this research focuses on user perceptions of the Peduli Lindungi application to support improvements in improving the

quality and performance of the Peduli Lindungi application. With the launch of the Peduli Lindungi application, it has generated various opinions and criticisms from the public. So, it is necessary to conduct a sentiment analysis to obtain information based on two classification classes, namely negative and positive written by Peduli Lindungi application users. To obtain the correct label results, a classification process is needed with a method that can classify text automatically and efficiently, namely the text classification method. The text classification method is used to find interesting patterns from a large and complex set of textual data. The text classification method used in this study is a machine learning technique, namely the Support Vector Machine algorithm. The advantages of the Support Vector Machine are in finding the best hyperline as a separator (Ubaidillah et al. 2019) having good accuracy in classification, and a fast learning process (Budianto et al. 2019). So that the model built, can provide optimal performance to be used as the basis for recommendations for improving the Peduli Lindungi application service.

1.1 Objectives

This study aims to determine perceptions and evaluate the performance of the Peduli Lindungi application and to reveal recommendations for improvement that will be taken based on negative reviews from users. This is intended to support the text mining methodology, namely sentiment analysis with machine learning algorithms, namely the Support Vector Machine classification algorithm so as to produce accurate class classification predictions. The results should bring analysts information on what improvements can be made to support the reliability of the application in helping to prevent the spread of Covid-19 in Indonesia.

2. Literature Review

Peduli Lindungi is an application developed by Kominfo and the Ministry of State-Owned Enterprises of Indonesia with the aim of assisting government agencies in tracking to stop the spread of Covid-19 (Peduli Lindungi 2021). The Peduli Lindungi application operates based on user participation, namely by sharing location data while traveling so that contact history tracing with Covid-19 sufferers can be carried out. In addition, the application will periodically identify the user's location and provide information related to the crowds and zoning of the spread of Covid-19. One of them is as a screening function to enter a place or area such as places of worship, shopping centers, transportation, workplaces, and the education sector. Through the Peduli Lindungi application, users will be checked for their vaccination status, Covid-19 test results or whether there are close contacts with Covid-19 patients. Based on this urgency, public opinion on the Peduli Lindungi application is considered very important.

Text mining or text analytics is a methodology of extracting information from unstructured text data which involves modeling and pattern discovery to parse text data into standard linguistic components of the language used with a view to obtaining quality new knowledge for users. Sentiment analysis is a branch of text mining research or science to find information that is unknown, something that is not known and cannot be written (Fitriyah et al. 2020). Sentiment analysis is used to determine the attitude of a speaker or writer with several topics or the contextual polarity of the whole document. The attitude taken may be an opinion or judgment or evaluation, an affective state (the writer's emotional state when writing) or emotional communication (the emotional effect the author wants to convey to the reader). In the real world, businesses and organizations always want to see public opinion about a product or service. Using social media as a marketing tool has benefits and challenges because social media is interactive which focuses on consumer engagement where this can be used as a tool for business people to interact and invite targeted consumers to participate as consideration based on the feedback provided (Larasati et al. 2021). Because online review is a form of electronic Word of Mouth (eWOM) or as a new marketing communication tool and can influence and play a role in the purchasing decision process, with information identifying and evaluating products that consumers need (Sutanto & Aprianingsih 2016). So that sentiment analysis is also useful as a basis for decision making.

Classification is the process of recognizing new data. Classification is widely used in various applications, including fraud detection, customer management, medical diagnosis, sales prediction, and so on. Classification by manual will take a long time. So it requires a machine learning method (G. Aurélien 2019). The machine learning process requires input in the form of a training set that is labeled (has a class attribute) and produces an output in the form of a classification model (Mutawalli et al. 2019). There are several measures that can be used to assess or evaluate the classification model, including: accuracy or recognition rate, error rate or classification error rate, recall or sensitivity or true positive, specificity or true negative, and F1 score. Classification has two classes in {0,1}, {+1,-1} or {positive; negative} (Handayani et al. 2018). In the classification evaluation process, there are four

possibilities that occur from the process of classifying a row of data. If the data is positive and it is predicted to be positive it will be counted as true positive, but if the data is predicted to be negative it will be counted as false negative. If the data is negative and it is predicted to be negative it will be counted as true negative, but if the data is predicted to be positive it will be counted as false positive. Support Vector Machine (SVM) is a relatively new technique for prediction, both in classification and regression (Handayani et al. 2018). The SVM concept can be explained simply as an attempt to find the best hyperplane that functions as a separator of two classes in the input space. SVM tries to find a separating function (hyperplane) by maximizing the distance between classes. SVM is included in the type of classifier, which is binary, linear, and non-probabilistic. In general, the first thing that underlies to understand classification with SVM is to look for the optimal (hyperplane) line (Mutawalli et al, 2019).

To obtain good performance, it is necessary to set/optimize the parameters of the SVM machine learning algorithm to be built. Parameter optimization takes a very long time, especially if the machine learning algorithm that is built has many parameters. Grid Search is a complete search by combining all the given hyperparameters (Ihsan 2021). Hyperparameter is defined with minimum value, maximum value and scale between values in it. Grid Search optimizes the parameters of SVM (C, kernel, etc.) using cross validation as a performance matrix. The goal is to find the best combination of hyperparameters so that the classification model can predict the data and produce optimal performance.

3. Methods

The research design starts from labeling the initial data using the Text blob library, text preprocessing, building a Support Vector Machine model, and associating words based on Word cloud. The data used in this case are 34.760 reviews which consist of independent text variables as variables in modeling. The data was processed using Anaconda 3.0 software using the python 3.0 programming language, involving several modules such as “pandas”, “emoji”, “regular expression”, “sastrawi”, “nltk”, “scikit-learning”, “matplotlib”. The difference between this study and previous research is the use of the Textblob library for initial class labeling and optimization of SVM parameters.

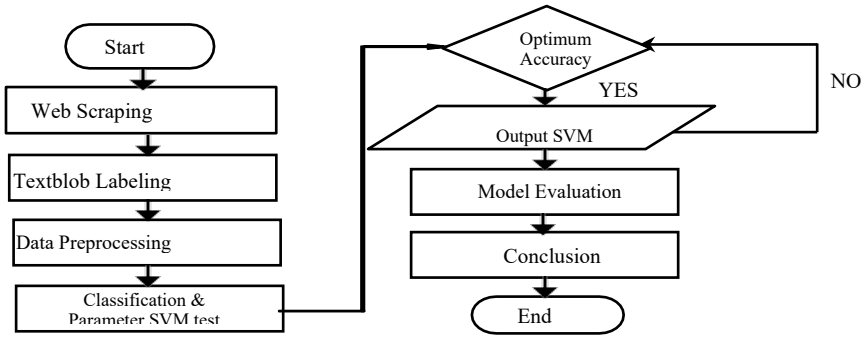

Figure 1. Research flow design

Based on Figure 1, the first stage is labeling the initial data using the Text blob library. Sentiment analysis using Text blob is only available in English so before translating the data into English analyze the sentiment. Text blob offers natural language (NLP) permissions such as tagging part of speech, noun extraction, sentiment, classification, translation, and more. Sentiment analysis in Text blob is done by returning two properties, namely polarity and subjectivity. Polarity is a float value that ranges from -1 to 1. A polarity value of -1 indicates negative sentiment, while a polarity value of +1 indicates positive sentiment, while a polarity value of 0 means neutral, but is not included in determining sentiment in this study because the focus of the research is prioritized opinions or polarity values below 0.

The second stage is text preprocessing data or early in the data processing process. The preprocessing stage is the process of extracting interesting and important knowledge from unstructured text data (Hermawan & Bellaniar Ismiati 2020). The preprocessing text stages are case folding, stemming, filtering, and tokenizing. Text preprocessing begins by eliminating emoticons, digits, usernames. Text preprocessing begins by eliminating emoticons, digits, stop word removal usernames, and URLs in reviews using the "emoji" and "regular expression" modules. Case folding is the process of changing the letters in the text into lower case letters to make them the same

(Permatasari et al. 2021). The next stage is stemming, namely equating words into basic forms by removing affixes using the "sastrawi" module. The next step is to remove punctuation marks because punctuation marks have no special meaning in textual data (Larasati et al. 2021). The next step is word filtering to remove words general that did not have a significant effect in the review (Permatasari et al. 2020). In this study, filtering was carried out based on a dictionary compiled in txt format using the "sastrawi" module. The next stage is tokenizing which is the process of cutting the text based on each constituent word used to calculate the frequency of occurrence of words and the process of weighting the terms. The final step in text preprocessing is term-weighting based on the TF-IDF concept. The TF-IDF mechanism is to calculate the term weighting of word occurrences and multiplied by the frequency of documents on a logarithmic scale (Larasarti et al. 2021).

The third stage is to build a model and classification process using the Support Vector Machine (SVM) method using Kernel Linear, Polynomial, and RBF test scenarios with regular parameters, namely Complexity (C) and Gamma (ɤ) with trial-and-error parameter designs and references from previous studies. By using a preliminary study and trial and error method, the parameter range for C is 1, 10, 100. Furthermore, the gamma parameters in ranges 1, 2, 3 and the use of kernel parameters are RBF, linear, and polynomial.

To evaluate the performance of the classification that has been done, it is necessary to calculate accuracy, precision, recall, and F1 score with a confusion matrix. The structure of the confusion matrix is represented by rows and columns, where rows are actual data and columns are predicted data. The fourth stage is followed by extracting Wordcloud information on negative reviews which will be used as a basis for providing recommendations for improvements that the company needs to do to deal with these problems.

4. Data Collection

This study uses primary data collected through the scrapping process of the Google Play site. The review data scrapping process uses Anaconda 3.0 software and the Python programming language. The data comes from the Peduli Lindungi application comments column, with the review upload date starting from July 1 to November 30, 2021. The total data obtained is 39,1001 reviews consisting of two variables, namely text and date. The text is a user review of the Peduli Lindungi application that only uses Indonesian, while the date or time the review was uploaded by the user.

5. Results and Discussion

5.1 Overview of Peduli Lindungi Application Reviews

The research began by scrapping Google play reviews data Peduli Lindungi application on July 1st, 2021 to November 30th, 2021. From the results of scrapping the data, there are 34.760 reviews. The following Figure 2 shows the distribution of the reviews.

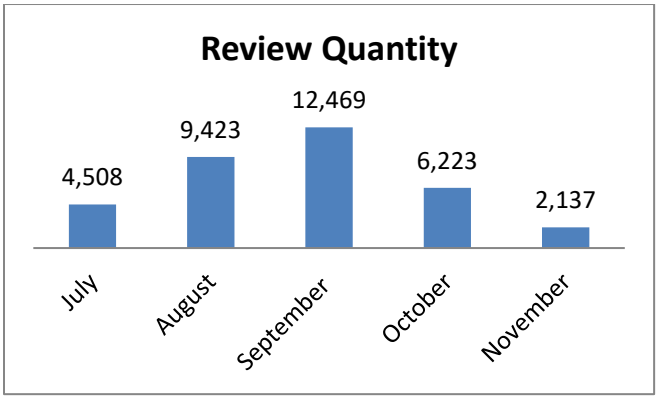

Figure 2. Reviews Distribution

Based on Figure 2, the results of review data that fluctuate every month are obtained. The trend of increasing the number of reviews occurred in the first 3 months. Starting from July to September, Peduli Lindungi application user reviews increased to 12.469 reviews. This is expected, because during that time the government has just started a

work program by urging the entire community to use the Peduli Lindungi application which launches a vaccination program to prevent the spread of the Covid-19 virus. In the implementation of the work program related to the use of the Peduli Lindungi application, there were people who began to express complaints and submitted them through the comment's column, for example such as Vaccine certificate delays, Population Identification Numbers are deemed inappropriate, notifications always appear to activate GPS, and so on. There are also people who provide reviews to ask the government to be responsive in improving the application. The government responded well to the note, this was marked in October to November where the comments submitted by the public decreased and the public's reviews argued that they were examples; thank you for fixing it, my vaccine certificate has been published, and so on.

5.2 Analyzing Classification

Based on the results of the initial labeling using the Text blob library with the classification of review data into opinion and fact categories obtained from the value of subjectivity and positive and negative sentiment categories based on the polarity value, the results are shown in Figure 3 and 4 below:

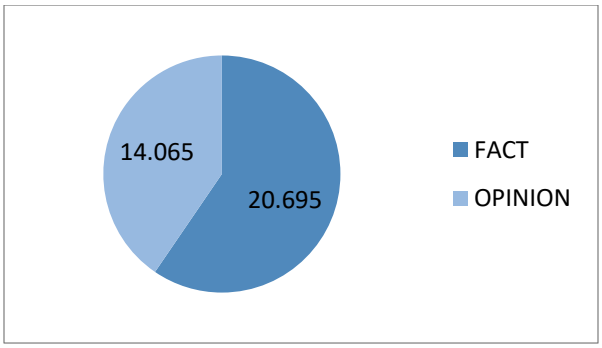

Figure 3. Total Fact and Opinion Reviews

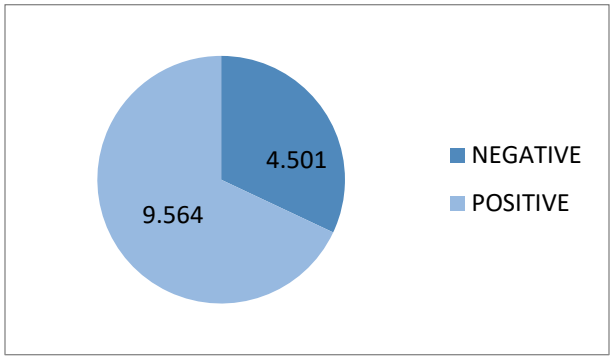

Figure 4. Total Sentiment Classification

From the results of the division of the period, it was found that on Figure 2, the number of fact reviews was 20.695 and opinion reviews 14.065. Based on Figure 3, it was found that the number of negative reviews was 4.501 and positive reviews was 9.564. So, in this study only use data from opinions because they want to know public opinion on the Peduli Lindungi application.

5.3 Discovering Optimal Hyperparameters Support Vector Machine

This model is a knowledge representation that will be used to predict new data classes. The training data will be used as data that will train yahoo SVM and testing data is the data that the SVM algorithm will try to predict and measure the performance of the model that has been obtained. With a ratio of 80:20 SVM. In the initial scenario, the SVM parameter which will try to learn the feature is populated with the default values and get the following results (Tables 1 & 2).

Table 1. Confusion Matrix SVM Parameter Standard

	Class	Precision	Recall	F1-Score	Accuracy
SVM	Negative	0,69	0,51	0,58	0,7831
	Positive	0,82	0,90	0,86	

Table 2. Confusion Matrix SVM Parameter Standard Cross Validation

	Index K	Precision	Recall	Accuracy	F1-Score
SVM/	1	0,797088	0,886640	0,761905	0,839483
	2	0, 793824	0,884615	0,757640	0,836764
	3	0,805871	0,861336	0,756930	0,832681
	4	0,805479	0,892713	0,773276	0,846855
	5	0,806301	0,932118	0,795164	0,864662
	6	0,810017	0,950355	0,808677	0,874592
	7	0,833039	0,955420	0,834282	0,890042
	8	0,849237	0,901722	0,818634	0,874693
	9	0,801052	0,926039	0,786629	0,859023
	10	0,793691	0,943262	0,788051	0,862037
	Average	**0,8095599**	**0,913422**	**0,7881188**	**0,85803**

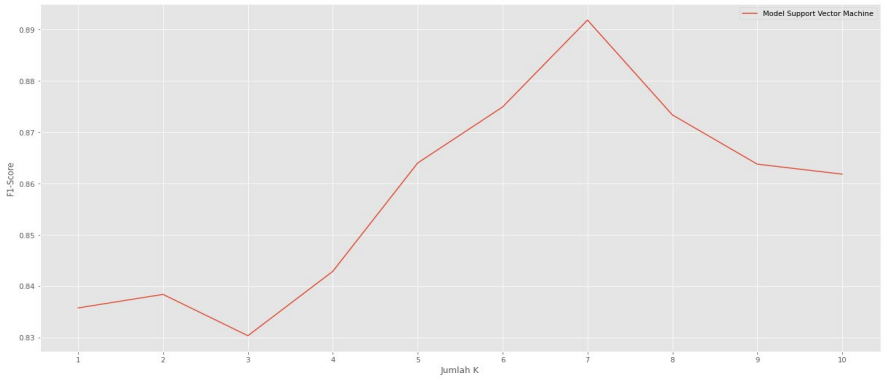

Figure 5. F1 Score K-fold Parameter Standar

Parameter optimization will be carried out using 3 regular parameters, namely Complexity (C), kernel, and gamma (ɣ). With the results of the best combination of parameters, namely C = 10, Gamma = 2, and Kernel = RBF. These results are implemented in the SVM model so that a confusion matrix can be obtained as in Tables 3, 4 and 5.

Table 3. Results Grid Search Combination Parameter

Parameter	*Complexity*			
		1	10	100
Gamma (1)	RBF	0,799	0,81	0,805
	Linear	0,774	0,781	0,784
	Polynomial	0,795	0,802	0,799
Gamma (2)	RBF	0,805	0,812	0,808
	Linear	0,786	0,779	0,770
	Polynomial	0,799	0,805	0,796
Gamma (3)	RBF	0,803	0,804	0,804
	Linear	0,761	0,781	0,784
	Polynomial	0,802	0,799	0,789

Table 4. Confusion Matrix SVM with Optimization Parameters

	Kelas	Precision	Recall	F1-Score	Accuracy
SVM	Negatif	0,75	0,53	0,62	0,812
	Positif	0,83	0,93	0,88	

Table 5. Confusion Matrix SVM with Optimization Parameters Cross Validation

	Index K	Precision	Recall	Accuracy	F1-Score
SVM	1	0,795247	0,880567	0,790765	0,835735
	2	0,796718	0,884615	0,825432	0,838369
	3	0,803217	0,859312	0,753376	0,830318
	4	0,802379	0,887652	0,839872	0,872864
	5	0,804367	0,933131	0,793741	0,863977
	6	0,811255	0,949341	0,809388	0,874883
	7	0,832309	0,960486	0,832457	0,891816
	8	0,850288	0,89767	0,847212	0,873337
	9	0,807760	0,928065	0,794452	0,863744
	10	0,796902	0,938197	0,848765	0,861796
	Average	**0,8100442**	**0,9119036**	**0,813546**	**0,8606839**

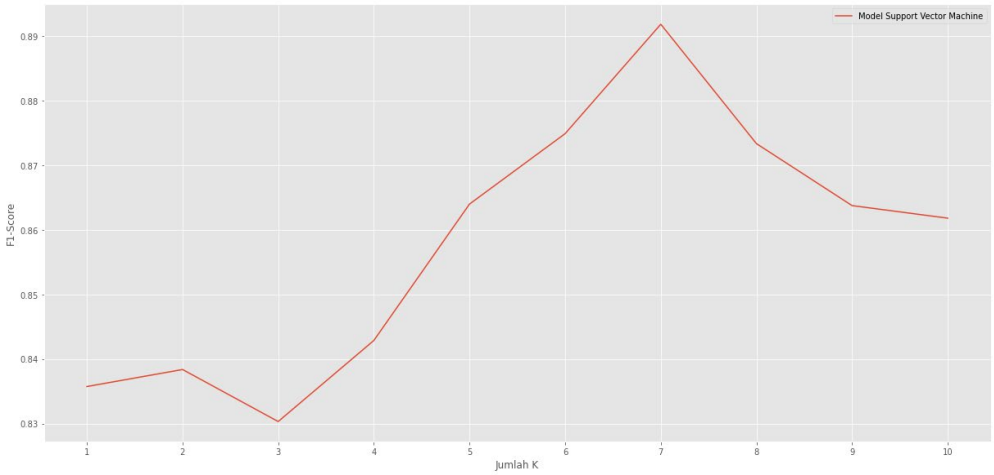

Figure 6. F1 Score K-fold Hyperparameters

As shown in Figures 5 and 6, the F1-Score values from both experiments equally increased to the 7th index and slowly decreased to the 10th index. The increasing trend starting from index 1 is caused by the training data which has slightly different characteristics from the test data, until the 7th indexes the training and testing data have the same characteristics, resulting in better predictions (Kartini & Bachtiar, 2019).

5.4 Analyzing Word Association

Each class classification of positive and negative sentiments from the Peduli Lindungi application user review data will be visualized. The visualization aims to extract information that is most frequently reviewed by users of the Peduli Lindungi application. From this review, information that is considered important will be obtained. In addition, to strengthen the information obtained, a search for word associations that have more frequency was

carried out. The following is a visualization in the form of a diagram of the frequency of occurrence of words and wordclouds as well as word associations from each user review of the Peduli Lindungi application.

Figure 7. Word cloud Positive Reviews

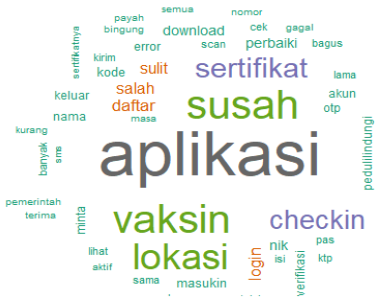

Figure 8. Word cloud Negative Reviews

Figure 7 and Figure 8 are visualizations of words that appear most often in reviews classified as positive and negative sentiment. In the first figure, words such as #aplikasi, #bagus, and #mantap were one of the many words that most often emerged from the results of user's reviews that had positive meanings. These results are supported by research by Latifah et al. (2022) related to the user experience of Peduli Protect application users that 80% tend to give positive statements. Especially related to the topic of equitable distribution of vaccination activities to combat the spread of the virus during the Covid-19 pandemic. Based on research results by Fastyaningsih (2021) explained that users of the Peduli Protect application stated that the application was effective in supporting the policy of accelerating vaccination, to reduce the spread of the Covid-19 virus.

Then for the second, #aplikasi, #susah and #vaksin were some of the many words s that most often appear from the results of negative user reviews. These words indicate user dissatisfaction with the performance of the Peduli Protect application. Referring to research conducted by Sudiarsa & Wiraditya (2018) that there are still many Peduli Protect application errors, especially related to the use of notification menus that are less simple and less informative for user error handling independently. In addition, the results of research by Latifah et al. (2022) show that the Peduli Protect application needs to be improved regarding the redesign of the appearance, feature innovation, and improvements related to efficiency and effectiveness in the Peduli Protect application. So, based on the word cloud negative review can be useful as an evaluation for the Government of Indonesia to improve the application so that this policy can be in accordance with its objectives, namely as an effort to minimize and overcome negative impact in the era of disruption due to the COVID-19 pandemic. The following are suggestions for improving recommendations from researchers based on Google Play and government policies. (Table 6)

Table 6 recommendations from researchers based on Google Play and government policies.

No	Factor	Problem Statement	Repair Recommendation
1	Application	Not compatible with various devices	Provide information on compatible devices in the Terms and Conditions of Use of the Cares Protect application based on the target level API (Application Programming Interface) as needed (example: android device) Source : (Google Developer 2021)
		Confusing features for new users	Provide tour guide usage for new users Provide an easily accessible helpdesk or FAQ Source: (Google Developer 2021)

2	Vaccination	Vaccination features that are difficult to understand, and don't display accurate or real time data or locations	Developers can create instructions for using the application Source : (Google Play 2022)
3	Location	The Peduli Lindungi application by default accesses the user's location 24 hours a day, which causes a waste of battery and interferes with user privacy	Give full rights to the user regarding the location activation permission while using the Peduli Lindungi application Source : (Google Play 2022)
4	Certificate	Vaccine certificates that are not real time according to the time of vaccine implementation	Integrating input from the vaccine site to the system
5	*Check-in*	Failed to check-in due to network not being connected	Developers can make innovations check-in offline
6	Registration	Personal data does not match	Require users to only use their NIK and password every time they register
7	Login	Login takes a long time and a complicated process, besides that personal data is always lost when the application is updated	Developers can make a quick login only by using a NIK or finger print Source : (Google Play 2022)

6. Conclusion

The results in this study provide information related to public feedback towards the Peduli Lindungi application. The results of the study show that Peduli Lindungi users often discuss applications, vaccines, services, certificates, data, locations, and others. The word association in the negative sentiment class shows performance complaints related to applications, vaccines, certificates, locations, check-ins, registers, and service complaints. Therefore, the results of this study are expected to focus on improving the Peduli Lindungi application to improve application performance. The proposal is based on Google Play policies and government policies for public use. Based on the analysis of the results, the Support Vector Machine model is able to perform calcification stably and flexibly. In addition, the results of the implementation of the combination of parameters by the Grid Search module show an increase in the performance of the built model. This study also provides information for further research, namely adding parameters to the Support Vector Machine algorithm in order to obtain maximum results.

Acknowledgments

The authors would like to acknowledge financial support through UM Research Grant 2022 from Universitas Negeri Malang (UM) under grant number 19.5.1123/UN32.20.1/LT/2022.

References

Almutaqqi, I.A. Kekacauan Terhadap Respon Covid-19 di Indonesia. Available: www.habibiecenter.or.id, September 2021.

Budianto, A., Ariyuana, R., & Maryono, D. Perbandingan K-Nearest Neighbor (Knn) Dan Support Vector Machine (SVM) Dalam Pengenalan Karakter Plat Kendaraan Bermotor. *Jurnal Ilmiah Pendidikan Teknik dan Kejuruan*, vol. 11, no. 1, pp. 27, 2020.

Fastyaningsih, A., Priyantika, D., Widyastuti, F. T., & Herawati, A. R. *Keberhasilan Aplikasi Pedulilindungi Terhadap Kebijakan Percepatan Vaksinasi Dan Akses Pelayanan Publik Di Indonesia*. Jurnal Manajemen dan Kebijakan Publik, vol. 6, no. 2, pp. 95-109, 2021.

Fitriyah, N., Warsito, B., & Maruddani, D. A. I. Analisis Sentimen Gojek Pada Media Sosial Twitter Dengan Klasifikasi Support Vector Machine (SVM). *Jurnal Gaussian*, vol. 9, no. 3, pp. 376–390, 2020.

G,Aurélien. Hands-On-Machine-Learning-with-Scikit-Learn-Keras-and-Tensorflow_-Concepts-Tools-and-Techniques-to-Build-Intelligent-Systems. O'Reilly-Media, 2019.

Google Developer. Memenuhi persyaratan API level target Google Play. Memenuhi Persyaratan API Level Target Google Play. Available: https://developer.android.com/distribute/best-practices/develop/target-sdk?hl=id, 2021.

Google Play. Pusat Kebijakan. Pusat Kebijakan. Available: https://support.google.com/googleplay/android-developer/topic/9858052?hl=id, 2020.

Handayani, A. S., Soim, S., Agusdi, T.E., Rumiasih, & Nurdin, A. Klasifikasi Kualitas Udara Dengan Metode Support Vector Machine. *Jurnal Informatika & Rekayasa Elektronika*, vol. *3, no.* 2, pp. 187-199, 2018.

Hermawan, L., & Bellaniar Ismiati, M. Pembelajaran Text Preprocessing berbasis Simulator Untuk Mata Kuliah Information Retrieval. *Jurnal Transformatika*, vol. 17, no. 2, pp. 188, 2020.

Ihsan, I. Sentiment Analysis RKHUP Pada Twitter Menggunakan Metode Support Vector Machine. vol. *8,* no. 2, pp. 3520-3536, 2021.

Kartini, N. A., & Bachtiar, F. A. Klasifikasi Rating Berdasarkan Komentar Tempat Wisata Di Media Sosial Dengan Menggunakan Metode Fuzzy K-Nearest Neighbor. *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer,* vol. 3, n0. 5, pp. 4164-4169, 2019.

Kemenkes. Situasi Terkini Perkembangan Coronavirus Disease (COVID-19) 18 September 2021. Available: https://covid19.kemkes.go.id/situasi-infeksi-emerging/situasi-terkini-perkembangan-coronavirus-disease-covid-19-18-september-2021, September, 2021.

Larasati, A., Maren, R., & Wulandari, R. Utilizing Elbow Method for Text Clustering Optimization in Analyzing Social Media Marketing Content of Indonesian e-Commerce. *Jurnal Teknik Industri*, vol. 23, no. 2, pp. 9, 2021.

Latifah Hanum, A., Karunia Miranti, T., Fatmawati, D., Frendi Diyon, M., & Joyo Prawiro, C. Analisis User Experience Aplikasi Mobile Peduli Lindungi Menggunakan Heart Metrics. *Jurnal Health Sains*, vol. 3, no. 2, pp. 362–372, 2022.

Mutawalli, L., Zaen, M. T. A., & Bagye, W. Klasifikasi Teks Sosial Media Twitter Menggunakan Support Vector Machine (Studi Kasus Penusukan Wiranto). *Jurnal Informatika dan Rekayasa Elektronik,* vol. 2, no. 2, pp. 43, 2019.

Peduli Lindungi. 2021. Peduli Lindungi. Peduli Lindungi. Available: https://www.pedulilindungi.id/, September, 2021.

Permatasari, N., Yosral, R., & Annisa, C. F. Analisis Media Sosial Twitter Tentang Pendidikan Daring Pada Masa Pandemi Covid-19 Di Indonesia. Seminar Nasional Official Statistics, 2020(1), pp. 359–369, 2021.

Sudiarsa, I. W., & Wiraditya, I. G. B. Analisis Usability Pada Aplikasi Peduli Lindungi Sebagai Aplikasi Informasi Dan Tracking Covid-19 Dengan Heuristic Evaluation. *Journal of Information Technology and Computer Science*, vol. 3, no. 2, pp. 354-364, 2020.

Sutanto, M. A., & Aprianingsih, A. The Effect Of Online Consumer Review Toward Purchase Intention: A Study In Premium Cosmetic In Indonesia. 13, 2016.

Ubaidillah, M. J., Munadhif, I., & Rinanto, N. Klasifikasi Gelombang Otot Lengan Pada Robot Manipulator Menggunakan Support Vector Machine. *Rekayasa*, vol. 12, no. 2, pp. 91–97, 2019.

World Health Organization (WHO). (2020). Pertanyaan dan jawaban: Pelacakan kontak untuk COVID-19. Pertanyaan jawaban terkait COVID-19, HIV, antiretroviral di Indonesia. Available: https://www.who.int/indonesia/news/novel-coronavirus/qa/qa-contact-tracing, May, 2022.

Biography

Aisyah Larasati is an associate professor at State University of Malang, Indonesia. She achieved bachelor and master's degree in industrial engineering from Institute Technology Sepuluh Nopember (ITS) Surabaya, Indonesia, and master's in industrial management from Hogeschool van Arnhem en Nijmegen (HAN University), Netherlands. Afterwards, she earned her PhD degree in Industrial Engineering and Management from Oklahoma State University, USA. Her research interests are in data analytics, statistics, and service quality.

Vertic Eridani Budi Darmawan is a lecturer of program of undergraduate program in Industrial Engineering at State University of Malang, Indonesia. She achieved bachelor's degree in industrial engineering from Telkom University, Indonesia, and Masters in Industiral Engineering and Management form Da Yeh University, Taiwan. Her passion in data analytics, statistics, and service quality has led her to publish several journals and papers.

Yohana Ruth Wulan Natalia Susanto is a candidate for bachelor's degree in industrial engineering from State University of Malang, Indonesia.