Sentiment Analysis of Peduli Lindungi Application Using the Naive Bayes Method

Zulkifli Rais[*], Ferigo Taufani Tri Hakiki, & Riska Aprianti

Department of Statistics,Faculty of Mathematics and Natural Science, Universitas Negeri Makassar

Abstract

PeduliLindung application as a form of government policy in the context of handling Covid-19. The level of usability in an application is really needed to see the usefulness of the application itself. The analysis is carried out in the form of a fine-grained sentiment analysis based on a five-star review. Models used in conducting the analysis in this study using Naïve Bayes. Data used in get it through Google Play Store until April 2022. Rating 1 has the most number from other ratings, namely as many as 467 reviews and rating 4 has the lowest number, namely 55 reviews. The data is classified as negative as many as 146 data, a lot of data are classified as negative classified as true positive as many as 30 data, and data classified as neutral as many as 30 data, with classification accuracy still at 73%. The results obtained by the community tend to show words that refer to the problems that exist in the application.

Keywords: Sentiment Analysis, Naïve Bayes, Cares to Protect.

1. Introduction

The outbreak of the Covid-19 virus in March 2020 in Indonesia has resulted in all community activities being completely restricted. This has a major impact on every line of human life so every community is required to be able to apply new life habits. However, the government has also intensified the handling of the Covid-19 pandemic, one of the efforts being made is to launch the Peduli Lindungi application (Haerani & Rahmatulloh, 2021). Peduli Lindungi is an application developed to assist government agencies in tracking to stopping the spread of Covid-19. This application relies on community participation to share location data when traveling so that contact history can be traced with Covid-19 sufferers. The application can also provide periodic information regarding the crowds and zoning of the spread of Covid-19. In other words, this application will assist the government in carrying out the tracing and tracking process to break the chain of transmission of Covid-19 (Wijayanto et al., 2021).

The launch of the Peduli Lindung application raises questions about the usability of the application in social life. Usability is the extent to which the feasibility of a system is based on effectiveness, efficiency, and satisfaction in a certain context (Sudiarsa & Wiraditya, 2020). Of course, it is very important to measure the usability of applications that are launched for a big purpose, namely alleviating the transmission of Covid-19. In general, usability testing uses a questionnaire, but there may be several methods that are relevant in measuring the usability of an application.

The level of community satisfaction with the application as one can be found in the comments column in the Play Store. Negative and positive sentiments towards the Peduli Lindungi application can be read easily. The things that are most often commented on are features of the appearance of the application (Astuti, 2020). As of April 2022, the Peduli Lindungi application received 888,615 reviews with an average rating of 4.3. Of course, the reviews and

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[*] Corresponding author.

E-mail address: zulkifli.rais89@unm.ac.id (Zulkifli Rais)

ratings that are available are very diverse, which are actually in the form of suggestions, input, and criticism related to improving the application for the better.

Various reviews of the Peduli Lindungi application certainly need to be analyzed. This analysis is useful for knowing how much positive or negative sentiment is related to the features and appearance of the application. Reviews of the Peduli Lindungi application are inseparable from the rating as an illustration of the application usability assessment in the community. Therefore, data mining is carried out to factually analyze the usability of the Peduli Lindungi application.

Analytical problems related to ratings include the form of fine-grained sentiment analysis. This analysis is based on a five-star review where one star states a very negative value, while five stars state a very positive value. In the analysis process, two stages will be carried out, namely the first stage, text/information retrieval, and topic classification, then the second, classification using the Naïve Bayes method. The results of this analysis will certainly provide an overview to the user community and prospective application users regarding the usability of the Peduli Lindungi application and become a benchmark for application developers and the government to improve features and provide useful services in accordance with suggestions, criticisms, and expectations of application users.

2. Literature Review

2.1. Sentiments Analysis

Sentiment analysis is a method used to identify how sentiment is expressed in a text and how that sentiment can be categorized as positive or negative. Sentiment analysis is used to understand comments made by users and explain how a brand product is accepted by the public (Hadna et al., 2016). Users of an application or brand can write experiences, and opinions, and give ratings. Writing about what they feel in the form of positive, neutral, or negative feelings can be expressed in quite complex ways (Troussas et al., 2013).

2.2. Text Mining

Text mining is a data mining process in the form of text that comes from documents or other text. Tent mining is used to analyze the relationship in a document or text. The data obtained will be converted into numerical data by carrying out further processing (Martiana et al., 2011). In turning text data into numeric data, there is a process called data preprocessing, while the data preprocessing process is as follows;

1. Tokenizing

Tokenizing is the process of separating characters without explicit information. This character separation can be in the form of space characters, punctuation marks, and certain characters.

2. Case Folding

Case Folding is the process of converting all characters or sentences into lowercase letters. This process is used to simplify the search because not all characters are consistent in the use of capital letters.

3. Filtering

Filtering is the stage of taking important words from the tokening results. The filtering process can also use stoplist algorithms (removing less important words) or wordlists (saving important words).

4. Labeling

Labeling is the process of labeling a character that is used to identify a variable. In labeling, there are two types, namely labeling tokens with reinforcing words and negation words.

5. Stemming

Stemming is the process of finding root words from filtered words. At this stage, it is mostly used for texts that use English and is more difficult to apply to Indonesian. This is because Indonesia does not have a standard formula.

6. Counting

The counting process is the process of calculating each document that is calculated using the desired weighting scheme. Word weighting is the process of assigning a weight to each word contained in a text or document. (Gunawan et al., 2018)

2.3. Naïve Bayes Method

Naïve Bayes is a machine learning method that uses probability calculations. Bayes' theorem in its classification is carried out through training sets of some data efficiently (Dahri et al., 2016). Naive Bayes assumes that the value of an attribute in a given class is independent of the attributes of other classes. Bayes' theorem was popularized by the English scientist Thomas Bayes, which predicts future opportunities depending on the previous period. The equation of Bayes' theorem is as follows:

$$P(C|X) = \frac{P(X|C)P(C)}{P(X)} \qquad (1)$$

Where;
X : is data with unknown class
C : is the hypothesis of data X which is a specific class
P(C | X) : is the probability of C based on condition X
P(C) : is the probability of C
P(X | C): is the probability X based on the hypothesis C
P(X) : probability X

2.4. Peduli lindungi

Peduli Lindungi is an application launched by the Government of Indonesia to assist the government in tracking to stop the cause of Coronavirus Disease (Covid-19). This application relies on public participation to obtain information from the location and travel history to obtain information on Covid cases. Users of this application will receive notifications if they are in a crowded situation and cases are increasing in an area (Wijayanto et al., 2021).

3. Research Method

3.1. Data

The data used is secondary data that comes from the Peduli Lindung application review on the Play Store. The data retrieval process uses a scraping method which produces a thousand (1000) review data. The data obtained are in Indonesian and the location of the reviewers is Indonesia. The reviews that appear are sorted by the usefulness of the reviews (most helpful). The composition of the training data is 80%, while the composition of the analysis data is 20%.

3.2. Research Flow

The research preparation stage was carried out through data collection by scraping. At this stage, the split 80 20 methods are used with pandas, NumPy, matplotlib. pyplot, and string tools. From this process, data are obtained in the form of username, score (rating of the application), value, date, and content (comments). Then, the data taken is then

processed by data cleaning and tokenizing. It turned out that there was some text in the review that still needed to be filtered, therefore the data filtering process was carried out with the NLTK tools and the StopWord module. The process is continued with Steaming which aims to remove affixes, for example washing into washing. In this steaming process, Pipeline and StemmerFactory tools are used.

At the data processing stage, a Naïve Bayes classification process is also carried out to determine the presence of positive, negative, or neutral sentiments. Naïve Bayes modeling with MultinomialNB, accuracy_score, precision_score, recall_score, f1_score, classification_report, and confusion_matrix tools to produce calculation accuracy. In addition, due to unbalanced data, a Random Under Sampler was carried out to overcome it. The data that has been prepared by scraping and processed through cleaning, and tokenizing, until the data filtering process, is then visualized through graphs and WordCLoud Sentiment with WordClouds tools. In addition, the data is also processed by TF-IDF with CountVectorizer and TfidVectorizer tools.

4. Results and Discussion

From the total reviews obtained through the scraping process, there are ratings of 1 to 5, which for labeling the sentiment classification is taken based on the existing rating. The condition of the review data based on the rating is shown in the table 1.

Table 1. Sample Some Reviews

Number	Rating	Reviews
1	1	*Semakin menyulitkan ketika lagi ada musibah kehilangan HP dan memakai HP yg lama mau download apk ini gak bisa karena perangkat tidak mendukung untuk apk ini. Padahal kalo kemana – mana mewajibkan adanya apk ini untuk scan. Kalah sama apk swasta belanja online yg bisa di instal di type HP lama padahal ini adalah punya pemerintah tapi kenapa gak mendukung di type HP yg lama.*
3	3	*Saya kasi bintang 3 saja karena proses klaim sertifikat terlalu lama, dan juga tidak langsung berhasil. Dan sangat lambat menampilkan sertifikat setelah di lakukan vaksin sampai benerapa minggu belum muncul di aplikasi*
5	5	*sangat bermanfaat, tapi sayang nya pada saat Akan update, malah muncul notifikasi (Aplikasi Peduli Lindungi tidak dapat di instal)*

As in the review sentence in Table 1 that tend to be negative, neutral, and positive, but several sentences give a rating of 5 but also provide reviews that tend to complain so the sentences need to be cleaned and separated to get aspects that may be different in each sentence.

Table 2. Number of Reviews per Rating

Rating	Total Reviews
1	467
2	236
3	141
4	55
5	101
Total	**1000**
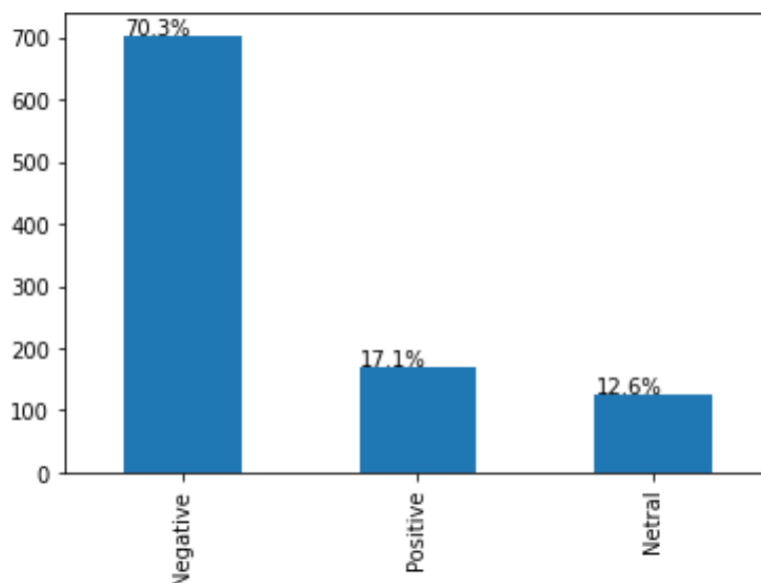
Figure 1. Percentage of Number of Reviews by Weighting

Based on Figure 1 shows that negative reviews dominate then followed by positive and neutral reviews. Because the number of sentiments is not balanced, it is necessary to do data cleaning to get word for word from each review.

4.1. Preprocessing Results

Text data must be cleaned first so that it can be processed and converted into numeric form, so that it can be processed by a computer. Preprocessing carried out includes deleting symbols and stopwords, case-folding, tokenization, and stemming. The following is an example of some initial data from the preprocessing results:

Table 3. Preprocessing Result Data

No	Rating	Reviews	Cleaning Reviews
1	1	*Sertifikat vaksin boster tidak terbit padahal sudah 2 bulan. Klaim sertifikat keterangan tanggal lahir tidak sesuai. Padahal sudah diisi benar. Payah...*	*sertifikat vaksin boster terbit klaim sertifikat terang tanggal lahir sesuai isi payah*
2	3	*Aplikasinya bagus dan memudahkan pada waktu awal, tapi untuk sekarang sulit untuk mengklaim sertif punya orang lain, selalu gagal dengan keterangan "captca salah" padahal sudah berulang kali sudah hampir sebulan tetap tidak bisa, mohon diperbaiki lagi agar lebih mudah, terima kasih.*	*aplikasi bagus mudah sulit klaim sertif orang gagal terang captca salah ulang kali bulan mohon baik mudah terima kasih*
3	5	*Aplikasi nya sangat membantu ,memudahkan kita untuk mengecek tempat vaksin yg kita butuh kan dan jg langsung mendapat kan sertifikatnya.tapi sayangnya di akun aplikasi ini nik saya tidak sesuai dg nik yg sebenarnya. Mungkin agar lebih di tingkatkan lg aja yah,ketelitiannya*	*aplikasi nya bantu mudah ecek vaksin yg butuh jg langsung sertifikatnyatapi sayang akun aplikasi nik sesuai dg nik yg tingkat lg aja yahketelitiannya*

In Table 3 resulting from the preprocessed review sentences are entered into the cleaned review column, the missing words, especially conjunctions and emojis, are included in the stopword list, so those words are deleted.

4.2. Result of Preprocessing

The algorithm used in Sentiment Analysis is the Naïve Bayes classification model. Because the data is not balanced, it needs some way to overcome it. The technique used is the Random Under Sampler. With this technique, the evaluation of precision, recall, and F1-Score and the support of each technique are seen, compared to the evaluation of the original data.
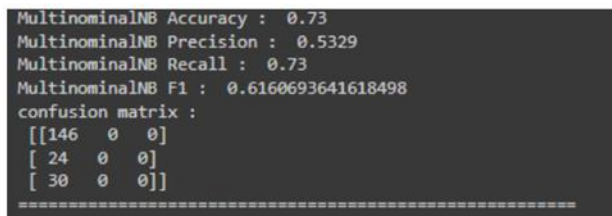
Figure 2. Image accuracy and confusion matrix

Figure 3. Image Results Random Under Sampling

The confusion matrix shows that a lot of data that is correctly classified as negative is 146 data, a lot of data that is classified as true is positive as many as 30 data, and data that is classified as neutral is 30 data, with classification accuracy still at 73%. Data visualization using word cloud and word link on sentiment in every aspect, as shown in the following figure:

Figure 4. Word Cloud Sentiment Image

5. Conclusion

Based on the results of the study, there were 146 data classified as negative, a lot of data classified as true positive as many as 30 data, and data classified as neutral as many as 30 data, with classification accuracy still at 73%. In Wordcloud, public sentiment tends to show words that refer to problems that exist in the application

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