

Sentiment Analysis on Tiktok Application Reviews Using Natural Language Processing Approach

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Abstract

Abstract: Technology today is very developed, there are so many media that can be used to communicate, these media are very easy to use by connecting to the internet network. Research on the sentiment of this analysis can still be relatively small and new. The rapid development of technology today makes it very easy for humans to communicate with one of the modern technologies, namely smartphones. The initial stage of this research begins with the review to be analyzed, then continues with the collection of review data. Conducted on reviews that have been collected with and without an NLP approach resulting in 2 datasets, with an NLP approach and datasets without an NLP approach. The first step is to identify the problem with the research object. It then looked for related literature studies from both journals and review proceedings used as many as 1000 reviews, which have been labeled by 5 correspondents and resulted in positive reviews and negative reviews. The review is used as a dataset, then pre-processed with an NLP approach. Classification using the NLP approach got an accuracy of 76.92%, a precision of 80.00% and a recall of 74.07%, while without NLP it only got an accuracy of 69.23%, a precision of 80.00% and a recall of 64.52%. At the preprocessing stage, the stemming feature, and stopword removal features were applied to each review. Word normalizer to handle variations in writing words that have the same meaning to be counted as a single term. Furthermore, a stopword removal process is carried out to remove the stopword from the review.

Keywords: NLP approach, pre-processing, Scrapping

Abstrak

Teknologi saat ini sudah sangat berkembang, banyak sekali media yang dapat digunakan untuk berkomunikasi, media tersebut sangat mudah digunakan dengan cara terkoneksi dengan jaringan internet. Penelitian tentang sentimen analisis ini masih dapat tergolong sedikit dan baru. Pesatnya perkembangan teknologi saat ini sangat memudahkan manusia untuk berkomunikasi dengan salah satu teknologi modern yaitu smartphone. Tahapan awal penelitian ini dimulai dengan ulasan yang akan dianalisis, lalu dilanjutkan dengan pengumpulan data ulasan. Dilakukan pada ulasan yang sudah terkumpul dengan dan tanpa pendekatan NLP sehingga menghasilkan 2 dataset, dengan pendekatan NLP dan dataset tanpa pendekatan NLP. Langkah pertama yaitu mengidentifikasi masalah pada objek penelitian. Selanjutnya mencari studi literatur terkait baik dari jurnal maupun prosiding. Ulasan yang digunakan sebanyak 1000 ulasan, yang telah diberi label oleh 5 koresponden dan menghasilkan ulasan positif dan ulasan negatif. Ulasan dijadikan dataset, kemudian dilakukan pra-pemrosesan dengan pendekatan NLP. Klasifikasi menggunakan pendekatan NLP mendapat akurasi sebesar 76,92%, presisi 80,00% dan recall 74,07%, sedangkan tanpa NLP hanya mendapat akurasi sebesar 69,23%, presisi 80,00% dan recall 64,52%. Pada tahap pra-pemrosesan diterapkan fitur stemming, dan stopword removal untuk setiap ulasan. Word normalizer untuk menangani variasi penulisan kata yang memiliki makna yang sama agar terhitung sebagai istilah tunggal. Selanjutnya dilakukan proses stopword removal untuk menghilangkan stopword dari ulasan.

Kata kunci: Pendekatan NLP, pra-pemrosesan, Scrapping

1. Introduction

Technology is currently very developed. There are so many media that can be used to communicate. These media are very easy to use by connecting to the internet network. Research on the sentiment of this analysis can still be relatively small and new. Because in ancient times, no internet world caused data collection to be taken only through the opinions of friends around and family [1]. The rapid development of technology today makes it very easy for humans to communicate with one of the modern technology methods, smartphones. The public can use many media to communicate, for example, Facebook, Instagram, Twitter, etc. These media have different features. One of the applications currently getting a lot of attention is the TikTok application. This TikTok app allows users to create short and fast videos [2].

The average age of TikTok users is almost the average of minors, even though most of them are elementary school children [3]. Many underage TikTok users use devices that do not have support using features or filters available on the Tiktok application. The negative impact is that the uploader gets a negative effect because it is judged that the uploaded video is of poor quality. In the comment section, users can read comments in any language that does not deny that writing comments is rude and even attacks the video's uploader, leading to bullying [4]. Not only the comment section. This application also provides a like button that is used to watch the videos that have been watched. Not a few reviews of the TikTok application on the Google Play Store also gave negative comments. The review can be done with sentiment analysis. To solve the problem of grouping reviews into negative or positive opinions, it can be done by conducting sentiment analysis [5].

From the above problems, the author conducted a sentiment analysis using public responses taken from reviews of the TikTok application on the Google Play Store. The task of this sentiment analysis is to classify positive, negative, and neutral texts based on the document [6]. In conducting classification to determine the positive or negative review of the author using the Natural Language Processing Approach method, This research aims to find out the sentiment of user reviews and provide recommendations for improvements to the Tiktok application based on reviews given by users through the Google Play Store. The methods used are Natural Language Processing (NLP) and Lexicon Based Approaches. The NLP method is part of artificial intelligence for

understanding natural language related to interactions between computers and humans [7]. NLP is used because it is ideal for analyzing information from text data as well as facilitating and generating information that can be used for subsequent analysis [8]. At the same time, the lexicon-based method is a sentiment analysis method by grouping into positive, negative, or neutral sentiments using a language dictionary [9]. The method was chosen because it provides better sentiment analysis results at the sentence or clause level, is easier to understand and modify, and avoids manually labeling the training data [10].

2. Method

The flow of research in sentiment analysis on Tiktok reviews using the Natural Language Processing (NLP) approach consists of several stages, as shown in Figure 1. The initial phase of this research begins with the review to be analyzed, then continues with the collection of review data. Conducted reviews collected with and without an NLP approach resulting in 2 datasets with an NLP approach and datasets without an NLP approach. The dataset then goes through a preprocessing process to clean and prepare data so that it is ready for analysis [11].

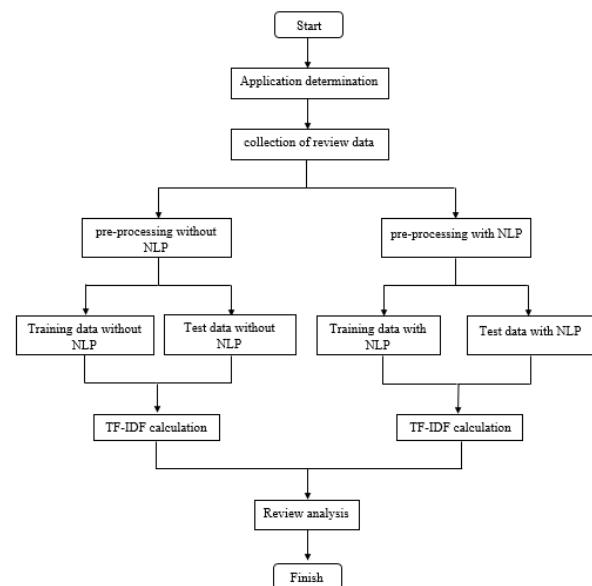


Figure 1. Flow of research

Figure 1 describes the flow of research conducted in this study. The first step is to identify the problem with the research object. Next look for studies of related literature from both journals and

proceedings. Data collection is carried out on the Google Play Store (play.google.com) site to obtain user review data on the Tiktok application using Web Scraper.

Then, data processing is done in Python using Google Colab to perform data preprocessing with Natural Language Processing and analysis of user review sentiment using the Lexicon Based method. Preprocessing data carried out includes casefolding, normalization, stopword removal, tokenization, stemming, and replacing slang words.

The lexicon-based method goes through two stages, namely entering a dictionary of positive and negative words and determining the score of each review based on the frequency of positive and negative word matches. After processing, the results of the percentage of user sentiment will be obtained, both positive, neutral, and negative.

Further analysis of negative reviews was carried out using word cloud analysis. The analysis is used to find out the problems that users often face as well as to provide recommendations for both application developers and subsequent research.

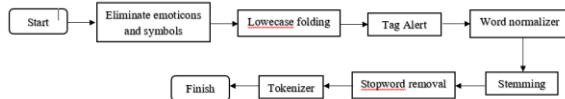


Figure 2. The pre-processing stage uses NLP

The preprocessing stage workflow with an NLP approach is shown in Figure 2, with an explanation of each stage as follows:

- **Eliminating emoticons and symbols** In this study, the emoticons and symbols present in the review were removed because this study focused only on the text contained in the review. Discarded symbols are "~", " ", "!", " \$", " %", " ^", " & ", " * ", " (", ") ", " _ ", " + ", " = ", " : ", " ", " ", " ", " ", " < ", " > ", " comma ", " period ", " ? ", " / ", " ", " ", " ", " # ", and " | ". Reviews that contain symbols such as "very satisfying, brother :)" After processing, MenjAdi is "very satisfying, sis."
- **Lowercase folding** converts all letters to lowercase to be the same word [12]. Comment "Very good to order" to "really good to order," Alphabet "B" capital changed to lowercase "b"
- **Stemming** makes a word a base word by removing all the affixes present in the word [13]. For example, the sentence "The Tiktok application is suitable bgt to accompany when gabut" was later

changed to "The Tiktok application is suitable to accompany when gabut"

- **Word Normalizer** is used to improving the words in the review to produce good and correct sentences according to the rules of Indonesian grammar. This improvement is necessary to make it easier for the reader to understand the sentence's meaning [14]. Comment "the application is suitable bgt nemenin when gabut" then after the Word Normalizer process, it becomes "the application is suitable." The word "bgt" was changed to "really" so that it was easier to understand.
- **Stopword removal** eliminates words with a high number of occurrences k but is not very important [15]. Words that enter the stopwords, such as "which," "and," "in," and "of" thus leave important words. For example, the sentence "The app is good" is changed to "Good app."

The dataset, which has gone through the preprocessing stage with and without an NLP approach, is divided into two parts with a composition of 208 training data and 52 test data. Then weighting is applied with the Term Frequency Inverse Document Frequency (TF-IDF) algorithm. TF-IDF is used to give weight to the relationship of a word or term to the entire review. The number of times a word appears in a review indicates how important the word is in the review and which reviews have that word so that the review can be classified into two classes (positive and negative reviews) [16]. TF-IDF calculation using Equation 1.

$$W_{x,y} = tf_{x,y} \times \log \left(\frac{N}{df_x} \right) \quad (1)$$

Where $W_{x,y}$ is the weight of the term (t_y) against the document (d_x). While $tf_{x,y}$ is the number of occurrences of the term (t_y) in the document (d_x). N is the sum of all documents in the dataset, and df_x is the number of documents containing the term (t_y). There is at least one word i.e., the term (t_y)

A. Data collection

Data is collected through play.google.com website with the help of the Web Scraper extension from Google Chrome as shown in Figure 3. Data is filtered by the most relevant categories, across all devices, and all are well rated from 1 to 5 stars.

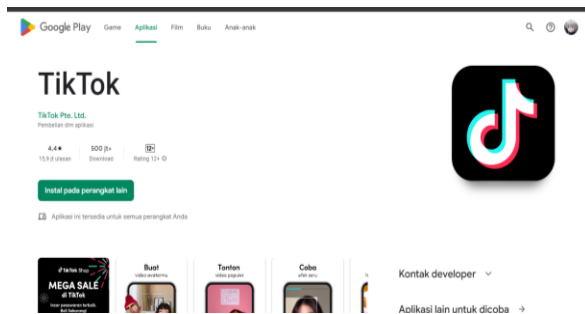


Figure 3. Data collection

Table 1. Example of Dataset

No	Reviews
1	Apologies to the tiktok team! The issue of tiktok community guidelines and rules does not match what is being talked about. Tiktok has bad AI rules, many creators are
2	why are there so many songs that can't be used??? like why? when can the song only be used to influence a lot of folowers? not fair bgt.
3	To tiktok developers please yaa this signal I have a lot of quota smooth but why when I scroll the tiktok, how come you can't keep going even though bukak ig is just smooth how come this is even
4	How come I gk can log in using fb ama google the answer is always "The frequency of visits is too frequent" That means what the hell I udh try brp times still gk can login too
997	The removal of the gabut terbaik. Those of us who are sometimes upset are in the spirit again. The filter is cool2. I like it
998	G can shop every time in the yellow basket click na even try again
999	There is the same thing that I don't want to see people's judgments on tiktokshop can't2 there is a problem continue it knpa ya
1000	Want to shop at tiktok shop ordinary free shipping vouchers are easy to use. This time it's complicated to be confused about how to use the voucher.
1001	I've bought the package but singal music is ugly hi that makes this have to be fixed ok thanks

After the data is collected, a selection is carried out based on predetermined criteria. The selection criteria is the review release period from August 1, 2022 to August 20, 2022. In addition, the main language of the review is Indonesian. Irrelevant data will be deleted and unused

Table 1 is a table containing original reviews written by users through the Google Play Store website. Data was collected through a predetermined selection of 1001 reviews. This study uses a sentiment review research method using a dictionary of positive and negative words. Therefore, before conducting an analysis, it is necessary to carry out data processing first.

B. Sentiment Analysis

Sentiment analysis using lexicon-based method. This method is more practical for determining sentiment by identifying each word in the review using a dictionary whether describing positive sentiment or negative [17]. If a review of the forming word has a higher number of positive words than the number of negative words, it will give a positive sentiment, and vice versa. But if a review of the forming word has a positive word count equal to the number of negative words, it will give a neutral sentiment.

C. Confusion Matrix

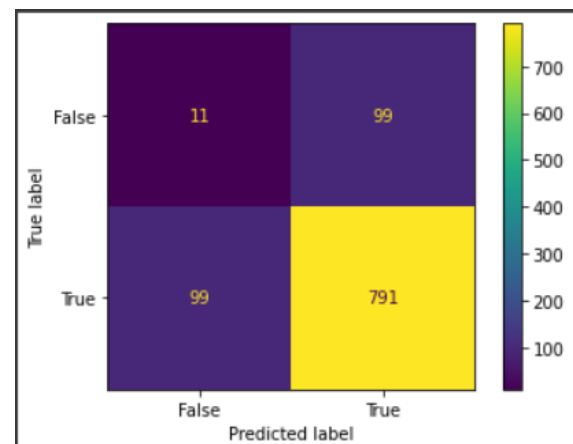


Figure 4. confusion matrix

Information:

TP = True Positive value

FP = False Positive value

FN = False Negative value

TN = True Negative value

In this study using the Confusion Matrix which was used to calculate the accuracy value. This

Confusion Matrix is suitable for calculations that have a dataset consisting of positive classes and negative classes

In the confusion matrix can be done to calculate the value of accuracy that can be seen in the equation.

The result of the confusion matrix is then calculated to obtain the values of accuracy, precision and recall. Accuracy is the ratio between correctly classified samples compared to the total number of samples, accuracy is calculated using Equation 2. Precision is the proportion of positively sampled correctly against the total number of samples predicted to be positive, precision is calculated using Equation 3. Recall is a positive sample correctly classified to the total number of positive samples; recall is calculated using Equation 4 [18].

D. Frequency of Word Occurrence

Words that have a high frequency of appearance in reviews can describe the general state of market acceptance of the product. The word that is often used in giving reviews on Tiktok is shown with the wordcloud created with the Wordart application in Figure 3.



Figure 5. Wordcloud word

On reviews with a positive label, and negative words that have a frequency of occurrence of more than 50 - 100 times are negative and positive words. From the frequency of words that appear on positive reviews and negative reviews, it can describe the state of affairs in the Tiktok App Review segmentation where some users are satisfied with the quality of the application and educational spectacle. Some users are dissatisfied with the application because there is less educational content and problems with the application that cannot use the feature.

3. Results and Discussion

The reviews used were obtained from review search activities in September 2022 on the Tiktok application. Reviews are taken from the app with a search using the keyword "Tiktok app". Examples of reviews used are shown in Table 2.

Table 2. Table of negative reviews

No	Account name	Reviews	Label
1	Yan Pradnya	Apologies to the tiktok team! The issue of tiktok community guidelines and rules does not match what is being talked about. Tiktok has bad AI rules, many creators are	Negative
2	Anggi Pitaloka	why are there so many songs that can't be used??? like why? when can the song only be used to influence a lot of followers? not fair bgt.	Negative
3	KAizeen	To tiktok developers please yaa this signal I have a lot of quota smooth but why when I scroll the tiktok, how come you can't keep going even though bukak ig is just smooth how come this is even	Negative
4	Ahmad Dio	How come I gk can log in using fb ama google the answer is always "The frequency of visits is too frequent" That means what the hell I udh try brp times still gk can login too	Negative

In Table 2. Yan Pradnya's account wrote a review of the problem on the Tiktok community guidelines because it has a bad AI system and is given a negative label. Anggi Pitaloka's account name writes reviews about songs on the Tiktok application that

cannot be used in general and can only be used by influence and given a negative label. The account name KAizeen wrote a review of the signal problem applied by Tiktok which was buffering, but the quota and user signals were censored and gave a negative label. Ahmad Dio's account name wrote a review about not being able to log in to the Tiktok application using Facebook or Google and giving a negative label.

A. Review Analysis

Furthermore, a stemming process is carried out on the dataset, to eliminate prefixes, inserts and word endings so that they become their basic form, with the aim of retrieving information to be efficient and effective [19]. An example of applying stemming is shown in Table 3.

Table 3. Stemming review table

No	Terms on reviews	Stemming
1	Posted	Send
2	Service	Service
3	Gk	not
4	bangettttt	Very
5	bget	Very

In Table 3, you can see the words in the review such as "sent" and "send" when omitted prefixes, inserts and suffixes will be the base word "send". It is also with the word's "service", "service", and "service" after going through the stemming process into the basic word "service". Stemming makes the words on the review into its basic form and into the same term. Furthermore, a stopword removal process is carried out to remove the stopword from the review. The list of stopwords used is self-generated in reference to the context of the word often used in

Word normalizer to handle variations in writing words that have the same meaning in order to be counted as a single term [20]. An example of a variation in the writing of a word that has the same makna is shown in Table 3.

Table 3. variations of writing words on reviews that have the same meaning.

No	Terms on reviews	Word normalizer
1	tdk	Not
2	mhn	Request
3	g	not
4	Very	Very
5	bget	Very

Fig. 1. Word normalizer review table

There Table 3 shows the variations of words that have the meaning of sama. The word "ga" is found in reviews and the word "gak" is found in reviews, used by users to replace the word "no". The word "bgt" is found in reviews and kata "bget" is found in ulasan which is used by users to replace the word "really". The use of word normalizer can handle the large variety of words used in writing reviews by buyers to be converted into the same term.

Furthermore, a stopword removal process is carried out to remove the stopword from the review. The list of stopwords used is self-generated in reference to the context of words that are often used in online reviews. An example of a list of used stopwords is shown in Table 4.

Table 4. Stopwords and amounts

No	Stop word	Sum
1	Request	2141
2	Sorry	1808
3	And	681
4	That	3512
5	What	158

As can be seen in Table 4, the word "which" is one of the most common stopword lists, and the word "what" appears. In addition to the word form numbers are also included in the stopword, numbers have no effect on sentiment analysis and can be removed, so as to reduce noise and increase efficiency

4. Conclusions and Suggestions

Tiktok application reviews are needed by developers to find information about their application at the time of in i, as well as input for developers in improving the quality of applications and features. Giving a star to a review does not always describe the content of the review, this is evidenced by the high number of stars, but the content of the review is negative. Sentiment analysis on the content of Tiktok app reviews can provide deeper information about review ratings on the widely used Tiktok app. The study found that the dominant words on positive reviews were the words "good", "useful", "steady", "really", "cool", and "good" which indicated the app's features received positive reviews from users in terms of video quality, music and filters that could be used. While the dominant words in negative reviews are "no", "favoritism", "no", "disappointed", and "kok" which shows that the Tiktok application gets negative reviews from users in terms of features that cannot be

used, music that cannot be used and other features that do not support users who use Android.

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