PUBLIC SENTIMENT ON HEALTHCARE SERVICES DURING COVID-19 IN INDONESIA

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Abstract

The Covid-19 pandemic is an epidemic that makes all hospitals overwhelmed in handling patients. this of course affects the service of health workers to patients other than Covid-19 patients. Some opinions on these servants are conveyed on social media such as twitter. This article will describe public sentiment regarding health care services during the COVID-19 pandemic using Naive Bayes in Indonesia. The results of the analysis show that Indonesian citizens choose to be neutral towards the services of health workers in hospitals.

Keywords: Healthcare, Services, COVID-19, Twitter, Sentiment, Naïve Bayes, Indonesia

Introduction

COVID 19 has been spreading in the world since 2019, but the first case in Indonesia since March 2020. This virus then became a very massive outbreak in Indonesia quickly. In May 2021, the number of positive sufferers of COVID19 was 1.8 million.

With so many patients exposed to COVID 19, all health workers are concentrated on helping treat these patients. In accordance with the Decree of the Minister of Health of the Republic of Indonesia regarding guidelines for the prevention and control of COVID-19, one of the strategies for overcoming COVID-19 is to provide maximum health services for patients in critical times [1-4].

This causes hospitals and available health workers to focus on helping COVID-19 patients. As a result, health services for patients with cases other than COVID-19 have limited health personnel.

This study aims to determine public sentiment regarding health services during the COVID-19 pandemic. Data obtained from social media Twitter as many as 1000 tweets. Then the data is evaluated to determine the accuracy of the data using Naïve Bayes.

Literature Review

Research in the area of sentiment analysis is getting more and more diverse. Along with the COVID-19 pandemic, research with the theme of COVID-19 is increasing. In this subsection, several studies on sentiment towards health services will be described before the pandemic. The data discussed in previous studies used several algorithms and data sources[5].

The COVID-19 pandemic has greatly affected all processes in various community activities around the world. The number of patients exposed to this virus has made it difficult

for health workers to provide good services [1, 2, 6].

The second study discusses the sentiment analysis of satisfaction with hospital services. This study uses Naïve Bayes as an algorithm to classify data. The accuracy results obtained are 98% of the data obtained from comments on questionnaires filled out by patients [7, 8].

The third study discusses BPJS services, one of the government programs in helping the community in obtaining health funding assistance. The algorithm used for data classification is Nave Bayes with an accuracy of 84.5%[9-11].

The next section describes the methodology used in this study.

Methodology

This study uses a methodology consisting of steps of Data Collection, Data Pre-processing, Sentiment Classification and Scores of Sentiment
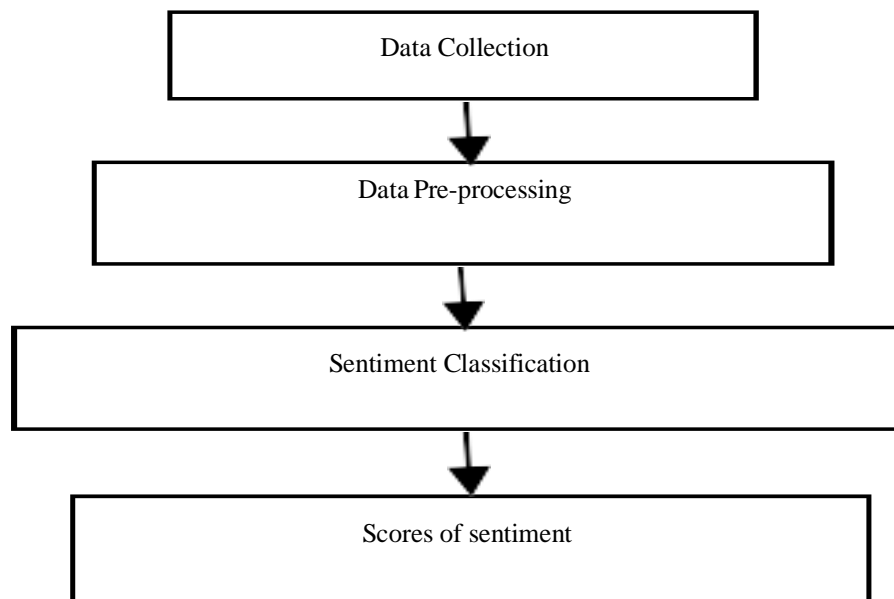

Fig 1 Methodology of Sentiment Analysis

The first step is to crawl or collect data from Twitter social media. The keywords used are health workers, doctors, services, and covid. The language used is Indonesian. The data that was successfully crawled were 1000 tweets, but after going through the preprocessing process, only 612 tweets were analyzed.

Fig 2 Collecting Twitter data result

The next step is data preprocessing, which is cleaning up unnecessary symbols and punctuation marks. In addition, stop words were also removed in tweets that did not have an important meaning for the sentence. Figure 3, and Figure 4 describe the steps involved in the data collection and data preprocessing process.
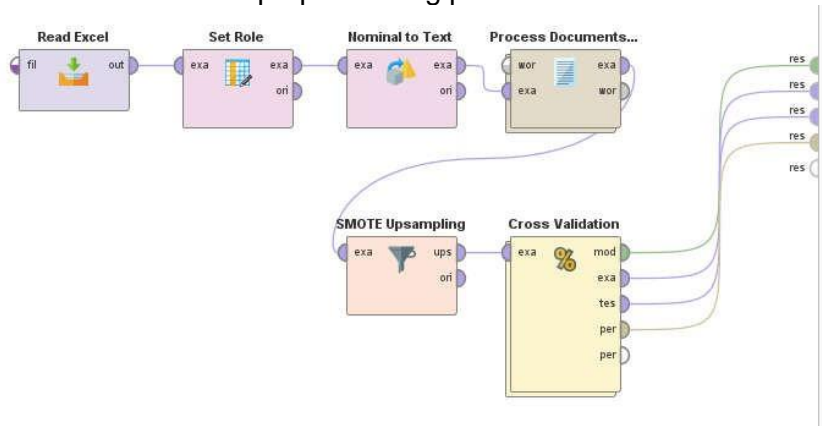

Fig 3 The whole process of sentiment analysis

Figure 3 describes the stages carried out in this research. the first stage is retrieval of datasets that have been collected from the previous twitter data crawling process. Then do the conversion from numeric data to text. In the process document, the data preprocessing process is carried out which is described in more detail in Figure 4.
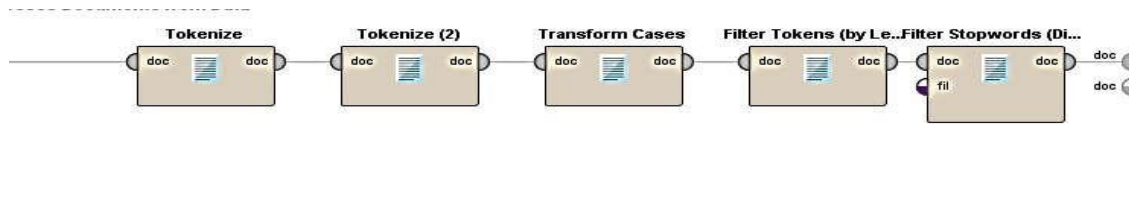

Fig 4 Proses Data preprocessing

Figure 4 describes the steps of data preprocessing which consists of tokenizing, converting to lowercase and removing unnecessary words or stopwords.

In the next subsection, the sentiment classification steps using Naïve Bayes will be explained and the score results will be explained.

Results and Discussions

This section will describe the process of classifying datasets that have been obtained from the results of data collection and data preprocessing. Of the 1000 tweet data obtained previously, the remaining 612 tweets have undergone the data preprocessing process. This is because there are duplicated tweets.

The 612 tweets were classified using the Naïve Bayes algorithm, with the following formula:

$$P(Y|X) = \frac{P(X|Y) \; P(Y)}{P(X)}$$

X: data

P(Y|X)   : possible hypotheses to condition
P(Y) and P(X|Y) : previous probability based on hypothetical
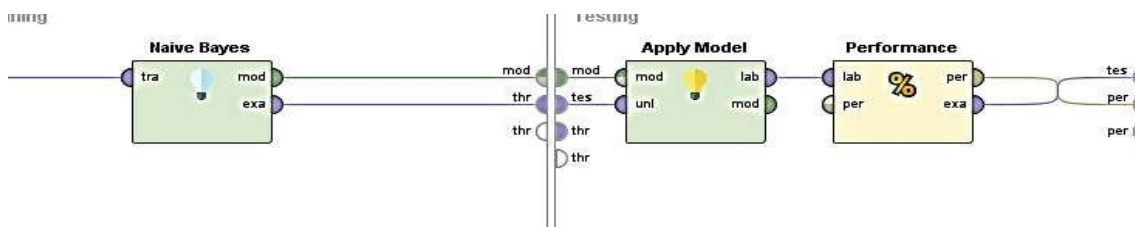condition P(X)   : probability of Y

Fig 5 Stages of data classification Figure 5 describes the steps taken in classifying data using Naïve Bayes.

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accuracy: 91.77% +/- 2.80% (micro average: 91.76%)

	true positive	true neutral	true negative	class precision
pred. positive	31	37	0	45.59%
pred. neutral	36	465	0	92.81%
pred. negative	2	16	518	96.64%
class recall	44.93%	89.77%	100.00%	

Fig 6 The results of data classification using Naïve Bayes

Based on Figure 6, the accuracy results show a high value, which is 91.77%. The results are then described in the form of a graph to see what percentage of sentiment is obtained from the classification results.
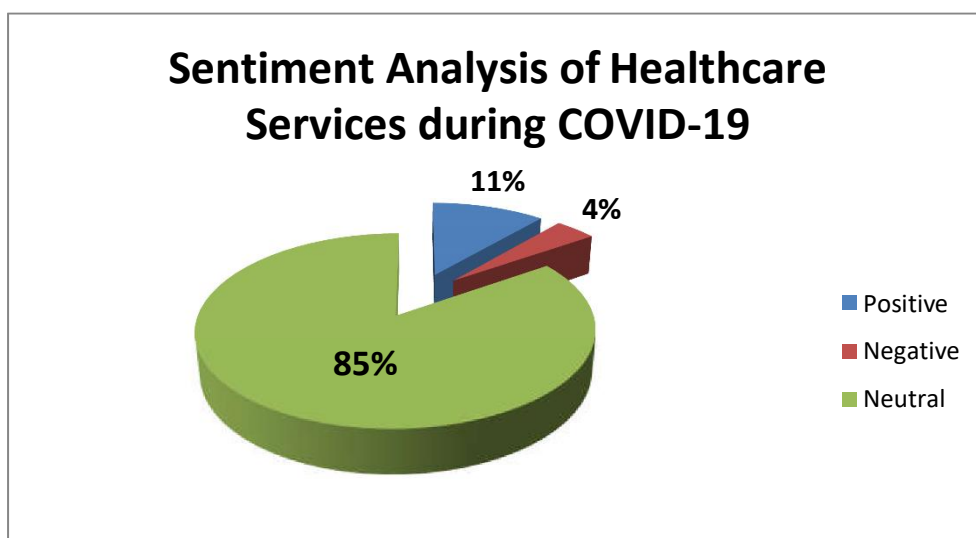

Fig 7 Graphics of sentiment analysis of health care services during COVID-19

Figure 7 shows; public sentiment towards health care services during the COVID-19 pandemic is 85% neutral, 11% positive and only 4% negative. This shows that the

performance of health care services during the COVID-19 pandemic is still considered good despite the shortage of human resources.

Conclusion

The COVID-19 pandemic has greatly affected all processes in various community activities around the world. The number of patients exposed to this virus has made it difficult for health workers to provide good services.

However, from the results of this study, public opinion on health workers during the COVID-19 pandemic is still very good, as seen from the classification results showing that the highest opinion value is 85% neutral and 11% positive. This shows that health workers in Indonesia are still responsible for providing the best service despite all the limitations they face.

In the future, it is hoped that further research can be carried out that can discuss what variables are needed by a health worker to be able to provide good service in a critical period.

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