

Comparison Of Sentiment Analysis Of Traveloka And Tiket.Com Applications On Twitter Using The Naive Bayes Method

1st Nathifa Agustiana
Information system
Telkom University
Bandung, Indonesia
nathifaa16@gmail.com

2nd Oktariani Nurul Pratiwi
Information system
Telkom University
Bandung, Indonesia
onurulp@telkomuniversity.ac.id

3rd Hanif Fakhurroja
Information system
Telkom University
Bandung, Indonesia
haniff@telkomuniversity.ac.id

Abstract— The country of Indonesia has a strategic geographical position and is also said to be a country that is very rich in natural resources and cultural diversity. One of the supporters of economic growth in Indonesia is tourism. To support the potential of the tourism sector in Indonesia, many online travel agent applications have started to appear. Of the many OTAs, the top two applications were selected, namely the Traveloka and Tiket.com applications. This sentiment analysis requires data from Twitter. This research compares sentiment analysis on the Traveloka and Tiket.com applications in terms of price and service. The method used is naïve Bayes. The goal is to get sentiment information contained in a text with a positive or negative view. With this research, it is hoped that we can see a comparison of sentiment analysis between the Traveloka and Tiket.com applications and be able to find out the level of accuracy of naïve bayes on the Traveloka and Tiket.com applications. The price dataset that gets more positive sentiment is the Traveloka price of 97.2%. In the service dataset that has positive sentiment, Tiket.com is 46.9%. Then, the greatest accuracy was obtained after oversampling the Tiket.com price dataset by 73%, Traveloka prices by 94%, Ticket services by 87% and Traveloka services by 86%.

Keywords— *Traveloka, Tiket.com, Naïve Bayes, Online Travel Agent*

I. INTRODUCTION

The country of Indonesia has a strategic geographical position and is also said to be a country that is very rich in natural resources and cultural diversity. Based on data from the central statistical agency for the number of islands in Indonesia until 2021, if it is counted, there are 16,766 islands [1]. To support the potential of the tourism sector in Indonesia, many online travel agent applications have started to appear. An online Travel Agent is one type of Travel Agent that carries out all its activities online. This type of travel agent provides online reservation services. This is a means that someone needs to travel. The task of the Online Travel Agent is to become a trusted intermediary and consultant for accommodation companies and airlines in online promotions and increasing consumer visits [2].

To find out what the public thinks about the Traveloka and Tiket.com applications, data is needed. The data to be used is data from one of the social media, namely Twitter. Sentiment analysis or opinion mining means digging opinions and emotions from data. Therefore, sentiment analysis is useful for knowing public opinion. The purpose of sentiment analysis is to find out the opinions on

social media in several classes such as positive, negative, and neutral [3]. The objects that will be used for sentiment analysis in this study are the Traveloka and Tiket.com applications.

Traveloka and Tiket.com are quite popular applications in Indonesia. Therefore, both of these applications are looking for customers by providing attractive services and promos to increase customer satisfaction. Promo is an activity to make customers aware of and interested in the offers that have been given by the company. Service is an activity related to what is expected by the customer[4]. Meanwhile, Traveloka and Tiket.com customers complain about prices and services. In addition, customers also feel that the quality of these two applications needs to be improved in terms of price and service. Therefore, this study conducted a sentiment analysis on the Traveloka and Tiket.com applications in terms of price and service.

In conducting sentiment analysis this time the researcher carried out a data selection process from one of Twitter's social media using crawling data. If the required data has been collected, then it goes directly to the data preprocessing process, which includes labeling, cleaning, case folding, stemming, tokenizing, stopwords, and spell correction processes. Then, to the transformation stage to do TF-IDF. After that, the data mining process in which there is a data splitting process then uses the Naïve Bayes method. The Naïve Bayes method is a probabilistic classification method that predicts classes based on the probability of a particular characteristic. This method is used to classify data into two or more classes. Naïve Bayes is also a simple classification algorithm but has high accuracy [5]. In carrying out the classification, the existence of an imbalance in the data in this process results in inaccuracies or deviations in the classification. Therefore, to deal with the problem of class imbalance in the dataset we have, we need a random oversampling process [6].

Based on the explanation above, the author will conduct further research regarding a comparison of the sentiment analysis of the Traveloka and Tiket.com applications with data that has been retrieved on the Twitter application within a span of time following holiday schedules where it is likely that many people use online travel agent applications to order tickets. holidays, namely from June 2022 to February 2023. The method that will be used in this study is Naïve Bayes.

II. RESEARCH METHODOLOGY

This study uses the Knowledge Discovery in Databases Process method. The following are the steps taken when carrying out systematic problem-solving. There are several stages consisting of problem identification, data selection, data preprocessing, data mining, and evaluation [7]. The stages of this research are illustrated in the following figure.

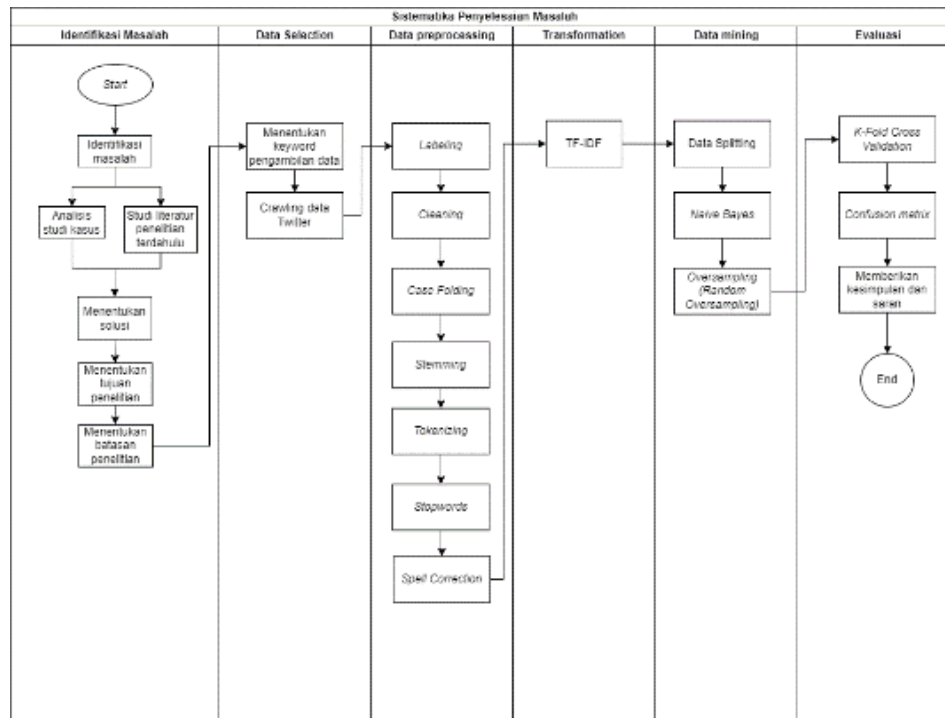


Figure 1 solution systematics

A. Data selection

The data collected is data obtained from one of the social media. One of these social media is Twitter. This dataset is sourced from Tweets on Twitter regarding the Traveloka and Tiket.com applications taken from June 2022 to February 2023. Several datasets have been obtained which are files in the .xlsx format.

B. Data preprocessing

The initial stage in carrying out text classification to prepare text data before being used in the next process is the meaning of Preprocessing. At the Preprocessing stage, there is a process for converting text data into a better form so that text data that has been processed will produce text information of good quality and be ready for use in the next process[8]. The preprocessing steps are as follows [9] :

1) Labeling

The labels that the data will have consist of three categories: positive, neutral, and negative. Data that supports the price and services of the Traveloka or Tiket.com application will be labeled as positive. Data that does not support the price and services of the Traveloka or Tiket.com application will be labeled as negative. Data that is considered ambiguous will be assigned a neutral label. However, the data categorized as neutral will not be used, as in this research, data with a neutral label does not provide support.

Table 1 Dataset

No	Waktu	username	Tweets	Label
1	2022-12-10 09:07:46+00:00	hilmaamir	@traveloka mohon konfirmasinya sudah pesan tiket tapi belum tidak bisa masuk ke akun, jadi tidak bisa print eticket	Negatif
2	2022-12-10 00:22:34+00:00	HaloKamuu_	@mandiricard Kebetulan banget mau pesan tiket liburan nih di Traveloka, pakai Mandiri jadi murah dong tiketnya	Positif
3	2022-07-13 14:30:21+00:00	mas_indrajay	@traveloka Mohon informasi min., untuk alamat email CS Traveloka apa yah ? Atau yg berkaitan	Netral

2) *Cleaning*

The purpose of the data cleaning process is to analyze the quality of the data and also detect problematic data or errors, if the data has received an error, the data will be cleaned or deleted. Cleaning data involves steps such as the process of cleaning data by removing usernames, hashtags, hyperlinks, unnecessary characters, duplicate data and deleting numbers.

3) *Case Folding*

Case folding is the process of standardizing words within data by converting all letters to lowercase. Its purpose is to ensure uniformity in the text by changing all letters to lowercase.

4) *Stemming*

Stemming is the process of transforming words into their base forms by removing affixes from words in a document. For example, the word "membela" becomes "bela," "dikatakan" becomes "kata," and so on.

5) *Tokenizing*

In this stage, the data's words are divided into tokens. The purpose is to facilitate the subsequent data analysis process.

6) *Stopwords*

Stopwords is a process that removes words that are considered common or often appear but these words have a role that is not too important in a word. Examples of omitted words are the words which, to, in, and from.

7) *Spell Correction*

This process aims to correct word errors in the text that has been written. The following is an example of data that has been processed by data preprocessing.

Table 2 *Data preprocessing*

Before	After
https://t.co/5QRPWATi1h Bener2 ya di tiket.com kalo ngasih promo walaupun cuma seratus ribu tp diskonnya lumayan bgt.	bener ya tiket.com kalo ngasih promo walaupun cuma seratus ribu tapi diskonnya lumayan banget

C. Transformation

1) *TF-IDF*

TF-IDF (Term Frequency-Inverse Document Frequency) is the most popular weighting scheme. The word weights calculated using the TF-IDF scheme are proportional to the events in the given text, but inversely proportional to those in other texts [10]. This process is carried out to find out how important the words are in the data.

D. Data mining

1) *Data splitting*

Data splitting, its purpose is to divide data into training data and testing data. The acquired data is divided using various ratio comparisons. Data splitting is a crucial and necessary process to reduce or eliminate bias in the training data of Machine Learning Models. The aim is to prevent the occurrence of overfitting, which can result in poor performance on actual test data [11].

2) *Naïve Bayes*

In this study, the classification process uses Naïve Bayes. Naïve Bayes is a simple classification algorithm but has high accuracy ability [5]. Naive Bayes Classifier is a simple model for classifying. This model is a simple form of Bayesian Network, in which all independent attributes are given class variable values [12].

3) *Random oversampling*

Random oversampling is a method used to generate new data from a minority class that has the same class or close to the majority class by doubling the sample randomly so that the desired class ratio can be fulfilled [13].

E. Evaluation

1) *K-Fold cross validation*

To examine overfitting in a classification model, model validation is required. One of the models for validation is K-Fold cross-validation. In the process of K-Fold cross-validation, the

entire dataset will be shuffled and then divided into equally sized parts, where a portion will be used as the testing data, while the rest will be used as the training data. [14].

2) *Confusion matrix*

- 3) The confusion matrix can present the results of model evaluation using a matrix table. In the evaluation stage using the confusion matrix, it will produce values for Accuracy, Precision, Recall, and F-Measure [15]. The confusion matrix can assist in understanding the extent to which the model we use classifies data.

III. DISCUSSION AND RESULT

The data used in this research involves information about prices and services on the Tiket.com and Traveloka applications from the social media platform Twitter. The acquired data is manually labeled into positive and negative categories.

Table 3 obtained data

No	Dataset	Jumlah Baris setelah preprocessing	Positif	Negatif
1	Harga Tiket.com	278	204	74
2	Harga Traveloka	4961	4821	140
3	Layanan Tiket.com	322	151	171
4	Layanan Traveloka	511	140	371

The following is a graph depicting the analysis of positive and negative sentiments in the Tiket.com price dataset.

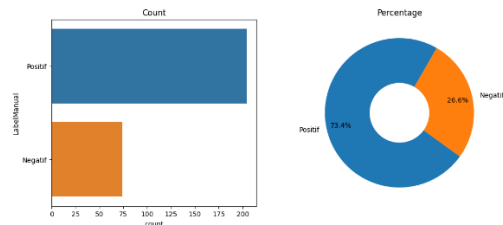


Figure 2 Tiket.com Price Charts

Based on the image above, the graph illustrates a comparison of positive and negative sentiment analysis in the Tiket.com price dataset. It can be seen that customers who provided positive sentiment were 206, accounting for 73.4%, while those with negative sentiment were 74, accounting for 26.6%. This leads to the conclusion that customers expressing opinions about Tiket.com prices on Twitter mostly provided positive comments.

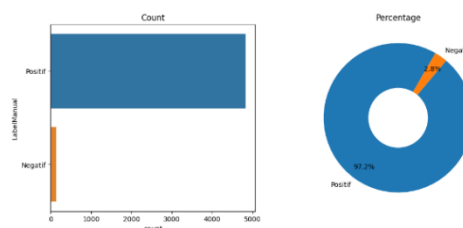


Figure 3 Traveloka Price Charts

Based on the image above, the graph illustrates a comparison of positive and negative sentiment analysis in the Traveloka price dataset. It can be observed that customers providing positive sentiment were 4821, accounting for 97.2%, while those with negative sentiment were 140, accounting for 2.8%. This leads to the conclusion that customers expressing opinions about Traveloka prices on Twitter mostly provided positive comments.

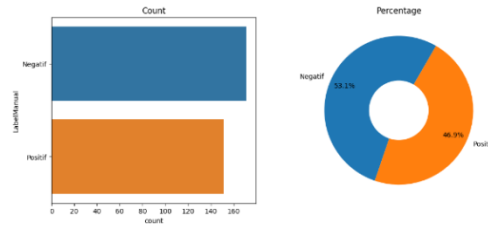


Figure 4 Tiket.com Service Charts

Based on the image above, the graph depicts a comparison of positive and negative sentiment analysis in the Tiket.com service dataset. It can be observed that customers providing positive sentiment were 151, accounting for 46.9%, while those with negative sentiment were 171, accounting for 53.1%. This leads to the conclusion that customers expressing opinions about Tiket.com services on Twitter mostly provided negative comments.

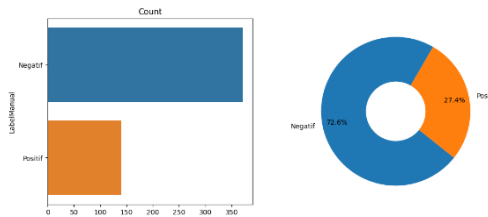


Figure 5 Traveloka Service Charts

Based on the image above, the graph illustrates a comparison of positive and negative sentiment analysis in the Traveloka service dataset. It can be seen that customers providing positive sentiment were 140, accounting for 27.4%, while those with negative sentiment were 371, accounting for 72.6%. This leads to the conclusion that customers expressing opinions about Traveloka services on Twitter mostly provided negative comments.

At this stage the researcher used the naïve Bayes algorithm. Then, try various ratios on all datasets to see which ratio has the highest level of accuracy in each dataset. The following are the results of the accuracy of several ratios that have been tried.

Table 4 data accuracy

Dataset	Akurasi		
	80:20	70:30	60:40
Harga Tiket.com	0.714	0.702	0.696
Harga Traveloka	0.973	0.975	0.974
Layanan Tiket.com	0.892	0.866	0.852
Layanan Traveloka	0.747	0.733	0.761

Furthermore, this study also employs oversampling, which aims to address the issue of class imbalance in the dataset. The following are the accuracy results of the conducted oversampling:

Table 5 Accuracy after oversampling

Dataset	Akurasi		
	80:20	70:30	60:40
Harga Tiket.com	0.678	0.678	0.732
Harga Traveloka	0.94763	0.94761	0.94609
Layanan Tiket.com	0.876	0.865	0.868
Layanan Traveloka	0.864	0.818	0.824

After that, test the accuracy of this study using the confusion matrix. The following is the highest accuracy result after oversampling obtained from the Tiket.com price dataset.

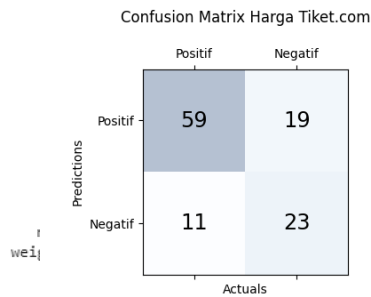


Figure 6

Figure 7

The following is the highest accuracy result after oversampling obtained from the Traveloka price dataset.

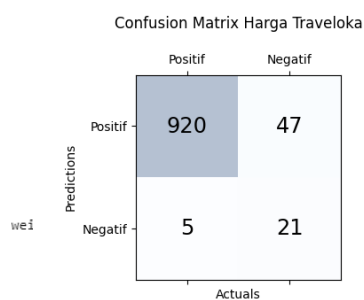


Figure 8

Figure 9

The following is the highest accuracy result after oversampling obtained from the Tiket.com service dataset.

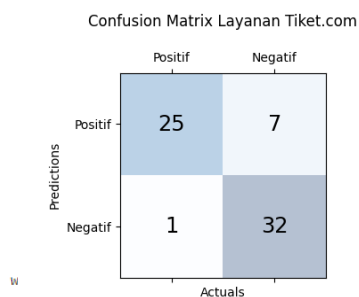


Figure 10

Figure 11

The following is the highest accuracy result after oversampling obtained from the Traveloka service dataset.

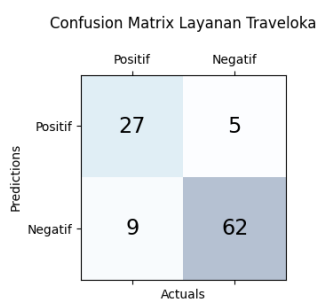


Figure 12

In validating this study using K-Fold with a value of $K = 5$, which means that there are 5 tests to be carried out. The following is the result of validation on various datasets after oversampling.

Table 6 K-fold result

No	Dataset	K1	K2	K3	K4	K5	Avg.
1	Harga Tiket.com	0.71	0.67	0.78	0.78	0.70	0.73
2	Harga Traveloka	0.97	0.97	0.97	0.96	0.97	0.97
3	Layanan Tiket.com	0.89	0.87	0.89	0.89	0.85	0.88
4	Layanan Traveloka	0.86	0.79	0.78	0.74	0.85	0.80

Visualization aims to represent visuals easily. In this study using wordcloud visualization. The purpose of wordcloud visualization is to visually represent data from the number of words in a data.



Figure 13 Positive and negative visualization of the Tiket.com price dataset



Figure 14 Positive and negative visualization of the Traveloka price dataset



Figure 15 Positive and negative visualization of the Tiket.com service dataset



Figure 16 Positive and negative visualization of the Traveloka dataset

N-gram is a method whose function is used to sort n of items which can be either characters or words. This function can be used to divide the existing text in the dataset into a sequence of n adjacent items. The following are the results of N-grams in research.

N-gram Label Positif:		
	N-gram	Count
0	tiket com	44
1	harga gledek	34
2	konser raisa	9
3	harga tiket	9
4	beli tiket	8
5	dapat harga	8
6	dapat tiket	5
7	tiket pesawat	5
8	gledek tiket	5
9	happy birthday	4

N-gram Label Negatif:		
	N-gram	Count
0	harga giledek	17
1	tiket com	10
2	beli tiket	9
3	hai sobat	5
4	sobat tiket	5
5	tiket pesawat	5
6	yang beli	5
7	ya sobat	4
8	beli harga	4
9	harga normal	4

N-gram Label Positif:		
	N-gram	Count
0	hotel promo	1879
1	staycation hotel	1869
2	suka staycation	1863
3	promo suka	1858
4	promo traveloka	707
5	pake promo	648
6	holiday stays	608
7	hotel holiday	512
8	diskon sd	490
9	promo diskon	448

N-gram Label Negatif:		
	N-gram	Count
0	promo traveloka	17
1	maling duit	11
2	duit langgan	11
3	tiket pesawat	8
4	duit hasil	8
5	duit gw	8
6	traveloka eats	7
7	beli tiket	6
8	traveloka udah	6
9	promo tiket	6

Figure 17

Figure 18

N-gram price Tiket.com N-gram price Traveloka

N-gram Label Positif:		
	N-gram	Count
0	pesan tiket	72
1	konser raisa	37
2	tiket konser	24
3	tiket libur	23
4	raisa gratis	18
5	happy birthday	15
6	ayo pesan	13
7	sat set	11
8	libur pesan	11
9	tiket gratis	10

N-gram Label Negatif:		
	N-gram	Count
0	cs nya	1
1	server error	1
2	tiket com	1
3	server tiketcom	9
4	cs tiketcom	9
5	server down	4
6	pesan tiket	4
7	server nya	7
8	the script	9
9	beli tiket	9

N-gram	Label	Positif	Count
0	pesan	tiket	45
1	alam	inap	21
2	pes	traveloka	21
3	traveloka	senang	21
4	senang	yuk	21
5	yuk	lihat	21
6	lihat	akomodasi	21
7	akomodasi	alam	15
8	tiket	pesawat	11
9	beli	tiket	7

N-gram	Label Negatif	Count
0	pesan tiket	55
1	cs nya	40
2	cs traveloka	39
3	call center	39
4	beli tiket	20
5	customer service	20
6	tiket pesawat	18
7	telpon cs	12
8	gimana iya	11
9	suruh nunggu	10

Figure 4

Figure 5

N-gram service Tiket.com N-gram service Traveloka

IV. CONCLUSION

The sentiment analysis in this study resulted in both positive and negative opinions. The comparison of sentiment analysis can be observed in the feedback provided regarding the application in terms of prices and services. When looking at the sentiments obtained for the price dataset, Traveloka's prices received a higher percentage of positive sentiment, which is 97.2%. For the service dataset, Tiket.com had a higher percentage of positive sentiment, which is 46.9%. Furthermore, sentiment analysis comparison can also be seen in N-grams and word cloud visualizations. Observing the N-grams and word clouds, it can be concluded that both Tiket.com and Traveloka applications are perceived positively by users in terms of pricing due to frequent promotions and special coupons. However,

regarding service aspects, users feel that both applications lack in handling refunds, rescheduling, and customer service, and also have issues with server quality.

The stages of sentiment analysis in the Traveloka and Tiket.com applications use the naïve Bayes algorithm by carrying out several stages such as the process of selecting data, pre-processing data, and processing data. The greatest accuracy that can be obtained is the Tiket.com price dataset of 71%, Traveloka prices at 97%, Ticket services at 89%, and Traveloka services at 76%. While the greatest accuracy that can be obtained after oversampling the Tiket.com price dataset is 73%, Traveloka prices are 94%, Ticket services are 87% and Traveloka services are 86%.

V. SUGGESTION

The results show that both the Tiket.com and Traveloka applications have a good opinion in the eyes of users in terms of price, while in terms of customer service, they feel that these applications are equally poor in serving refunds, rescheduling, customer service, and poor servers. Good. For this reason, it is hoped that Tiket.com and Traveloka companies will continue to maintain and improve quality by providing affordable prices, promos, and discounts so that customers will still be interested. As for services, the server capacity can be increased even more if there is an event, the quality of service using customer service, especially in serving refunds, and rescheduling.

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