

Twitter Sentiment Analysis of Indonesian Airlines Using LSTM

Benedictus Prabaswara
School of Computer Science
Bina Nusantara University
Jakarta, Indonesia

benedictus.prabaswara@binus.ac.id

Wanda Safira
School of Computer Science
Bina Nusantara University
Jakarta, Indonesia

wanda.safira@binus.ac.id

Kartika Purwandari
School of Computer Science
Bina Nusantara University
Jakarta, Indonesia

kartika.purwandari@binus.ac.id

Felix Indra Kurniadi
School of Computer Science
Bina Nusantara University
Jakarta, Indonesia
felix.indra@binus.ac.id

Abstract—Twitter is one of the social media that is currently a trend, where Twitter users can tweet as freely as possible about their opinions and even those opinions about airlines in Indonesia. Twitter sentiment analysis is a process to identify whether tweets on Twitter are included as positive tweets or negative tweets. In this research, the tweets will be divided into three categories: positive, neutral, and negative, using Lexicon and Long Short-Term Memory (LSTM). The data taken are tweets from Twitter in the form of text. One hundred positive, one hundred neutral, and one hundred negative tweets were taken. After going through the process using the Lexicon and LSTM method, the results obtained are 73% accuracy, where there are 130 positive tweets, 105 negative tweets, and 62 neutral tweets.

Keywords—Twitter, sentiment analysis, social media, Indonesia airlines, LSTM, lexicon.

I. INTRODUCTION

Social media is a digital platform that facilitates social media users to carry out social activities. An example is communication between users, providing the latest information about today's world, and can be accessed 24 hours a day. Social media is a result of the development of the internet, where the action is prevalent and allows us to communicate virtually and quickly get information from anywhere [1].

An example of one social media is an application called Twitter. Twitter is a social media that facilitates users to send messages to each other, and there is even a so-called "tweet" on Twitter. That is a feature that only exists on Twitter. This feature is helpful for pouring out the contents of the user's head or heart on social media called Twitter. It can be said that this feature makes it very easy for users to give their opinions freely, including opinions for airlines in Indonesia [2].

However, these opinions can be divided into three categories, namely positive opinions, neutral opinions, and negative opinions, using Sentiment Analysis. Sentiment Analysis is part of Natural Language Processing NLP. Sentiment analysis is the process of identifying a text. An example is when you want to specify an opinion. Does this opinion belong to a negative opinion or a positive opinion? Sentiment Analysis will automatically process the opinion and issue output from the results of the process [3].

There are many methods that can be used for sentiment analysis. Examples are Lexicon [4], [5] and LSTM [6]. Lexicon is a classification based on the word, which is assessed with a polarity score to determine whether the word is positive or negative. The long short-term memory network or LSTM is a modified version of the recurrent neural network or RNN as part of deep learning model [7]. LSTM is used to process, predict, and classify existing text [8], [9].

II. LITERATURE REVIEW

Twitter is a part of social media where it is used to express the user's expression or to interact with other users. Nowadays, Twitter is mostly used to comment on a certain topic whether it is positive comments or negative comments. But with language barriers and ambiguous comments, it is sometimes unknown what the tweet is trying to tell [3].

In order to classify these tweets to recognize if it is a positive, neutral, or negative tweets, they can be researched and analyzed using Sentiment Analysis. Sentiment analysis (also known as opinion mining) is analyzing the true opinion, emotions, ratings, and attitudes of people associated with a particular product, organization, service, film, individual, political event [10], problem, and characteristics., And means to analyze emotions [2], [11].

Approaching Sentiment Analysis with Machine Learning can be done in many methods. LSTM is the more common use for Sentiment Analysis. With the use of Lexicon(unsupervised) Lexical analysis estimates the sentiment from the semantic orientation of words or phrases that occur in a text. Lexicon Analysis is approached by a dictionary containing positive and negative words which is why this analysis technique depends fully on the dictionary [9].

Previous works on Sentiment Analysis using Lexicon Approach have been done on certain topics as referenced such as Student Comments and Product Review. Both used the same Lexicon Approach method and resulted in modifying the Lexicon dictionary to get the optimal result. Since the topic of Airline comments in Indonesia is new, this research is done to prove that the Sentiment Analysis using the Lexicon approach can be used to analyze the comments on Twitter and classify them as positive, neutral, or negative comments [9].

III. METHODOLOGY

Figure 1 is the flow of the methodology in flowchart to illustrate the process of Indonesian airlines sentiment analysis.

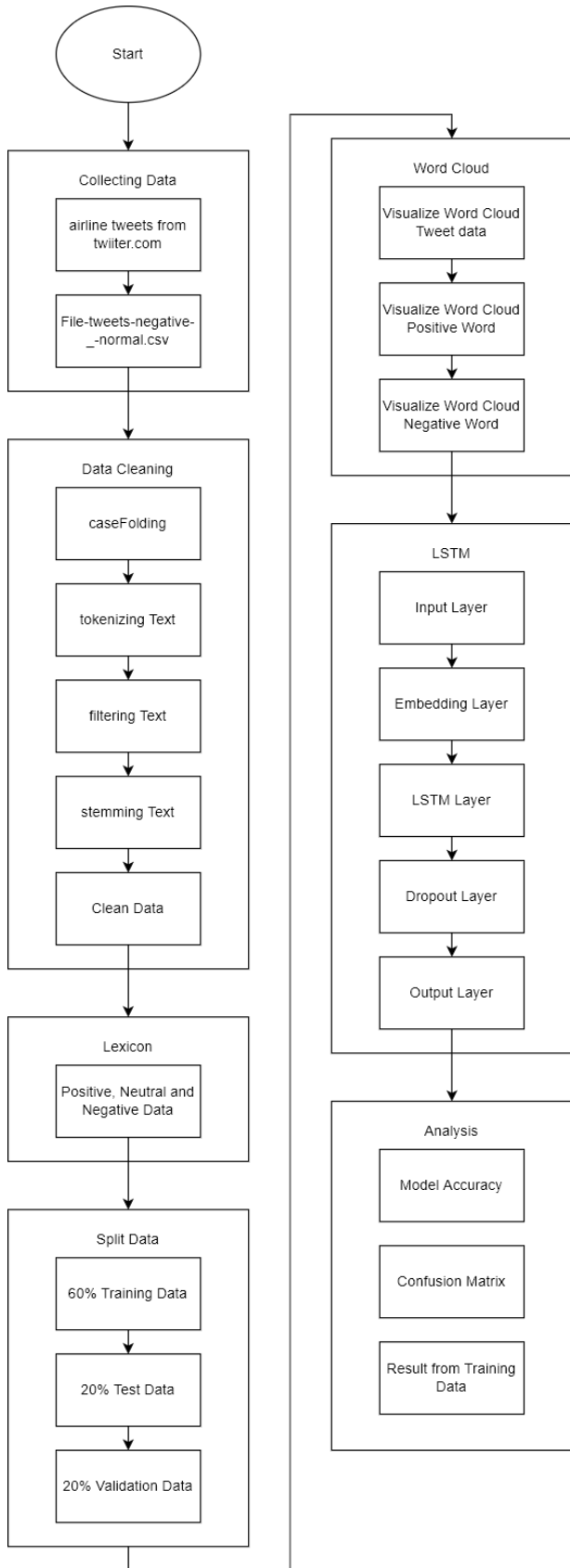


Fig 1. Flowchart sentiment analysis

A. Dataset

The first step is to collect the data from Twitter. We search through Twitter while filtering only airline tweets and collected 300 tweets, which contained 100 neutral, 100 positive, and 100 negative units.

B. Data Cleaning

Data Cleaning is the preprocessing task for cleaning the tweets [12]. Tweets may contain emojis and ambiguous words that the computer may not understand. The first step is to remove mentions, hashtags, punctuations, and emojis. Case-folding is to convert all characters into lower case. Next, there is tokenizing which is splitting a string of text into a list of tokens. After tokenizing we filter the text by removing stopwords using the list of stopwords in Indonesian and stemming the text which is to reduce a word to its word stem that affixes to suffixes and prefixes or to the roots of words [13]. Table I shows the comparison of before and after data cleaning.

TABLE I. COMPARISON OF BEFORE AND AFTER DATA CLEANING

Uncleaned Data	Cleaned Data
akun twitter batik air apa ya jancuk konter buka cuma antrian mengular bodo kali lah manajemennya	[akun, twitter, batik, air, ya, jancuk, konter, buka, antri, ular, bodo, kali, manajemen]
yaallah batik air kenapa susah bgt sih di hubungin call center nya ini tiket ku tiba di ubah jadwal nya gak ada pemberitahuan harus hubungin kemana ini	[yaallah, batik, air, susah, bgt, sih, hubungin, call, center, nya, tiket, ku, ubah, jadwal, nya, gak, pemberitahuan, hubungin, mana]
halo batik air plis gue cape telfonin customer care dan customer service jamnya gak pernah diangkat toloooonggg bgt ini mah plis ya	[halo, batik, air, plis, gue, cape, telfonin, customer, care, customer, service, jam, gak, angkat, toloooonggg, bgt, mah, plis, ya]
kacau batik air	[kacau, batik, air]
kereta bandara ada jam w udh landing dr jam bagasi bangsat dr batik air lama bgt keluarnya kalo w naik kereta menit ke tugu berarti w nunggu jam an di bandara trus dr tugu ke slemanrumah gw lama lg 🤬🤬	[kereta, bandara, jam, w, udh, landing, dr, jam, bagasi, bangsat, dr, batik, air, bgt, keluar, kalo, w, kereta, menit, tugu, w, nunggu, jam, an, bandara, trus, dr, tugu, slemanrumah, gw, lg,]

C. Lexicon

Positive and negative words and opinions The phrases are collectively called the Opinion Lexicon. The lexicon-based approach used lexicon and unlabeled data. Words in the text are evaluated by opinion. A lexicon to determine those directions and the sentiments of texts. Opinion The generation of lexicons is very important for the lexicon-based sentiment analysis process [3].

Table II has shown the polarity score and result after classification using Lexicon. In this step, Load the lexicon of positive, neutral, and negative data and create a function to determine the polarity of the tweets.

D. Split Data

To get the maximum results, we split the data into 60% training data, 20% data test, and 20% for validation data. The data is split into 180 training data, 60 data tests, and 60 validation data.

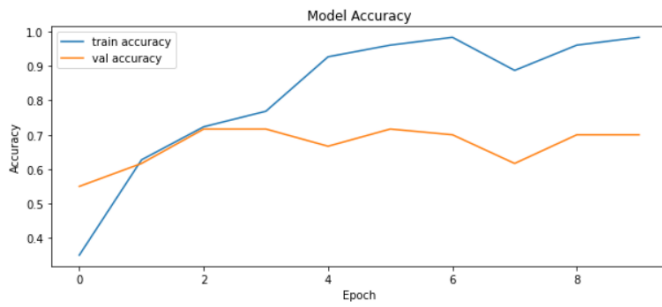


Fig 6. Model accuracy

B. Confusion Matrix

According the result of model accuracy, confusion matrix (Figure 7) can be created to list out the words that which are negative, neutral, and positive.

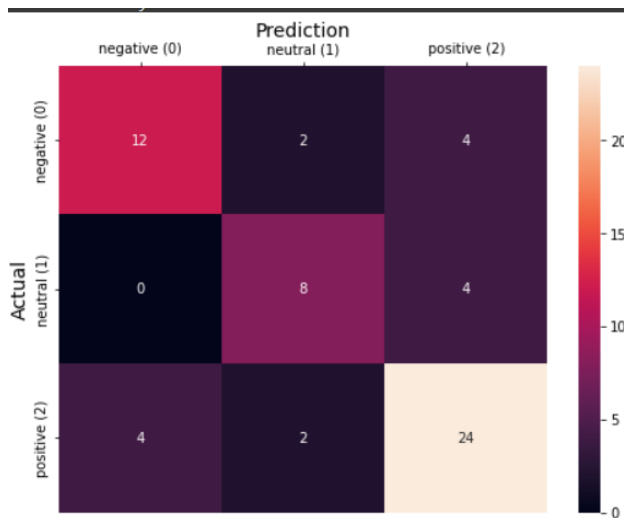


Fig 7. Confusion matrix.

C. Result from Training Data

After analyzing, we can test the model using the test data to further check if our model predicts correctly. Table III shows the result from prediction sentiment on data text.

TABLE III. RESULT FROM PREDICTION SENTIMENT ON TEST DATA

Polarity	Text
Positive	hebat selalu ontime take off well dan landingnya very well mulus gitu loh keep the good job
Positive	boarding pass barunya bagus 🍀
Neutral	untuk citilink butuh berapa milles min
Neutral	yukkk terbang yukkk
Negative	gimana gak sik dg murahnya terbang utk menikmati keindahan raja ampat dg naik pesawat batik air perjalanan jauh itu kalau dptnpswt yg nyaman jd gak brasa capek kan dg dudukan yg nyaman n spt hrg tiket murahnya dr mimpi apa yak rasanya
Negative	air asia system booking nya jelek bgt error pas pembayaran di atm alfamart atau indomart masih error gmna ini booking dr toped juga sama loading terus sejamin

V. CONCLUSION

Sentiment Analysis using LSTM had been researched and is proven to be working properly. In this paper, based on the result of collecting 300 data, the LSTM model works well with the model Accuracy of 73% and it can already predict most sentiments whilst using new data to test the model.

LSTM can be used as a reliable way to do Sentiment Analysis. Since this topic is about Airline Comments which is different than most researched topics, LSTM can still be used in fairly high accuracy to predict correctly. In further work, we can add better Lexicon data for classification and add another method besides the LSTM method. after we add another method, we can make a comparison about which method is the best method for Twitter Sentiment Analysis.

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