

## SENTIMENT ANALYSIS OF ONLINE GOJEK TRANSPORTATION SERVICES ON TWITTER USING THE NAÏVE BAYES METHOD

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**Abstract**— Social media is the most accessed internet content by internet users in Indonesia. This is not surprising, given the many benefits that social media provides, one of which is the benefit of self-expression. Self-expression can include many things, including emotional openness, which is the openness of a person in conveying the emotions he is feeling. Along with the development of social media, emotional disclosure is ubiquitous in social media, one of which is social media Twitter. With the development of information technology, means of transportation are also developing with the existence of online transportation services. Currently, the use of online transportation services has become a necessity, so it is necessary to conduct a sentiment analysis on online transportation services to find out how the public responds to these online transportation services. The purpose of this study is to analyze community responses by analyzing data in the form of tweets and then classifying them into positive, negative, and neutral classes using the Naïve Bayes method because the error rate obtained is lower when the dataset is large, besides that the accuracy of Naive Bayes and the speed is higher. high when applied to a larger dataset. The results of this study indicate that the neutral sentiment level of public tweets is greater than the level of positive sentiment and negative sentiment with an accuracy of 25.00%.

**Keywords:** Online Transportation, appraisal analysis, Twitter, Naïve Bayes.

**Intisari**— Media sosial merupakan konten internet yang paling banyak diakses pengguna internet di Indonesia. Hal ini tidak mengherankan, mengingat banyaknya manfaat yang diberikan media sosial, salah satunya adalah manfaat untuk mengekspresikan diri. Ekspresi diri dapat mencakup banyak hal, termasuk keterbukaan emosional, yaitu keterbukaan seseorang dalam menyampaikan emosi yang sedang dirasakannya. Seiring dengan perkembangan media sosial, keterbukaan emosional semakin banyak dijumpai di media sosial, salah satunya adalah media sosial Twitter. Berkembangnya teknologi informasi, alat transportasi juga berkembang dengan adanya jasa transportasi online. Saat ini penggunaan jasa transportasi online sudah seperti kebutuhan, maka perlu melakukan analisis sentimen terhadap jasa transportasi online untuk mengetahui bagaimana tanggapan masyarakat terhadap jasa transportasi online tersebut. Tujuan dari penelitian ini adalah untuk menganalisa tanggapan masyarakat dengan analisis data yang berupa tweet kemudian diklasifikasikan menjadi kelas positif, negatif, dan netral menggunakan metode Naïve Bayes dikarenakan tingkat nilai error yang didapat lebih rendah ketika dataset berjumlah besar, selain itu akurasi naive bayes dan kecepatannya lebih tinggi pada saat diaplikasikan ke dalam dataset yang jumlahnya lebih besar. Hasil penelitian ini menunjukkan bahwa dengan metode yang digunakan tingkat sentimen netral dari tweet masyarakat lebih besar dibandingkan dengan tingkat sentimen positif dan sentimen negatif dengan akurasi sebesar 25.00%.

**Kata Kunci:** Transportasi Online, Analisis sentimen, Twitter, Naïve Bayes.

## INTRODUCTION

The development of technology and information is so fast. The breadth of internet service systems and the high influence of smart phones have made Indonesia one of the countries with the potential for developing online-based applications. One of them is in the field of public transportation. Users of technology and information systems that make transportation services more efficient to use, namely by ordering online via smart phone [1].

By registering as an online transportation driver, both private two-wheeled and four-wheeled vehicles, these private vehicles can be as useful as public transportation that can be ordered by the public, utilizing access to cellular telephone technology. In addition, this online transportation application is not only used as a means of transportation for the community but can also serve as a goods delivery service and food delivery. This online transportation phenomenon is becoming popular quickly because it offers the latest innovations regarding transportation combined with online communication technology so that it makes it easy for people to order transportation anywhere and anytime. [2].

With this phenomenon, many people express their opinions about online transportation in Indonesia through social media. Social media is a service that facilitates the exchange of information and topics on an ongoing basis with a broad scope [3]. One of the most popular social media in society is Twitter. Twitter is a social media that can connect many people with various topics from around the world [4]. Dengan menggunakan Twitter masyarakat dapat memberikan pendapat mereka tentang apapun yang terjadi secara langsung. Hal tersebut didukung dengan banyaknya masyarakat yang sudah memiliki telepon selular sehingga memudahkan untuk mengakses Internet untuk menggunakan media sosial. Populasi penduduk Indonesia saat ini mencapai 262 juta orang. Lebih dari 50 persen atau sekitar 143 juta orang telah terhubung jaringan Internet sepanjang 2017 [5].

Based on PeerReach research, Indonesia is the third most active Twitter user in the world, which means that Twitter users in Indonesia are among the most active in the world. [6] If we examine further the community's tweets, we will get a sentiment that can be analyzed.

In previous research [10] positive sentiment results of 88.60% and negative sentiment of 11.40% with an accuracy of 86.80%. The results show that the level of positive sentiment from public tweets is greater than the level of negative sentiment.

In this study, the authors analyzed public sentiment on Twitter to provide information about

public satisfaction with online transportation services in Indonesia. The method to be used is the Naïve Bayes Classifier. One of the reasons this method was chosen is because the error rate obtained is lower when the dataset is large, besides that the accuracy of Naive Bayes and the speed is higher when applied to a dataset with a larger number, it has several advantages, including, simple, fast, and high accuracy. [7].

Data must go through the pre-processing stage before being classified. After being classified, you will get tweets that have positive or negative meaning.

Sentiment analysis is an analysis of an event from an opinion based on a person's attitude about an object. Sentiment analysis is usually done to collect and find out public opinion in Blog posts, Twitter, Facebook, and others. Sentiment analysis is needed with the aim of knowing public opinion on an object. These opinions can be negative or positive opinions depending on the public's view of the object. Therefore an analysis of these opinions is needed in this study so that it can be used as a benchmark for whether or not online transportation services are good according to customers.[8].

From the background of the problems above, the purpose of this study is to measure the accuracy, class precision, and class recall of the Naïve Bayes-based text classifier method to carry out sentiment analysis of online transportation services on Twitter.

## MATERIALS AND METHODS

### Data Collection Method, Population and Research Sample

#### A. Data Collection Method

In this chapter explains the steps undertaken by researchers included in the quantitative research methods, namely [9]:

##### 1. Preparation Stage:

At this stage it is a stage that prepares material related to the selection of high achieving students and decision support systems, formulation of problems by gathering preliminary information to find out the background of the problem, identification of problems, goals and objectives scope and hypotheses, and compiling a study of literature relating to research.

##### 2. Collecting data stage:

Data collection techniques used in this study is collecting data on Twitter to get data and conducting interviews and observations as a start to start research

##### 3. Pre-processing:

Pre-processing is carried out in six stages, namely as follows following:

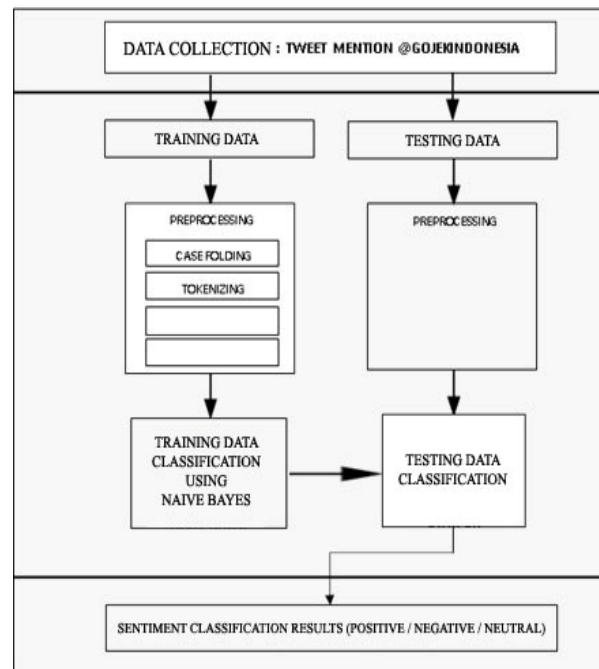
- a. **Cleansing:** This stage is the character elimination stage non alphabetic to reduce noise. Deleted characters punctuation marks such as periods (.), commas (,), question marks (?), and exclamation points (!), as well as symbols such as the '@' sign for username, hashtag (#), emoticon, and website address.
- b. **Case Folding:** Case folding is the stage for converting staged alphabetic characters cleanup to lowercase (lowercase).
- c. **Tokenizing:** This stage functions as a breaker sentence based on each word that composes it, that is called terms or tokens. Tokenizing is broken down by space.
- d. **Slang word Normalization or Conversion:**  
 This stage done so the words are shortened or extended into normal words according to the Big Dictionary Indonesian (KBBI). Cconversion is a process change non-standard words to standard words, this stage done with the help of a Tokenizing dictionary in words standard and check the word is in the dictionary slang or not. If the non-standard word is in dictionary, then the non-standard word is changed to the standard word is in the dictionary.
- e. **Filtering or Removing Stop words:** This stage is processing so that words that are not important or not meaningful are deleted

**4. Term weighting:**

This research utilizes Term Frequency-Inverse Document Frequency (TF-IDF), which is implemented using Rapid Miner tools which done with the operator Process Document from Data (extension of Text Processing). Term Frequency ( $tf(w,d)$ ) is considered to have a proportion of importance according to the total appearance in the text or document. Inverse Document Frequency (IDF) is a token weighting method that functions to monitor token occurrences in text sets. TF-IDF is a statistic to show the vitality of a word in a dataset or document [10]. Data that has gone through the pre-processing stage must be numeric form. TF-IDF is used to change data it becomes numeric. In the weight calculation using TF-IDF, the TF value per word is calculated first with the weight of each word is 1.  $IDF(word) = \frac{1}{\log(\frac{td}{df})}$  where  $td$  is the number all existing documents, and  $df$  is the number the word appears in all documents.

**Stages Study**

The stages of research in making this research can be seen in Figure 1 below:



**Figure 1. Research Stages**

**B. Population**

The population can be interpreted as a generalization area consisting of: objects/subjects that have certain qualities and characteristics determined by the researcher to be studied and then conclusions drawn [11]

Population as a whole group, people, events or things that are interesting for researchers to study [11].

So the population is not only people, but also objects and other natural objects. The population is also not just the amount that exists in the object/subject being studied, but includes all the characteristics/values possessed by the subject or object.

**C. Research Sample**

The sample is a number of examples from a population that has the same characteristics as the population and is directly the target of research [11].

The sample is defined as part or subset of the population consisting of selected members of the population [12]

If the writer wants to do research on a large population, while the writer wants to research about this population and the writer has limited funds, manpower, time and other conditions, then the writer determines the sample using a simple random sampling technique (Simple Random Sampling) taken from several Twitter respondents by calculating the number of samples using the Slovin method with an error tolerance of 0.1 (10%).[13]



**D. Research Instruments**

The research instrument is a tool used to measure observed natural and social phenomena [14]. In this study there are research instruments to obtain the data needed to support the research. In this study, the authors obtained data with secondary data, namely online transportation data from this study obtained from the general public's Tweets using a simple random sampling technique (Simple Random Sampling).

**E. Data Analysis Methods**

The analytical method used is the Naïve Bayes Classifier (NBC) which is a simple probability classifier that applies Bayes' Theorem with the assumption of high independence. The advantage of using NBC is that it is small to determine parameter estimates as an independent variable, so only the variance of a variable in a class is needed to determine the classification, not the entire covariance matrix.[15]

**RESULTS AND DISCUSSION**

**A. Research Results**

The data collection process was taken from the crawling process of the RapidMiner application using the Twitter search operator with the query "@GojekIndonesia". Then the data is stored in excel format. The training data used when testing the data was taken from Twitter. Data testing was carried out using public opinion reviews about Sentiment Analysis for Online Transportation Services. Then testing and training is carried out so that accuracy is obtained. The following describes in more detail the research results obtained. The results of this study indicate that with the method used the level of neutral sentiment from public tweets is greater than the level of positive sentiment and negative sentiment with an accuracy of 25.00%.

**B. Data Entry Process**

In the process of entering data taken from excel data in the form of training data and test data which contains words from the results of word weighting using Microsoft Excel. An overview of word data from excel files before being entered into Rapid Miner as training and test data can be seen in table 1.

**Table 1. Tweet Data From Twitter**

No	Tweet	Label/Class
1	Why do I rarely get GO-FOOD vouchers now?	Negative

No	Tweet	Label/Class
2	hello min, how come it's been 4 months since my go-jek account has never gotten any promo vouchers, has it been banned or what?	Neutral
3	hello, admin, how come I want to order Gofood, they say the server is busy all the time	Neutral
4	admin, my account has been blocked but emailed and called there is no solution, so what do you do? there is still gopay that can be used	Negative
5	admin, I'm asking for help, I ordered go food from half past 7 until now it hasn't arrived and the driver can't be contacted, I can't cancel.	Neutral
6	hi min! Today I ordered gofood with the Visa debit card payment method, when the order arrived "the server was full my order was canceled but my balance was drained according to the amount. Can you help min??	Neutral
7	already don't have this money Claim covid hurry up why disbursement account is turned off, money is not sent either	Negative
8	Just be fair, whoever claims first will be processed first. Don't get privileges, but many are given a long time. In the regulations it is clearly written that it applies to all drivers, there are no castes.	Negative
9	I want to log in, how come I can't?	Neutral
10	The voucher that was given to me can't be used. Please check your DM, min.	Positive
11	My account suddenly logs out on its own, I want to log in again but the verification link doesn't	Positive



No	Tweet	Label/Class
	appear in the SMS	
12	hello gojek I have been called 3 times by gojek, but I answered but only answered hello hello. Until I'm confused, what error does my cellphone have? Btw, why are you calling, min?	Positive
13	down.. the application on my cellphone can't be used at all..	Positive
14	Hawo, etmin here, right? There's a discount of 20k, but how come when you order, you pay 70k?	Positive
15	Recently, why is the driver so hard to contact, since yesterday I often get drivers who can't be contacted, I've been waiting 30 minutes and then they just cancelled. we customers have no other option cuma just waiting, please how is this	Negative
16	why my account is blocked and my balance is red? Even though it doesn't violate the gojek community / and doesn't commit any fraud	Negative
17	I have registered for goride through the gopartner application and I have registered as a goride partner... Waiting for verification, until when should I wait... Thank you	Neutral
18	hi sis, I want to ask if the gofood restaurant sent the wrong food and I want to claim the food that was ordered, how about it how do you do it?	Neutral
19	Gojek has a habit like this every time it's about to overdue, what do you do on purpose to get fined? It goes on like this, where are your engineers whose salaries are tens of millions? since March there has always been a bug like this, fix it asap	Neutral

No	Tweet	Label/Class
20	Before adding, it was difficult to find orders, let alone driver added	Neutral

### C. Manufacture Process

The next step is to create each process in RapidMiner which consists of training data, data testing or tests, retrieve trainer methods, naïve Bayes, apply models and performance. Data imported into Rapid Miner as training data can later be seen in Figure 2.

Row No.	Sentimen	Text
1	Negative	kenapa skarang jrang dpet voucher GO-FOOD sih
2	Neutral	halo min, kenapa ya udah 4 bulan ini akun gojek saya gapemah ...
3	Neutral	halo min kok saya mau pesen gofood diblangnya server busy te...
4	Negative	min akun saya kena block tapi diemail dan ditelfon gaada solusi...
5	Neutral	min minta tolong, saya pesen go food dari setengah 7 sampe s...
6	Neutral	hi mini! Hari ini saya pesen gofood dengan metode pembayaran ...
7	Negative	daah ga punya duit ini... Klaim covid cepetan napa cairannya... A...
8	Negative	adil ajalah . siapa yang klaim duluan ya di proses duluan. Janga...
9	Neutral	saya mau login kok gakbisa bisa ya??
10	Positive	voucher yang dikasih ke saya tidak bisa digunakan nih. Tolong c...
11	Positive	ini akunku tiba-tiba ke logout sendiri, mau login lagi tapi link verif...
12	Positive	halo gojek saya udah 3 kali nih ditelepon sama gojek, tapi saya j...
13	Positive	down.. aplikasi di hape gw gabisa dipake sama sekali..
14	Positive	hawo etmin disini kan ket nya diskon 20k ya tp kok pas order ttp ...
15	Negative	ini belakangan ini drivernya kenapa susah bgt dihubungin ya, da...
16	Negative	kenapa akun saya teblokir dan saldo saya merah? Padahal tida...
17	Neutral	saya sudah daftar goride melalui aplikasi gopartner dan saya su...
18	Neutral	hai kak mau tanya kalau resto gofood salah kirim makanan dan ...
19	Neutral	Gojek kebiasaan bgt begini tiap udah mau overdue, sengaja bia...
20	Neutral	Sebelum ditambah aja susah nyari orderan ka, apalagi driverny...

Figure 2. Upload training data in .CSV format

Data imported into Rapid Miner as testing data can be seen in Figure 3.

Row No.	Sentimen Manual	Text
1	Negative	tolong tanggapi email saya dengan nomor tiket 72654451. S...
2	Neutral	kak saya mau hapus akun gojek yang ternyata nomor telpon ...
3	Positive	kapan keluarin voucher 75% lg? i need that
4	Negative	ini knp abangnya marah marah pls aku gaterima ya diginiin
5	Positive	hai min mau tanya tentang pergantian rekening buat gofood ...
6	Positive	ada lowongan driver dgn sepeda?
7	Positive	voucher gofood nya dibanyakin dong min, masa punyaku vou...
8	Positive	bagaimana cara menghapus akun gojek yang sudah tidak di...
9	Negative	haloo tadi aku pesen gofood tapi pesenannya gak lengkap u...
10	Negative	min tolong dong ini saya kirim pengaduan saya tentang Go F...
11	Positive	min mau tanya, kalo pesen gobox tuh sama kaya kalau pese...
12	Neutral	minn knp yaa top up GO-PAY di alfamart katanya akun aku ga...
13	Negative	halo selain via twitter kalo mau tanya" soal gojek kemana la...
14	Negative	top up aku kok ga masuk ya dari m bangking aku sendiri? pa...
15	Positive	Tolong ni ya buat gojek masa yang jauh2 bisa kecantol gini? ...
16	Negative	kenapa ga bisa di pake ya promo nya?? padahal udah menc...
17	Neutral	Halo, saya mau tanya ini kenapa gini terus ya kl lagi order? J...
18	Negative	saya sdh bayar bpjs tgl 24 Juni selama 3 bulan . Saldo terpot...
19	Neutral	kok promo pengguna baru gojek tokopedia gabisa sih
20	Neutral	kok akunku jarang dapet promo sih min?padahal aku sering ...

Figure 3 Upload Testing Data in .CSV Format



After the data import vector process is complete, then carry out the process flow design process and input other processes such as the retrieve trainer method, naïve Bayes, apply model and performance. The following method can be seen in Figure 4.

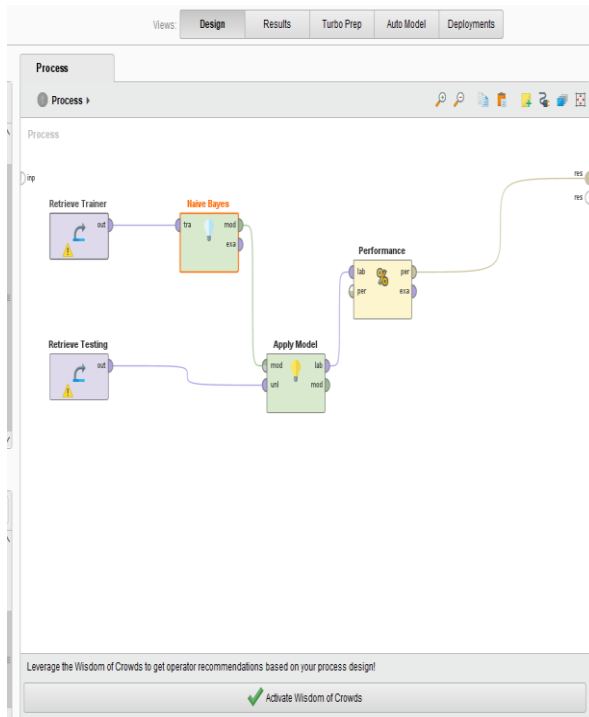


Figure 4 Adding Naïve Bayes Design, Apply Model and Performance

In figure 4 explain the training data used is 20 After pre-processing the training data remains at 20, the next stage is the classification of sentiment analysis. This stage is the stage to provide training and implement various machine learning algorithms. Figure 4 shows the contents of the "Cross Validation" operator in a RapidMiner application. In this process, two classification operators "Naive Bayes" are used After the experiment and the proposed model are created, then experiments are carried out by testing existing models with grouped datasets that become training data and testing data. The "Performance" operator is an operator for displaying accuracy, precision and recall results.

**D. Rapid Miner Analysis Results**

After processing the Rapid Miner, we get data that has been tested by the methods in Rapid Miner. The display of the analysis results can be seen in Figure 5 below.

Row No.	Sentimen Manual	prediction(Sentimen)	confidence	confidence	confidence	Test
1	Negative	Neutral	0.331	0.348	0.321	tolong tanggapi email saya dengan nomor tlp 72954451...
2	Neutral	Neutral	0.331	0.348	0.321	kak saya mau hapus akun gojek yang ternyata nomor telpe...
3	Positive	Neutral	0.331	0.348	0.321	kapan kelain voucher 75% lg? i need that
4	Negative	Neutral	0.331	0.348	0.321	ini top abangnya marah marah pis alu galemnya ya diginin
5	Positive	Neutral	0.331	0.348	0.321	hai min mau tanya tentang pergantian rekening bank gofo...
6	Positive	Neutral	0.331	0.348	0.321	ada lowongan diwv dgs sapa?da?
7	Positive	Neutral	0.331	0.348	0.321	voucher gofood nya doayakin dong min, masa pnyaku vs...
8	Positive	Neutral	0.331	0.348	0.321	bagaimana cara menghapus akun gojek yang sudah tidak...
9	Negative	Neutral	0.331	0.348	0.321	haloo tadi aku pesen gofood tapi pesannya gak lengkap...
10	Negative	Neutral	0.331	0.348	0.321	min tolong dong ini saya ingin pengaduan saya tentang Go...
11	Positive	Neutral	0.331	0.348	0.321	min mau tanya, kalo pesen goobun tuh sama kaya kalau pes...
12	Neutral	Neutral	0.331	0.348	0.321	min tolong yaa tolong GO-PIV di alamat kapan aku aka...
13	Negative	Neutral	0.331	0.348	0.321	halo selain via better kalo mau nanya "sual gojek kemana l...
14	Negative	Neutral	0.331	0.348	0.321	top up alu koi ga masuk ya dari m banyang alu sendiri? p...
15	Positive	Neutral	0.331	0.348	0.321	Tolong ni ya buat gojek masa yang jauh2 bisa kecabul gini...
16	Negative	Neutral	0.331	0.348	0.321	kenapa ga bisa di palne ya promo nya? padahal udah men...
17	Neutral	Neutral	0.331	0.348	0.321	halo, saya mau tanya ini kenapa gini lms ya kl lagi order?...
18	Negative	Neutral	0.331	0.348	0.321	saya sdh bayar tops lg 24 Juni selama 3 bulan. Sdhr ter...
19	Neutral	Neutral	0.331	0.348	0.321	kok promo pengguna baru gojek kokpeda gabisa sih...
20	Neutral	Neutral	0.331	0.348	0.321	kok akunku jarang dapat promo sih min?padahal aku sen...

Figure 5. Display of Data Analysis Results

The Rapid Miner can also see the performance results from the naïve Bayes calculations, so the performance results obtained from the Naïve Bayes analysis results are 100% Neutral, as can be seen in Figure 6 below.

	true Negative	true Neutral	true Positive	class precision
pred Negative	0	0	0	0.00%
pred Neutral	0	5	7	25.00%
pred Positive	0	0	0	0.00%
class recall	0.00%	100.00%	0.00%	

Figure 6. Accuracy Result Display

**CONCLUSION**

Based on the results of research and discussion carried out starting from the design stage to testing, it can be concluded that the results of the analysis using Rapid Miner for the Pred.Negative class get True Negative results, namely 0, True Neutral, namely 0, True Positive, namely 0 and results from class precision, namely 0.00%. the results of the analysis using the Rapid Miner for the Pred.Neutral class get True Negative results, namely 0, True Neutral, namely 5, True Positive, namely 7 and the results of the precision class, namely 25.00%, the results of the analysis using Rapid Miner for the Pred.Positive class get True Negative results,

namely 0, True Neutral, namely 0, True Positive, namely 0 and the results of class precision, namely 0.00%, and the results of analysis using Rapid Miner for class recall get True Negative results, namely 0.00%, True Neutral, namely 100.00%, True Positive, namely 0.00%. So sentiment analysis on Gojek online transportation is more neutral by Twitter users than positive or negative values.

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