# Measuring information credibility in social media using combination of user profile and message content dimensions

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Article Info	ABSTRACT					
<i>Article history:</i> Received Mar 19, 2019 Revised Feb 3, 2020 Accepted Feb 12, 2020	Information credibility in social media is becoming the most important part of information sharing in the society. The literatures have shown that there is no labeling information credibility based on user competencies and their posted topics. This paper increases the information credibility by adding new 17 features for Twitter and 49 features for Facebook. In the first step, we parfer a labeling process based on user competencies and their posted topic					
Keywords:	to classify the users into two groups, credible and not credible users, regarding their posted topics. These approaches are evaluated over ten					
Facebook	thousand samples of real-field data obtained from Twitter and Facebook					
Information credibility	networks using classification of Naive Bayes (NB), Support Vector Machine					
Social media	(SVM), Logistic Regression (Logit) and J48 Algorithm (J48). With the proposed new features the credibility of information provided in social					
Iwitter	media is increasing significantly indicated by better accuracy compared to the existing technique for all classifiers.					
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# 1. INTRODUCTION

It cannot be denied that the popularity of social media has increased rapidly in recent years. Currently, about 320 million users monthly are active on the micro-blogging site, Twitter. Twitter is a global phenomenon, where 77% of Twitter accounts are outside of the United States and Twitter supports 33 languages. Because of the efficiency, volume, and timeliness of information, Online Social Networking (OSN), for example, twitter.com, has become an important source of information [1]. According to the Twitter blog, about an average of 340 million tweets are generated per day as of March 2012. In addition to receiving information from the people they "follow", people are increasingly looking for relevant topical tweets, which is more than 1.6 billion requests for Twitter search portals per day.

In particular, learning about news is often an important motivation for people to read tweets [2], for example, in order to continuously update information about local emergencies [3]. One of the OSN functions is to become a medium of sharing and searching for information [4, 5]. Each user can act as a source and spreader to the information, either forwarded in full or with modifications and additions. The role of OSN as a source of information is even more prominent in emergencies such as in particular accidents, natural disasters and incidents of terrorism because it provides a faster report than conventional media [6-14].

However, false information that spreads on social media has serious consequences. Thus, a mechanism to automatically determine the credibility of the tweet is required. Morris et al conducted a survey to understand the perceptions of user credibility on Twitter [3]. Morris et al also conducted an experiment with the purpose of uncovering user-based or content-based features used to assess the credibility. Consequently, user-based features can be grouped into three categories: influence, topical

expertise, and reputation. The influence feature includes the number of followers, retweet, and mention. While the topical expertise feature is obtained by searching through the author's homepage, the author's imaging history, outside the web page that discusses the topic the author is conveying, and the author is in a location that is relevant to the topic. The reputation-based feature helps to show the user's familiarity with the Twitter author.

This feature includes the case, either the author is followed by the user, or the author is someone that the user has heard before, or the author's account has been verified by Twitter. The content-based feature that reveals most of the credibility of tweets is if the tweet contains a reputable URL link, some tweets made the same claim as the intended tweet, it uses standard grammar, or it uses its own profile photo image or images related to the topics they are interested in and the structure of the author's username.

A study to analyze how online social media users rated the credibility of tweets has been conducted by Shariff [15]. In this study, 98 evaluators have been empowered to assess the credibility level of 400 tweets that have been used. Shariff reveals that the topic involving politics has a number of tweets with low credibility. In addition, tweets that do not have links, such as URLs, are often difficult for users to recognize. In addition, one of the earliest works that automatically predicted the credibility of the news and tweets has been conducted by Castillo [16]. This work applied two stages of data collection. First, label and save the tweets that are considered newsworthy. Second, use 7 evaluators to label newsworthy tweets with credibility values. To get this annotation, Castillo used Amazon Mechanical Turk and labeled the tweets based on new feasibility and credibility.

Furthermore, the use of SVM ratings and Pseudo-Relevance Feedback (PRF) to rank the credibility of tweets has been done by Gupta [17]. Gupta categorizes its features into two: content-based features or source-based features. The results of the study show that manual labeling has been carried out for the level of credibility related to tweets that propagate fake images of the hurricane Sandy but have not involved the competency of the source/user who spread the tweet. Some key observations about the tweet features which correlate with credibility have been created. The tweets with a large number of unique characters and contain URLs tend to be more trusted.

The latest research was conducted by Ross in 2016 with an aimed at creating and selecting a range of features that would produce a better performance when training and testing data sets originating from two different years with different topics. The data used in this study is the data used by Gupta in two different studies that have been manually labeled namely [18, 19].

Facebook has more challenges in term of information credibility compared to Twitter. Therefore, the research on the information credibility on Facebook is rarely conducted and one of the research was conducted by Saikaew in 2015. The reasons that make Facebook is more challenging because, first, the convenience in accessing Twitter content through Twitter API. Although Facebook has a Graph API with the ability to access content, the access to the information is also limited through the Graph API itself. Second, Facebook has more active users than Twitter. In September 2017, about 2,061 billion users are active in Facebook, while 328 million users are active in Twitter [20]. While Indonesia is ranked second, which is 48%, as the country with the most active social media users. Finally, compared to Twitter, Facebook has richer features, such as features that allow users to simply click and comment easily.

Several researches discussed the credibility of information on popular social networking sites, such as Twitter. However, Saikaew's research is the only research that focuses on calculating the value of information credibility on Facebook that has more users. Saikaew only uses 8 features [21], however we use 54 features to increase accurate of credibility measurement. The labeling is made manually then the rating is updated systemically by the user who can access the application. However, in Saikaew, the user's competence is still not being viewed. Furthermore, this paper applies a different approach, i.e., labeling information credibility based and introduce 17 new features for Twitter and 49 new features for Facebook. Meanwhile, for the feature dimensions, we use two feature dimensions consisting of user profile and message content dimension.

Our contributions are summarized as follows:

- a. The paper introduces new 17 features for Twitter and 49 features for Facebook to increase information credibility
- b. We present a labelling process to classify the users into two groups, credible and not credible user groups, depending their posted topics.

The finding in this paper is expected to help organizations and the practitioners to make better decisions, because accurate credibility is achievable due to large number of features. Furthermore, the organizations and the practitioners are informed with the updated topic due to automatically tool.

# 2. RESEARCH METHOD

The Proposed Information Credibility Model is shown in Figure 1. Dataset are divided into two, i.e., training data and testing data, where training data are labeled manually, and while testing data are pre-processed, including their feature extraction. The result of the feature extraction for training data come into the feature selection process and then move to the credibility classification modeling process and then the modeling result is used to predict the testing data. Finally, the Twitter credibility class with good accuracy is expected to be gained.



Figure 1. The proposed information credibility model

#### 2.1. Labeling

Labeling is applied based on the compatibility of user competencies and tweet or message. In this paper, we consider of concept stating that posted tweets with a tweet topic correlated to competence of the posting account is a measure to be credible rather than posted tweets with a tweet topic uncorrelated to competence of the posting account. This concept builds a higher probability of posted tweet is credible or not. We also define tweet is message posted in twitter and message is message posted in Facebook. We perform labeling manually for tweet and message categories, while for user competencies, we perform a real survey. The objective of survey is to collect information of user competencies. We made an online survey through the website www.surveymonkey.com in January - March 2017. Respondents were asked questions about their opinion of 256 famous people with each corresponding competence. Information displayed in the survey includes photos, bio profiles, five tweets and five messages having the highest engagement, number of followers, number of tweets, and number of following. The survey has been conducted on 188 respondents, 137 men and 51 women. Where the job distribution is shown in Figure 2. The percentage of four large respondents are 28.19% from private employees, 27.13% for lecturers, 19.15% for students, and 15.43% for self-employed.

Respondent distribution based on education is shown in Figure 3. The largest component of the respondents is 98 respondents (52%) from Bachelor degree, 62 respondents (33%) from Master degree, 13 respondents (7%) from Senior High School level, 4 respondents (2%) from 3-year Diploma, and 1 respondent from pharmacist education. The way to determine whether the user is competent or not is by calculating the highest number of opinion given by the respondent to the provided 256 famous people. The survey is conducted to obtain competencies from 256 famous people, including 115 famous people which the data are taken from Twitter. Competence sample data of 10 people is shown in Table 1.









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rable r.	Dample	01 10	ramous	people v	competencies

No	Name	Competence 1	Competence 2	Competence 3	Competence 4
1	Abdullah Gymnastiar	religious	motivational	social	education
2	Aburizal Bakrie	political	governmental	economic	social
3	Acha Septriasa	entertainment	social	general	advertising
4	Addie MS	entertainment	cultural	social	general
5	Ade Komarudin	political	governmental	social	general
6	Adhicipta R. Wirawan	general	political	financial	economic
7	Adhie M Massardi	political	general	governmental	social
8	Adhyaksa Dault	political	governmental	sport	social
9	Adi Amran Sulaiman	social	political	governmental	general
10	Adib Hidayat	general	entertainment	social	journalism

Two credibility labels are used in this study, i.e., "credible" and "not credible". We define that information is considered as credible when the famous people posts tweet or message appropriate to their competencies. On the other hand, when the tweet or message are posted out of the famous people competencies, the information is considered as not credible. The process is shown in Figure 4



Figure 4. A labelling information credibility process by combining competence corpus and tweet topic

Data resulted from labeling are shown as follows:

a. Twitter social Media

The distribution of information credibility labeling for Twitter social media is shown in Table 2.

%

64.12

35.88

b. Facebook social media

The distribution of information credibility labeling for Facebook social media is shown in Table 3.

Total

Table 2.	Information	credibility	distribution
	in T	witter	

Number

12439

6962

19401

Table 3. Infor	mation credibility	y distribution
	in Facebook	
Class	Number	%
Credible	15677	66.74
Not Credible	7812	33.26

23489

#### 2.2. Pre-processing

Class

Total

Credible

Not Credible

By assuming text input from the original tweet (Twitter) or post message (Facebook) content, preprocessing consists of case folding, tokenization, stop-word removal, and stemming. Case Folding is the process by which words or phrases in a text tweet or post message will be converted into lowercase letters (a to z). This is expected to solve problems when words are written in different letters. Tokenization is applied to cut the input of a tweet or post message from its composing words. In principle, separate each word in the text tweet or post message. This process includes deleting numbers, punctuation, and characters other than alphabetical letters. These characters are considered as word separators so they will be removed to prevent "noise" in further processes. Meanwhile, stop-word removal removes non-topical words that are not considered important such as: "and", "this', "that", "is", "or", "which", "through", and so on. This pre-processing helps reduce irrelevant features in the data. Finally, stemming is the process of finding root words by removing prefixes, infixes, suffixes, and confixes (combination of prefixes and suffixes) in derivative words. By originating, variations in words that have the same root will be considered the same way (feature). It helps improve retrieval performance on Information Retrieval.

# 2.3. Feature extraction

This section elaborates the feature extraction on Twitter and Facebook. The feature distribution, in both Twitter and Facebook, is attached, while the user profile dimension feature and message content dimension feature are also presented.

# 2.3.1. Features used on twitter

This paper uses two dimensions of features, namely the user profile dimension and message content dimensions. The most popular old features used by previous works have also been summarized in this study. In total, 33 features obtained from 5 different papers are discussed in this paper. The collection of features from works using classifiers is performed to predict credibility [3, 15, 16, 22, 18]. Furthermore, 17 new features are proposed in Table 4 indicated by underlined bold features.

No	Feature	Castillo (2011)	Morris (2012)	Gupta (2014)	Syariff (2014)	Ross (2016)	The Proposed
1	display_name		· · ·		V		v
2	age_account_day	V		V			V
3	check_web_institution						V
4	has_bio	V	V			V	V
5	words_desc						V
6	<pre>#positive_desc</pre>						V
7	<pre>#negative_desc</pre>						V
8	<u>#sentiment_desc</u>						V
9	numPosWordDesc						V
10	numNegWordDesc						V
11	Check_personal_web						V
12	Check_location						V
13	is_verified	V	V	V		V	V
14	number_follower	V	V	V		V	V
15	number_statuses	V	V	V		V	V
16	number_following	V	V			V	V
17	<u>NumFollowingNumFollower</u>						V
18	<u>#likes_user</u>						V
19	<u>NumLikesNumFollower</u>						V
20	length_tweet	V		V		V	V
21	#words_tweet	V		V		V	V
22	#stock_char			V		V	
23	hasStockChar					V	
24	#colon_char			v		v	
25	hasColonChar					v	
26	#char			v			v
27	NumCharPanjangTweet	V				V	V
28	NumCharNumKata	V				V	V
29	#mention	V	V	V	V	V	V
30	#hashtag	V	V	V	V	V	V
31	#url	V	V	V	V	V	V
32	#emot_happy	V		V			V
33	has_happy					V	V
34	#emot_sad	V		V			V
35	has_sad					v	V
36	<u>check_spam</u>						V
37	source						V
38	is_url	V	**	V	V	V	V
39	is_mention	V	V		V		V
40	is_hashtag	V	V	<b>X</b> 7	V	¥.7	V
41	is_retweet	v	v	v	v	v	V
42	#like_tweet	N/	N	X7	N/	17	V
45	retweet_counted	V	v	V	v	V	V
44	#pos_tweet	v		V		V	V
45	#neg_tweet	v		v		v	V
40	ratioPosiNum I weet						V
4/	rauoineginum i weet					V	V V
48	#senumen_tweet					v	V
49	senument tweet					v	v

Table 4. Feature distribution used in Twitter

Measuring information credibility in social media using combination of user profile ... (Erwin B. Setiawan)

From 49 available features, only bout 45 features are used. Besides, its dimensions are divided into two dimensions, namely 19 features of the user profile dimension and 26 features of the message content dimension. The most widely used tweets feature for measuring credibility in tweets are retweeting, tweet length, number of words, number of mentions, number of hashtags, number of URLs, tweets having URLs, number of retweets, having happy emoticons, having sad emoticons, and value sentiments [22]. The description of each of the 45 features is shown in Tables 5 and 6.

Table 5. User profile dimension feature on Twitter

No	Feature	Description	New Feature
1	display_name	Whether the display name use the real name of the account owner or not. This is closely related to the	No
		level of trust.	
2	age_account_day	In this feature, the age of the user's account can be seen. The longer the age of someone's account the	No
		higher the level of trust	
3	check_web_institution	Having a URL that connects to the original website of the user's institution and it can be used to see the	Yes
		credibility	
4	has_bio	If there is a description of the user's authenticity in the profile, then it can be a basis for assessing the	No
		user's credibility.	
5	words_desc	The number of words which gives an explanation of whether the user explains the bio profile. A detailed	Yes
		explanation will make it easier for us to assess a person's credibility	
6	<pre>#positive_desc</pre>	The number of positive sentiment words from an account's bio profile	Yes
7	#negative_desc	The number of negative sentiment words from an account's bio profile	Yes
8	#sentiment_desc	Number of sentiments from an account's bio profile	Yes
9	numPosWordDesc	The ratio of the sentiments number is positive towards the number of words in an account's bio profile.	Yes
		The value of the ratio is bigger equal to the value of the account's credibility.	
10	numNegWordDesc	The ratio of the sentiments number is negative towards the number of words in an account's bio profile.	Yes
		The value of the ratio is getting smaller compared to the value of the account's credibility.	
11	check_web_personal	Having a URL that connects to the user's original website and it can be used to see the credibility.	Yes
12	check_location	Having a location in the description can guarantee the authenticity of the user's original area.	Yes
13	is_verified	A verified account is an official account that has been authenticated by Twitter.	No
14	number_follower	The number of followers can help to find out how many other users want to see/follow the trail of	No
		information from the user. The number of followers can become an indication of the user's information	
		credibility level, the more followers the higher the level of trust.	
15	number_statuses	The number of statuses can inform the level of user's activity in using Twitter. Users who do more	No
		activities will have more credibility.	
16	number_following	From the number of Following, it can be seen that the user has many friends who might be giving more	No
		sources of information. The number of Following shows many sources of information.	
17	numFollowingNumFollower	The ratio of Following to the number of Followers of an account	Yes
18	#likes_user	The number of likes can show how active the user is in using Twitter. The number of likes can also	Yes
		indicate the number of truths of tweets that are liked by users.	
19	numLikesNumFollower	The ratio of the number of Like to the number of an account's followers.	Yes

#### Table 6. Message content dimension feature on Twitter

No	Feature	Description	New Feature
1	length tweat	Description	No
1	lengui_iweei	Ing existence of which length of characters of words that could explain whether the user gives a short of long message to influence the percention of others	INO
2	#words_tweet	Which of the number of works that could explain whether the user gives a short or long message to	No
2	#words_tweet	which of the number of words that could explain whether the user gives a short of long message to influence the number of others	140
3	#char	Number of character in a tweet	No
1	numCharl engthTweet	The ratio of the number of characters compared to the length of a tweet	No
5	numCharNumWords	The ratio of the number of characters compared to the number of words from a tweet	No
6	#mention	The number of mention from a tweet	No
7	#hashtag	The number of <i>hashing</i> from a tweet By clicking the #Hashing in Twitter, the same information with the	No
/	masntag	same hashing will appear so that people will be assisted to find the information uniformity to digest the	110
		same nashag win appear so that people win be assisted to find the information unformity to digest the truth of the information with data and clear history.	
8	#url	The number of IRL in a tweet	No
9	#emot happy	The number of barny emotions	No
10	has happy	The existence of emotion that contains hanny expression	No
11	#emot sad	The number of sademotions	No
12	has sad	The existence of emotion that contains sad expression	No
13	check spam	To see whether a tweet has some works listed in span	Yes
14	Source	The means used to share a tweet can be divided into two via a smartphone or PC Client	Yes
15	is url	A tweet with URL helps deliver more information so it can provide trust by giving the tweet source. The	No
15	is_uii	more in number of LIRLs given in a tweet the more credible the information is	110
16	is mention	Tweet contains Mention it means where its source was taken from someone else to provide better source	No
10	is_mention	certainty. The mention can indicate where its the mentioned user mentioned provides evidence of the news	110
		authenticity for example, the user included photos of the evidence	
17	is hashtag	The existence of $\#hashtaa$ below the ensure and view the news history in order to be able to seek information	No
17	is_nashag	credibility. By clicking the #Hashtag in Twitter the same information with the same hashtag will annear so	110
		that people will be assisted to find the information uniformity to digest the truth of the information with	
		detail and clear history	
18	is retweet	To know whether the tweet is posted by themselves or reposted (re-tweet) from others.	No
19	#like tweet	The number of users' likes to a tweet	Yes
20	retweet counted	The number of users who re-tweet a tweet.	No
21	#pos tweet	The number of positive sentiments words from a tweet.	No
22	#neg_tweet	The number of negative sentiments words from a tweet.	No
23	ratioPosNumTweet	The ratio of the number of positive sentiments to the number of words in a tweet. The value of the ratio is	Yes
		bigger equal to the value of the account's credibility.	
24	ratioNegNumTweet	The ratio of the number of negative sentiments to the number of words in a tweet. The value of the ratio is	Yes
	6	getting smaller equal to the value of the account's credibility.	
25	#sentiment_tweet	The number of sentiments from a tweet's bio profile.	No
26	sentiment tweet	The existence of positive, neutral, and negative sentiments to select the information that its credibility level	No
		is going to be seen. The positive sentiments are usually describing more credible information.	

# **2.3.2. Features used in facebook**

This paper successfully develops Facebook API application with 54 features (8 user profile dimension features, 46 message content features). Besides, 49 new features have been added from previous research [21]. Table 7 shows the user's dimension features in Facebook, while Table 8 shows the message content dimension features in Facebook.

Table 7	User 1	profile	dimension	features	in	Facebook
I uoic /.	0.001		unionon	reatures		I UCCOOK

No	Feature	Description	New Feature
1	check_bio	The authenticity description in the user's profile can become a basis to know the user's credibility.	Yes
2	#word_bio	The number of words in describing the user's profile (bio profile). A detailed description can make it easier to	Yes
		know someone's credibility.	
3	length_bio	The length of character and words that explain whether the user gives a short or long message that could	Yes
		influence someone's perception.	
4	<pre>#positive_desc</pre>	The number of positive sentiment words in an account bio profile	Yes
5	#negative_desc	The number of negative sentiment words in an account bio profile	Yes
6	sentiment_desc	The existence of positive, neutral, and negative sentiments to select the information that its credibility level is	Yes
		going to be seen. The positive sentiments are usually describing more credible information.	
7	#url_institution	Having a URL that connects to the original website of the user's institution and it can be used to see the	Yes
		credibility	
8	engagement_count	The number of engagement shows the number of other users who want to see/follow the user's trail of	Yes
		information. The number of engagement can become an indication of the user's information credibility level.	
		The more engagement the higher the trust.	

### Table 8. Message content features in Facebook

1     pype     The cansification of pots message types (photo, link, status, note, video, event)     Yes       3     kickar     The number of Lanacter in a pots message     Yes       4     ratioCharlenghWord/bw     The ratio of the character number compared to the length of a pots message     Yes       5     ratioCharlenghWord/bw     The ratio of the character number compared to the number of words in a pots message     Yes       6     main     The number of the bashing in a post message. We (chicking the flashing in in post message)     Yes       7     Bandard     The custeme of endotion that custains happy endoties the hands in in post message. We (chicking the flashing in post message)     Yes       8     Remot, happy     The custeme of endotion that custains happy engression     Yes       10     fermot, sad     The custeme of endotion that custains happy engression     Yes       11     hand, main     The custeme of endotion that custains happy engression     Yes       12     ewood     To be evektered hep post message custain she webs the user gives a short or long     Yes       13     lengh_message     To be evektered endotion that custain she webs the due go the post message to influence the processage to influence t	No	Feature	Description	New Feature
2         field post         The number of URL in a post message         No           4         ratioCharLenghWordPost         The ratio of character in post message         Yes           6         #promition         The ratio of the character number compared to the length of a post message         Yes           6         #promition         The number of the balaug in a post message         Yes           7         #promition         The number of the balaug in a post message         Yes           8         #monthang         The number of the balaug in a post message         Yes           9         has_lang         The number of happy enotions         Yes           9         has_lang         The number of happy enotions         Yes           10         #mont_gad         The number of ada concions         Yes           11         has_sad         The number of outsits sad expression         Yes           12         #word         Which of the number of outsits         Yes           13         length_message         Which of the number of outsits         Yes           14         check_symm         The character part of the character and word that could explain whether the user gives a short or long         Yes           15         check_symm         The outsite of ada concicons         Yes </td <td>1</td> <td>type</td> <td>The classification of post message types (photo, link, status, note, video, event)</td> <td>Yes</td>	1	type	The classification of post message types (photo, link, status, note, video, event)	Yes
3     #char     The number of character in a post message     Yes       5     matic/LangtuWordPort     The ratio of the character number compared to the length of a post message     Yes       6     #materina     The number of mention in a post message     Yes       7     #materina     The number of the hashing will appeat so that popt message     Yes       8     #more_langty     The number of the hashing will appeat so that popt will be assisted to find the information unformity to diget the truth of the information with detail and clear listory.     Yes       8     #more_langty     The cumber of emotion in a post message     Yes       9     hes.angty     The cicculter of emotion than contains sad expression     Yes       10     fenner_sad     The existence of emotion than contains sad expression     Yes       11     has_ad     The existence of emotion than contains and expression     Yes       12     #scord     The existence of emotion of the character and word that could explain whether the user gives a short or long message to infulne cumber presence or absec of the full picture in a post message     Yes       13     length_message     To existence age carcer. The more in any or the sci given in a post message more information so it can provide trust by giving in a post message exord. The more in annohor of ULS given in a post message more in certainty to the post message exord. The more in a mather of days based on the age of the post message in the number of days based on the age of the post	2	#url_post	The number of URL in a post message	No
4ratioCharLenghtWorlPoot methodThe ratio of the character number compared to the number of works in post messageYes6mennionThe number of mention in a post messageYes7MushingThe number of mention in a post messageYes8mennionThe number of the shalks in a post messageYes8mennionThe number of mention in a post messageYes8mennionThe number of happy enotionsYes9hashingThe existence of enotion that contains happy expressionYes10hernot_sadThe mumber of sade enoticonsYes11has-sadThe existence of enotion that contains sade spressionYes12weordWhich of the length of the character and word han could explain whether the user gives a short or long message to fillacence the preception of others.Yes13length_messageTo see whether the post messageYes14check_fordTo be existence and word han could explain whether the user gives a short or long message to influence the preception of others.Yes15check_fordTo be existence and word han could explain whether the user gives a short or long messageYes16eheck_fordTo be existence and word han could explain whether the user gives a short or long messageYes16eheck_fordTo be existence and word han could explain whether the user gives a short or long messageYes17post_methingsThe mumber of use inflame or divers words in a post messageYes18ikee,count,ho	3	#char	The number of character in a post message	Yes
5         matchChaNumWend         The runber of menton in a post message         Yes           7         Bashing         The number of menton in a post message. By clicking the #hashing in Twitter, the same information         No           8         #ennot_bappy         The number of the hashing will appear so that pools will be assisted to find the information uniformity or diges the truth of the information with detail and clear history.         Yes           9         has_happy         The existence of ennotion that contains happy expression         Yes           10         #ennot_bapp         The number of words that could explain whether the user gives a short or long message to influence the preception of others.         Yes           13         length_message         Wich of the number of words that could explain whether the user gives a short or long message to influence the preception of others.         Yes           14         check_span         To exclus the presence or absence or of the full picture in a post message in the provide intis soid approvide intis dot approvide intis by giving in a post message in the preception of others.         Yes           15         check_span         To exclus the presence or absence or of the full picture in a post message in the more of days is based on the past provide intis by giving in a post message in the preception of others.           16         init, domain         The presence of a post message in the mumber of days is based on the gost of the post message in the post message in the mumber of days based on	4	ratioCharLenghtWordPost	The ratio of the character number compared to the length of a post message	Yes
6         #mention         The number of mention in a post message         1         Yes           7         #hashing         The number of mention in a post message         Yes         Yes           8         #ecnot_happy         The number of happy emoticons         Yes           9         has_happy         The number of adopt ventions         Yes           10         #ecnot_sad         The number of adopt ventions         Yes           11         hag_sad         The existence of emotion that contains sad expression         Yes           12         #word         The cumber of social social social social explain whether the user gives a short or long         Yes           13         length_message         To see whether the port ressage contains the words included in the sopan list         Yes           14         check_full_picture         To obeck the presenge contains the words included in the sopan list         Yes           15         check_full_picture         To beck the presenge contains the words included in the sopan list         Yes           16         link_domain         The greenee of a post message with URL helps telver more information on ic rearbity to the correlist in the sopan list         Yes           17         post_published         The age of a post message with URL helps telver more information and ic apost message         Yes	5	ratioCharNumWord	The ratio of the character number compared to the number of words in a post message	Yes
7     #hashing     The number of the hashing in a post message. By clicking the #hashing in Twinthe is number of happy enotions     No       8     #eno_Lappy     The number of happy enotions     Yes       9     has_Lappy     The existence of enotioon that contains happy expression     Yes       10     #enot_sald     The number of sale enotioons     Yes       11     has_sad     The existence of enotioon that contains happy expression     Yes       12     #sord     The number of sale enotioons     Yes       13     length_message     Which of the number of words that could explain whether the user gives a short or long message to influence the perception of others.     Yes       14     check_span     To see whether the post message contains the words included in the span list     Yes       15     check_span     To see whether the post message with URL helps whether most message to incluse the perception of others.     Yes       16     link_domain     The number of like count for a post message     No       18     likes_count_hor     The number of post message to incluse the number of days based on when the last post message was taken     Yes       18     likes_count_hor     The number of count for a post message     No       19     likes_count_hor     The number of count for a post message     No       20     comments_count_hor     The number of count for	6	#mention	The number of mention in a post message	Yes
with the same hashing will appear so that people will be assisted to find the information uniformity to digest the truth of the information with detail and carh history.         Yes           8         #etmot_happy         The number of happy emotions         Yes           10         femot_sad         The number of adapty expression         Yes           11         has_sad         The existence of emotion that contains hapy expression         Yes           12         #word         Which of the number of words that could explain whether the user gives a short or long message to influence the perception of others.         Yes           13         length_message         Which of the length of the character and word that could explain whether the user gives a short or long message to influence the perception of others.         Yes           14         check_span         To exe whether the post message contains the words included in the span list         Yes           15         length_message         To exe whether the post message on the number of Uks give in a post message the more in carbinity to the contains and post message in the number of dives is based on when the last post message to more in contains of UKs give in a post message to more in carbinity of the post message on the number of dives based on the age of the post message is the number of dives based on the age of the post message is come. The meanter of comments in a post message in the number of dives based on the age of the post message is come. The number of source post message in the number of dives based on the age of the post message is come. The number of	7	#hashtag	The number of the hashtag in a post message. By clicking the #hashtag in Twitter, the same information	No
adjest the truth of the information with detail and clear history.         Yes           9         has, happy         The existence of emotion that contains happy expression         Yes           9         has, happy         The existence of emotion that contains happy expression         Yes           11         has, sad         The existence of emotion that contains and expression         Yes           12         #word         Which of the number of words that could explain whether the user gives a short or long message to influence the perception of others.         Yes           13         length_message         Which of the length of the character and word that could explain whether the user gives a short or long message to the perception of others.         Yes           14         check_span         To see whether the post message with URL heigh early beliver more informations oit can provide trust by giving the post message with URL heigh with shard on when the last post message was taken         Yes           15         link_comain         The gene transce on a post message in the number of dig vis based on when the last post message was taken         No           16         link_comain.         The member of like count for a post message in the number of digs based on the age of the post message vis         No           17         post_publiched         The sign of a post message in the number of digs based on the age of the post message vis         No           16         <			with the same hashtag will appear so that people will be assisted to find the information uniformity to	
8         #emot_happy         The number of happy emotions         Yes           9         has_happy         The cristence of emotion that contains happy expression         Yes           10         #emot_sad         The number of sad emoticons         Yes           11         has_sad         The cristence of emotion that contains add expression         Yes           12         #word         Which of the number of words that could explain whether the user gives a short or long message to inflamene the perception of others.         Yes           13         length_message         To be existence of a post message contains the words included in the spann list         Yes           14         check_spam         To see whether the post message contains the words included in the spann list         Yes           16         link_domain         The presence of a post message on the number of URLs given in a post message to me in certainty to the contiformation.         Yes           17         post_published         The angle of post message on the number of days is based on the age of the post message         Yes           18         likes_count_fb         The number of most message in the number of days based on the age of the post message         Yes           21         comments_count_fb         The number of most message         Yes           22         reactions_count_fb         The number of most messa			direct the truth of the information with detail and clear history	
9         has_happ         The existence of emotion that contains happy expression         Yes           10         memory, said         The mumber of sade emotions         Yes           11         bas_sad         The existence of emotion that contains sad expression         Yes           12         fivord         Which of the number of vords that could explain whether the user gives a short or long message to influence the perception of others.         Yes           13         length_message         Which of the length of the character and word that could explain whether the user gives a short or long message to influence the perception of others.         Yes           14         check_spam         To see whether the post message words till, helps deliver more information soit ic an provide trust by giving the post message source. The more in number of Ukps diver more information soit ic an provide trust by giving the post message on the number of days is based on when the lags of the post message 'Yes           16         likes_count_fb         The number of like count for a post message in the number of days based on the age of the post message 'Yes         No           19         likes_count_fb_per_day         The number of soar message in the number of days based on the age of the post message 'Yes         No           21         reactions_count_fb_per_day         The number of soar message (share, like, none, love, wow, haha, sad, angry, 'tes         Yes           23         reactions_count_fb_per_day	8	#emot happy	The number of happy emotions	Yes
Image of the number of set atomatics and sequences of the presence of a protect multical contains and sequences of the sequence of the number of sequences of the sequences of the presence of or others.         Yes           11         hex, such         The existence of emoticnes that contains say despension.         Yes           12         #word         Which of the number of words that could explain whether the user gives a short or long message to influence the perception of others.         Yes           13         length_message         Which of the length of the character and word that could explain whether the user gives a short or long message to influence the perception of others.         Yes           14         check_spam         To see whether the post message on message on message.         Yes           16         link_domain         The presence of a post message on the number of dlks is based on when the last post message was taken         Yes           18         likks_count_fb         The mumber of a post message in the number of dlays based on the age of the post message         Yes           19         tikks_count_fb         The mumber of a post message in the number of days based on the age of the post message         Yes           19         likks_count_fb         The mumber of users with share a post message in the number of days based on the age of the post message         Yes           20         comments_count_fb_per_day         The mumber of short response activities with certain icons (like, non	9	has happy	The existence of emotion that contains hanny expression	Yes
11         has, sufficient         The existence of emotion that contains sud expression         Yes           12         #word         Which of the number of words that could explain whether the user gives a short or long message to influence the perception of others.         Yes           13         length_message         Which of the length of the character and word that could explain whether the user gives a short or long message to influence the perception of others.         Yes           14         check_spam         To see whether the post message contains the words included in the span list         Yes           16         link_domain         The presence of a post message contains the words included in the span list         Yes           16         link_domain         The presence of a post message contains the words included in the span list         Yes           17         post_publishd         The angle of post message conte hundher of UKLS given in a post message that more in certainty to the cridibility of the information.         Yes           18         likes_count_b         The anumber of a post message in the number of days based on the age of the post message         Yes           20         comments_count_b         The number of ouser stapes as the span is a post message         Yes           21         reactions_count_b         The number of sub response activities with certain icons (like, none, love, wow, haha, sad, angry, tes         Yes           <	10	#emot sad	The number of sad emotions	Yes
11       mix_baa       Witch of the number of orords that sate archystem.       No         13       length_message       Witch of the number of orords that could explain whether the user gives a short or long message to the number of orords that could explain whether the user gives a short or long message to the number of the negation of the charact of others.       Yes         14       check_spam       To see whether the post message contains the works included in the spam list       Yes         15       check_spam       To see whether the post message contains the works included in the spam list       Yes         16       check_spam       To see whether the post message contains the works included in the spam list       Yes         16       check_spam       To expect the presence or a post message on the number of URLs given in a post message was taken       Yes         17       post_published       The games on the number of days is based on when the last post message       Yes         18       likes_count_fb       The mumber of a post message in the number of days based on the age of the post message       Yes         19       likes_count_fb       The mumber of spart message       No         11       mease of post message       The number of spart message       No         12       comments_count_fb_per_day       The mumber of spart message       No         13       reactions_count_fb_per_day	11	has sad	The existence of emotion that contains and expression	Ves
12       whold       minker of the minker of whole keyhain whether the user gives a short of nog message of the perception of others.       influence the perception of others.         13       length_message       Which of the length of the character and word that could explain whether the user gives a short or long message influence the perception of others.       Yes         14       etheck_spam       To see whether the post message contains the words included in the spam list       Yes         16       ink_domain       To breack the presence or a post message on a son message with URL helps deliver more informations oit can provide trust by giving       Yes         16       ink_domain       The presence of a post message on the number of days is based on when the last post message was taken       Yes         17       post_published       The aumber of information.       The aumber of a post message in the number of days based on the age of the post message       Yes         18       ikkes_count_bp_er_day       The number of a post message in the number of days based on the age of the post message       Yes         20       comments_count_b_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, tes       thankful) in a post message       No         21       shares_count_b_per_day       The number of short response activities with post message       No         23       shares_count_b_per_day       The number of short	12	#word	Which of the number of words that could available whether the user gives a short or long message to	Vas
13       length_message       Which of the length of the character and word that could explain whether the user gives a short or long message to influence the perception of others.       Yes         14       check_spam       To see whether the post message of the full picture in a post message       Yes         15       check_full_picture       To check the presence or absence of the full picture in a post message on its can provide trust by giving the post message source. The more in number of URLs given in a post message the more in certainty to the credibility of the information.       Yes         17       post_published       The age of a post message on the number of days is based on when the last post message was taken       Yes         18       likes_count_fb_per_day       The number of normations are post message in the number of days based on the age of the post message       Yes         19       likes_count_fb_per_day       The number of some message in the number of days based on the age of the post message       Yes         21       comments_count_fb_per_day       The number of some message       No       No         23       reactions_count_fb       The age of a post message (chare, like, comment)       Yes       Maakfulj in a post message (chare, like, comment)       Yes         24       shares_count_fb_per_day       The number of some reseage       Yes       No         25       shares_count_fb_per_day       The number of some reseage       <	12	#word	which of the number of whose state could explain whether the user gives a short of long message to	105
15       rengin junksage       which of the rengin of the character and work unit could explain which the user gives a short of hong       res         14       check_span       To see whether the post message contains the works included in the span list       Yes         16       ink_domain       To see whether the post message with URL helps deliver more informations on it can provide trust by giving the post message with URL helps deliver more information so it can provide trust by giving the post message go and number of URLs given in a post message was taken       Yes         17       post_published       The genese of a post message with URL helps deliver more information so it can provide trust by giving the post message go and number of days is based on when the last post message was taken       Yes         18       likes_count_fb       The number of like count for a post message in the number of days based on the age of the post message       Yes         20       comments_count_fb_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, ter shankfu) in a past message       Yes         23       reactions_count_fb_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, ters mashares_count_fb_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, ters mankfu) in the age of a post message (share, like, comment)       Yes         24       shares_count_fb_per_day       The number of interaction in a post message (s	12	longth massage	Multiple of the learth of the above and word that could evaluate whether the user gives a short or long	Vac
14       check_spam       To see whether the post message of unsessage of unsessage       Yes         15       check_full_picture       To check the presence or absence of the full picture in a post message       Yes         16       link_domain       The presence or absence of the full picture in a post message the more in ormations or it can provide trust by giving       Yes         17       post_published       The age of a post message on the number of days is based on when the last post message was taken       Yes         18       links_count_h       The number of like count for a post message       Yes         18       links_count_h       The number of like count for a post message in the number of days based on the age of the post message       Yes         19       likes_count_h       The number of source response activities with certain icons (like, none, love, wow, hala, sad, angry, Yes       Yes         21       reactions_count_h       The number of source response activities with certain icons (like, none, love, wow, hala, sad, angry, Yes       Yes         23       reactions_count_h       The number of source response activities with certain icons (like, none, love, wow, hala, sad, angry, Yes       Yes         24       shares_count_h       The number of source response activities with certain icons (like, none, love, wow, hala, sad, angry, 	15	lengui_message	which of the length of the character and word that could explain whether the user gives a short of long	res
14         Check Spann         15         Ves           15         check Spann         10 see whether the postence or absence of the full picture in a post message         Yes           16         link_domain         To be whether the presence or absence of the full picture in a post message the more incrimation so it can provide trust by giving the post message or the number of URLS given in a post message the more incrimating the message source. The more innormation so it can provide trust by giving the post message or absence of the number of days is based on when the last post message was taken         Yes           18         likes_count_fb_         The number of like count for a post message in the number of days based on the age of the post message         Yes           20         comments_count_fb_         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, the hankful) in a post message         Yes           23         reactions_count_fb_         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, the hankful) in a post message         Yes           24         shares_count_fb         The number of users who share a post message (hare, number) end the post message         Yes           25         reactions_count_fb_         The number of users who share a post message (hare, like, comment)         Yes           26         shares_count_fb         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, tes <td>14</td> <td>abaalt snow</td> <td>To see whether the perception of others.</td> <td>Vac</td>	14	abaalt snow	To see whether the perception of others.	Vac
15         cinck_lum_produce         16         link_domain         178           16         link_domain         The presence of a post message with UKL helps deliver more informations oi it can provide trust by giving         Yes           17         post_published         The age of a post message with UKL helps deliver more informations oi it can provide trust by giving         Yes           18         likes_count_b         The number of like count for a post message         in a post message         No           19         likes_count_b         The number of like count for a post message         in a momessage         No           20         comments_count_b         The number of sour response activities with certain icons (like, none, love, wow, haha, sad, angry, tes         Yes           21         comments_count_b         The number of sour response activities with certain icons (like, none, love, wow, haha, sad, angry, tes         Yes           22         reactions_count_b         The number of users who share a post message (adh a based on the age of the post message         Yes           23         shares_count_b         The number of interaction in a post message (share, like, comment)         Yes           24         shares_count_b         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, tes         Yes           25         shares_count_b         The number of s	14	check_span	To see whether the post message contains the words included in the span inst	Tes V
10       nmm_sontant       The presence of a post message with OKL nedge deriver more monation so it and provide rise presence of a post message with or the information.         17       post_published       The age of a post message out number of days is based on when the last post message was taken       Yes         18       likes_count_b_per_day       The number of like count for a post message       Yes         20       comments_count_b_       The number of like count for a post message       Yes         21       comments_count_b_       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes       Yes         22       reactions_count_b_per_day       The number of nessage       No         23       reactions_count_b_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes       Yes         24       shares_count_b_per_day       The number of users who share a post message       No         25       shares_count_b_per_day       The number of users who share a post message (ada day based on the age of the post message       Yes         26       engagement_b       The number of lasic level comments       Yes         27       engagement_b       The number of interaction in a post message (ada, day based on the age of the post message       Yes         28       comments_relies       The number of	15	link damain	To check the presence of absence of the full picture in a post message	Yes
Interposit message source. The more in number of UKLs given in a post message the more in certainly to the creditivity of the information.           17         post_published         The age of a post message on the number of days is based on when the last post message was taken         Yes           18         likes_count_b_per_day         The number of like count for a post message         No           19         likes_count_b_per_day         The number of comments in a post message         No           21         comments_count_b_per_day         The number of comments in a post message         No           22         reactions_count_b_per_day         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, thankful) in ha gost message         Yes           23         reactions_count_b_per_day         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, thankful) in the age of a post message         Yes           24         shares_count_b         The number of interaction in a post message (share, like, comment)         Yes           25         shares_count_b         The number of basic level comments         Yes           26         engagement_b_per_day         The number of short response activities by INONE in a post message         Yes           26         comments_retrieved         The number of short response activities by INONE in a post message         Yes <td>16</td> <td>link_domain</td> <td>The presence of a post message with URL helps deliver more information so it can provide trust by giving</td> <td>res</td>	16	link_domain	The presence of a post message with URL helps deliver more information so it can provide trust by giving	res
credibility of the information.17post_publishedThe aumber of lays count of a post message in the number of days is based on when the last post message was takenYes18likes_count_bThe number of like count for a post message in the number of days based on the age of the post messageNo20comments_count_bThe number of comments in a post message in the number of days based on the age of the post messageNo21comments_count_b_per_dayThe number of comments in a post message in the number of days based on the age of the post messageYes23reactions_count_b_per_dayThe number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, tesYes24shares_count_b_per_dayThe number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, tesYes25shares_count_b_per_dayThe number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, tesYes26engagement_b_per_dayThe number of interaction in a post message (share, like, comment)Yes28comments_retrievedThe number of basic level commentsYes29comments_retrievedThe number of short response activities by LNE in a post messageYes31rea_LNONEThe number of short response activities by LNE in a post messageYes32rea_LIKEThe number of short response activities by LNE in a post messageYes33rea_LINCEThe number of short response activities by LNE in a post messageYes34rea_LINCEThe n			the post message source. The more in number of URLs given in a post message the more in certainty to the	
1/       post_published       The age of a post message on the number of days is based on when the last post message was taken       Yes         19       likes_count_fb_per_day       The number of like count for a post message in the number of days based on the age of the post message       Yes         21       comments_count_fb_per_day       The number of comments in a post message in the number of days based on the age of the post message       Yes         22       reactions_count_fb_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, thankful) in a post message       Yes         23       shares_count_fb_per_day       The number of users who share a post message each day based on the age of the post message       Yes         24       shares_count_fb_per_day       The number of users who share a post message (ad by based on the age of the post message       Yes         25       shares_count_fb_per_day       The number of interaction in a post message (share, like, comment)       Yes         26       engagement_fb_per_day       The number of comments in a post or by the user       Yes         27       engagement_fb_per_day       The number of short response activities by NONE in a post message       Yes         28       comments_retrieved       The number of apost message       Yes         29       comments_hap ost message       Yes         20       <	1.5		credibility of the information.	
18       likes_count_lb       The number of like count for a post message in the number of days based on the age of the post message       No         20       comments_count_bper_day       The number of comments in a post message in the number of days based on the age of the post message       No         21       comments_count_bper_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, test thankful) in a post message       Yes         23       reactions_count_bper_day       The number of users who share a post message each day based on the age of the post message       Yes         24       shares_count_bp_per_day       The number of users who share a post message (share, like, comment)       Yes         25       shares_count_bp_per_day       The number of interaction in a post message (share, like, comment)       Yes         26       engagement_bp_per_day       The number of comments is a post message (share, like, comment) each day based on the age of the post message       Yes         27       comments_retrieved       The number of nument of users who share a post message (share, like, comment) each day based on the age of the post       Yes         28       comments_retrieved       The number of nument of users who share a post message (share, like, comment) each day based on the age of the post       Yes         29       comments_retrieved       The number of norment level relying       Yes         3	17	post_published	The age of a post message on the number of days is based on when the last post message was taken	Yes
19         likes_count_lb_per_day         The number of like count for a post message in the number of days based on the age of the post message         Yes           21         comments_count_b_per_day         The number of comments in a post message in the number of days based on the age of the post message         Yes           22         reactions_count_bb         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes         Yes           23         reactions_count_bb         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes         Yes           24         shares_count_bb         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes         Yes           25         shares_count_bb         The number of users who share a post message         No           26         engagement_b         The number of ousers who share a post message (share, like, comment)         Yes           27         reagument_b_per_day         The number of comments in a post or by the user         Yes           28         comment_ise_sount         The number of source post level comments         Yes           30         comment_ise_and         fe in a comment of a post message         Yes           31         comment_ise post of by the user         Yes         Yes           32	18	likes_count_fb	The number of like count for a post message	No
20         comments_count_b         The number of comments in a post message         No           21         comments_count_b_per_day         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes thankful) in a post message         Yes           23         reactions_count_b_per_day         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes thankful) in the age of a post message         Yes           24         shares_count_b_per_day         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes         Yes           25         shares_count_b_per_day         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes         Yes           26         engagement_b_per_day         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes         Yes           26         engagement_b_per_day         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes         Yes           27         engagement_b_per_day         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes         Yes           28         comments_count_b_per_day         The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, Yes         Yes           29         comments	19	likes_count_fb_per_day	The number of like count for a post message in the number of days based on the age of the post message	Yes
21       comments_count_fb_per_day       The number of comments for a post message in the number of days based on the age of the post message       Yes         23       reactions_count_fb_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, thankful) in a post message       Yes         24       shares_count_fb_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, the number of users who share a post message cach day based on the age of the post message       Yes         25       shares_count_fb_per_day       The number of users who share a post message (share, like, comment)       Yes         26       engagement_fb       The number of interaction in a post message (share, like, comment) each day based on the age of the post message       Yes         27       engagement_fb_per_day       The number of comments in a post or by the user       Yes         28       comments_replies       The number of comments to a post message       Yes         29       comments_tosage       Yes       Yes         31       comments_replies       The number of short response activities by NONE in a post message       Yes         32       rea_LOVE       The number of short response activities by LIKE in a post message       Yes         33       rea_LOVE       The number of short response activities by NONE in a post message       Yes	20	comments_count_fb	The number of comments in a post message	No
22       reactions_count_fb       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, thankful) in post message       Yes         23       reactions_count_fb_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, thankful) in the age of a post message       No         24       shares_count_fb_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, thankful) in the age of a post message       No         25       shares_count_fb_per_day       The number of users who share a post message (share, like, comment)       No         26       engagement_fb_per_day       The number of interaction in a post message (share, like, comment) each day based on the age of the post message       Yes         27       engagement_fb_per_day       The number of comment is post or by the user       Yes         28       comments_reptire       The number of short response activities by LNEE in a post message       Yes         31       comment_likes_count       The number of short response activities by LIKE in a post message       Yes         34       rea_LIKE_per_day       The number of short response activities by LIKE in a post message       Yes         35       rea_LOVE       The number of short response activities by LIKE in a post message       Yes         36       rea_LANGR       The number of sho	21	comments_count_fb_per_day	The number of comments for a post message in the number of days based on the age of the post message	Yes
23reactions_count_fb_per_day the number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, thankful) in the age of a post messageYes24shares_count_fb_per_day the number of users who share a post message (share, like, comment)No25shares_count_fb_per_day 	22	reactions_count_fb	The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry,	Yes
23       reactions_count_fb_per_day       The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry, thankfu) in the age of a post message       Yes         24       shares_count_fb_per_day       The number of users who share a post message each day based on the age of the post message       Yes         25       shares_count_fb_per_day       The number of users who share a post message each day based on the age of the post message       Yes         26       engagement_fb_       The number of ointeraction in a post message (share, like, comment)       Yes         27       engagement_fb_per_day       The number of ointeraction in a post message (share, like, comment) each day based on the age of the post message       Yes         28       comments_retrieved       The number of comments in a post message (share, like, comment) each day based on the age of the post message       Yes         30       comments_retrieved       The number of base in a post message       Yes         31       comment_likes_count       The number of short response activities by LIKE in a post message       Yes         32       rea_LIKE       The number of short response activities by LIKE in a post message       Yes         33       rea_LIKE_per_day       The number of short response activities by LOVE in a post message       Yes         34       rea_LIKE_per_day       The number of short response activities by SAD in a post mess			thankful) in a post message	
thankful) in the age of a post message24shares_count_fb_per_dayThe number of users who share a post messageNo25shares_count_fb_per_dayThe number of users who share a post message (share, like, comment)Yes26engagement_fb_per_dayThe number of interaction in a post message (share, like, comment) each day based on the age of the postYes28comments_fb_per_dayThe number of asci level commentsYes28comments_repticesThe number of basic level commentsYes30comment_likes_countThe number of apost message (share, like, comment) each day based on the age of the postYes31comment_likes_countThe number of apost messageYes32rea_NONEThe number of short response activities by NONE in a post messageYes33rea_LIKEThe number of short response activities by LIKE in a post messageYes34rea_LOVEThe number of short response activities by LOVE in a post messageYes35rea_WOWThe number of short response activities by WOW in a post messageYes36rea_AGRYThe number of short response activities by MOW in a post messageYes37rea_AGRYThe number of short response activities by ANGRY in a post messageYes38rea_SADThe number of short response activities by ANGRY in a post messageYes39rea_ANGRYThe number of short response activities by ANGRY in a post messageYes40rea_SADThe number of negative sentiments to the number of words in a po	23	reactions_count_fb_per_day	The number of short response activities with certain icons (like, none, love, wow, haha, sad, angry,	Yes
24     shares_count_fb     The number of users who share a post message     No       25     shares_count_fb_per_day     The number of users who share a post message (share, like, comment)     Yes       26     engagement_fb_     The number of interaction in a post message (share, like, comment)     Yes       28     comments_retrieved     The number of comments in a post message (share, like, comment)     Yes       28     comments_retrieved     The number of comments in a post or by the user     Yes       29     comments_retrieved     The number of apost message     Yes       31     comments_retrieved     The number of short response activities by LIKE in a post message     Yes       31     comment_likes_count     The number of short response activities by LIKE in a post message     Yes       33     rea_LIKE_     The number of short response activities by LIKE in a post message     Yes       34     rea_LOVE     The number of short response activities by LOVE in a post message     Yes       35     rea_WOW     The number of short response activities by SAD in a post message     Yes       36     rea_MORY     The number of short response activities by SAD in a post message     Yes       36     rea_AGRY     The number of short response activities by SAD in a post message     Yes       37     rea_LAGRY     The number of short response activities by SAD in a po			thankful) in the age of a post message	
25       shares_count_fb_per_day       The number of users who share a post message each day based on the age of the post message       Yes         26       engagement_fb_per_day       The number of interaction in a post message (share, like, comment)       Yes         27       engagement_fb_per_day       The number of interaction in a post message (share, like, comment)       Yes         28       comments_peries       The number of comments in a post message (share, like, comment)       Yes         29       comments_replies       The number of comments in a post message (share, like, comment)       Yes         30       comment_likes_count       The number of comment level replying       Yes         31       comment_likes_count       The number of short response activities by NONE in a post message       Yes         33       rea_LIKE       The number of short response activities by LIKE in a post message       Yes         34       rea_LOVE       The number of short response activities by LOVE in a post message       Yes         35       rea_SAD       The number of short response activities by SAD in a post message       Yes         35       rea_ANGRY       The number of short response activities by SAD in a post message       Yes         36       rea_SAD       The number of short response activities by SAD in a post message       Yes         36       <	24	shares_count_fb	The number of users who share a post message	No
26engagement_fb engagement_fb_per_dayThe number of interaction in a post message (share, like, comment)Yes27engagement_fb_per_dayThe number of interaction in a post message (share, like, comment) each day based on the age of the post messageYes28comments_retrievedThe number of comments in a post or by the userYes29comments_repliesThe number of comments in a post or by the userYes30comments_repliesThe number of comment level replyingYes31comments_repliesThe number of short response activities by NONE in a post messageYes33rea_LIKEThe number of short response activities by LIKE in a post messageYes34rea_LOVEThe number of short response activities by LIKE in a post messageYes35rea_WOWThe number of short response activities by LOVE in a post messageYes36rea_AOREThe number of short response activities by LAKE in a post messageYes37rea_AOREThe number of short response activities by LOVE in a post messageYes38rea_SADThe number of short response activities by ANA in a post messageYes39rea_ANGRYThe number of short response activities by THANKFULThe number of short response activities by THANKFUL in a post messageYes41#positiveThe number of positive sentiment words in a post messageYes42ratioPosNumWordThe rauber of positive sentiments to the number of words in a post message. The value of the ratio is bigger equal to the value of a post message credibil	25	shares_count_fb_per_day	The number of users who share a post message each day based on the age of the post message	Yes
27engagement_fb_per_day ensageThe number of interaction in a post message (share, like, comment) each day based on the age of the post messageYes Yes28comments_retrieved comments_baseThe number of comments in a post or by the userYes29comment_ikes_count retrievedThe number of comment level replying The number of short response activities by NONE in a post message rea_NONEYes31comment_likes_count rea_LIKEThe number of short response activities by LIKE in a post message messageYes34rea_LIKE_per_day messageThe number of short response activities by LIKE in a post message messageYes35rea_LOVEThe number of short response activities by LOVE in a post message messageYes36rea_MOWThe number of short response activities by LOVE in a post message messageYes36rea_MOWThe number of short response activities by LOVE in a post message messageYes37rea_LOVEThe number of short response activities by SAD in a post message messageYes38rea_AORThe number of short response activities by SAD in a post message rea_THANKFUL the number of short response activities by SAD in a post message the number of positive sentiment words in a post message rea_THANKFULYes41#positiveThe number of positive sentiments to the number of words in a post message. The number of positive sentiment words in a post message. The number of sentimes of a post message tris by and the subset of a post message. The number of sentimes in a post message tris by and the number of sentiments to the num	26	engagement_fb	The number of interaction in a post message (share, like, comment)	Yes
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28comments_retrievedThe number of comments in a post or by the userYes29comments_baseThe number of commentsYes30comments_repliesThe number of basic level commentsYes31comment_likes_countThe number of short response activities by NONE in a post messageYes33rea_LIKEThe number of short response activities by LIKE in a post messageYes34rea_LOVEThe number of short response activities by LIKE in a post messageYes35rea_LOVEThe number of short response activities by LOVE in a post messageYes36rea_SADThe number of short response activities by HAHA in a post messageYes37rea_HAHAThe number of short response activities by SAD in a post messageYes38rea_SADThe number of short response activities by SAD in a post messageYes39rea_ANGRYThe number of short response activities by SAD in a post messageYes40rea_THANKFULThe number of short response activities by THANKFUL in a post messageYes41#positiveThe number of positive sentiment words in a post messageYes42ratioPosNumWordThe ratio of the number of negative sentiments to the number of words in a post message.Yes44#negativeThe number of negative sentiments to a post messageYes45#sentimentThe number of negative sentiments to select the information that its credibility levelYes44#negativeThe number of sentiments in a post messageYes<			message	
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30comments_repliesThe number of comment level replyingYes31comment_likes_countThe number of short response activities by NONE in a post messageYes32rea_NONEThe number of short response activities by NONE in a post messageYes33rea_LIKEThe number of short response activities by LIKE in a post messageYes34rea_LIKE_per_dayThe number of short response activities by LIKE in a post messageYes35rea_LOVEThe number of short response activities by LOVE in a post messageYes36rea_WOWThe number of short response activities by WOW in a post messageYes37rea_HAHAThe number of short response activities by MAHA in a post messageYes38rea_SADThe number of short response activities by ANGRY in a post messageYes39rea_ANGRYThe number of short response activities by ANGRY in a post messageYes40rea_THANKFULThe number of short response activities by THANKFUL in a post messageYes41#positiveThe number of positive sentiments to the number of words in a post message.Yes42ratioPosNumWordThe ratio of the number of negative sentiments to the number of words in a post message.Yes44#negativeThe number of negative sentiments to the number of words in a post message.Yes45#sentimentThe number of sentiments in a post messageYes46sentimentThe number of negative sentiments to select the information that its credibility levelYes47<	29	comments_base	The number of basic level comments	Yes
31comment_likes_countThe number of like in a comment of a post messageYes32rea_NONEThe number of short response activities by NONE in a post messageYes33rea_LIKEThe number of short response activities by LIKE in a post messageYes34rea_LIKE_per_dayThe number of short response activities by LIKE in a post messageYes35rea_LOVEThe number of short response activities by LOVE in a post messageYes36rea_HAHAThe number of short response activities by WOW in a post messageYes37rea_HAHAThe number of short response activities by SAD in a post messageYes38rea_SADThe number of short response activities by ANGRY in a post messageYes39rea_ANGRYThe number of short response activities by ANGRY in a post messageYes41#positiveThe number of short response activities by THANKFUL in a post messageYes42ratioPosNumWordThe ratio of the number of positive sentiments to the number of words in a post message. YesYes43ratioNegNumWordThe ratio of the number of positive sentiments to the number of words in a post message. The value of the YesYes44#negativeThe number of negative sentiments to the number of words in a post message. The value of the ratio is bigger equal to the value of a post message credibilityYes44#negativeThe number of sentiments in a post messageYes45#sentimentThe number of sentiments in a post messageYes46sentimentThe number of	30	comments_replies	The number of comment level replying	Yes
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33       rea_LIKE       The number of short response activities by LIKE in a post message       Yes         34       rea_LIKE_per_day       The number of short response activities by LIKE in a post message each day based on the age of the post message       Yes         35       rea_LOVE       The number of short response activities by LOVE in a post message       Yes         36       rea_WOW       The number of short response activities by WOW in a post message       Yes         36       rea_HAHA       The number of short response activities by HAHA in a post message       Yes         37       rea_ANGRY       The number of short response activities by ANGRY in a post message       Yes         39       rea_THANKFUL       The number of short response activities by THANKFUL in a post message       Yes         40       rea_TGPONUMWord       The ratio of the number of positive sentiments to the number of words in a post message.       Yes         41       #positive       The ratio of the number of negative sentiments to the number of words in a post message. The value of the ratio is bigger equal to the value of a post message credibility       Yes         43       ratioNegNumWord       The ratio of the number of negative sentiments to the number of words in a post message. The value of the ratio is getting smaller equal to the value of a post message credibility       Yes         44       #negative       The number of sentiments in a post message<	32	rea_NONE	The number of short response activities by NONE in a post message	Yes
34       rea_LIKE_per_day       The number of short response activities by LIKE in a post message each day based on the age of the post message       Yes         35       rea_LOVE       The number of short response activities by LOVE in a post message       Yes         36       rea_WOW       The number of short response activities by WOW in a post message       Yes         37       rea_HAHA       The number of short response activities by HAHA in a post message       Yes         38       rea_SAD       The number of short response activities by ANGRY in a post message       Yes         38       rea_ANGRY       The number of short response activities by ANGRY in a post message       Yes         40       rea_THANKFUL       The number of short response activities by THANKFUL in a post message       Yes         41       #positive       The number of positive sentiment words in a post message       Yes         42       ratioPosNumWord       The ratio of the number of negative sentiments to the number of words in a post message. The value of the ratio is bigger equal to the value of a post message credibility       Yes         43       ratioNegNumWord       The number of negative sentiments to the number of words in a post message. The value of the ratio is bigger equal to the value of a post message credibility       Yes         44       #negative       The number of sentiments in a post message       Yes         4	33	rea_LIKE	The number of short response activities by LIKE in a post message	Yes
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35       rea_LOVE       The number of short response activities by LOVE in a post message       Yes         36       rea_WOW       The number of short response activities by WOW in a post message       Yes         37       rea_HAHA       The number of short response activities by HAHA in a post message       Yes         37       rea_SAD       The number of short response activities by SAD in a post message       Yes         38       rea_SAD       The number of short response activities by ANGRY in a post message       Yes         39       rea_ANGRY       The number of short response activities by THANKFUL in a post message       Yes         40       rea_THANKFUL       The number of positive sentiment words in a post message       Yes         41       #positive       The number of positive sentiments to the number of words in a post message. The value of the ratio of the number of negative sentiments to the number of words in a post message. The value of the ratio is bigger equal to the value of a post message credibility       Yes         43       ratioNegNumWord       The ratio of the number of negative sentiments to the number of words in a post message. The value of the ratio is getting smaller equal to the value of a post message credibility       Yes         44       #negative       The number of sentiments in a post message       Yes         45       #sentiment       The number of sentiments in a post message       Yes		·	message	
36       rea_WOW       The number of short response activities by WOW in a post message       Yes         37       rea_HAHA       The number of short response activities by HAHA in a post message       Yes         38       rea_SAD       The number of short response activities by SAD in a post message       Yes         39       rea_ANGRY       The number of short response activities by ANGRY in a post message       Yes         40       rea_THANKFUL       The number of short response activities by THANKFUL in a post message       Yes         41       #positive       The number of positive sentiment words in a post message       Yes         42       ratioPosNumWord       The ratio of the number of positive sentiments to the number of words in a post message. The value of the Yes       Yes         43       ratioNegNumWord       The ratio of the number of negative sentiments to the number of words in a post message. The value of the Yes       Yes         44       #negative       The number of negative sentiments to the number of words in a post message. The value of the Yes       Yes         45       #sentiment       The number of sentiments in a post message       Yes         46       sentiment       The number of sentiments in a post message       Yes         46       sentiment       The number of positive sentiments are usually describing more credibility level       Yes <td>35</td> <td>rea LOVE</td> <td>The number of short response activities by LOVE in a post message</td> <td>Yes</td>	35	rea LOVE	The number of short response activities by LOVE in a post message	Yes
37       rea_HAHA       The number of short response activities by HAHA in a post message       Yes         38       rea_SAD       The number of short response activities by SAD in a post message       Yes         39       rea_ANGRY       The number of short response activities by ANGRY in a post message       Yes         40       rea_THANKFUL       The number of short response activities by THANKFUL in a post message       Yes         41       #positive       The number of positive sentiment words in a post message       Yes         42       ratioPosNumWord       The ratio of the number of positive sentiments to the number of words in a post message. The value of the Yes       Yes         43       ratioNegNumWord       The number of negative sentiments to the number of words in a post message. The value of the Yes       Yes         44       #negative       The number of negative sentiments in a post message       Yes         45       #sentiment       The number of sentiments in a post message       Yes         46       sentiment       The number of positive, neutral, and negative sentiments to select the information that its credibility level       Yes         45       #sentiment       The number of sentiments are usually describing more credibility level       Yes         46       sentiment       The number of positive, neutral, and negative sentiments nor usualt describing more credibilit	36	rea WOW	The number of short response activities by WOW in a post message	Yes
38       rea_SAD       The number of short response activities by SAD in a post message       Yes         39       rea_ANGRY       The number of short response activities by ANGRY in a post message       Yes         40       rea_THANKFUL       The number of short response activities by THANKFUL in a post message       Yes         41       #positive       The number of positive sentiment words in a post message       Yes         42       ratioPosNumWord       The ratio of the number of positive sentiments to the number of words in a post message. The value of the Yes       Yes         43       ratioNegNumWord       The number of negative sentiments to the number of words in a post message. The value of the ratio is bigger equal to the value of a post message credibility       Yes         44       #negative       The number of sentiments in a post message       Yes         45       #sentiment       The number of sentiments in a post message       Yes         46       sentiment       The number of positive sentiments are usually describing more credibility level       Yes         46       sentiment       The number of positive sentiments are usually describing more credibility level       Yes	37	rea HAHA	The number of short response activities by HAHA in a post message	Yes
39       rea_ANGRY       The number of short response activities by ANGRY in a post message       Yes         40       rea_THANKFUL       The number of short response activities by THANKFUL in a post message       Yes         41       #positive       The number of positive sentiment words in a post message       Yes         42       ratioPosNumWord       The ratio of the number of positive sentiments to the number of words in a post message. The value of the ratio is bigger equal to the value of a post message credibility       Yes         43       ratioNegNumWord       The ratio of the number of negative sentiments to the number of words in a post message. The value of the ratio is getting smaller equal to the value of a post message credibility       Yes         44       #negative       The number of sentiments in a post message       Yes         45       #sentiment       The number of positive, neutral, and negative sentiments to select the information that its credibility level is proing to be seen. The positive sentiments are usually describing more credibility level       Yes         46       sentiment       The existence of positive, neutral, and negative sentiments to select the information       Yes	38	rea SAD	The number of short response activities by SAD in a post message	Yes
40       rea_THANKFUL       The number of short response activities by THANKFUL in a post message       Yes         41       #positive       The number of positive sentiment words in a post message       Yes         42       ratioPosNumWord       The ratio of the number of positive sentiments to the number of words in a post message. The value of the Yes         43       ratioNegNumWord       The ratio of the number of negative sentiments to the number of words in a post message. The value of the Yes         44       #negative       The number of negative sentiments in a post message credibility         44       #negative       The number of negative sentiments in a post message       Yes         45       #sentiment       The number of sentiments in a post message       Yes         46       sentiment       The number of sentiments in a post message       Yes         46       sentiment       The number of sentiments in a post message       Yes         46       sentiment       The existence of positive, neutral, and negative sentiments to select the information that its credibility level is going to be seen. The positive sentiments are usually describing more credible information       Yes	39	rea ANGRY	The number of short response activities by ANGRY in a post message	Yes
41       #positive       The number of positive sentiment words in a post message       Yes         42       ratioPosNumWord       The ratio of the number of positive sentiments to the number of words in a post message. The value of the Yes         43       ratioNegNumWord       The ratio of the number of positive sentiments to the number of words in a post message. The value of the Yes         43       ratioNegNumWord       The ratio of the number of negative sentiments to the number of words in a post message. The value of the Yes         44       #negative       The number of negative sentiments in a post message       Yes         45       #sentiment       The number of sentiments in a post message       Yes         46       sentiment       The number of positive, neutral, and negative sentiments to select the information that its credibility level is going to be seen. The positive sentiments are usually describing more credible information       Yes	40	rea THANKFUL	The number of short response activities by THANKFUL, in a post message	Yes
42       ratioPosNumWord       The ratio of the number of positive sentiments to the number of words in a post message. The value of the value of the value of a post message credibility       Yes         43       ratioNegNumWord       The ratio of the number of negative sentiments to the number of words in a post message. The value of the value of the value of a post message credibility       Yes         44       #negative       The number of negative sentiments in a post message       Yes         45       #sentiment       The number of sentiments in a post message       Yes         46       sentiment       The existence of positive, neutral, and negative sentiments to select the information that its credibility level is point to be sentiments are usually describing more credible information       Yes	41	#positive	The number of positive sentiment words in a post message	Yes
43       ratioNegNumWord       ratio is bigger equal to the value of a post message credibility       For the number of negative sentiments to the number of words in a post message. The value of the ratio is getting smaller equal to the value of a post message credibility         44       #negative       The number of negative sentiments in a post message       Yes         45       #sentiment       The number of sentiments in a post message       Yes         46       sentiment       The existence of positive, neutral, and negative sentiments are usually describing more credibility level       Yes	42	ratioPosNumWord	The ratio of the number of positive sentiments to the number of words in a post message. The value of the	Yes
43       ratioNegNumWord       The ratio of the number of negative sentiments to the number of words in a post message. The value of the ratio is getting smaller equal to the value of a post message credibility       Yes         44       #negative       The number of negative sentiments in a post message       Yes         45       #sentiment       The number of sentiments in a post message       Yes         46       sentiment       The number of sentiments in a post message       Yes         46       sentiment       The existence of positive, neutral, and negative sentiments to select the information that its credibility level is going to be seen. The positive sentiments are usually describing more credible information       Yes			ratio is bigger equal to the value of a post message credibility	
44     #negative     The number of negative sentiments in a post message     Yes       45     #sentiment     The number of sentiments in a post message     Yes       46     sentiment     The number of sentiments in a post message     Yes       46     sentiment     The sistence of positive, neutral, and negative sentiments to select the information that its credibility level is going to be seen. The positive sentiments are usually describing more credible information     Yes	43	ratioNegNumWord	The ratio of the number of negative sentiments to the number of words in a post message. The value of the	Yes
44     #negative     The number of negative sentiments in a post message     Yes       45     #sentiment     The number of sentiments in a post message     Yes       46     sentiment     The existence of positive, neutral, and negative sentiments to select the information that its credibility level     Yes       46     sentiment     The existence of positive, neutral, and negative sentiments are usually describing more credible information     Yes			ratio is getting smaller equal to the value of a post message credibility	100
45     #sentiment     The number of sentiments in a post message     Yes       46     sentiment     The existence of positive, neutral, and negative sentiments to select the information that its credibility level     Yes       46     sentiment     The existence of positive, neutral, and negative sentiments are usually describing more credible information     Yes	44	#negative	The number of negative sentiments in a post message	Ves
46 sentiment The function of solution in a post inclusion a post inclusion of solution in a post inclusion of solution of solution in a post inclusion of solution	45	#sentiment	The number of sentiments in a post message	Yee
is going to be seen. The positive sentiments are usually describing more credible information	46	sentiment	The existence of positive neutral and negative sentiments to calact the information that its credibility lavel	Yee
ALEXANDE IN THE MARK THE REPORT OF THE PROPERTY AND THE REPORT OF THE PROPERTY AND THE PROP	10	Sentiment	is going to be seen. The positive sentiments are usually describing more credible information	105

In addition, this paper also applies a new approach related to the spam prediction and sentiment prediction described as follows:

a. Spam prediction (*check\_spam*)

We use two corpuses related to the spam words or phrases that are 200 English spam words or phrases and 100 Bahasa Indonesia spam words or phrases as used in our previous study [23]. The two corpuses are developed based on Indonesia spam-words. Table 9 describes 12 examples of Bahasa Indonesia spam words or phrases [23].

b. Sentiment prediction

This paper uses a corpus which contains the list of sentiments words consists of 354 words [24]. This sentiment is obtained by searching for words that are categorized as negative, positive and neutral. Some sample data are shown in Table 10 [24].

Table 9.	Samples	of	12	Indonesian	spam-	words
1 4010 /.	Sampies	<b>U</b> 1		maomeonam	opum	

No	Indonesian Spam-words
1	kredit dp
2	paket kredit
3	cicilan ringan
4	dp ringan
5	cash/kredit
6	dana tunai
7	proses cepat
8	dana cepat
9	pinjaman uang
10	pinjaman dana
11	pinjaman
12	gadai

Table 10. Ten data survey of sentiment

No	Word	Positive (%)	Negative (%)	Neutral (%)	Quality
1	buruk	0	78.3	21.7	3
2	jelek	0	78.3	21.7	3
3	lama	4.3	30.4	65.3	0
4	lamban	4.3	78.3	17.4	3
5	lambat	13	52.2	34.8	1
6	baik	82.6	0	17.4	4
7	berani	82.6	0	17.4	4
8	benar	82.6	0	17.4	4
9	sudah	56.5	0	43.5	1
10	ayo	65.2	4.3	30.5	2

# 2.4. Classification algorithm

The four learning algorithms that will be explored are Naive Bayes (NB), Support Vector Machine (SVM), Logistic Regression (Logit) and J48. As illustrated in Fig. 1, the four algorithms are used to model the topic classification of tweets during the training phase. The topic model of tweets is then used to classify the credibility of new information, using the same algorithm as that used to model the classification. The following is a description of each algorithm.

a. Naive bayes (NB)

Naive Bayes (NB) is a classification model in the form of probability values for each attribute to the class, and the classification of new data is done by looking at classes that have the maximum probability based on attribute data [25]. Naive Bayes has the advantage of construction easiness which does not require several complex parameters, and it is scalable. In addition, this method is expressed as an algorithm that has the properties of simplicity, elegance, robustness, and high accuracy [26]. b. Support vector machine (SVM)

The idea of Support Vector Machine (SVM) for classification is to find the optimal hyperplane (line/boundary field) that separates data into two classes in the data n-dimensional feature space. With this concept, the optimal hyperplane solution in SVM does not have a local optimum, and as a result, the solution will be unique [25]. SVM can be implemented easily and is one of the right methods used to solve high-dimensional problems within the limitations of existing data samples. c. Logistic regression (Logit)

Logistic Regression (Logit) is a probability classification model with a real value input vector. The input vector dimensions are called features. There are no restrictions imposed for correlated features. Logistic Regression is used every time we need to set input to one of several classes. The logistics function is a linear combination of features. The output is usually binary, but Logistic Regression can also be applied to multiclass classification problems [25].

#### d. J48 algorithm (J48)

J48 is a development of the ID3 algorithm. J48 is an implementation of the C4.5 algorithm that produces a decision tree. This algorithm can classify data with decision tree methods that have the advantage of being able to process numerical (continuous) and discrete data, can handle missing attribute values, and produce rules that are easily interpreted. Each data from an item is based on the value of each attribute. Classification can be seen as a mapping of a group of sets of attributes from a particular class. Decision tree classifies the data given using the value of the attribute [27].

#### 3. RESULTS AND ANALYSIS

This section provides the results and analysis of the data set and labeling scheme for Twitter and Facebook.

#### 3.1. Data set for experiment

The use of Twitter data containing Indonesian language is the same as in [28], involving 115 accounts with 19401 tweets. Table 11 provides a sample labeling of tweet topics from Law, Politics, and Entertainment [28]. Table 12 shows the distribution of Twitter data. It consists of 19 topics where the distribution is not balanced ranging from 0.2% to 15.3% [28].Facebook data used in this study consists of 56 accounts with 23489 messages. Due to the absence of a user account, not all accounts on Twitter (115 accounts) can be retrieved. Table 13 describes the distribution of Facebook data used, consists of 19 topics, which shows that the distribution is also unbalanced, ranging from 0.17% to 18.38%.

Table 11.	Some	samples of	category	labeling	in	Twitter
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Tweet	Label
Yg disoal Saripin cm apakah KPK berwenang sidik #BG, dugaan korupsinya tdk diusik. Bagi saya, BG tetap "tersangka"	Law
mestinya #JKW jg demikian	
DPR Akan Gelar Paripurna Sahkan Revisi UU Pilkada Hari Ini http://t.co/jcxclL9faO @detikcom	Political
Studio Denny JA, MTV dan Mizan bersama HanungBramantyo membuat 5 film layar lebar bertema Islam Cinta:	Entertainment
http://t.go/DrdUfhDgub	

uic	14.	I writter uata u	surroution	by topic/category	1 4010	, 15.1	accook uata	uisuitouui	m by topic
	No	Label	Number	Percentage		No	Category	Number	Percentage
	1	Religion	1025	5.28%		1	Religion	1952	8.31%
	2	Business	460	2.37%		2	Business	1267	5.39%
	3	Culture	235	1.21%		3	Culture	87	0.37%
	4	Economy	235	1.21%		4	Economy	1421	6.05%
	5	Entertainment	1742	8.98%		5	Entertainment	2977	12.67%
	6	Law	1557	8.03%		6	Law	1329	5.66%
	7	Advertisement	485	2.50%		7	Advertisement	331	1.41%
	8	Journalism	2420	12.47%		8	Journalism	96	0.41%
	9	Health	74	0.38%		9	Health	313	1.33%
	10	Finance	35	0.18%		10	Finance	41	0.17%
	11	Motivation	927	4.78%		11	Motivation	1169	4.98%
	12	Sports	431	2.22%		12	Sports	495	2.11%
	13	Government	1935	9.97%		13	Government	3613	15.38%
	14	Education	466	2.40%		14	Education	775	3.30%
	15	Transportation	149	0.77%		15	Transportation	43	0.18%
	16	Political	2959	15.25%		16	Political	4287	18.25%
	17	Social	1238	6.38%		17	Social	630	2.68%
	18	Technology	1218	6.28%		18	Technology	2022	8.61%
	19	General	1810	9.33%		19	General	641	2.73%
		Total	19401				Total	23489	
_									

# Table 12. Twitter data distribution by topic/category Table 13. Facebook data distribution by topic/category

#### 3.2. Experiment

We consider three objectives of performing experiment, i.e., (i) to compare the proposed technique with previous research on Twitter and Facebook about information credibility, (ii) evaluate the effect of adding new features in Twitter and Facebook, and (iii) evaluate the effects of feature dimensions used both on Twitter and Facebook. Our experiments used a comparison of training data versus data testing, with a composition of 80:20.

#### 3.2.1. Twitter social media

In this study, each cell describes an average of 5 times of the accuracy taking for each testing vs twitter composition taken randomly. The results of the proposed method and the previous research are shown in Table 14. Table 14 shows that this paper succeeded in increasing the accuracy of previous studies in almost all classifiers. When compared to previous studies, it can be seen that the highest accuracy is 88.42% achieved by using J48 classifier with the lowest increase of 5.93% and the highest of 27.17%.

	Table 14. The proposed and previous research results in Twitter								
					Percentage (%	5)			
Classifier	Contillo Montio		Gunto	Country Country			The Proposed Feature		
Classifier	(2011) (2012)	(2014)	(2014)	2014) (2016)	User	Message	User Profile +		
		(2012)	(2014)	(2014)	(2010)	Profile	Profile	Message Profile	
NB	60.79	58.41	60.79	65.95	60.52	66.97	62.93	66.42	
SVM	77.70	82.36	76.73	67.86	77.13	82.70	73.41	87.36	
Logit	77.26	77.24	76.27	66.25	76.56	78.25	64.57	78.04	
J48	83.09	83.47	83.00	69.53	82.16	82.77	79.36	88.42	

Table 14. The proposed and previous research results in Twitter

Table 14 also shows a comparison of the accuracy value between the user profile dimension and message content dimension in 4 different classifiers. The user profile dimension accuracy is higher than the message content dimension accuracy for all classifiers. The highest accuracy value on the user profile dimension using the J48 classifier is 82.77%. All the merging the features of the both dimensions used in this study increase accuracy for SVM and J48 classifiers, while the two other classifiers, i.e., NB and Logit classifiers, provide a decrease on the accuracy.

The new features are classified according to the influence of them on the accuracy. The features that increase the accuracy after it added to the baseline features are classified as increased group, the features that decrease the reverse are classified as decreased group, while the features that not effect are classified as mixed group, in this paper. Here, the baseline features represent the set of feature used in Ross and Thirunarayan [22].

Table 15 shows the effect of the 17 new features proposed, consist of 12 features based on user profile and 5 features based on message content dimension, in each classifier on Twitter. All features proposed on Twitter in both feature dimensions provide an increase on the accuracy of each classifier. For influence on all classifiers, all new feature increase on the accuracy of 6.60%, with 6.67% for features based on user profile, and 6.45% for features based on message content dimension. The biggest average for feature is 8.55%, achieved by the NumFollowingNumFollower feature. In the terms of the effect in each classifier, #sentiment\_desc feature provides the highest improvement of accuracy of +13,41% was achieved on SVM classifier.

Table 15. New features distribution by	v influence of accurac	cy based on features	dimension on Twitter
	2	2	

Influence of accuracy	Feature dimension					
initiachee of accuracy	User Profile	Message Content				
Increased	check_web_institution, #sentiment_desc, numPosWordDesc, check_web_personal, NumFollowingNumFollower, NumLikesNumFollower, word_desc, #positive_desc, #negative_desc, check_location, #likes_user, numNeeWordDesc	source, ratioNegNumTweet, #like_tweet, check_spam, ratioPosNumTweet				
Decreased	-	-				
Mixed	-	-				

#### 3.2.2. Facebook social media

This paper has carried out two developments. First, developing Facebook API that can retrieve datasets online. Second, adding more features to 49 new features based on users and content. Table 16 shows the highest accuracy increase compared to Saikaew's study. This paper succeeded in increasing the accuracy of previous studies in almost all classifiers. The increase is 9.91% with an accuracy value of 78.61% by using J48 Classifier. Table 16 also shows a comparison of the accuracy value between the user profile dimension and message content dimension in 4 different classifiers. The user profile dimension accuracy is higher than the message content dimension accuracy for all classifiers. The highest accuracy value on the user profile dimension using the SVM classifier is 76.50%. All the merging the features of the both dimensions used in this study increase accuracy for only J48 classifiers, while the three other classifiers provide a decrease on the accuracy.

Table 16. Saikaew vs the proposed in Facebook							
			Percentage (%)				
Classifier	Cailrean		The Proposed Feature				
Classifier	(2015)	User	Massaga Profile	User Profile +			
	(2013)	Profile	Message Profile	Message Profile			
NB	65.02	66.58	62.32	65.39			
SVM	71.10	76.50	71.38	71.83			
Logit	69.93	73.41	70.54	72.57			
J48	71.52	76.46	74.61	78.61			

Table 17 shows the effect of the 49 new features proposed, consist of 8 features based on user profile and 41 features based on message content dimension, in each classifier on Facebook. Here, the baseline features used as the comparison is representing the set of feature used in Saikaew [21]. All proposed features based on user profile dimension provide an increase on the accuracy of each classifier, whereas for message content based only 27 features or equal to 65.85% which give an increase in accuracy, remaining is 14 features or 34.15% provide mixed results.

 Table 17. New features distribution by influence of accuracy based on features dimension on Facebook

Influence of	reatures dimension					
Accuracy	User Profile	Message Content				
Increased	check_bio, #word_bio, length_bio,	type, #char, ratioCharLengthWordPost, ratioCharNumWord, #mention,				
	num_positive_desc, num_negative_desc, sentiment_desc, #url_institution, engagement_count	<pre>#emot_happy, has_happy, #emot_sad, #word, length_message, check_spam, check_full_picture, link_domain, post_published, likes_count_fb_per_day, reactions_count_fb_per_day, engagement_fb, engagement_fb_per_day, comments_retrieved, comments_base, rea_LIKE, rea_LIKE_per_day, rea_SAD, num_positif, ratioPosNumWord, #sentiment, sentiment</pre>				
Decreased	-					
Mixed	-	has_sad, comments_count_fb_per_day, reactions_count_fb, shares_count_fb_per_day, comments_replies, comment_likes_count, rea_NONE, rea_LOVE, rea_WOW, rea_HAHA, rea_ANGRY, rea_THANKFUL, ratioNegNumWord, num_negative				

For influence on all classifiers, all new feature increase on the accuracy of 0.57%, with 2.64 % for features based on user profile, and 0.17% for features based on message content dimension. The biggest average for feature is 7.26%, achieved by the engagement\_count feature. In the terms of the effect in each classifier, engagement\_count feature also provides the highest improvement of accuracy of +11,98% was achieved on J48 classifier.

The additional new feature on Twitter and Facebook are found to provide the best accuracy value and are influencing the credibility of the information, where the results are shown in Tables 14 and 16. It is clearly shown that user profile dimension is having a higher accuracy compared to message content dimension for all classifiers. Based on these results, it can be concluded that the credibility of information can be seen from the Twitter users. In searching for the information from Twitter, making users who provide content or tweets as the source of information can add the credibility and trust. This result confirm that purpose concept is practical and reliable. Finally, the effect of two feature dimensions, user profile dimension and message content dimension, on Twitter and Facebook are also found to provide the best accuracy value and are influencing the credibility of the information, where the results are shown in Tables 15 and 17. It is clearly shown that user profile dimension is more consistent increasing accuracy than message content dimension for all classifiers.

# 4. CONCLUSION

In this study, a method to measure the credibility of information on social media, i.e., Twitter and Facebook, has been proposed using labeling process and additional new features. We introduced 17 new features for Twitter and 49 new features for Facebook. We also used 4 classification methods, i.e., NB, SVM, Logit and J48 Algorithms. By adding new features, we obtained an accuracy of measurement about 88.42% for Twitter and 78.61% for Facebook, which is better than the previous results for all classifiers. In terms of the two feature dimensions, the user profile dimension accuracy is found to be better than the message content dimension for all classification conditions. Finally, the effect of new features to accuracy, all features proposed on Twitter in two feature dimensions provide an increase of accuracy for all classifiers. However, in Facebook, from the view point of message content dimension, only 27 features (65.85%) provided an increase in accuracy. On the other hand, the remaining 14 features (34.15%) provided mixed results. For all conditions, we found that the user profile dimension is more consistent to increase the accurate measurement rather than the message content dimension for all classifiers. We are expecting that these results can provide contributions to the future development of information credibility on social media.

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