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LANGUAGE ATTITUDE AND SENTIMENT ANALYSES IN GETTING THE INSIGHTS TOWARDS COVID-19'S OMICRON VARIANT NEWS

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Abstract: Omicron variant has been massively reported on Indonesian mass media following the spread of other previous variants during Covid-19 pandemic. This research combines computer science and linguistics to analyze the news on the variant. It implemented quantitative research using computational algorithm by collecting the titles of the news from Indonesian mainstream online mass media. Sentiment Analysis (SA) was applied to obtain the sentiments, opinion, and subjectivities of the texts along with topic modeling in classifying the topics. The words in the headline news titles were used as the data and grabbed by Python programming language. A criterion-based sampling was employed in to select the relevant data and to formulate the criteria in the research methodology. The results were filtered to 'Omicron' keyword for SA processing by the Azure Text Sentiment Analysis tool. The results of SA, as computational research, was then confirmed with Attitude Analysis (AA) from the perspective of Systemic Functional Linguistics. AA classified the words into affect, judgment, and appreciation as the attitude construed in English text. This research provides SA as the insights of Omicron issue. The presence of AA extracts the words into bipolar senses of human's meaning interpretation. AA is important to straighten SA findings. SA has contextual meaning problem and requires study on its words classified in 'neutral' which are then confidently directed into positive or negative meanings by AA. It is found that there are different dynamics by SA and AA findings as they reflect particular meanings. Besides their difference, SA is useful for managing overload data into fast policy making whereas AA makes sure the acceptable meanings to people. In this case AA corrects the bias occurring from SA.

Key words: attitude analysis; Covid-19; Omicron; sentiment analysis

Introduction

Starting from the beginning of 2020, Covid-19 had been the primary concern of health issue in Indonesia since the virus had been spreading in the last months of 2019 in the world. Mass media had been following the dynamics of the issue, until this article is being written, so that public understands the development of this pandemic happening. Mass media remains the relevant source that people pay attention on because news provides reports of current happening or information of particular event (Nazhira et al. 2016).

Covid-19 virus had shown some variants. Most victims were infected by Delta variant. It was not an end, Indonesia was watchful with Omicron variant. Using a developed application to collect news headlines from online legal Indonesian mass media, the researchers had found this wary dated on January 17th 2022. That was the date those Indonesian mass media started to report Omicron variant in Indonesia. Those findings attract the researchers in using the headlines for projecting Omicron issues in its continuation in Indonesia.

Some publications have recorded analyzing mass media or newspaper for various goals. Nazhira et al. (2016) analyzed attitude built in Indonesian newspapers: *Media Indonesia* and *Republika*. They found attitudinal pattern based on reflected language choice and the way how the pattern was practiced. Recently, Nurjanah (2021) showed her findings about the attitude expressed by the Guardian Editorial toward lockdown policy and the government handling Covid-19. The benefit of involving attitudinal language analysis as part of appraisal study was also explored by Isti'anah (2021) to provide an ecolinguistic point of view in the case of appreciating natural phenomena and preserving environment as reflected in the website of *Indonesia Travel*.

Those researches did linguistics study using attitude analysis that is developed in Systemic Functional Linguistics (SFL). In SFL, attitude system is studied under appraisal framework. The term appraisal refers to the approach of exploring, describing, and explaining how language is performed for evaluation, adopting stance, building persona, and managing position and interpersonal relationship. These interpersonal resources are manifested in language features as reflected by words. The features are classified into: (1) affect, concerning positive and negative feelings; (2) judgement, dealing with behavior; and (3) appreciation, evaluating semiotic and natural phenomena. Those explorations concern on attitude by involving explicit and/or implicit ways to decide affect, judgment, or appreciation (Martin & Rose 2003; Martin & White 2004; Wijaya et al. 2019).

Appraisal and attitude analyses are also applicable to the discourse used in commercial uses such as product advertisement (Wijaya et al. 2019) and promoting tourist destination (Suryaningtyas et al. 2019).

Nazhira et al. (2016), Nurjanah (2021); Suryaningtyas et al. (2019), Wijaya et al. (2019) have shown good progress of attitude and appraisal in SFL studies. Their findings inspire the researchers in using news headlines in estimating Omicron issues in 2022 by getting a glance from the publication in January 2022 whether positive or negative considering the classification including affect, judgment, and appreciation.

However, those previous publications have not collaborated with informatics and computing studies. Nazhira et al. (2016) and Wijaya et al. (2019) worked with linguistic data that were collected from words to clauses. Nurjanah (2021) got the data by using a software facilitating Simple Concordance Program (SCP). It was a good decision for using the software for collecting data but that research has not collaborated with different discipline and remains language study. Multidiscipline study was done by Suryaningtyas et al. (2019) in combining linguistics and visual communication. In this article, the researchers apply linguistic analysis along with informatics and computing studies named sentiment analysis. This way is expected to complete the previous researches.

The Sentiment Analysis is one of the disciplines of text mining study using Long Short-Term Memory (LSTM) proposed by Hochreiter and Schmidhuber (1997). It is a computational algorithm to obtain text's sentiments, opinions, and subjectivities. As Natural Language Processing task, Sentiment Analysis has been handled at many levels of data structure: such as the document level, the sentence level, and recently at the phrase level of classification task. Srivastava et al. (2019). The objective of Sentiment analysis is to process of classifying textual documents into several classes such as positive, neutral, and negative sentiments (Nomleni et al. 2019).

Former study signifies the sentiment analysis was applied to Twitter Data by Agarwal et al. (2011). Their research deepened analysis on POS-spesific prior polarity features and a tree kernel too. The next sentiment analysis on Twitter was implemented to find out the trend of halal tourism by analyzing tweets. The finding of this study showed that Japan is the most-tweeted about halal tourism, followed by Malaysian and Indonesia (Ainin et al. 2020). Another study implements Sentiment Analysis to evaluate the effectiveness of social media posts. The results indicated the necessity of Sentiment

Analysis in optimizing brand communication on social media and better understanding of consumers feedback (Poecze et al. 2018).

Both of studies indicate the sentiment analysis now commonly used to extract opinions of the people in order to optimize the services provided by an institution. Sentiment analysis projects positive, neutral, and negative tendencies by using language elements up to sentence level towards an issue. On the other hand, attitude analysis classifies words that are in clauses for getting views of an issue being concerned whether positive or negative attitude. The issue in this article is about Omicron variant of Covid-19 virus in Indonesian mass media in 2022 from the beginning month that was coincidentally when Omicron was firstly reported in Indonesia.

Supported by computerized mechanism, sentiment analysis facilitates getting conclusion of viewing a topic quickly. Attitude analysis needs time because it requires human participation in making sense of words. This research applies comparison study of sentiment and attitude analyses towards Omicron news in Indonesia. This research reveals the application and implementation of SA and AA in handling Omicron issues for their users.

Research Method

This research conducts multidisciplinary study involving computer science and linguistics. All data in this research are managed quantitatively for fulfilling the formulation of SA and the calculation of AA. The data were collected and firstly treated with computerized application for getting SA considering the ranges as formulated in Table 3. Then, the data were managed with linguistic treatment by AA.

In order to get relevant data for answering problem statements, the researchers formulate the criteria as follow:

1. The data were in the form of word. The words were particularly specified to those which were classified in scientific criteria of sentiment and attitude analysis.
2. The data were collected from the news titles published as the headlines in Indonesian mainstream online mass media.
3. The researchers grabbed the data by using developed application written on Python programming language that was set in 1-31st January 2022. This way was decided in order to get the early projection of Omicron issues in 2022 as stated in problem statements.
4. The grabbed data is filtered using one keyword “omicron” and then involved in the sentiment analysis process using The Azure Text Sentiment Analysis tool in order to get positive, neutral, and negative sentiments (see Fig 1.).
5. The sentiment analysis processes were conducted by using a Long Short-term Memory (LSTM) model which has an accuracy value 70.36% and overfitted value 6.28%.
6. After passing the procedure 1 to 5 above, they were decided as linguistic data for AA because they also had fulfilled the criteria of appraising features reflecting emotion, norms or sanction, and aesthetic (i.e. affect, judgment, and appreciation) as part of appraisal analysis in Systemic Functional Linguistics or SFL (Isti’anah, 2021, 165; Nurjanah, 2021, 197)

id	media	headline_en	date	sentiment_result	sentiment_magnitude
284697	antaranews.com	Sinovac Learn the Development of Omicron Cases in Indonesia	2022-01-19 16:40:11.896151	positive	0.685635149478912
283844	okezone.com	Facing Omicron Waves, Ministry of Health Prepares Micro Lockdown Scenario	2022-01-17 23:16:38.869425	negative	0.425491809844971
285507	okezone.com	Omicron patients can be an independent isolation at home, this is the complete requirement!	2022-01-21 07:50:48.220305	neutral	0.591099381446838

Figure 1: The example of SA findings

The comparison study was done because of the different treatments of data. After the data were initially studied by computer science's SA, they were provided for SFL's AA. Each finding was classified and tabulated. Their findings were then compared to answer how SA and AA process Omicron news for discovering public views. This analysis procedure was also as data management for getting meanings.

Findings

After compiling all results, there is difference. Sentiment Analysis (SA) shows that the Omicron news was dominated by positive (+) views whereas Attitude Analysis (AA) found negative (–) ones.

Table 1: The overview of SA and AA.

SA			AA	
+	–	0	+	–
173	58	78	135	274

Firstly, this may refer to the absence of neutral in AA. Secondly, the mechanism of counting affects this finding. SA uses particular calculation by computer. In contrast, AA needs human involvement to make sense of words before classifying them. The discussion below elaborates those indications towards the topic. Besides the difference, their existence complements delivering information.

SA in getting insights of Omicron issue

SA quickly finds the tendency which view dominates Omicron issue. Table 1 shows the final finding of SA providing positive view dominantly of Omicron issue in news. This finding provides a glance of news viewing Omicron issue. Initially, it may reflect the condition of Omicron trend that has not shown unstable or chaotic condition. It is possible that people react calmly. However, SA, as shown in Table 1, does not place negative view in controlling the concerns. Viewing the finding cannot reflect people in anticipating the virus trend positively. When it shows positive, the question is uttered about which positive things are there.

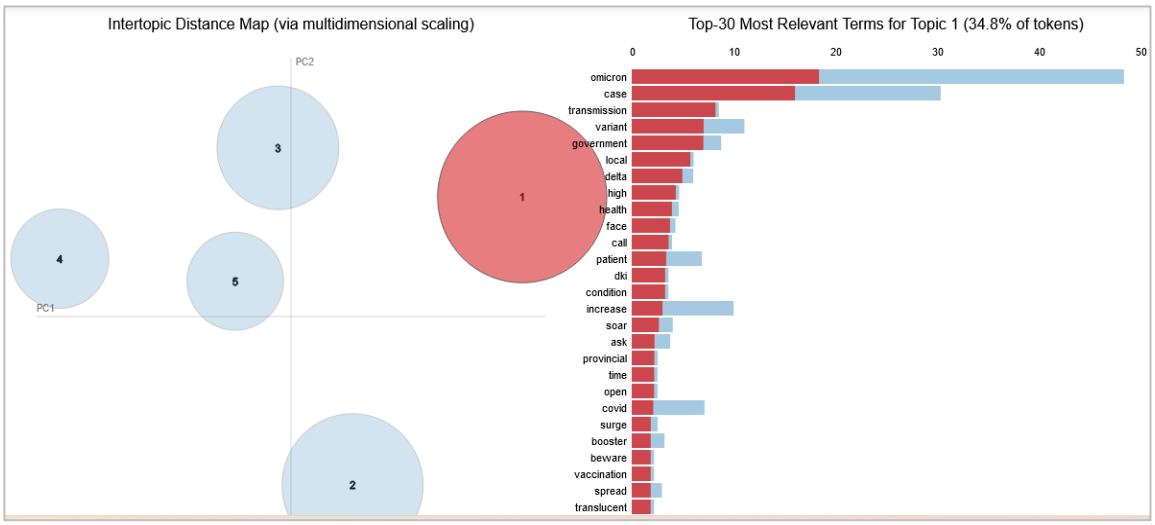

Figure. 2. The example finding of modeling topic towards positive views on Omicron news

Furthermore, SA finding is then supported by topic modeling to get which things are viewed positively, negatively, and neutrally. Topic modeling elaborates some keywords to draw the views so that people can interpret what is going on. The resulted topics were obtained by weighting of topic lists collected by LDA process. The figure below exemplifies it.

The topic modeling is facilitated by Latent Dirichlet Allocation (LDA) to solve the problem. This decision helps researchers in getting what topics concerned in positive. By computerized collection, there are series of words that dominate in the news and this way gives three alternative topics in each view.

Table 2: Alternative topics found by LDA.

View	Topic #1	Topic #2	Topic #3
+	omicron; case; transmission; variant; government; local; delta; high; health; face	omicron; case; increase; vaccine; percent; anticipate; covid; start; special; study	omicron; people; variant; covid; expose; isoman; patient; positive; symptom; test
–	omicron; patient; die; variant; break; news; case; close; increase; vaccinate	omicron; rise; covid; case; ask; community; patient; feel; force	omicron; case; underestimate; let; leave; remind; deputy; governor; dki; variant
0	omicron; case; covid; die; patient; health; increase; variant; ready; ask	omicron; patient; government; case; die; surge; variant; heal; enter; task	omicron; last; option; die; surge; peak; announce; run; prediction; ready

In the context of positive view, it is concluded government effort to anticipate Omicron variant of Covid-19 virus spreading by vaccination.
In negative view, it is about the rise of Omicron variant of Covid-19 virus that rose higher and a plenty of died patients.

There are findings that are classified as neutral by sentiment analysis. These findings are based on the score of sentiment analysis resulting range between 0.50 to 0.59. They are categorized as neutral sentiment (see Table 3).

Table 3. The overview of SA categorization

Range	Sentiment
0.00 - 0.49	Negative
0.50 - 0.59	Neutral
0.60 - 1.00	Positive

AA in Extracting words into bipolar meaning.
On the other hand, the SA are from words that are important elements to construct clauses, sentences, and higher language units so that ideas are expressed. This makes words as linguistic resource that needs linguistic treatment in order to get the final goal. That is for creating meanings.

The analysis involves the researchers in making meaning whether the words that are classified in positive and negative. The researchers complement SA findings (see Figure 1) with AA classification. The words are the bases of understanding which are positive and negative. As lexis, the meanings of those words are grounded in vocabulary. The words are then classified into three main categories: affect, judgement, and

appreciation for getting the relevant views. Those categories have subcategories adjusting positive and negative views. Affect includes desire (des), un/happiness (hap), in/security (sec), dis/satisfaction (sat). Judgement refers normality (norm), capacity (cap), tenacity (ten), veracity (ver), and propriety (prop). Appreciation provides reaction (reac), composition (comp), and valuation (val). Those subcategories are then completed by + or - sign.

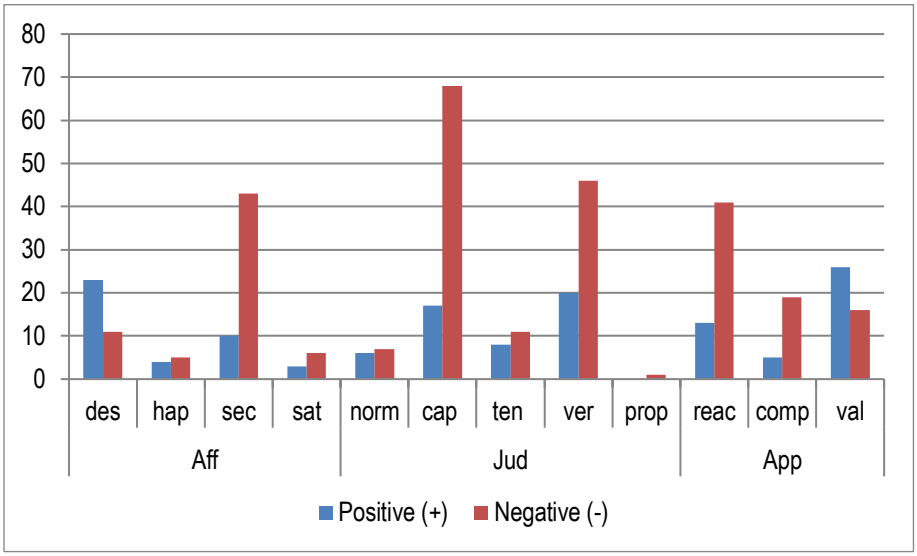

Figure 3: The AA findings

Note

Aff : affect	Jud : judgement	App : appreciation
des : desire	norm : normaliry	reac : reaction
hap : happiness	cap : capacity	comp : composition
sec : security	ten : tenacity	val : valuation
sat : satisfaction	ver : veracity	
prop: propriety		

Figure 3 shows that the news mostly highlights -cap towards Omicron reports. The words that are the bases of classifying -cap such as *increase, detect, transmission, move, lockdown*. The researchers find the issues focusing on -cap including the capacity of Omicron variant, mitigation, and government along with its policy.

(1) Alert, 5 Batam residents *are attacked* by Omicron with a history of traveling out of the area.

(suara.com 27/01/2022)

(2) Deputy Governor Riza: DKI Jakarta is ready to *fight against* Omicron

(merdeka.com 17/01/2022)

The headline (1) is an example of reflecting negative view towards Omicron. It was reported that Omicron has capacity to attack the residents. The capacity values negative (-cap) because its ability to infect people. The headline (2) shows +cap. It exemplifies the capability of fighting Omicron. The comparison above gives people understanding what capacities are happening and interpret which positive and negative.

Negative attitudes that rise in Omicron variant news include the perspective of finding or clarifying truth, veracity (-ver); insecurity (-sec); and reaction (-reac).

(3) *Hoax*! Omicron is claimed to be the end of the times.

(okezone.com 19/01/2022)

(4) Nadiem about PTM in the middle of Omicron: Rules for SKB 4 Ministers Accommodating *Emergency* Covid-19.

(merdeka.com 17/01/2022)

(5) Omicron *rampant*, off the jacket consumed before entering the house!

(okezone.com 26/01/2022)

The headlines (3), (4), and (5) provide the examples of -ver, -sec, and -reac. Respectively, they are classified in judgement, affect, and appreciation. These data illustrate Omicron as a virus variant that influence people's belief, unexpected situation, and overspreading thing.

There are some reflecting words expressed by people and Indonesian official in handling Omicron. They are +des and +val that connect with positive desire and valuation. These ways arise hope to control the virus.

(6) Reflecting on the Omicron case in Africa, the government *was asked* to accelerate booster vaccination.

(merdeka.com 30/01/2022)

(7) Minister of Health: Production of Early Detection Tool Omicron *Completed* End of January.

(antaranews.com 18/01/2022)

Positive views towards Omicron issue are dominated by desire of handling the case. Text (6) is the example of news title reflecting +des. It was expressed by behavior and word such as *prevent, learn, appeal*, and *ask*.

Besides (7), +val grades Omicron as the case requiring and prepared for better treatment (e.g. *evaluation, will evaluate*). Along with collecting data that was done in beginning of 2022, Omicron was viewed in stable condition. This virus variant was not as high as Delta. It is written in words like *lower, not dangerous*, and *not as bad as* (like Delta). +val is also expressed for valuating pandemic needs (e.g. vaccine and booster are *more effective*, mask is *powerful* for preventing virus).

Discussion

Among big quantity of data from texts, SA is the option to extract them into parts. This extraction is then classified by SA for getting mood. Supported by machine learning, analyzing sentiment requires numerical data to be trained and for getting prediction (Costola et al. 2020). As the result, SA offers mitigation to handle overload information so that it shows information for next decision by reliable data. That is why SA is a decision-making system by considering textual data expressing opinions, emotion, and sentiment (Puschmann & Powell 2018).

Positive and negative findings of SA can be considered for deciding policies by government and related stakeholders. They can use SA findings to select which are their priorities. However, the involvement of machine in SA sometimes shows misinterpretation to particular words. This finding enhances the importance of involving AA to straighten this problem since words are language units as the main object of linguistic study.

Contextual meaning problem by SA

Shown in Table 2, some words indicating virus trend (e.g. *high, increase*), transmission (e.g. *expose, positive*), infection (e.g. *delta, patient, symptom, covid*) and treatment (e.g. *isoman* – English: *self-isolation)* are classified positive (+) by SA. Those words are meant on the contrary by AA. Those mentioned words are inacceptable positively by human language when they are in the context of health problem. For example, the word *high* and *increase* may be positive by other domains in society but it is anxiousness in the case of virus spreading. In other issue, the word *patient* may be meant positively by SA as 'good attitude' whereas it should be 'the infected person'.

Studying neutral SA findings

There are many words classified by SA as neutral (0). In the perspective of AA, positive and negative word meanings contain there. This may be the reason why the numbers are different between SA and AA. Neutral findings in SA contribute in the high number of negative AA if those words are extracted to AA. Positive SA is not affected; even it is reduced in number because of the correction as explained in 3b above.

Conclusion

By comparing the findings of SA and AA concerning on the rise of Covid-19's Omicron variant in Indonesia, the researchers have found some essentials. SA model applied in this research has 70.36% accuracy level so that it is possible to result bias in the topic modelling. This happens because there is possibility of false positive and false negative on the SA's results. In order to handle this problem, AA is the alternative of complementing SA and correcting the bias. SA is recommended to handle massive information and classify it in order to get relevant policy quickly. AA applies more on long-term use to do deep analysis on the word meanings. Both treat words. It is relevant to handle them as language unit in getting meanings that are acceptable for humans while they are applicably managed by computerized system.

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