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SENTIMENT ANALYSIS ON THE PERMENDIKBUD CONCERN PREVENTION AND TREATMENT OF SEXUAL VIOLENCE IN HIGHER EDUCATIONAL ENVIRONMENTS USING SUPPORT VECTOR MACHINE (SVM)

Reinhard Alfaries Saemani [1], Nina Setiyawati[2*]

Informatics Engineering Study Program
Universitas Kristen Satya Wacana, Salatiga, Jawa Tengah
https://uksw.edu
672016104@student.uksw.edu[1], nina.setiyawati@uksw.edu[2]

(*) Corresponding Author

Abstract— Social media is no longer a foreign thing for people in today's technological era, one of the social media that is often used is Twitter. Twitter is used to communicate with other people and Twitter users can also give each other opinions on an issue. By involving 1252 Tweets, this study aimed to use the Support Vector Machine (SVM) algorithm on Tweet data. The processes carried out in this research are crawling, cleaning, translating, labelling, tokenizing, stop words, stemming, SVM classification. The results showed that the accuracy level of using the SVM algorithm after the param grid was 80.3% using the parameter C = 10; gamma = 0.1; and kernel = RBF as a benchmark in the classification process. This shows that the classification process using the SVM algorithm is quite accurate.

Keywords: sentiment analysis, permendikbud, ppks, support vector machine, svm, twitter

Abstrak— *Media sosial bukan lagi hal yang asing bagi masyarakat di era teknologi sekarang ini, salah satu media sosial yang sering digunakan adalah Twitter. Twitter digunakan untuk saling berkomunikasi dengan orang lain dan para Twitter juga bisa saling memberikan opini kepada suatu isu. Dengan melibatkan 1252 Tweet, penelitian ini bertujuan untuk melakukan analisis sentimen terhadap Permendikbud Sentimen Pencegahan dan Penanganan Kekerasan Seksual di Lingkungan Perguruan Tinggi (PPKS) menggunakan algoritma Support Vector Machine (SVM) pada data tweet. Adapun proses yang dilakukan dalam penelitian adalah crawling, cleaning, translate, labeling, tokenizing, stop words, stemming, klasifikasi SVM .Hasil penelitian menunjukkan tingkat akurasi dari penggunaan algoritma SVM ini setelah dilakukan grid param adalah 80,3% dengan menggunakan parameter C = 10; gamma = 0,1; dan kernel = rbf sebagai tolak ukur dalam proses klasifikasi. Hal ini menunjukkan bahwa proses klasifikasi menggunakan algoritma SVM ini cukup akurat.*

Kata Kunci*: : permendikbud ppks, support vector machine, svm, twitter*

INTRODUCTION

At present, most people have used social media to interact with each other and used to express opinions, one of which is Twitter. Currently, Twitter is one of the most popular social media out of 17 social media as of October 2021 with a total of 463 million users worldwide. [1]. Therefore, especially during the Covid-19 pandemic, it can be said that Twitter is a good source for investigating and conveying public opinion [2], [3] Twitter users can create tweets that will then be shared publicly. Through this tweet, Twitter users can interact with each other and express opinions. Tweets can also represent an opinion on a product, a political issue, a country's regulations, and so on.

In Indonesia, Twitter users reached 17.55 million as of October 2021, so it ranks sixth in the world [4]. Twitter users in Indonesia tend to focus on topical comments regarding their feelings [5]. In terms of expressing opinions, Twitter users in Indonesia are more focused on trending topics. One of the topics that are currently being discussed in November 2021 is a regulation made by the Ministry of Education, Culture, Research and Technology (Kemendikbud Ristek) regarding the Prevention and Handling of Sexual Violence in Higher Education (Permendikbud PPKS). This regulation made by the Ministry of Education and

Culture has become controversial among the public. The cause of the topic is controversial is that, implicitly, The Ministry of Education and Culture seems to allow sex in a college environment[6]. This controversial opinion developed because of the process of spreading with the use of language in which language can build and destroy one's cognition and psychology as well as the construction of heterodox. [7], [8] The use of language on Twitter can show the expression of feelings and opinions which of course are spread online. In addition to expressing feelings and opinions, social media such as Twitter can also disseminate certain attitudes and behaviours, for example in terms of disseminating government actions in handling emergency response and preventive behaviour. [9], [10].

Sentiment analysis on social media such as Twitter becomes a very important and challenging task due to the characteristics of the data, length of tweets, misspellings, abbreviations, and special characters. [11] so that the basic idea of the approach taken to analyze these characteristics is mediated by an approach to combine several machines learning to make several classifications of emotions in the behaviour of social media users. [12]. Classification is done using the SVM method to get the final result of the build system. SVM is a classification method with the principle of finding the hyperplane that has the largest margin. The hyperplane is a line that separates data between classes or categories. While the margin is the distance between the hyperplane and the closest available data in each class, while the data closest to the hyperplane is called the support vector [13].

Several methods can be used in sentiment analysis on social media such as SVM, Nave Bayes, Decision tree, K-Nearest Neighbor (K-NN), and the like. These methods certainly have different levels of accuracy in analyzing text and image data in social media. The difference in the level of accuracy could be caused by several things such as the involvement of emoji, the popularity of social media, and post-processing by adding specific knowledge [14]–[16].

The current research focuses on the use of the SVM algorithm by involving information data on the Permendikbud trending topic. Sentiment analysis using the SVM algorithm is a model derived from statistical learning theory that gives better results than other methods [17].

MATERIALS AND METHODS

The current research involves 1252 Tweets sourced from responses related to the topic of Permendikbud PPKS number 30 of 2021.

Several stages are carried out to carry out the analysis to provide maximum results.

1. Data collection (*crawling data)*

   The first stage in this sentiment analysis is data crawling (collecting data). At this stage, the tweet will be pulled from Twitter so that the data collected will become a dataset that has been labelled.
2. Prior process (*Pre-processing)*

The second stage is pre-processing. The dataset that has been collected will be processed first before being classified. At this stage the dataset will be carried out:

a. *Cleaning* data, to get rid of unnecessary characters.
b. *Translating* data, that is to translate the language.
c. *Labelling* data, i.e. to put a positive, negative, or neutral label on a tweet.
d. *Tokenizing,* that is dividing words in a sentence.
e. *Stopping words* is to filter and save the important words.
f. *Stemming,* i.e. changing a word to its basic form.
g. *Clouding words,* which is a visualization of each word that occurs most often.

3. Classificatingi *SVM* (*Classification)*

After pre-processing, then the data will be tested using the SVM algorithm to get the accuracy of the classification made by SVM.

RESULTS AND DISCUSSION

This study aims to determine the sentiment analysis on opinions about the PPKS Permendikbud made by the Ministry of Education and Culture through Twitter which will then be classified to separate the different classes. The flow in this study can be seen in Figure 1.

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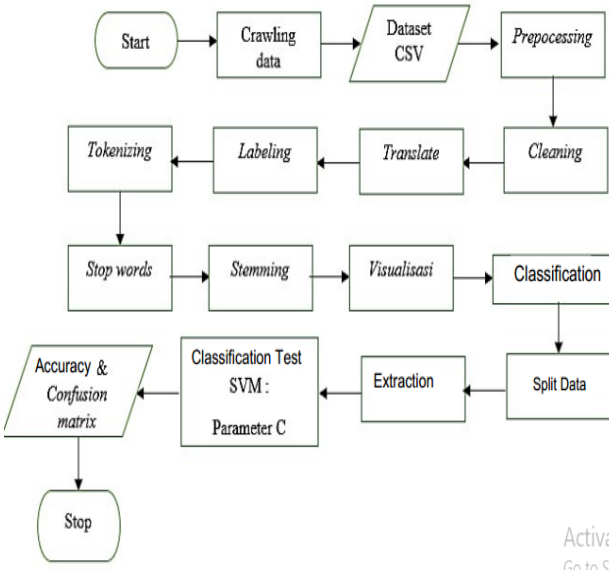

Figure 1. Research Flowchart

1. *Crawling data*

In this study, the data taken is a review of the PPKS Permendikbud with the keyword on Twitter, namely #Permendikbud30. At this stage, the opinions given from Twitter users will be crawled using the Twitter API to retrieve tweets which are then collected into a single dataset with the number of tweets taken being 1252 Tweets as shown in Table 1.

Table 1. Permendikbud Dataset

Date	Username	Tweet
14/12/20 21 05:53	#WE CARE FOR NKRI	Gilee... gilee! *[crazy... crazy...!]* because based on consensual, it makes the punishment lighter, so remember the Minister of Education and Culture?! How about the side of justice for her adulterous husband? Is it in line with the positive law/KUHP article 284 that the punishment is for adultery with someone's wife? ™??
14/12/20 21 05:50	Achmad Kusnanto	Ini sebenarnya yg dikhawatirkan.... Makanya ulama menolak Permendikbud yg kemarin *[This is actually what they are worried about.... That's why the Ulama rejected the previous Permendikbud]*
14/12/20 21 05:09	KOMAHI FISIP UNRI	The inspection team has also been carried out by the ministry, what are the results? is there "flirting" too? We are waiting for your promise, UNRI is the first case after Permendikbud No. 30 was ratified, but until now there has been no firm action by the campus or from the Ministry of Education and Culture.
14/12/20 21 05:03	Umrdyntt. O	@abdulaziz_hfr Assalamu'alaikum Warahmatullahi Wabarakatuh, I'm Umar Ardhiyanto with NIM 212121165, HKI Class 1 E Permission to express my opinion. I agree with the regulation of the Minister of Education and Culture, Research and Technology NO. 30 this year 2021.
14/12/20 21 04:49	Frisca Rahesha	@abdulaziz_hfr I think that related to Permendikbud Number 30 of 2021 is one of the right policies to protect victims because so far there is no clear law on sexual violence.

2. *Pre-processing*

In the pre-processing stage, cleaning, translating, labelling, tokenizing, stopping words, steaming, and clouding words were carried out on the data.

a. *Cleaning*

This data cleaning process, as shown in the example Table 2, is intended to remove characters, symbols, or links attached to words.

Table 2. Cleaning Data Results

tweet_clean
because based on consensual it makes the punishment lighter so remember the minister of education and culture how about the side of justice for her adulterous husband is it in line with the positive law KUHP article that the punishment is for adultery someone's wife
Ini sebenarnya yg dikhawatirkan... Makanya ulama menolak Permendikbud yg kemarin *[This is actually what they are worried about... That's why the Ulama rejected the previous Permendikbud]*
the inspection team has also been carried out by the ministry what are the results is there flirting too we are waiting for your promise UNRI is the first case after Permendikbud no was ratified but until now there has been no firm action by the campus or from the ministry of education and culture
assalamualaikum warahmatullahi wabarakatuh I'm Umar Ardhiyanto with NIM HKI class e permission to express my opinion I agree with the regulation of the minister of education and culture research and technology no this year

b. Translating data

Translating data to translate a language such as Indonesian to English. This is done because there are still some tweets that are still in Indonesian, which can be seen in Table 3, the results of the translation process on tweets.

Table 3. Translating Data Results

tweet translation

because based on consensual it makes the punishment lighter so remember the minister of education and culture how about the side of justice for her adulterous husband is it in line with the positive law KUHP article that the punishment is for adultery someone's wife
This is actually what I'm worried about, that's why the ulama rejected the previous Minister of Education and Culture
the inspection team has also been carried out by the ministry what are the results is there flirting too we are waiting for your promise UNRI is the first case after Permendikbud no was ratified but until now there has been no firm action by the campus or from the ministry of education and culture
assalamualaikum warahmatullahi wabarakatuh I'm Umar Ardhiyanto with NIM HKI class e permission to express my opinion I agree with the regulation of the minister of education and culture research and technology no this year
I think that related to Permendikbud number of is one of the right policies to protect victims because so far there is no clear law on sexual violence

c. Labelling

This data labelling aims to provide positive, negative, and neutral sentiments based on the polarity of each tweet with a positive polarity rating (> 0); neutral (== 0); negative (< 0) can be seen in Table 4.

Table 4. Labelling Data Results

tweet_translating	Polarity	Sentiment
because based on consensual it makes the punishment lighter so remember the minister of education and culture how about the side of justice for her adulterous husband is it in line with the positive law KUHP article that the punishment is for adultery someone's wife	0,227272727	positive
This is actually what I'm worried about, that's why the ulema rejected the previous Minister of Education and Culture	-0,083333333	negative
assalamualaikum warahmatullahi wabarakatuh I'm Umar Ardhiyanto with NIM HKI class e permission to express my opinion I agree with the regulation of the minister of education and culture research and technology no this year	0	neutral

d. Tokenizing

Tokenizing is dividing words in a sentence as shown in Table 5.

Table 5. Tokenizing Data Results

tweet_tokenizing
['because', 'on', 'the', 'basis', 'of', 'consensual', 'it', 'makes', 'the', 'punishment', 'lighter', 'so', 'remember', 'the', 'minister', 'of', 'education', 'and', 'culture', 'how', 'about', 'the', 'side', 'of', 'justice', 'for', 'her', 'adulterous', 'husband', 'is', 'it', 'in', 'line', 'with', 'the', 'positive', 'lawkuhp', 'article', 'that', 'the', 'punishment', 'is', 'for', 'adultery', 'someones', 'wife']
['This', 'is', 'actually', 'what', 'I', '"m", 'worried', 'about', ',', 'that', '"s", 'why', 'the', 'ulema', 'rejected', 'the', 'previous', 'Minister', 'of', 'Education', 'and', 'Culture']
['the', 'inspection', 'team', 'has', 'also', 'been', 'carried', 'out', 'by', 'the', 'ministry', 'what', 'are', 'the', 'results', 'is', 'there', 'flirting', 'too', 'we', 'are', 'waiting', 'for', 'your', 'promise', 'unri', 'is', 'the', 'first', 'case', 'after', 'permendikbud', 'no', 'was', 'ratified', 'but', 'until', 'now', 'there', 'has', 'been', 'no', 'firm', 'action', 'by', 'the', 'campus', 'or', 'from', 'the', 'ministry', 'of', 'education', 'and', 'culture']
['assalamualaikum', 'warahmatullahi', 'wabarakatuh', 'im', 'umar', 'ardhiyanto', 'with', 'nim', 'hki', 'class', 'e', 'permission', 'to', 'express', 'my', 'opinion', 'I', 'agree', 'with', 'the', 'regulation', 'of', 'the', 'minister', 'of', 'education', 'and', 'culture', 'research', 'and', 'technology', 'no', 'this', 'year']
['I', 'think', 'that', 'related', 'to', 'Permendikbud', 'number', 'of', 'is', 'one', 'of', 'the', 'right', 'policies', 'to', 'protect', 'victims', 'because', 'so', 'far', 'there', 'is', 'no', 'clear', 'law', 'on', 'sexual', 'violence']

e. Stopping words

Stopping words is to filter and save words that are important or discard words that are not meaningful as in Table 6.

Table 6. Stopping Words Results

tweet_stopping words
basis consensual make punishment lighter remember minister education culture side justice adulterous husband line positive law KUHP article punishment adultery someone's wife
This worry Ulama reject previous Minister Education Culture
the inspection team also carry ministry result flirt wait promise UNRI first case Permendikbud ratify firm action campus ministry education culture
assalamualaikum warahmatullahi wabarakatuh umar ardhiyanto nim hki class permission express opinion agree regulation minister education culture research technology year
think relate Permendikbud number one right policy protects victims far clear law sexual violence
several legal frameworks well policies often discuss major issue sexual violence law elimination sexual violence PKS also Permendikbud prevent address sexual violence higher education institutions
understand PKS reject Permendikbud regard sexual violence ushul fiqh via

f. *Stemming*

Stemming is changing a word to its basic form as shown in Table 7.

Table 7. Stemming Data Results

tweet_stemming
basis consensual make punish lighter remember ministry education culture side justice adultery husband

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line posit law KUHP article punish adultery someone's wife
this actual worried Ulama reject previous ministry education culture
inspect team also carry ministry result flirt wait promise UNRI first case Permendikbud ratify firm action campus ministry Educ culture
assalamualaikum warahmatullahi wabarakatuh umar ardhiyanto nim hki class permiss express opinion agree regul minist educ culture research technology year
think rectify Permendikbud number one right policy protect victim far clear law sexual violence
sever legal framework well policy often discuss major issue sexual violence law eliminate sexual violence pk also Permendikbud prevent address sexual violence higher Educ Institut
understand pk reject Permendikbud regard sexual violence ushul fiqh via

g. *Clouding Words*

Clouding words is a visualization of each word that appears most often.

- Clouding words of positive sentiment totalling 753 tweets as shown in Figure 2.

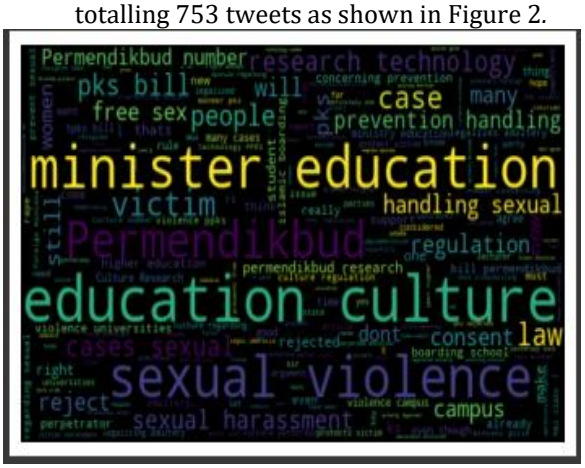

Figure 2. Positive Word Clouding

- Clouding words of negative sentiment totalling 173 tweets which can be seen in Figure 3.

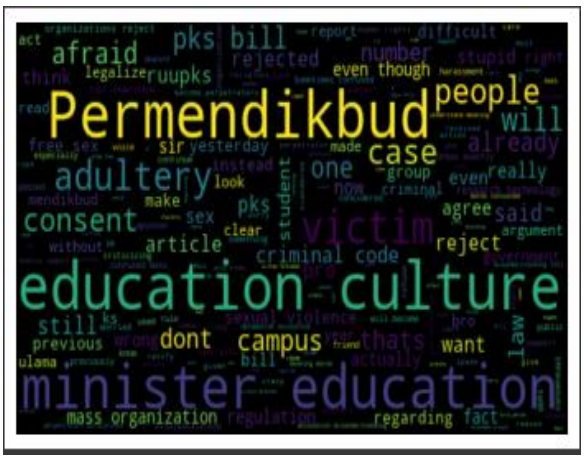

Figure 3. Negative Word Clouding

- Neutral sentiment clouding words totalling 326 tweets as shown in Figure 4.

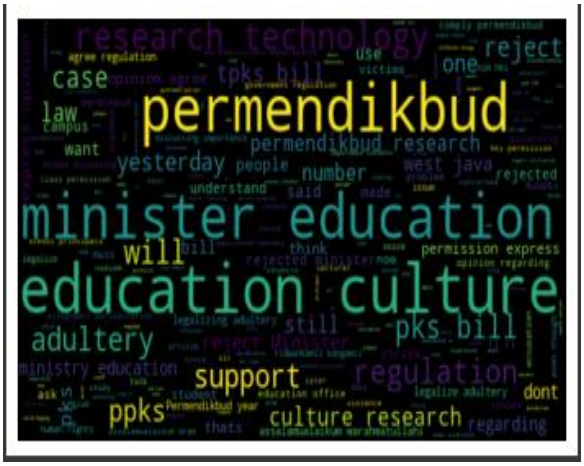

Figure 4. Neutral Word Clouding

3. *Classification*

At the data classification stage, the data will first be divided into 2, namely 20% training data and 80% testing data. Training data is used to create a model that will be used for testing data to classify then data testing.

a. The "C" Parameter

The classification process uses the C parameter, namely to avoid errors in the classification process, so to avoid small errors in the classification process, the selected C parameter must also be small with a large level of accuracy as in Table 8 by selecting C parameter of 0.75 with an accuracy level of 0.805 or 80.5%.

Table 8. The C Parameter Accuracy

C	Accuracy	Persentage (%)
0.01	0.76	76%
0.05	0.78	78%
0.25	0.8	80%
0.5	0.8	80%
0.75	0.805	80,5%
1	0.8	80%

Table 9. Confusion Matrix

	Negative	Neutral	Positive	*Class Precision*
Negative Prediction	21	6	10	68%
Neutral Prediction	2	45	6	65%
Positive Prediction	8	18	135	89%
Class Recalling	57%	85%	84%	

Table 10. Performance Evolution

Criteria	*Micro Average*
Weight Average Precision	81%
Weight Average Recall	80%
Accuracy	80%
Macro Average Precision	74%
Macro Average Recall	75%

In the test data using the parameter C = 0.75 in the SVM classification process, it shows the level of accuracy obtained is 80% which can be seen in Table 9 and 10.

b. *Grid param*

The param grid is used to determine the best parameters and accuracy so that the classification obtained is more accurate. The results of the analysis after the param grid shows the best level of accuracy obtained using the SVM algorithm is 80.3%. This is due to the C parameter = 10; gamma = 0.1; and kernel = RBF which is used to overcome or minimize errors and as a benchmark in the classification process so that the accuracy obtained is quite high. Empirically, the use of the SVM algorithm can be said to be more ideal than other algorithms both in terms of the number of classes [18] as well as in terms of the distribution of the ratio of training data and testing data [19]–[21]

CONCLUSION

From the results of the sentiment analysis of the Minister of Education and Culture on the prevention and handling of sexual violence in the university environment, the responses given were dominantly positive. This can be proven by using the SVM Algorithm which can be used in classifying sentiment analysis. The level of accuracy of using this SVM algorithm after the param grid is done is 80.3% using the parameter C = 10; gamma = 0.1; and kernel = RBF as a benchmark in the classification process. This shows that the classification process using the SVM algorithm is quite accurate. However, the pre-processing and classification stages certainly cannot be ignored because they are part of the analysis stage.

REFERENCE

[1] Statista.com, "Most popular social networks worldwide as of October 2021, ranked by some active users," *Statista*, 2021. https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/.

[2] Z. Bokaee Nezhad and M. A. Deihimi, "Twitter sentiment analysis from Iran about COVID 19 vaccine," *Diabetes Metab. Syndr. Clin. Res. Rev.*, vol. 16, no. 1, p. 102367, 2021, doi: 10.1016/j.dsx.2021.102367.

[3] M. Perez-Cepeda and L. G. Arias-Bolzmann, "Sociocultural factors during COVID-19 pandemic: Information consumption on Twitter," *J. Bus. Res.*, no. xxxx, 2021, doi: 10.1016/j.jbusres.2021.11.008.

[4] Statita.com, "Statista.com," *Leading countries based on some Twitter users as of October 2021*, 2021. https://www.statista.com/statistics/242606/number-of-active-twitter-users-in-selected-countries/ (accessed Dec. 12, 2021).

[5] D. S. Utami and A. Erfina, "Analisis Sentimen Pinjaman Online Di Twitter Menggunakan Algoritma Support Vector Machine (Svm) [Online Loan Sentiment Analysis on Twitter Using the Support Vector Machine (Svm) Algorithm]," *Semin. Nas. Sist. Inf. ...*, pp. 299–305, 2021, [Online]. Available: https://sismatik.nusaputra.ac.id/index.php/sismatik/article/view/34.

[6] B. Amal, U. Nahdlatul, U. Indonesia, and K. J. Pusat, "Tinjauan Hukum Terhadap Frasa 'Tanpa Persetujuan Korban' dalam Permendikbud Nomor 30 Tahun 2021 Tentang," *J. CREPIDO J. Mengenai Dasar-Dasar Pemikir. Huk. Filsafat dan Ilmu Huk.* [Legal Review of the phrase 'Without the Victim's Consent' in Permendikbud Number 30 of 2021 concerning," J. CREPIDO J. Regarding the Basics of Thinking. Philosophical Law and Legal Studies], vol. 03, no. November, pp. 86–95, 2021, doi: https://doi.org/10.14710/crepido.3.2.86-95.

[7] N. Lustyantie & F. Arung, *Pembelajaran Inovatif Bahasa dan Sastra: Mengembalikan Prinsip Bahasa dan Sastra sebagai Cara Berpikir Inovatif* [Innovative Language and Literature Learning: Bringing Back the Principles of Language and Literature as an Innovative Way of Thinking]. Yogyakarta: Penerbit Deepublish, 2020.

[8] M. Alam, "Reconstructing anti-capitalism as heterodoxa in Indonesia's youth-led urban environmentalism Twitter account," *Geoforum*, vol. 114, pp. 151–158, 2020, doi: 10.1016/j.geoforum.2020.06.005.

[9] A. R. Rahmanti, D. N. A. Ningrum, L. Lazuardi, H. C. Yang, and Y. C. Li, "Social Media Data Analytics for Outbreak Risk Communication: Public Attention on the 'New Normal' During the COVID-19 Pandemic in Indonesia," *Comput. Methods Programs Biomed.*, vol. 205, p. 106083, 2021, doi: 10.1016/j.cmpb.2021.106083.

VOL. 8. NO. 1 AUGUST 2022
P-ISSN: 2685-8223 | E-ISSN: 2527-4864
DOI: 10.33480/jitk.v8i1.2807

[10] P. L. Liu, "COVID-19 information on social media and preventive behaviours: Managing the pandemic through personal responsibility," *Soc. Sci. Med.*, vol. 277, p. 113928, 2021, doi: 10.1016/j.socscimed.2021.113928.

[11] A. S. M. Alharbi and E. de Doncker, "Twitter sentiment analysis with a deep neural network: An enhanced approach using user behavioural information," *Cogn. Syst. Res.*, vol. 54, pp. 50–61, 2019, doi: 10.1016/j.cogsys.2018.10.001.

[12] H. Li, Q. Chen, Z. Zhong, R. Gong, and G. Han, "E-word of mouth sentiment analysis for user behaviour studies," *Inf. Process. Manag.*, vol. 59, no. 1, p. 102784, 2022, doi: 10.1016/j.ipm.2021.102784.

[13] H. N. Irmanda and Ria Astriratma, "Klasifikasi Jenis Pantun Dengan Metode Support Vector Machines (SVM) [Classification of Poem Types Using Support Vector Machines (SVM) Method]," *J. RESTI (Rekayasa Sist. dan Teknol. Informasi)*, vol. 4, no. 5, pp. 915–922, 2020, doi: 10.29207/resti.v4i5.2313.

[14] C. Liu *et al.*, "Improving sentiment analysis accuracy with emoji embedding," *J. Saf. Sci. Resil.*, vol. 2, pp. 246–252, 2021, doi: 10.1016/j.jnlssr.2021.10.003.

[15] K. Chakraborty, S. Bhatia, S. Bhattacharyya, J. Platos, R. Bag, and A. E. Hassanien, "Sentiment Analysis of COVID-19 tweets by Deep Learning Classifiers—A study to show how popularity is affecting accuracy in social media," *Appl. Soft Comput. J.*, vol. 97, p. 106754, 2020, doi: 10.1016/j.asoc.2020.106754.

[16] V. García-Díaz, J. P. Espada, R. G. Crespo, B. C. Pelayo G-Bustelo, and J. M. Cueva Lovelle, "An approach to improve the accuracy of probabilistic classifiers for decision support systems in sentiment analysis," *Appl. Soft Comput. J.*, vol. 67, pp. 822–833, 2018, doi: 10.1016/j.asoc.2017.05.038.

[17] D. Darwis, E. S. Pratiwi, and A. F. O. Pasaribu, "Penerapan Algoritma Svm Untuk Analisis Sentimen Pada Data Twitter Komisi Pemberantasan Korupsi Republik Indonesia [Application of the Svm Algorithm for Sentiment Analysis on Twitter Data of the Corruption Eradication Commission of the Republic of Indonesia]," *Edutic - Sci. J. Informatics Educ.*, vol. 7, no. 1, pp. 1–11, 2020, doi: 10.21107/edutic.v7i1.8779.

[18] D. Alita, Y. Fernando, and H. Sulistiani, "Implementasi Algoritma Multiclass Svm Pada Opini Publik Berbahasa Indonesia Di Twitter [Implementation of the Svm Multiclass Algorithm in Indonesian Public Opinion on Twitter]," *J. Tekno Kompak*, vol. 14, no. 2, pp. 86–91, 2020, doi: 10.33365/jtk.v14i2.792.

[19] F. F. Irfani, "Analisis Sentimen Review Aplikasi Ruangguru Menggunakan Algoritma Support Vector Machine [Sentiment Analysis of Ruangguru Application Review Using Support Vector Machine Algorithm]," *JBMI (Jurnal Bisnis, Manajemen, dan Inform.*, vol. 16, no. 3, pp. 258–266, 2020, doi: 10.26487/jbmi.v16i3.8607.

[20] U. Rofiqoh, R. S. Perdana, and M. A. Fauzi, "Analisis Sentimen Tingkat Kepuasan Pengguna Penyedia Layanan Telekomunikasi Seluler Indonesia Pada Twitter dengan Metode Support Vector Machine dan Lexicon Based Features Twitter event detection View project Human Detection and Tracking View project [Sentiment Analysis of User Satisfaction Level of Indonesian Cellular Telecommunication Service Providers on Twitter with Support Vector Machine and Lexicon Based Features Twitter event detection View project Human Detection and Tracking View project]," *J. Pengemb. Teknol. Inf. dan Ilmu Komput.*, vol. 1, no. 12, pp. 1725–1732, 2017, [Online]. Available: https://www.researchgate.net/publication/320234928.

[21] R. S. P. Wanda Athira Luqyana, Imam Cholissodin, "Analisis Sentimen Cyberbullying Pada Komentar Instagram dengan Metode Klasifikasi Support Vector Machine [Analysis of Cyberbullying Sentiments on Instagram Comments with the Support Vector Machine Classification Method]," *J. Pengemb. Teknol. Inf. dan Ilmu Komput. Univ. Brawijaya*, vol. 2, no. 11, pp. 4704–4713, 2018, [Online]. Available: https://j-ptiik.ub.ac.id/index.php/j-ptiik/article/view/3051.