INTENSIF, Vol.6 No.1 February 2022
ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

Framework for Analyzing Netizen Opinions on BPJS Using Sentiment Analysis and Social Network Analysis (SNA)

Received:
20 April 2021
Accepted:
28 January 2022
Published:
11 February 2022

[1*]M. Khairul Anam, [2]Muhammad Ihza Mahendra, [3]Wirta Agustin, [4]Rahmaddeni, [5]Nurjayadi
[1,3,4,5] STMIK Amik Riau
[2] Telkom University
E-mail: [1]khairulanam@sar.ac.id, [2]ihzamuhammad46@gmail.com, [3]wirtaagustin@stmik-amik-riau.ac.id, [4]rahmaddeni@sar.ac.id, [5]nurjayadi@sar.ac.id
*Corresponding Author

Abstract—The Social Security Administrative Body is a legal entity established to administer social security programs. News about BPJS policies is often found online and social media that has received responses from netizens as a form of public opinion on the policy. One of them is the opinion of netizens on social media Twitter. Ideas can be positive, neutral, or negative. These opinions are processed using the Support Vector Machine (SVM) method, in some SVM studies still getting unsatisfactory results, with rates below 60%. For this reason, it is necessary to have feature selection or a combination with the other methods to obtain higher accuracy. To see the actors who influence the opinion of netizens on the topic of BPJS, the Social Network Analysis (SNA) method is used. Based on the SVM Method's test results, the best accuracy results are obtained in combining the SVM Method with Adaboost, with an accuracy rate of 92%. Compared to the pure SVM method by 91%, the Combination of SVM Particle Swarm Optimization (PSO) by 87% and SVM using Feature Selection Genetic Algorithm (GA) by 86%.

Keywords— SVM; SNA; Feature Selection; BPJS; Combination

Corresponding Author:

M. Khairul Anam,
STMIK Amik Riau,
Email: khairulanam@sar.ac.id

INTENSIF, Vol.6 No.1 February 2022
ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

I. INTRODUCTION

The Social Security Administrative Body, Penyelenggara Jaminan Sosial (BPJS), is an agency that handles problems for the users of both BPJS Kesehatan (Health Security Administrative Body) and BPJS Ketenagakerjaan (Labor Security Administrative Body). BPJS Kesehatan is the development of PT Askes (Persero) in 2011. The state is present through the National Health Insurance – Indonesian Health Cards (Jaminan Kesehatan National-Kartu Indonesia Sehat, abbreviated as JKN-KIS). The program organized by BPJS Kesehatan among its people ensures that all Indonesian citizens are protected by comprehensive, fair, and even health insurance [1]. Meanwhile, BPJS Ketenagakerjaan is a development of PT Jamsostek (Persero) in 2011. The BPJS Ketenagakerjaan program provides benefits to workers and employers and makes an essential contribution to increasing the nation's economic growth and the welfare of the Indonesian people [2]. News related to BPJS is widely available in online media such as detik.com, kompas.com, and liputen6.com. The news concerning the BPJS received mixed responses from netizens posted in comments on online social media platforms such as Twitter, Facebook, and Instagram [3]. Statements given by netizens are positive, negative, and neutral towards the policies issued by the BPJS.

The role of netizens in commenting on online media is a form of public opinion on policy. A statement is a form of participation by netizens on news or issues that develop both online and offline. Participation done online is commonly called E-participation, which several countries use to make policies [4]. Social media is one of the places where e-participation is formed, from providing support to criticizing it on social media [5]. Previous studies related to BPJS have been conducted, concerning sentiment analysis and social network analysis (SNA), including studies [6][7] that showed a sentiment analysis of the increase in BPJS contribution fees. Furthermore, a study also conducted [8] an analysis of the increase in BPJS contribution fees using SNA with Drone Emprit. Apart from the problem of increasing BPJS contribution fees, other researchers also conducted a sentiment analysis on BPJS services [9][10]. These studies have only discussed the increase in BPJS contribution fees or its service to BPJS users by applying one method.

This study uses tweets taken on Twitter by using the Drone Emprit Academy. This data tweet was processed using two stages. The first stage is to conduct sentiment analysis using Support vector machines (SVM). SVM is used because it produces a fairly good accuracy in several studies [11][12][13]. Sentiment analysis research using SVM [14] conducted several experiments in analyzing by. U. It is resulting in an accuracy value above 83%. Then another study [15] resulted in an accuracy of 93.65%. However, there are several studies that produce an accuracy of less than 80%, including 53.88% [11], 79,67% [16], and 67,83% [17]. From previous

ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

research, this research will combine the SVM method with the other methods or add feature selection to produce an accuracy above 80%. SVM is often combined with the other methods or added with feature selection such as GA-SVM (Genetic Algorithm and SVM) [18], SVM + IG (SVM and Information Gain) [19], a combination of SVM PSO (SVM With Particle Swarm Optimization) [20], combination of XGBSVM (SVM and XGBoost) [21], combination of RF + SVM (Random Forest dan SVM) [22][23], and combination of AdaBoost + SVM [24]. This study will perform a combination of SVM PSO, AdaBoost + SVM, and the SVM using the GA feature selection to increase the accuracy generated by SVM.

The second stage was looking for the relationship between one entity unit and other entity units with the help of graph theory [25][26][27]. The SNA method was chosen because this study required a technique. It can provide an image or visualization in the network according to the data that has been preprocessed. This SNA method can also find nodes, communities, and informal hierarchies that influence the network [26]. A complete, accurate data presentation framework was completed, and a better visualization was displayed by conducting these two stages.

II. RESEARCH METHOD

There are several stages to do this research can be seen in Figure 1. This study uses quantitative research because it has detailed and measurable character. [28]. The results obtained from sentiment analysis the accuracy were used to inform other researchers. SNA also produces the highest node from social media, Twitter.

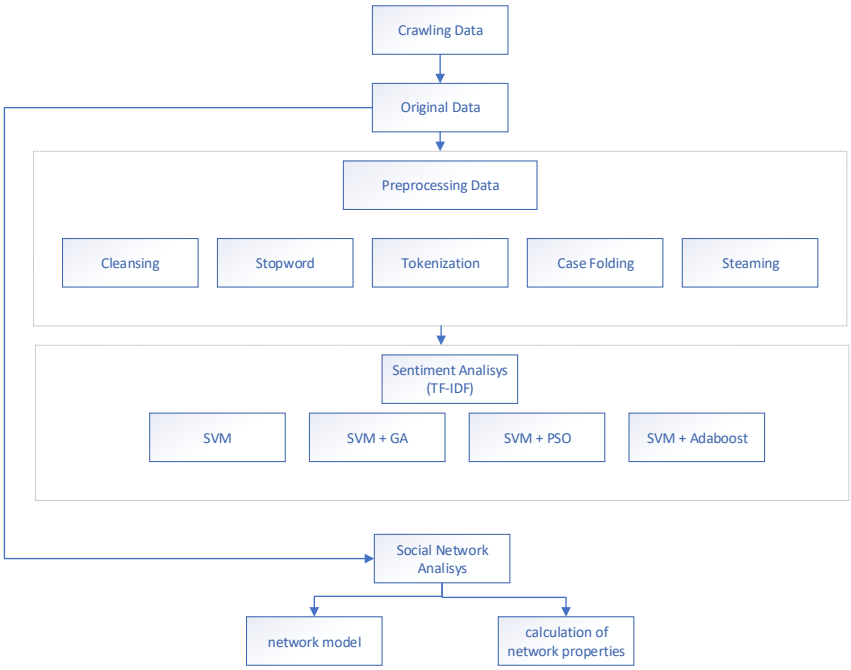

Figure 1. THE METHODOLOGY FLOW

INTENSIF, Vol.6 No.1 February 2022
ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

Below is an explanation of Figure 1 of the methodology flow.

1. Crawling Data

   Crawling data was carried out on Twitter to see comments or criticisms given by netizens to *BPJS*. The data crawling process in this study uses Drone Emprit Academy, using BPJS as a topic, and produces 2,145 Tweet data.

2. Preprocessing data

   The following process was to perform data preprocessing to enable the data obtained from Twitter to be read by the system. The preprocessing process in this study employed several stages as follows:

   a. The cleansing stage removed unnecessary characters and punctuation from the text. Cleansing works to reduce noise in the dataset [29].
   b. The next step was to do a stopword. A stopword is a common word that usually appears in large numbers and is considered to have no meaning [11].
   c. Tokenization is the process of cutting or breaking a sentence into several words [29].
   d. Case Folding is a process to change all documents' text to lowercase [30].
   e. Stemming is the stage to make suffix words into essential words according to correct Indonesian rules [29].

3. The TF-IDF method calculates the weight of each word that is most commonly used in information retrieval. This method is also efficient, easy, and has accurate results. This method was used to calculate the Term Frequency (TF) and Inverse Document Frequency (IDF) values for each token (word) in each document in the corpus. This method was also used to calculate the weight of each token t in d-document with the following formula:

   Wdt = tfdt * IDFt (1)

   Description :

   d: d-document

   t: the t-word of the keyword

   W: the d-document on the t-word

   tf: number of words searched for in a document

   IDF: Inverse Document Frequency

   The IDF value was obtained from

   IDF: log2 (D/df) (2)

   Description :

   D: total documents

   df: the number of documents that contain the word being searched

ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

After each document's weight (W) was known, a sorting process was carried out where the more significant the W value, the greater the similarity level of the document to keywords, and vice versa.

4. Processing sentiment analysis on these data using the SVM method with Adaboost, GA, and PSO. The GA method is used for feature selection to optimize the SVM parameters [31]. Problem solutions to use GA are represented as chromosomes. There are several important aspects when using GA, including: [32]:
   - definition of the fitness function,
   - definition and implementation of genetic representation, and
   - definition and performance of genetic operations.

   Then the PSO is used because it can optimize the SVM performance [33]. PSO is used as a feature selection tool, with PSO particles will be able to provide a combination of features in a problem space [34]. Next is Adaboost, a learning ensemble often used in boosting algorithms [35]. Boosting can be combined with other classifier algorithms to improve classification performance [36]. Another study conducted a combination of SVM and Adaboost can provide good performance on unbalanced data [37].
5. The interactions were seen using the social network analysis (SNA) method. The researchers built a network model and calculated network properties at this stage. Social Network Analysis had several conceptual approaches besides describing patterns formed through relationships between nodes and actors, which are more often used in SNA in determining the central node in a network by calculating some commonly calculated centrality values as follows [25]:
   a. Degree centrality is calculating the number of interactions that a node has. The following formula was used to calculate the degree centrality value of this node:

      $$CD(ni) = d(ni) \quad (3)$$

      Description:

      Where d(ni) is the amount of information that node ni has with other nodes in the network.
   b. Betweenness centrality calculates how often other nodes traverse a node to go to a particular node in the network. This value determines the actor's role as the bridge connecting interactions in the network. The following formula was used to calculate the degree centrality of a node:

      $$CB(ni) = \frac{\sum gjk(ni)}{gjk} \quad (4)$$

INTENSIF, Vol.6 No.1 February 2022
ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

Description:

$\sum gjk(ni)$ is the shortest number of j to node k passing through node n*i* and *gjk* is the number of shortest paths between 2 nodes in the network.

c. Closeness centrality calculates the average distance between a node and all other nodes in the network. In other words, it measures the closeness of a node to other nodes. In a network with g node, the closeness centrality of these nodes was as follows:

$$Cc(ni) = \left[\frac{N-1}{\sum d(ni,nj)}\right] \quad (5)$$

Description:

N is the number of nodes in the network

$\sum d(ni, nj)$ is the number of shortest paths connecting *node* n*i* and n*j*.

d. Eigenvector centrality is measurements that give higher weight to nodes connected to other nodes with high centrality values. The following formula was done to calculate the eigenvector centrality value of a node:

$$Ci(\beta) = \sum(a + \beta cj)Aji$$

$$C(\beta) = a(I - \beta A)\text{-}lAl \quad (6)$$

Description:

a is the normalization constant (vector scale)

β represents how much a node has a centrality weight in a node with a high centrality value.

A is *the adjacency matrix,*

I is *the identity matrix*

1 is the *matrix.*

The amount of β is the radio power of a node. If β is positive, it has high centrality bonds and connects with central people. Meanwhile, if β is negative, it has high centrality bonds but is connected to not central people. If β=0, a degree of centrality can be obtained.

6. After getting the analysis results from SNA and sentiment analysis, the next step was concluding the findings obtained in this study.

INTENSIF, Vol.6 No.1 February 2022
ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

III. RESULT AND DISCUSSION

The following is an explanation of the research conducted, in which this study carried out two different analyzes. The first analysis used was sentiment analysis, while the second was social network analysis.

1. Sentiment Analysis

Preprocessing that had been done aims to process data or opinions from netizens into sentiment analysis. Figure. 2 visualizes the results of sentiment analysis processing.

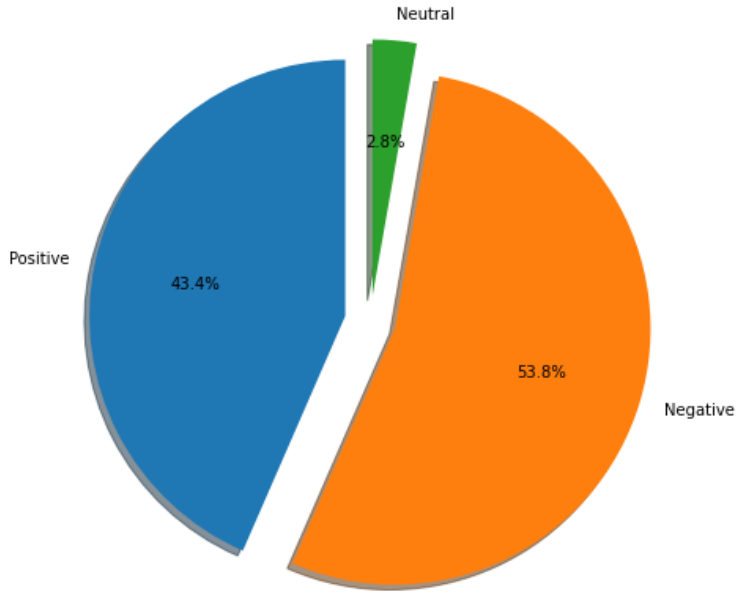

Figure 2. VISUALIZATION OF THE SENTIMENT ANALYSIS PROCESSING RESULTS

Figure 2 described that the opposing opinion is more dominant, at 53.8%, followed by the positive opinion at 43.4%, and the neutral opinion at 2.8%. After the data processing, the data were tested to see the level of accuracy using SVM. Figure 2 presents the accuracy results obtained from SVM.

	precision	recall	f1-score	support
0	0.89	0.89	0.89	142
1	0.94	0.98	0.96	104
2	0.92	0.88	0.90	104
accuracy			0.91	350
macro avg	0.92	0.92	0.92	350
weighted avg	0.91	0.91	0.91	350

Figure 3. ACCURACY SVM

INTENSIF, Vol.6 No.1 February 2022
ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

Figure 3 indicates that the accuracy produced by SVM alone is quite high, 91%. These results are quite high compared to other studies, which produce accuracy below 80%. [38][39]. However, compared with other studies, in which the accuracy results reach 95% [40][41], this research should optimize the SVM method. A combination with the other methods and feature selection is needed to increase the accuracy. The following is the addition of feature selection and combination in the SVM.

	precision	recall	f1-score	support
0	0.90	0.72	0.80	1023
1	0.77	0.97	0.86	1061
2	0.94	0.87	0.91	1061
accuracy			0.86	3145
macro avg	0.87	0.86	0.86	3145
weighted avg	0.87	0.86	0.86	3145

Figure 4. ACCURACY SVM + GENETIC ALGORITHM

Genetic Algorithm (GA) was used to optimize optimal parameters with an enormous scope. The selection of the proper parameters will make the genetic algorithm optimal [42]. However, some researchers make GA a Feature Selection [43][44][45]. This study also uses GA as feature selection. GA used cannot be separated from the previous studies using SVM with a Genetic Algorithm. A previous study [46] classified Parkinson's disease using a genetic algorithm and SVM classifier. The combination of the two methods showed higher accuracy than the last survey, 91.18%.

Meanwhile, a previous study [47] resulted in an accuracy of 80% using the SVM and MFCC methods. Then, another previous study [48] conducted a sentiment analysis on television shows using SVM and SVM + GA. There was no improvement in their accuracy. Another study conducted [49] a sentiment analysis on Apple products using SVM + GA. In the SVM of that study, an accuracy of 70.00% was obtained when GA was added to SVM. There was a significant increase in the accuracy of 85.76%. It is presented in Figure 4 that the resulting accuracy was not good enough compared to SVM without a feature selection, 86%. It shows that GA has not been able to improve the accuracy in this study, which used more than 2000 data and used 70:30 data splitting. In addition, to using the GA feature selection, this study also combines SVM with Particle Swarm Optimization (PSO).

ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

	precision	recall	f1-score	support
0	0.93	0.73	0.81	142
1	0.94	0.98	0.96	104
2	0.75	0.94	0.84	104
accuracy			0.87	350
macro avg	0.87	0.88	0.87	350
weighted avg	0.88	0.87	0.86	350

Figure 5. ACCURACY SVM + PARTICLE SWARM OPTIMIZATION (PSO)

Figure 5 describes that PSO is better than GA but still lower than SVM without feature selection or combination, 87%. PSO is the simplest optimization method for modifying several parameters [41]. PSO was used because it has relatively high accuracy when combined with SVM. A previous study also used SVM and PSO, [50] comparing SVM and SVM-PSO for airline services reviews. SVM initially had an accuracy of 84,25%. After adding PSO, the accuracy increased to 87,39%. Another study [41] analyzed online transportation sentiment using SVM. The accuracy was 95.46% before adding the PSO, and it grew to 96.04% after adding the PSO. However, in this study, the combination of SVM PSO has not been able to increase the accuracy but tends to decrease compared to SVM. Apart from using GA and PSO, this study also employed Adaboost.

	precision	recall	f1-score	support
0	0.89	0.91	0.90	142
1	0.94	0.98	0.96	104
2	0.94	0.87	0.90	104
accuracy			0.92	350
macro avg	0.92	0.92	0.92	350
weighted avg	0.92	0.92	0.92	350

Figure 6. ACCURACY SVM + ADABOOST

The combination of SVM and Adaboost is the right one that can be applied in this research. The addition of Adaboost resulted in an increase in accuracy, which was 92%. Adaboost is a learning algorithm that can increase precision for weak learning algorithms [51]. Another study using Adaboost [52] compared the accuracy of several classification methods. The method compared logistic regression (LR), back-propagation neural network (BPNN), Adaboost, SVM (Linear), SVM (Polynomial), Adaboost-SVM (RBF). Of the several methods used, Adaboost-SVM (RBF) had the highest accuracy after several trials with a value of 93.33%. Table 1 below presents that SVM + Adaboost had the highest accuracy at 92%, followed by pure SVM at 01%.

INTENSIF, Vol.6 No.1 February 2022
ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

Tabel 1. COMPARISON OF PURE SVM WITH SVM USING FEATURE SELECTION AND THE COMBINATION WITH THE OTHER METHODS

SVM	SVM+GA	SVM+PSO	SVM+Adaboost
91%	86%	87%	92%

This study utilized word cloud to see the most dominant word in each sentiment. Word cloud is a visual representation of text data, commonly used to describe keywords metadata on a website to freely visualize a form of text. A word cloud can display the word with the most frequency. The word's frequency is more dominant than other words [53]. The following is a word cloud generated from every sentiment of Indonesian netizens towards BPJS.

- Negative

  BPJS, Bankrupt, Amies, examination, and being sued negatively were the most dominant words.

Figure 7. WORDCLOUD NEGATIVE

- Positive

  The most dominant words were BPJS, Increase, Unemployment, Health, and Pay on positive sentiment.

Figure 8. WORDCLOUD POSITIVE

ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

- Neutral

  The most dominant words were BPJS, Be patient, God willing, Indonesia, and fees on neutral sentiment.

Figure 9. WORDCLOUD NEUTRAL

2. Social Network Analysis (SNA)

In contrast to sentiment analysis, SNA only used two stages. They are case Folding, changing the character of the letters in the data to be the same as all lowercase letters, and Spelling Normalization functions to identify excessive sentences or abbreviated words replaced with existing words provisions [26].

a. Network Visualization

The visualization of the network model was done with the help of Gephi software which used an undirected graph, where the way the graph works does not take into account the direction of destination between nodes. This type of graph does not see indegree (the target node) and outdegree (original node). The graph layout chosen for this network model is the Yifan Hu Proportional layout. An algorithm unites the good parts of a force-directed algorithm and a multilevel algorithm to reduce the algorithm's complexity. It is an algorithm that works very well with large networks. The network's results were a network model that shows each actor or node who talked about the relationship between nodes and the network. The type of graph applied to the image of the formed network model can be seen in Figure. 10 below:

INTENSIF, Vol.6 No.1 February 2022
ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

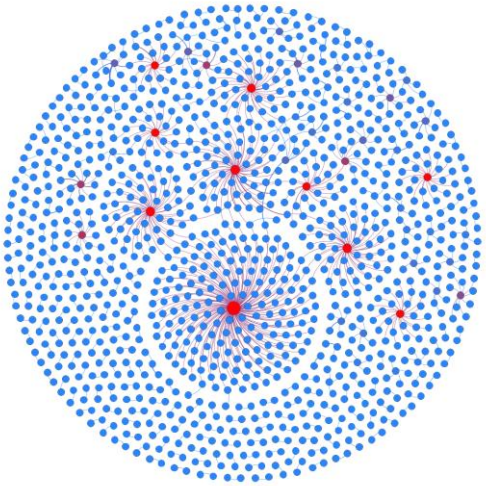

Figure 10. NETWORK VISUALIZATION

b. Network Property Calculations

After making the network model visualization, it is necessary to calculate the network properties. Thus, it can be analyzed further. The calculation was done automatically through the Gephi software. The analysis obtained the results of the value of each actor who played a role in discussing the increase in *BPJS* contribution fees.

Table 2. CONSIDER NETWORK PROPERTIES

Properti Jaringan	Size	Density	Modularity	Diameter	Average Degree	Average Path Length	Clustering Coefficient
Kenaikan BPJS	Nodes: 1170 Edges: 975	0.001	0.922	16	1.677	5.434	0

Table 2 shows the comparison of the network property values that contain user interactions on social media Twitter data on the increase in the BPJS contribution fees from March 2020 to July 2020, which had a total of 2,145 data. The property compared first was the size, where the more significant the node, the more connected actors in the social network. Things like this indicate that many actors increased the BPJS contribution fees. The size value reached the nodes of 1170 and edges of 975. Edges are interactions between actors. The higher the edge value indicates many conversations about increasing BPJS contribution fees on social media Twitter.

The second network property is density. The more actors in the network produce a considerable density value. The greater the density value of a network, the more connected actors in the network. From the data on the increase in the BPJS contribution fees, the density value was 0.001. The third network property is modularity. The higher the value of modularity, the clearer the network that is formed. Each network obtained can be interpreted as a different community.

ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

Thus, it gets more specifications for the product in each community. The BPJS contribution fee increase network received the value modularity of 0.922.

The fourth network property is the diameter. Diameter is the distance between nodes in a network. The smaller the diameter on the web, the easier the nodes will interact because the distance between the nodes is very short. In the BPJS contribution fee increase data, the diameter value was 16, indicating that many nodes interact. The fifth network property is the Average degree. The average degree shows the value between actor relationships in a social network. The greater the average value of the moderate degree, the better since every actor in the network is connected. Therefore, the dissemination of information is wider. Data on the increase in the BPJS contribution fees got a value of 1.677.

The sixth network property Average path length is that the less the average network of accounts passed, the better because each network has a strong relationship. The value of the middle path length on user interaction regarding the BPJS contribution fee increase data was 5.4334. The last network property is the clustering coefficient. The clustering coefficient shows the actor related to network properties. Actors in network properties in the BPJS contribution fee increase data were told. Thus, the information discussed was known in advance.

c. The centrality of *BPJS* Contribution Fee Increase Data

Table 3 presents the centrality of data on the increase in *BPJS* in the research conducted. The following is the comparison table.

Table 3. THE CENTRALITY OF BPJS INCREASE DATA

Node	***Degree Centrality***	***Betweenness Centrality***	***Closeness Centrality***	***Eigenvector Centrality***
	Score / (Rank)	*Score / (Rank)*	*Score / (Rank)*	*Score / (Rank)*
@LailyFadillah	173 / (1)	80008.44 / (1)	0.287671 / (637)	1.0 / (1)
@idtodayco	62 / (2)	71446.60 / (2)	0.294778 / (636)	0.162116 / (2)
@YongL4dy	56 / (3)	45299.63 / (4)	0.257226 / (647)	0.137566 / (3)
@pakaipeci	53 / (4)	25198.40 / (5)	0.231583 / (667)	0.120926 / (4)
@precariat_sweat	43 / (5)	45624.81 / (3)	0.218295 / (880)	0.085428 / (15)
@LokadataID	25 / (6)	300.0 / (83)	1.0 / (1)	0.033636 / (181)
@anisbaswedan	25/ (7)	20044.0 / (7)	0.179364 / (1002)	0.037264 / (179)
@mas__piyuuu	24 / (8)	14001.09 / (12)	0.208250 / (885)	0.036866 / (180)
@N0N4m3_90	21 / (9)	210.0 / (84)	1.0 / (2)	0.026668 / (189)
@BPJSKesehatanRI	19 / (10)	15743.0 / (11)	0.1252684 / (1063)	0.024923 / (190)

ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

The results of the calculation of *BPJS* increase data through social media, Twitter, using Gephi 0.9.1 software on the value of Degree Centrality, Betweenness Centrality, Closeness Centrality, and Eigenvector Centrality. It showed that the actor who influenced social network interaction is LailyFadillah, who excels at the value of degree centrality, betweenness centrality, eigenvector centrality, and LokadataID actors who excel at closeness centrality. The LailyFadillah account became the most influential actor from the number of interactions generated. Then, this account became a bridge for the exchanges of other actors in the network and excelled in their relationships with other influential actors in the network. The LokadataID account excels in being close to other actors around it. Thus, enabling these actors to convey information to other actors quickly. Other supporting actors also had a sizable influence in interactions on Twitter.

IV. CONCLUSION

This research produces a framework that combines two methods, namely SVM and SNA methods. The test results are tabular, word cloud, and network visualization. Meanwhile, sentiment analysis produced different accuracy. The SVM and Adaboost methods combination is the best combination in this research, producing 92% accuracy. But because SVM with the GA feature selection and SVM PSO has low accuracy compared to SVM, it doesn't mean that they are not good. The test was carried out only using one data split, 70:30. SVM GA and SVM PSO's accuracy will increase significantly if different data splits are used, such as 80:20 or 90:10. For this reason, there is a need for further research related to sentiment analysis using different data splits. This study has not compared with the other methods such as Naïve bayes, KNN, Decision Tree, etc. Therefore, this research could still be developed by other researchers in the future to compare the accuracy, either using feature selection or a combination of methods. Then on the SNA, it can be seen that the influential actor or account in Tweets about BPJS is @LailyFadillah. SNA in this study still uses one tool. It is necessary to research using other devices such as Drone Emprit Academy, which has many features. So the comparisons can be made regarding the results of the tools used.

REFERENCES

[1] H. Sutrisno, “Pengaruh Bpjs Ketenagakerjaan Dalam Meningkatkan Kesejahteraan Tenaga Kerja,” PREPOTIF J. Kesehat. Masy., vol. 4, no. 1, pp. 78–84, 2020, doi: 10.31004/prepotif.v4i1.670.

[2] R. R. Farza, A. M. Karsona, and B. Rubiati, “Berdasarkan Pancasila dan Undang-Undang Dasar Negara Kesatuan Republik Indonesia Tahun 1945 Pasal 27 ayat (2) dan Pasal 28 menyatakan bahwa , pekerjaan merupakan hak azasi Ketenagakerjaan . Secara yuridis dalam hukum ketenagakerjaan kedudukan pengusaha,” J. Bina Mulia Huk., vol.

ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

4, no. 1, pp. 150–166, 2019, doi: 10.23920/jbmh.v4n1.9.

[3] M. K. Anam, “Analisis Respons Netizen Terhadap Berita Politik Di Media Online,” J. Ilm. Ilmu Komput., vol. 3, no. 1, pp. 14–21, 2017, doi: 10.35329/jiik.v3i1.62.

[4] M. Naranjo-Zolotov, T. Oliveira, S. Casteleyn, and Z. Irani, "Continuous usage of e-participation: The role of the sense of virtual community," Gov. Inf. Q., vol. 36, no. 3, pp. 536–545, 2019, doi: 10.1016/j.giq.2019.05.009.

[5] B. R. Pflughoeft and I. E. Schneider, "Social media as E-participation: Can a multiple hierarchy stratification perspective predict public interest? " Gov. Inf. Q., vol. 37, no. 1, 2020, doi: 10.1016/j.giq.2019.101422.

[6] E. D. Wardhani, S. K. Areka, A. W. Nugroho, A. R. Zakaria, A. D. Prakasa, and R. Nooraeni, "Sentiment Analysis Using Twitter Data Regarding BPJS Cost Increase and Its Effect on Health Sector Stock Prices," Indones. J. Artif. Intell. Data Min., vol. 3, no. 1, p. 1, 2020, doi: 10.24014/ijaidm.v3i1.8245.

[7] R. Fahlapi and Y. Rianto, “Twitter Comment Predictions on Dues Changes BPJS Health In 2020,” SinkrOn, vol. 5, no. 1, p. 170, 2020, doi: 10.33395/sinkron.v5i1.10588.

[8] M. A. Laagu and A. Setyo Arifin, "Analysis the Issue of Increasing National Health Insurance (BPJS Kesehatan) Rates through Community Perspectives on Social Media: A Case Study of Drone Emprit," Proceeding - ICoSTA 2020 2020 Int. Conf. Smart Technol. Appl. Empower. Ind. IoT by Implement. Green Technol. Sustain. Dev., 2020, doi: 10.1109/ICoSTA48221.2020.1570615599.

[9] R. Y. Yanis and A. Iriani, “Sentiment Analysis of Bpjs Kesehatan Services To Smk Eklesia and Bina Insani Jailolo Teachers,” J. Terap. Teknol. Inf., vol. 2, no. 2, pp. 25–34, 2018, doi: 10.21460/jutei.2018.22.105.

[10] I. Rasyada, Y. Setiowati, A. Barakbah, and M. T. Fiddin Al Islami, "Sentiment Analysis of BPJS Kesehatan's Services Based on Affective Models," IES 2020 - Int. Electron. Symp. Role Auton. Intell. Syst. Hum. Life Comf., no. January 2019, pp. 549–556, 2020, doi: 10.1109/IES50839.2020.9231940.

[11] A. N. Ulfah and M. K. Anam, “Analisis Sentimen Hate Speech Pada Portal Berita Online Menggunakan Support Vector Machine (SVM),” JATISI (Jurnal Tek. Inform. dan Sist. Informasi), vol. 7, no. 1, pp. 1–10, 2020, doi: 10.35957/jatisi.v7i1.196.

[12] M. Al-Smadi, O. Qawasmeh, M. Al-Ayyoub, Y. Jararweh, and B. Gupta, "Deep Recurrent neural network vs support vector machine for aspect-based sentiment analysis of Arabic hotels' reviews," J. Comput. Sci., vol. 27, pp. 386–393, 2018, doi: 10.1016/j.jocs.2017.11.006.

[13] E. Indrayuni, “Komparasi Algoritma Naive Bayes Dan Support Vector Machine Untuk Analisa Sentimen Review Film,” J. Pilar Nusa Mandiri, vol. 14, no. 2, p. 175, 2018, doi: 10.33480/pilar.v14i2.918.

[14] S. Fransiska and A. Irham Gufroni, "Sentiment Analysis Provider by. U on Google Play Store Reviews with TF-IDF and Support Vector Machine (SVM) Method," Sci. J. Informatics, vol. 7, no. 2, pp. 2407–7658, 2020, doi: 10.15294/sji.v7i2.25596.

[15] A. A. Lutfi, A. E. Permanasari, and S. Fauziati, "Sentiment Analysis in the Sales Review of Indonesian Marketplace by Utilizing Support Vector Machine," J. Inf. Syst. Eng. Bus. Intell., vol. 4, no. 1, pp. 58–64, 2018, doi: doi: http://dx.doi.org/10.20473/jisebi.4.1.57-64.

[16] S. R. Hakim, M. A. Rizki, N. I. Zekha F, N. Fitri, Y. R. A, and R. Nooraeni, “Analisis Sentimen Pengguna Instagram Terhadap Kebijakan Kemdikbud Mengenai Bantuan Kuota Internet Dengan Metode Support Vector Machine (Svm),” J. MSA (Mat. dan Stat. serta Apl.), vol. 8, no. 2, p. 15, 2020, doi: 10.24252/msa.v8i2.16795.

[17] V. I. Santoso, G. Virginia, and Y. Lukito, “Penerapan Sentiment Analysis Pada Hasil Evaluasi Dosen Dengan Metode Support Vector Machine,” J. Transform., vol. 14, no. 2, p. 72, 2017, doi: 10.26623/transformatika.v14i2.439.

[18] P. H. Prastyo, I. Ardiyanto, and R. Hidayat, "A Combination of Query Expansion Ranking and GA-SVM for Improving Indonesian Sentiment Classification

ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

Performance," in Procedia CIRP, 2021, vol. 189, pp. 108–115, doi: 10.1016/j.procs.2021.05.074.

[19] R. Maulana, P. A. Rahayuningsih, W. Irmayani, D. Saputra, and W. E. Jayanti, "Improved Accuracy of Sentiment Analysis Movie Review Using Support Vector Machine Based Information Gain," in Journal of Physics: Conference Series, 2020, vol. 1641, no. 1, doi: 10.1088/1742-6596/1641/1/012060.

[20] Z. I. Alfianti, D. Gunawan, and A. F. Amin, "Sentiment Analysis of Cosmetic Review Using Naive Bayes and Support Vector Machine Method Based on Particle Swarm Optimization," J. Ris. Inform., vol. 2, no. 3, pp. 169–178, 2020, doi: 10.34288/jri.v2i3.149.

[21] W. Chang, Y. Liu, X. Wu, Y. Xiao, S. Zhou, and W. Cao, "A New Hybrid XGBSVM Model: Application for Hypertensive Heart Disease," IEEE Access, vol. 7, pp. 175248–175258, 2019, doi: 10.1109/ACCESS.2019.2957367.

[22] A. Andreyestha and A. Subekti, "Analisa Sentiment Pada Ulasan Film Dengan Optimasi Ensemble Learning," J. Inform., vol. 7, no. 1, pp. 15–23, 2020, doi: 10.31311/ji.v7i1.6171.

[23] Y. Al Amrani, M. Lazaar, and K. E. El Kadirp, "Random forest and support vector machine-based hybrid approach to sentiment analysis," in Procedia Computer Science, 2018, vol. 127, pp. 511–520, doi: 10.1016/j.procs.2018.01.150.

[24] P. Kalaivani, "Machine Learning Approach to Analyze Ensemble Models and Neural Network Model for E-Commerce Application," Indian J. Sci. Technol., vol. 13, no. 28, pp. 2849–2857, 2020, doi: 10.17485/ijst/v13i28.927.

[25] M. K. Anam, T. P. Lestari, Latifah, M. B. Firdaus, and S. Fadli, "Analisis Kesiapan Masyarakat Pada Penerapan Smart City di Sosial Media Menggunakan SNA," J. RESTI (Rekayasa Sist. dan Teknol. Informasi), vol. 5, no. 1, pp. 69–81, 2021, doi: https://doi.org/10.29207/resti.v5i1.2742.

[26] I. Febrianti, M. K. Anam, Rahmiati, and Tashid, "Tren Milenial Memilih Jurusan Di Perguruan Tinggi Menggunakan Metode Social Network Analysis," Techo.COM, vol. 19, no. 3, pp. 216–226, 2020, doi: https://doi.org/10.33633/tc.v19i3.3483.

[27] A. Kartino, M. Khairul Anam, Rahmaddeni, and Junadhi, "Analisis Akun Twitter Berpengaruh terkait Covid-19 menggunakan Social Network Analysis," J. RESTI (Rekayasa Sist. dan Teknol. Informasi), vol. 5, no. 4, pp. 697–704, 2021, doi: 10.29207/resti.v5i4.3160.

[28] I. Jayusman and O. A. K. Shavab, "Aktivitas Belajar Mahasiswa Dengan Menggunakan Media Pembelajaran Learning Management System (Lms) Berbasis Edmodo Dalam Pembelajaran Sejarah," J. Artefak, vol. 7, no. 1, p. 13, 2020, doi: 10.25157/ja.v7i1.3180.

[29] R. Rasenda, H. Lubis, and R. Ridwan, "Implementasi K-NN Dalam Analisa Sentimen Riba Pada Bunga Bank Berdasarkan Data Twitter," J. Media Inform. Budidarma, vol. 4, no. 2, p. 369, 2020, doi: 10.30865/mib.v4i2.2051.

[30] E. S. Romaito, M. K. Anam, Rahmaddeni, and A. N. Ulfah, "Perbandingan Algoritma SVM Dan NBC Dalam Analisa Sentimen Pilkada Pada Twitter," CSRID J., vol. 13, no. 3, pp. 169–179, 2021, doi: 10.22303/csrid.13.3.2021.169-179.

[31] I. Syarif, A. Prugel-bennett, and G. Wills, "SVM Parameter Optimization Using Grid Search and Genetic Algorithm to Improve Classification Performance," TELKOMNIKA, vol. 14, no. 4, pp. 1502–1509, 2016, doi: 10.12928/TELKOMNIKA.v14i4.3956.

[32] O. Somantri and M. Khambali, "Feature Selection Klasifikasi Kategori Cerita Pendek Menggunakan Naïve Bayes dan Algoritme Genetika," JNTETI, vol. 6, no. 3, pp. 301–306, 2017, doi: 10.22146/jnteti.v6i3.332.

[33] S. D. Anggita and Ikmah, "Jurnal restiKomparasi Algoritma Klasifikasi Berbasis Particle Swarm Optimization Pada Analisis Sentimen Ekspedisi Barang," J. RESTI, vol. 4, no. 2, pp. 362 – 369, 2020, doi: 10.29207/resti.v4i2.1840.

[34] Y. Zhou, N. Wang, and W. Xiang, "Clustering Hierarchy Protocol in Wireless Sensor

Networks Using an Improved PSO Algorithm," IEEE Access, vol. 5, pp. 2241–2253, 2017, doi: 10.1109/ACCESS.2016.2633826.

[35] Y. Pristyanto, "PENERAPAN METODE ENSEMBLE UNTUK MENINGKATKAN KINERJA ALGORITME KLASIFIKASI PADA IMBALANCED DATASET," J. TEKNOINFO, vol. 13, no. 1, pp. 11–16, 2019, doi: 10.33365/jti.v13i1.184.

[36] E. Listiana and M. A. Muslim, "PENERAPAN ADABOOST UNTUK KLASIFIKASI SUPPORT VECTOR MACHINE GUNA MENINGKATKAN AKURASI PADA DIAGNOSA CHRONIC KIDNEY DISEASE," in Prosiding SNATIF Ke -4 Tahun 2017, 2017, pp. 875–881.

[37] C. Dedhia and J. Ramteke, "Ensemble model for Twitter sentiment analysis," in Proceedings of the International Conference on Inventive Systems and Control, ICISC 2017, 2017, pp. 1–5, doi: 10.1109/ICISC.2017.8068711.

[38] N. Fitriyah, B. Warsito, and D. A. I. Maruddani, "Analisis Sentimen Gojek Pada Media Sosial Twitter Dengan Klasifikasi Support Vector Machine (Svm," J. Gaussian, vol. 9, no. 3, pp. 376–390, 2020, doi: 10.14710/j.gauss.v9i3.28932.

[39] A. Rahman Isnain, A. Indra Sakti, D. Alita, and N. Satya Marga, "Sentimen Analisis Publik Terhadap Kebijakan Lockdown Pemerintah Jakarta Menggunakan Algoritma Svm," Jdmsi, vol. 2, no. 1, pp. 31–37, 2021, doi: 10.33365/jdmsi.v2i1.1021.

[40] P. Arsi and R. Waluyo, "Analisis Sentimen Wacana Pemindahan Ibu Kota Indonesia Menggunakan Algoritma Support Vector Machine (SVM)," J. Teknol. Inf. dan Ilmu Komput., vol. 8, no. 1, p. 147, 2021, doi: 10.25126/jtiik.0813944.

[41] V. K. S. Que, A. Iriani, and H. D. Purnomo, "Analisis Sentimen Transportasi Online Menggunakan Support Vector Machine Berbasis Particle Swarm Optimization," J. Nas. Tek. Elektro dan Teknol. Inf., vol. 9, no. 2, pp. 162–170, 2020, doi: 10.22146/jnteti.v9i2.102.

[42] H. Wang, X. Lang, and W. Mao, "Voyage optimization combining genetic algorithm and dynamic programming for fuel/emissions reduction," Transp. Res. Part D Transp. Environ., vol. 90, no. December 2020, p. 102670, 2021, doi: 10.1016/j.trd.2020.102670.

[43] N. Azhar, P. P. Adikara, and S. Adinugroho, "Sentiment Analysis for Coffee Shop Reviews Using Naïve Bayes," J. Teknol. Inf. dan Ilmu Komput., vol. 8, no. 3, pp. 609–618, 2021, doi: 10.25126/jtiik.202184436.

[44] R. Aryanti, A. Saryoko, A. Junaidi, S. Marlina, Wahyudin, and L. Nurmalia, "Comparing Classification Algorithm with Genetic Algorithm in Public Transport Analysis," in Journal of Physics: Conference Series, 2020, vol. 1641, no. 1, doi: 10.1088/1742-6596/1641/1/012017.

[45] R. T. Prasetio, "Genetic Algorithm to Optimize k-Nearest Neighbor Parameter for Benchmarked Medical Datasets Classification," J. Online Inform., vol. 5, no. 2, p. 153, 2020, doi: 10.15575/join.v5i2.656.

[46] Z. Soumaya, B. Drissi Taoufiq, N. Benayad, K. Yunus, and A. Abdelkrim, "The detection of Parkinson disease using the genetic algorithm and SVM classifier," Appl. Acoust., vol. 171, p. 107528, 2021, doi: 10.1016/j.apacoust.2020.107528.

[47] D. Anggraeni, W. S. M. Sanjaya, M. Y. S. Nurasyidiek, and M. Munawwaroh, "The Implementation of Speech Recognition using Mel-Frequency Cepstrum Coefficients (MFCC) and Support Vector Machine (SVM) method based on Python to Control Robot Arm The Implementation of Speech Recognition using Mel- Frequency Cepstrum Coefficients," in The 2nd Annual Applied Science and Engineering Conference (AASEC 2017), 2018, pp. 1–10, doi: 10.1088/1757-899X/288/1/012042.

[48] I. M. B. S. Darma, R. S. Perdana, and Indriati, "Penerapan Sentimen Analisis Acara Televisi Pada Twitter Menggunakan Support Vector Machine dan Algoritma Genetika sebagai Metode Seleksi Fitur," J. Pengemb. Teknol. Inf. dan Ilmu Komput., vol. 2, no. 3, pp. 998–1007, 2018, [Online]. Available: http://j-ptiik.ub.ac.id.

[49] E. Indrayuni and A. Nurhadi, "Optimizing Genetic Algorithms for Sentiment Analysis of Apple Product Reviews Using SVM," SinkrOn, vol. 4, no. 2, p. 172, 2020, doi:

ISSN: 2580-409X (Print) / 2549-6824 (Online)
DOI: https://doi.org/10.29407/intensif.v6i1.15870

10.33395/sinkron.v4i2.10549.

[50] R. Wati, S. Ernawati, and I. Maryani, “Optimasi Parameter Pso Berbasis Svm Untuk Analisis Sentimen Review Jasa Maskapai Penerbangan,” Evolusi J. Sains dan Manaj., vol. 8, no. 2, pp. 64–71, 2020, doi: 10.31294/evolusi.v8i2.9248.

[51] A. H. Yunial, “Analisis Optimasi Algoritma Klasifikasi Support Vector Machine , Decision Trees , dan Neural Network Menggunakan Adaboost dan Bagging,” J. Inform. Univ. Pamulang, vol. 5, no. 3, pp. 247–260, 2020, doi: 10.32493/informatika.v5i3.6609.

[52] J. Li, L. Sun, and R. Li, "Nondestructive detection of frying times for soybean oil by NIR-spectroscopy technology with Adaboost-SVM (RBF)," Optik (Stuttg)., vol. 206, no. January, p. 164248, 2020, doi: 10.1016/j.ijleo.2020.164248.

[53] N. L. P. Merawati, A. Z. Amrullah, and Ismarmiaty, “Analisis Sentimen dan Pemodelan Topik Pariwisata Lombok Menggunakan Algoritma Naive Bayes dan Latent Dirichlet Allocation,” RESTI, vol. 5, no. 1, pp. 123–131, 2021, doi: 10.29207/resti.v5i1.2587.