Exploring Social Network of Indonesia's Presidental Candidate for 2024 After Presidential Candidate Debates

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Abstract— **This Study attempted to deepen our comprehension of how X users interact within the network by doing visualization on social networks and calculating its betweenness and degree of centrality. The data is from X post and based on 3 keywords, Anies, Prabowo, and Ganjar. The node from the 'Anies' dataset becomes the majority in the top 5 highest betweenness and degree centrality. It is not because the node exists on all the datasets, but 'Anies' dataset has the best central node based on betweenness and degree centrality.**

***CRITICAL: Do Not Use Symbols, Special Characters, Footnotes, or Math in Paper Title or Abstract.** (Abstract)*

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I. INTRODUCTION

Indonesia will hold a general election to elect the President and Vice President, Legislative Assembly (DPR and DPRD), and Regional Representative Council (DPD RI) on the 14th of February 2024. This general election has become a prominent topic of discussion within society, particularly following the conclusion of the presidential candidate debates.

As the recent first debate for the Indonesia presidential election was held on 12th December of 2023, many discussions appeared either in offline or online conversation. During election periods, social media platforms have increasingly become integral, with Twitter that has risen as a crucial instrument for political campaigns and discussions, particularly among Political Candidates, Media Organizations, and Citizens [1]. It facilitates individuals in expressing their opinions and thoughts [2].

Social Network Analysis allows us to comprehend a community by visualizing its connections as a network, aiming to identify significant individuals, groups, and their associations based on the specific topic [3]. The previous study using SNA to examine Twitter discussions of the 2020 US presidential election, focusing on two specific hashtags (#Election2020results and #BidenTransition) and it offers an understanding of the network tendencies among users [4].

The research question in this study is: Who are the influential nodes within the X networks associated with the Indonesia 2024 election, specifically focusing on the presidential candidates Prabowo, Anies, and Ganjar? by conducting a Social Network Analysis. The goal is to deepen our comprehension of how X users (nodes) interact within these networks. By doing so, this study may provide valuable insights into the structure and behavior of these networks, identifying influential users and understanding the content of tweets within both hashtags during the post-debate period of the presidential candidate's debate.

II. RELATED WORK

A. X and Discussion

Over the past few years, social media has become a crucial component of political communication in election campaigns [5], where users can actively participate, share, and establish networks easily within the virtual world [6] X(formerly known as twitter) is one of the social media platforms commonly used for discuss a topic [7] that can reaches a broad audience [8] and specifically capture individuals interested in specific topics [9].

B. Social Network Analysis (SNA)

SNA is essential as it creates new opportunities for better comprehension of individuals or groups by analyzing how they interact, and it enables the exploration of patterns among organizations, concepts, and individuals across diverse environments [10]. SNA involves outlining the connections among individuals in social interactions that comprise nodes (representing actors) and edges (depicting relationships) [11].

To find the most important nodes, measurements are taken that reflect which nodes are at the center among the set of nodes, including degree centrality, betweenness centrality, closeness centrality, and eigenvector centrality [4, 12]. **Degree centrality** measures the number of edges associated with the nodes [10], the example is the number of account followers on Twitter [13] which means the higher score the number of followers a node has. **Betweenness centrality** identifies the position of the nodes that have a role as a bridge between two or more communities [4, 13]. Betweenness centrality with the highest score means that the node has become the shortest path between other nodes [12]. **Closeness centrality** is about how close a node is [12], which measures the average distance from a particular node to all other nodes in a network [10]. **Eigenvector centrality** shows the connections of the most significant nodes (which are connected to many actors) in the network and other important nodes related to those nodes [10, 13].
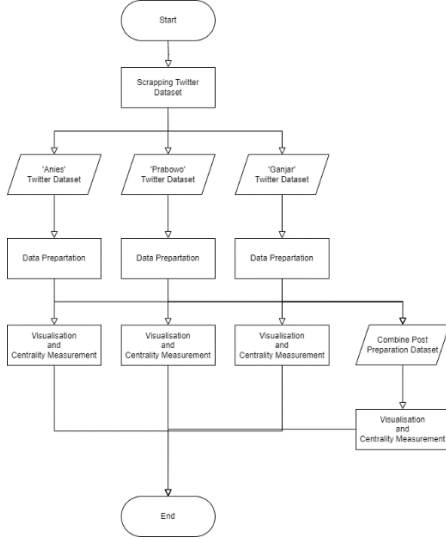
Fig. 1. Workflow

The system consists of several stages, starting with data collection using Python on Google Colab with the web-scraping technique. Web-scraping is defined as a process of extracting data or information from a website [14]. The web-scraping technique is used because it does not need to use the X API. In this study, data was collected from X on December 27th, 2023, focusing on keywords that related to presidential candidates, specifically Anies, Prabowo, and Ganjar.

By using the web-scraping technique, the data that has been collected does not make a connection since it only takes the tweet information based on the keyword. Therefore, in the data preparation stage, mention on the tweet is considered an edge that is directed to the mentioned user. Since there are only reply, quote and retweet numbers on a tweet, a new node is created based on the amount of those three features that have edge directed to the user that posts that tweet. Doing so allows the graph of the network to be constructed and perform centrality measurements.

Following the data preparation phase, network visualization was performed on each dataset using Gephi, an open-source tool for network visualization and analysis, which facilitates an intuitive exploration of patterns, outlier identification, storytelling, and trends [4]. Furthermore, centrality measurements were conducted using Python.

IV. RESULT AND DISCUSSION

This study aimed to determine the betweenness centrality and degree centrality within the networks. The web-scraping collected the data on December 27th, 2023. Table I shows the top five nodes with the highest degree centrality while Table II shows the betweenness centrality scores in the network of the three keywords, as also illustrated in Figure 2 and Figure 3. The node with the more central position has the higher degree score. Nodes represent user accounts who involved in online discussions, while edges are the connecting lines of nodes, representing various forms of interactive communication, such as replies or responses.
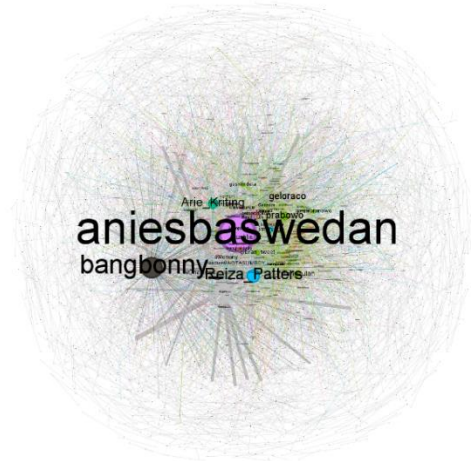

Fig. 2. All dataset degree centrality graph

Fig. 3. All dataset betweenness centrality graph

TABLE I. ALL DATASET DEGREE CENTRALITY

Rank	Username	Degree Centrality	Degree Score
1	@aniesbaswedan	0.041349	293
2	@bangbonny_	0.023568	167
3	@Reiza_Patters	0.014253	101
4	@Arie_Kriting	0.010866	77
5	@geloraco	0.008750	62

TABLE II. ALL DATASET BETWEENNES CENTRALITY

Rank	Username	Betweenness Centrality	Betweenness Score
1	@aniesbaswedan	7.27×10^{-6}	365
2	@gusniindera	4.66×10^{-6}	234
3	@hanny23ae	2.09×10^{-6}	105
4	@ f_wandal3	1.95×10^{-6}	98
5	@bro_munozz	9.96×10^{-7}	50

Based on Table I, @aniesbaswedan has the highest degree centrality score (0.041349), which means the account has the highest number of edges connected to another account in the graph and is the most central.

Those three keyword datasets are not related to each other. Table II shows that the betweenness centrality is very low, which indicates not many nodes that connected. Also, it is supported by @aniesbaswedan which is the most centralized node, the degree on all datasets is mostly from the 'anies' dataset itself. From Table III, @aniesbaswedan degree score is 280 on the 'anies' dataset, and Table I shows that combining three keyword datasets only adds 13 more degrees to it.

Centrality measurements were also performed on the data for each keyword, shown in Table III-VIII.

TABLE III. 'ANIES' DATASET DEGREE CENTRALITY

Rank	Username	Degree Centrality	Degree Score	In-Degree Score	Out-Degree Score
1	@aniesbaswedan	0.124888	280	280	1
2	@Reiza_Patters	0.045049	101	101	0
3	@Arie_Kriting	0.033006	74	74	0
4	@rihandaulah	0.018287	41	41	0
5	@muchlis_ar	0.016949	38	37	1

TABLE IV. 'ANIES' DATASET BETWEENNES CENTRALITY

Rank	Username	Betweenness Centrality	Betweenness Score
1	@aniesbaswedan	0.000064	322
2	@f_wandal3	0.000020	98
3	@bro_munozz	0.000010	50
4	@viverepericls	0.000008	41
5	@muchlis_ar	0.000007	37

Based on the 'anies' dataset, the @aniesbaswedan account has the highest amount of connectivity with other nodes which is supported by the highest degree centrality (0.124888), as shown in Table III. The degree score that those 5 top highest degree centralities score nodes got is dominantly from the in-degree score.

@aniesbaswedan is also node with the highest betweenness centrality, as shown in Table III. Both @aniesbaswedan and @muchlis_ar appear on top 5 highest betweenness and degree centrality.

TABLE V. 'PRABOWO' DATASET DEGREE CENTRALITY

Rank	Username	Degree Centrality	Degree Score	In-Degree Score	Out-Degree Score
1	@bangbonny_	0.064009	167	167	0
2	@prabowo	0.022231	58	58	0
3	@geloraco	0.015332	40	40	0
4	@gibran_tweet	0.011882	31	31	0
5	@gusniindera	0.011499	30	13	17

TABLE VI. 'PRABOWO' DATASET BETWEENNESS CENTRALITY

Rank	Username	Betweenness Centrality	Betweenness Score
1	@gusniindera	3.247960×10^{-5}	221
2	@hanny23ae	1.440272×10^{-5}	98
3	@13babpanda	3.674162×10^{-6}	25
4	@grupchavez	2.645397×10^{-6}	18
5	@Rakha_boumi	1.175732×10^{-6}	8

@bangnonny_ is the node that has the highest node in the 'prabowo' dataset. Same as the results of Table III and V show the degree score that those 5 top highest degree centralities score nodes got is dominantly from the in-degree score. Table III, V, and VII show that @prabowo is in rank 2 of the degree centrality which is the only presidential candidate account that does not topping degree centrality on their dataset.

From Table III, the graph of 'prabowo' dataset seems does not have a lot of nodes that connect to each other which is shown by the betweenness centrality being very low on the top 5 highest betweenness centrality. Table V and VI also do not have the same node that appears on both.
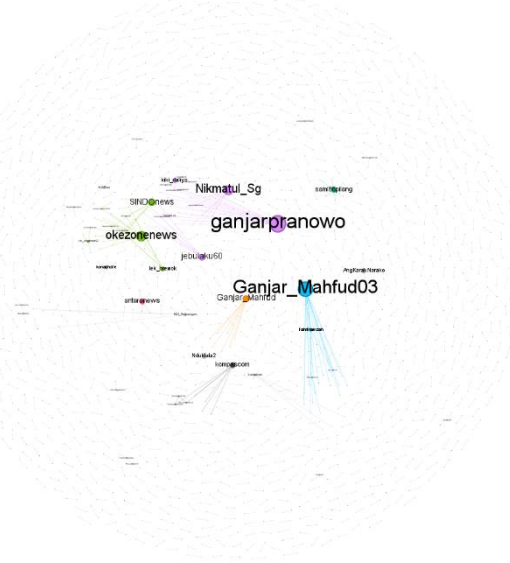

Fig. 4. Ganjar dataset graph for Degree Centrality

TABLE VII. 'GANJAR' DATASET DEGREE CENTRALITY

Rank	Username	Degree Centrality	Degree Score	In-Degree Score	Out-Degree Score
1	@ganjarpranowo	0.006268	17	17	0
2	@Ganjar_Mahfud03	0.005531	15	2	13
3	@okezonenews	0.003687	10	10	0
4	@Nikmatul_Sg	0.003687	10	10	0
5	@Ganjar_Mahfud	0.002581	7	7	0

TABLE VIII. 'GANJAR' DATASET BETWEENNESS CENTRALITY

Rank	Username	Betweenness Centrality	Betweenness Score
1	@Ganjar_Mahfud03	0.000003	25
2	@Roberto41359052	0.000000	0
3	@rravengger	0.000000	0
4	@ginasabrinaaaa	0.000000	0
5	@silber_rain	0.000000	0

As shown in Table VII, the highest score in the 'prabowo' dataset is @ganjarpranowo, which means that the account has the most amount connected nodes. @Ganjar_Mahfud03 is the only node that appears in the highest degree centrality that has a higher out-degree score than in-degree score. However, in the 'ganjar' dataset the centrality score is much lower compared to the 'anies' and 'prabowo' datasets.

Most of nodes in 'ganjar' dataset do not have multiple edges that connect to multiple nodes, as shown in Fig. 4. It results in only one node that becomes the shortest path, which is @Ganjar_Mahfud03 with betweenness centrality 0.000003 and it is very low compared to the other dataset.

V. Conclusion

The discussion of 3 presidential candidates does not involve one or each other. It is shown by the fact that the central nodes of all the dataset combined majority is from 'Anies' dataset and the degree and centrality score do not have much difference compared to their dataset itself.

'Anies' datasets have more discussion with one another than the other datasets indicated by their betweenness centrality significantly higher than the other 2. @prabowo is also the only presidential candidate account that does not top the degree and in-degree on their dataset. 'ganjar' datasets seem to be the one that has least interaction with each other shown by only one node that has betweenness centrality more than 0.

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