

Assessing Novice Voter Resilience on Disinformation During Indonesia Elections 2024 with Naïve Bayes Classifier

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(Received: September 3, 2024; Revised: October 6, 2024; Accepted: November 21, 2024; Available online: December 29, 2024)

Abstract

With the rise of social media platforms, the spread of fake news has become a significant concern. During the 2024 presidential election is dominated with novice voters, who are exposed to a lot of news from social media. As first-time voters, they get a lot of information and news exposure mainly from social media. This is also exacerbated by the fact that influencers are used to lead opinions. This research tries to measure the resilience of novice voters in dealing with hoax news compared with Naïve Bayes classifier to assessing the news. The purpose of this research is so that novice voters aware and are not easily polarized to prevent national disintegration due to disinformation and hoax news. Subsequently, this research also tries to develop a database of content and categories for hoax news from beginner voter data with a classification model. Data collection was carried out offline and online with interviews and questionnaires conducted with a total of 283 respondents from two private universities in East Java and came from various study programs. From the data, a classification approach using the naïve Bayes method was also built to help recommend a category whether this news is a hoax or news that can be verified. From the results of this study, it can also be concluded that the classification model with Naïve Bayes has a very good accuracy of up to 90.303% capable of categorizing a news story whether it is a hoax, dubious news, or valid news. In contrast, this study shows that the average accuracy of first-time voters is only 29.68%, which means that they are very vulnerable to hoax news, due to the many perceptions and assumptions in public comments that make views biased.

Keywords: Fake News, Classification, Hoax Classification, Disinformation

1. Introduction

Today, social media is a popular source of information [1]. Social media has evolved into an effective medium for information delivery. However, in addition to its benefits, social media presents concerns, particularly when it comes to the dissemination of misinformation and disinformation, particularly during significant events such as elections. The information exchanged in several forms, including news, photos, and videos. Social media networks such as Facebook, X (Twitter), and Instagram have been unable to adequately filter incoming cyber-space material [2]. Content that is distributed to users has not always been thoroughly screened, there is no fact checking, and it does not pass the editor's examination. In some situations, news can become viral and make national headlines.

Fake news refers to intentionally false or misleading information presented as factual news [3]. It can be categorized into various types, including fabricated stories, clickbait headlines, satire or parody, and manipulated content [4]. The impact of fake news extends beyond individual beliefs, as it can shape public opinion, influence decision-making, and even incite social unrest [2]. The truth is no longer the main thing because fake news or so-called hoaxes create alternative facts that can distort the point of view of each individual [5]. The content of a news message can change according to the perspective and understanding of the person reading. Many people believe in fake news that will become a new consideration in society [6]. Social media allows a person or group to create an 'alternative / fake fact' and publish the information, so there is a tendency for the news to spread widely [7]. Fake news has become a global

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 DOI: <https://doi.org/10.47738/jads.v6i1.489>

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phenomenon, and Indonesia is no exception to its impact. In recent years, the spread of fake news has become a significant concern in the country, affecting various aspects of society [8].

This research will explore the situations of fake news in Indonesia, including the factors contributing to its spread, its impact on society, and the efforts being made to combat it. President Joko Widodo highlighted that the government will battle the growing widespread transmission of fake news, or hoaxes, and also reminded people to participate in elections in peace. This is also consistent with the Minister of Religious Affairs, Lukman Hakim Saifuddin [9], who advised students to be critical of information dynamics [10]. Observe the news, who wrote it, its aim, the author's interest, and the influence on the individuals who read the news. According to the Minister of Communication and Information, the government and all segments of society must collaborate to battle fake news on social media. With the rise of social media platforms, the spread of fake news has become a significant concern. Fake news can have a detrimental impact on society, especially during elections, as it can mislead voters and influence their decision-making process [5]. Detecting and classifying fake news is crucial to ensure the dissemination of accurate information and reduce the disinformation effect on novice voters.

During the 2024 presidential election, many negative news began to appear on social media in order to manipulate public sentiment towards certain couples. This makes life in society become polarized. In order to reduce the impact of national disintegration, the government through the General Election Commission [11] always socializes peaceful elections and the resolution of PHPU problems later in 2024. Furthermore, in 2024, the election will be dominated by young voters who in fact capture more information from social media than from other sources of information. However, based on studies that have been conducted, by the Research and Development of Communication and Information Technology stated that more than 51% are unable to directly identify hoax news [12].

Departing from this background, this research tries to design a method to classify hoax news, especially on social media X (Twitter), where the frequency of data dissemination is very fast and massive. So as to be able to provide recommendations whether an information is included in hoax news, fact news or news that enters the gray zone / should be aware of its authenticity. This research tries to classify with the Bayesian heuristic algorithm approach by utilizing facts that have been checked directly by the research team between hoax news or non-hoax news, especially in the 2024 pre-election until the end of January 2024. This research also tries to measure the resilience of analysis and digital literacy for novice voters in analyzing news, whether it is fact or hoax news.

2. Literature Review

2.1. Lesson Learned on Combating Hoax News During Presidential Elections

In recent years, the spread of hoax news and misinformation has become a significant concern during presidential elections [13]. The proliferation of hoax news in presidential elections can have far-reaching consequences. It has the potential to polarize society, erode trust in political institutions, and distort public discourse. Furthermore, it can influence voter behavior and decision-making, ultimately shaping the electoral landscape. The dissemination of false information can manipulate public opinion, influence voting decisions, and undermine the democratic process. We can also learn from previous studies and danger stories of countries that failed to address the issue of hoax news during their presidential elections, highlighting the potential dangers and consequences that arise from such failures [14]. However, several countries have implemented strategies and initiatives to combat hoax news effectively. Therefore, we need to adapt the best strategies from country who have successfully tackled the issue of hoax news during their presidential elections.

The 2018 presidential election in Brazil was marked by the widespread circulation of hoax news, false information, and conspiracy theories through social media platforms, particularly WhatsApp. This phenomenon significantly impacted the political climate, leading to polarization, misinformation, and a lack of trust in the democratic process. False information and conspiracy theories circulated widely on social media platforms, particularly through WhatsApp groups. The spread of hoax news contributed to a highly divisive and polarized political climate. The existing literature demonstrates the urgent need to address the issue of hoax news and misinformation in the context of Brazil's political landscape. This research aims to build upon the current knowledge by investigating the specific mechanisms through which hoax news spread, the impact on public opinion, and the potential strategies to mitigate its effects.

Misinformation campaigns targeted specific candidates, spreading false narratives and manipulating public opinion. The failure to effectively address the issue of hoax news resulted in a misinformed electorate and undermined trust in the democratic process [15].

The Philippines faced challenges in combating hoax news during its 2016 presidential election. False information and propaganda spread rapidly on social media platforms, influencing public opinion and shaping the electoral outcome [16]. Hoax news stories targeted specific candidates, spreading false narratives and manipulating public perception. The failure to address the spread of hoax news effectively contributed to a misinformed electorate and undermined the credibility of the electoral process.

Several countries have implemented strategies to combat fake news and reduce its disinformation effect. For example, Singapore has introduced legislation that holds social media platforms accountable for the spread of fake news [17]. This approach aims to strike a balance between freedom of speech and the need to combat fake news. Other countries, such as France and Germany, have collaborated with fact-checking organizations to debunk fake news and promote media literacy among citizens. These initiatives have shown promising results in reducing the impact of fake news on elections.

The proactive measures taken by the French government during the 2017 presidential election, particularly the establishment of the "Stop Intox" task force, provide a valuable example of successful intervention in combating the spread of hoax news. The task force's composition of journalists, fact-checkers, and digital media experts highlights the importance of multidisciplinary collaboration in addressing misinformation. Drawing insights from the "Stop Intox" initiative, the proposed research will consider the potential for establishing a similar collaborative task force in the context of Brazil's 2018 presidential election. The task force could be designed to monitor and debunk false information circulating on social media platforms, with a focus on WhatsApp and other relevant channels. By leveraging the expertise of journalists, fact-checkers, and digital media specialists, the task force could play a crucial role in verifying the accuracy of news stories and providing the public with reliable information.

The comparative analysis of successful initiatives in France and other countries will inform the development of recommendations for the Brazilian context. The proposed research will explore the feasibility and effectiveness of establishing a dedicated task force, similar to "Stop Intox," to address the challenges of combating hoax news and misinformation in Brazil's electoral processes. The insights gained from the comparative study will contribute to the formulation of evidence-based recommendations for policy interventions and collaborative initiatives aimed at safeguarding the integrity of democratic processes and countering the impact of hoax news on public opinion. This initiative helped to raise awareness about the prevalence of hoax news and encouraged citizens to critically evaluate the information they encountered [18].

2.2. Naïve Bayes as Hoax Classifiers

Naive Bayes is a popular machine learning algorithm used for classification tasks. It is based on Bayes' theorem, which calculates the probability of an event occurring given prior knowledge. The "naive" assumption in Naive Bayes refers to the assumption that the features used for classification are independent of each other [19]. Naive Bayes algorithm is particularly useful for text classification tasks, such as classifying emails as spam or non-spam, sentiment analysis, and, in this case, classifying news articles as genuine or hoax [1]. It works by analyzing the features of the text, such as the words used, their frequency, and their context, to determine the probability of the article belonging to a particular class.

The social network analysis will be a crucial component of the research methodology. It will involve mapping the flow of hoax news within WhatsApp groups and other social media platforms to identify influential nodes and patterns of dissemination. By analyzing the structure of social networks and the interactions between users, the study aims to understand how hoax news spreads, the key sources of misinformation, and the impact of influential nodes on the dissemination process.

The social network analysis will utilize network visualization techniques to represent the connections between users and the flow of information. This will enable the identification of central nodes, clusters, and patterns of information

diffusion within the social networks. Additionally, measures of centrality, such as degree centrality and betweenness centrality, will be used to identify the most influential users and groups in the dissemination of hoax news [20].

Furthermore, the social network analysis will provide insights into the dynamics of information sharing, the formation of echo chambers, and the potential for the amplification of misinformation within specific communities. This component is the one that we classify using the machine learning.

To classify a new, unseen news article, Naive Bayes calculates the conditional probability of each class given the features of the article. It calculates the probability of each feature occurring in each class and combines them using Bayes' theorem to calculate the probability of the article belonging to each class. The class with the highest probability is assigned to the article [21]. One of the advantages of Naive Bayes is its simplicity and ease of implementation. It is a straightforward algorithm that can be easily understood and applied, making it accessible for novice users. It is also computationally efficient, allowing quick classification of large datasets.

However, Naive Bayes does have some limitations. The assumption of feature independence may not hold true in real-world scenarios, leading to inaccurate classifications [22]. It also does not consider the contextual meaning of words or phrases, which can result in misclassifications. Additionally, it is sensitive to outliers in the dataset, which can affect its performance [23].

Classifying hoax news is crucial during presidential elections to ensure that voters are well-informed and make decisions based on accurate information. Hoax news can manipulate public opinion, influence voting patterns, and undermine the democratic process. Therefore, it is essential to develop effective methods to identify and classify hoax news. Naive Bayes algorithm can be a valuable tool for classifying hoax news during presidential elections. It leverages the probability theory to calculate the likelihood of a news article being genuine or fake based on its features. By analyzing various features such as the source, language, tone, and content of the news article, Naive Bayes can provide a reliable classification.

The formula for Naive Bayes classifier is based on Bayes' theorem and is expressed as:

$$p\left(\frac{y}{x}\right) = \frac{p\left(\frac{x}{y}\right)p(y)}{p(x)} \quad (1)$$

Where this formula can be described as follows: $p\left(\frac{y}{x}\right)$ is the posterior probability of class y given predictor X ; $p\left(\frac{x}{y}\right)$ is the likelihood which represents the probability of predictor X given class y ; $p(y)$ is the prior probability of class y ; $p(x)$ is the probability of predictor X .

In classification tasks, we calculate the posterior probability for each class and choose the class with the highest probability as the predicted class for the input data X . Therefore, the greater the data in both class y as training data can increase the probability of predictor in X .

3. Methodology

3.1. Research Models

The method in this research models refers to the linear sequential system development life cycle (SDLC) process. With the flow stages starting from analysis, design, coding, testing and supporting finalization stages to then be developed in the future [24]. This series of activities is in line with the objectives of the research, which is to measure how resilient beginner voters are to fake news while developing a database of content and categories of hoax news. In the process of collecting data, this research is carried out with an observation model, a survey to respondents who are novice voters and collecting information related to fake news as categorized news supported by literature studies on previous related research. The stages of process for this research can be shown in figure 1 research roadmap as follows:

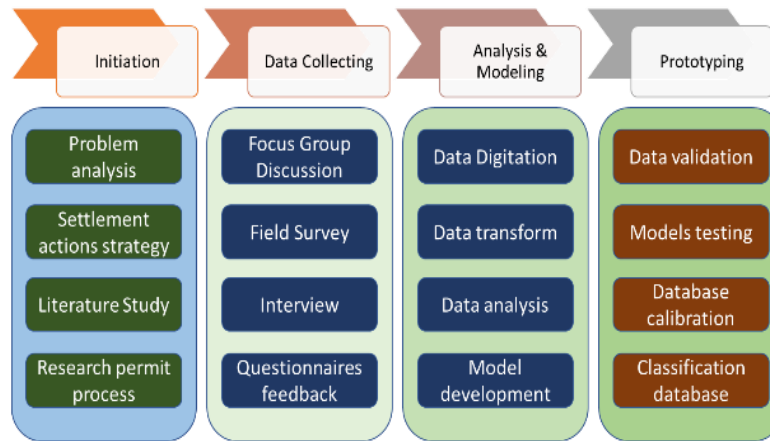


Figure 1. Research roadmap

From the research roadmap in [figure 1](#), there is four main stages during this research process. In the initiation process, problem analysis was carried out from the existing conditions on social media, especially related to hoaxes during the 2024 election period. From here, the strategy and the main problems that want to be built are prepared, after being supported by literature studies and data on the distribution of the age range of voters, it can be found that the 2024 elections are dominated by novice voters. These novice voters have relatively little knowledge of the full political conditions and are still impulsive, so it is easy to be deflected by a false reality of hoax news. This is the main basis for this research. Furthermore, the data collection process began with focus group discussions and dissemination of this activity to respondents. At in the stages of data collection, in the context of assessing respondents, the research team conducted dissemination and education related to national insight and maintaining the national integrity, which is prone to polarization during the 2024 elections. This dissemination and education were carried out both offline and online to all respondents, in cooperation with the regional general election commission.

One of the objectives of this study is to measure the resilience of first-time voters to hoax news represented by the sample of this study compared with Naïve Bayes classifier. Furthermore, they are asked to classify the news whether it is included in hoax news (positive), actual news (fact), or doubtful news (gray area). From this activity, in addition to measuring the ability of the sample, the system is also developed in its database so that it is richer in fact data and tests the classification system that is being built. Data from hoaxes and facts were collected from social media platform X (Twitter) between October 15, 2023 and January 31, 2024. This social media platform was chosen because it has a very massive and fast data distribution. As for the system that was built, it can be seen simply in [figure 2](#):

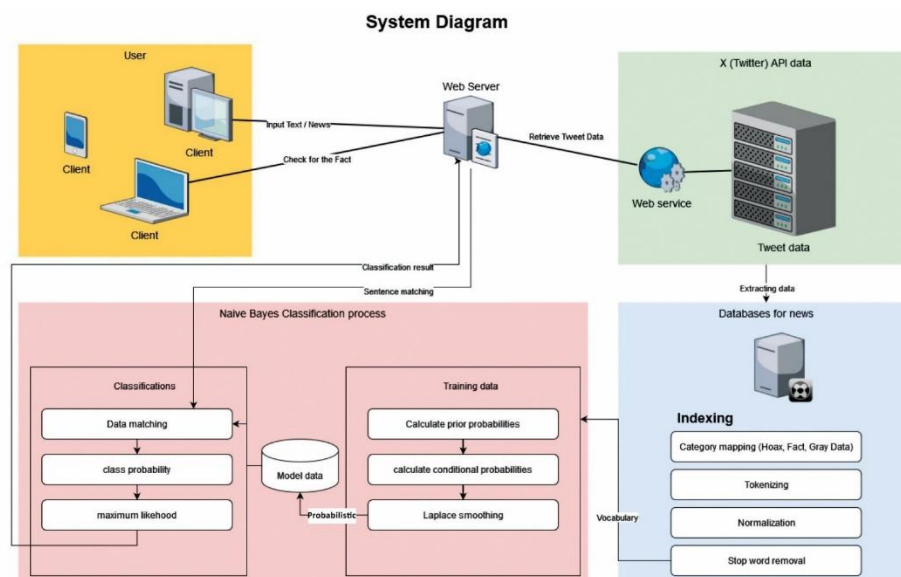


Figure 2. System Development Diagram

From [figure 2](#), training data is obtained by extracting data from social media X (Twitter) which is done with the help of a webservice from the Twitter API. Then the results of the extracted data are stored in the database built for the indexing process. The indexing process is carried out by mapping the extracted news then broken down per news with a tokenizing process to eliminate credentialed data then normalized and finally removed the stop word. Determination of weighting is done to determine whether the news obtained falls into the hoax, fact or gray area news category. Until finally producing a model that contains the probability of each vocabulary per category. To avoid zero (null) values, smoothing is done with the Laplace smoothing technique. Implementing Naive Bayes algorithm for classifying hoax news involves several steps as follows: Data Collection which is a process to gather a dataset of labeled news articles, including both genuine and hoax news. Preprocessing or clean the data by removing irrelevant information, such as stop words and punctuation. Feature Extraction process that identify relevant features from the news articles, such as the source, language, and content. Training the model, to split the dataset into training and testing sets. Train the Naive Bayes model using the training set. Testing and evaluation this to evaluate the performance of the trained model using the testing set. Calculate metrics such as accuracy, precision, and recall. And lastly fine-tuning to adjust the model parameters to improve its performance if necessary.

The data collection conducted in this research does not store individual information. For example, user name information on social media X (Twitter) was extracted so as not to violate individual privacy. This is done based on the rules of the Electronic Information and Transaction Law (ITE Law) established in Indonesia.

3.2. Data Collecting

This research was conducted by collecting data from respondents totaling 283 students who came from two private universities in Surabaya and came from various majors. These respondents were selected with the profile of all students who are in the category of novice voters who will use their voting rights for the first time in the 2024 elections. This survey was conducted using a stratified random sampling approach. Data collection is carried out in a random and structured manner by dividing the population of the sample into groups that are distinguished from the level of study, study program, and age range of the population. This population sampling is intended to flatten the sample and represent the characteristics of each sample. The data collection process was conducted both offline and online through Zoom.

In the classification process, two data are needed, namely the model data that has been built and the testing data. Testing data is obtained with each new news story inputted by users or users using their devices. The next process is matching the inputted data which then checks the probability of each inputted vocabulary and calculates the maximum like hood. With this, it can be concluded the category of news entered by the user so that it can provide recommendations to the user how to respond to the news.

This research was conducted with respondents who are first-time voters from several private campuses in Surabaya, Indonesia. The data collection mechanism was assisted by several volunteers who were final semester students. This data collection began with socialization related to elections and political profiles in general to all students. This socialization was facilitated by a team from the General Election Commission, with the main objective of maintaining stability and preventing national disintegration in the 2024 political year by carrying out peaceful elections. The coordination process of the research team members was carried out both offline and online with the help of the Zoom application. The documentation of this research activity can be seen in [figure 3](#).

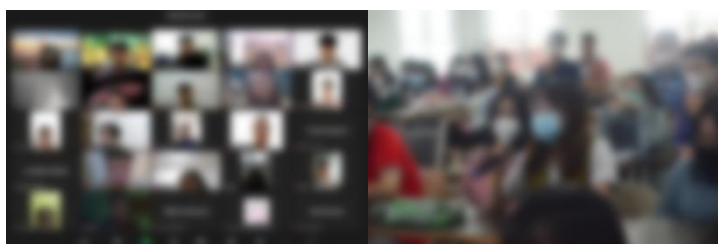


Figure 3. Research Assessment Documentation using both offline and online methods

Then after the team conducted socialization and dissemination, continued with the data collection and validation process. Here the team conducted a study of various articles and news on the internet and then grouped them into hoax or factual news groups. Furthermore, the data that has been summarized is tested to respondents in the form of a

questionnaire where they are asked to determine based on their understanding of the news circulating in the community. if in the form of a video, the team also provides a link to the news. The results of the respondent's questionnaire are then processed to determine the extent to which young voters are resilient to hoax news, and reduce the possibility of becoming swing voters because of a certain issue that is not clear the source. From the data obtained, it continues to the last process of the research roadmap in [figure 1](#). Where to do prototyping and validation of the developed system. This system is tested directly to respondents to conduct test cases from the classification results of the news they get or doubt the truth to help provide recommendations whether this news can be trusted or not.

4. Results and Discussion

From the results of observations and surveys to students as samples in this study, it can be concluded that they currently get more news from social media and the majority stated that they are often exposed to political news there. While the results of the initial survey of the respondents' ability to classify political news can be seen in [table 1](#). Resume of respondents' resilient classification results. The questionnaire measurement of this respondent uses a Likert scale with a value between 1 to 5 where, value 1 is the smallest or negative value and value 5 is the largest or positive value. Then the respondents were also asked to classify the existing news according to the category they believe in whether it falls into fact news, hoax news, or questionable news / gray area.

Table 1. Resume Result of Key Aspect Questionnaires

No	Key aspect	Var.	Mean	SD
1	Cognitive biases and susceptibility to hoax news	2.133	3.092	1.463
2	Knowledge about political processes and institutions	1.872	3.067	1.371
3	Media literacy and critical thinking skills	1.959	3.046	1.402
4	Psychological factors influencing belief in hoax	2.024	3.025	1.425
5	Ability to discern reliable sources of information	2.000	3.102	1.417
6	Recommendation system can help distinguishing hoax news	0.691	3.049	1.352

The data below is based on the right classification with number of data 10.

		Error rate	Mean Accuracy
7	Ability to classify news based on criteria.	70,32%	29.68%

Var = Variance; SD = Standard Deviation

Variance is a measure of the dispersion of a set of data points around their mean value. It quantifies the degree to which each data point in the set differs from the mean. The variance σ^2 is calculated by taking the average of the squared differences between each data point and the mean. The mean, often referred to as the arithmetic average, is a measure of central tendency. It is calculated by summing all the numerical values in a data set and then dividing this sum by the number of observations. While standard deviation is the square root of the variance. It provides a measure of the dispersion of data points in the same units as the original data. Based on [table 1](#) above, it can also be concluded that this classification system is helpful for respondents in analyzing news by providing input whether the news falls into the category of fact news, hoax news or gray news that needs to be searched for other sources and perceptions. With a low variance value and overall providing an average value above 3, respondents also agree that there needs to be an effort to assist in providing recommendations on existing news. As presented in [table 1](#). At point 7, has an average error value of 70.32% where this value represents the average of the entire respondent's ability to analyze a news article correctly so as to be able to categorize the news correctly whether it is classified as hoax news or news that can be accounted for. The results of this study represent that it is still very difficult for novice voters to know the truth of news [\[25\]](#), especially if the news spreads quickly and goes viral. Often perceptions and comments from other users as well as the impact of influencers turn news into false veracity and cause moral panic in society.

Subsequently, from the results of this questionnaire, as previously stated, a hoax news database will be built which will automatically categorize the news with the help of the naïve bayes algorithm. This algorithm was chosen on the basis of the speed of data processing and based on the results of previous research conducted by Widiyanto [26] and Santoso [22] which showed classification performance both quickly and fairly accurate. Then this research will test the results of the classification by respondents and compare them with the results of the naïve Bayes algorithm.

During the training phase, the Naive Bayes algorithm learns the probability distribution of each feature given the class labels (genuine fact or hoax or gray). It calculates the conditional probabilities of each feature occurring in genuine and hoax news articles. These probabilities are used to classify new, unseen news articles during the testing phase. In the testing phase, the trained Naive Bayes model is used to classify unseen news articles as genuine or hoax. The model calculates the probability of each class label given the features of the news article. The class label with the highest probability is assigned to the article. The performance of the model is evaluated using confusion metrics. The accuracy level of the checked news classification results can be seen in table 2. Confusion matrix of naïve Bayes classifier results.

Table 2. Confusion matrix

N = 165	Predicted : No	Predicted : Yes
Actual : No	TP: 49	TN: 11
Actual : Yes	FP: 5	FN: 100

In table 2, the confusion matrix describes the results of testing the accuracy and performance of a classification model with test data whose true value is known. With this confusion matrix, it is divided into 4 categories of approaches, namely; TP (True Positive): is news that is a fact and is correctly detected as a fact. TN (True Negative): is hoax news that is detected as fact. FP (False Positive): factual news that is detected as hoax news or gray area news. FN (False Negative): hoax news that is classified as true hoax news or questionable news (gray area).

From testing 165 news data, an accuracy value of 90.303% is obtained from the value $(TP + FN) / N$. While the classification error with the naïve Bayes model is 9.697% this value is obtained from the $(TN + FP) / N$. This result show a huge potential of naïve Bayes classifier especially when the database is massive. This result is in line with the research conducted by Widiyanto, 2021 [26], that stated the Naïve Bayes, is superior in term of accuracy and processing speed. This accuracy surpasses the ability of respondent which is novice voter to classify the news. The respondent can only get 29.68% of mean in accuracy, because many factors influence their perceptions. Whenever the news is right or wrong sometimes its very hard to distinguished. Nevertheless, the Naïve Bayes approach method is able to detect news classification correctly with an error value of only 9.697% error in news classification where this value comes from the classification process of the same news data from the respondent.

The results of the classification on the naïve Bayes model are much better than the results of the respondent assessment. Where in the same test case the naïve Bayes model was able to achieve an accuracy value of 90.303%, while the results of the respondents on average were only able to categorize correctly by 29.68%. from this result represents that novice voters are very vulnerable to disinformation and hoax news. This result turns out to be in line with previous research conducted by Balshetwar [1] where the sentiment of each character is a challenge for researchers. Classification using naïve Bayes classifier can be one of the alternatives to provide recommendations for the category of news, whether it is included in hoax news, facts or gray areas. The characteristics of naïve Bayes are fast and can increase in accuracy along with the amount of training data owned making this algorithm has great potential to be developed further.

Moreover, novice voters have a change in habits in getting information and news, namely more in social media. This is certainly a challenge in itself, especially a lot of fake news or opinions that lead to a certain condition [24]. The nature of social media that is free and straightforward in commenting makes everyone and individuals free to express and convey their opinions even though sometimes it is not necessarily true [25]. However, with so much exposure to political information, a person's literacy skills are sometimes unable to filter every information presented and displayed on social media [27]. Especially with the support of endorsements from public figures, influencers, buzzers and so on, it is a challenge for each individual to analyze the truth of the information received [18]. In order to maintain their

existence, influencers often create fake famous trends so that they remain viral, even though it is a lie that is not based on anything [28]. Influencers often use the emotional aspect, as well as the sentiment of the community to attract an issue to go viral [25].

The government plays a crucial role in addressing the issue of fake news [27]. Legislation can be enacted to regulate the spread of fake news, ensuring accountability and transparency. However, it is essential to strike a balance between freedom of speech and the need to combat fake news. Government initiatives should focus on promoting media literacy, supporting fact-checking organizations, and fostering collaboration between stakeholders [29]. As a recommendation for the government and related stakeholders based on the results of this research, a database has been formed that will continue to grow with classification data information for hoax news. This database will be the basis for the development of filter features for existing news in the form of plugins on web browsers. These plugins can provide a classification of whether the news article is a hoax or news that can be accounted for.

In an era characterized by the proliferation of big data and real-time information streams, future developments in the naive Bayes classifier system will likely focus on accommodating and effectively analyzing large volumes of data in real time. This entails optimizing the system's scalability and performance to handle massive datasets and deliver timely insights in dynamic environments.

In addition to naïve Bayes, further approaches and research are needed regarding other algorithms that can also help to actively detect hoax news, such as logistic regression, support vector machine, stochastic gradient descent, neural network and so on. The speed and accuracy of each algorithm can be reviewed in more depth by previous research done by Qubra [30] and Nagoya [19]. So that an integrated system can be developed that can help everyone to be more preventive against news that cannot be justified. Future research can try to delve deeper into sentiment analysis on news, so that it can prevent news that goes viral only because of inappropriate sentiment. An interesting example is the news of an emergency warning with a picture of a blue Garuda on social media in 2024, which eventually became an inappropriate national movement. Sentiment analysis and emotional analysis approaches can make a tremendous contribution to further improve the accuracy of a news classification [30].

As advancements in the naive Bayes classifier system unfold, a parallel emphasis on ethical and responsible implementation will be paramount. Future developments will prioritize the ethical considerations surrounding data classification and the responsible use of predictive algorithms, ensuring that the system's deployment aligns with ethical standards and societal well-being.

5. Conclusion

Detecting and classifying fake news in social media pose several challenges. These include the rapid spread of misinformation, the evolving nature of fake news techniques, and the presence of sophisticated disinformation campaigns. Researchers are continuously developing new algorithms and techniques to address these challenges, including the use of deep learning models, network analysis, and collaborative filtering.

This research objectives are to measure the resilience of novice voters against fake news and misleading information and furthermore creating a recommendations system for them to classify whenever the news is fact of fake using machine learning with naïve Bayes algorithm. From the result in this research we can conclude that mostly the novice voters is not resilient enough when facing with a huge wave of fake news especially in social media. According to the results of the average accuracy of the classification carried out by respondents is only 29.68% while the naïve Bayes algorithm is far superior with an average accuracy of 90.303% and in a very short time. The reason for the low score is due to the amount of biased information they get, especially in comments made by influencers or public figures who sometimes give them a second opinion.

The outcome of this research will also include the development of a hoax news classification database. This will serve as the basis for the development of plugins on web browsers that help to recommend the classification of news on social media. This will significantly help people to raise awareness of the news they read and reduce the possibility of disinformation. Naïve Bayes can be an alternative to provide recommendations from the classification. Nevertheless, it needs to be supported by a sufficient training database to provide optimal results. The accuracy of the models is

measured using confusion matrix based on the result of the classification provided with test data and training data. In conclusion, the future developments in the naive Bayes classifier system hold immense potential for elevating the system's capabilities, refining its accuracy, and expanding its applicability across diverse domains. By embracing technological innovations and addressing inherent limitations, the evolution of the naive Bayes classifier system is poised to contribute to enhanced data classification and decision-making processes in the years to come.

This research has a limitation in time series and data gathering which is only for three month since the declarations of presidential candidate and the number of respondents only limited in one area. Furthermore, this research can be improved with gathering more data for training or done in other areas in Indonesia with different demography and education levels. The other limitations are the naïve Bayes classification sensitive to outliers in dataset therefore can affect its performance. This method also holds independence assumptions thus the quality of the dataset is one of the most crucial for this method. And for further studies combining the multiple naïve Bayes models with tree-augmented to handle dependencies and also utilizing the Natural Language Processing technique especially in sentiment analysis can greatly enhance the contextual understanding of the news to another level.

6. Declarations

6.1. Author Contributions

Conceptualization: Y.H., M.E.Y., and A.S.P.; Methodology: Y.H., M.E.Y.; Software: Y.H.; Validation: Y.H., M.E.Y., and A.S.P.; Formal Analysis: Y.H., M.E.Y., and A.S.P.; Investigation: Y.H.; Resources: M.E.Y.; Data Curation: Y.H., M.E.Y.; Writing Original Draft Preparation: Y.H., M.E.Y., and A.S.P.; Writing Review and Editing: M.E.Y., Y.H., and A.S.P.; Visualization: Y.H. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6.3. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6.4. Institutional Review Board Statement

Not applicable.

6.5. Informed Consent Statement

Not applicable.

6.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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