Evaluating Jokowi's Policy on Alcoholic Drink Investment in Indonesia by using sentiment analysis

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Abstract.

This paper discusses the evaluation of Jokowi's policy regarding alcoholic drink investment in Indonesia by using sentiment analysis. The source of data used as policy feedback in this study is data from the Twitter API. There were 6,963 tweets taken five days before and five days after Jokowi lifted the policy. The data was then manually annotated as many as 963 tweets by sentiment labels. This study uses NLP Techniques to process the data and uses SVM to classify it. Furthermore, using trained data, this paper labels the rest of the tweets into three groups of sentiments, namely positive, negative, and neutral, to see how much public support or rejection of policies on social media. From the analysis, the alcoholic drink investment policy was not successful. The number of negative sentiments from the public shows that this policy is against the people's will. Negative comments dominated during the period of this study, significantly before the President lifted the policy. Nevertheless, Jokowi's decision to revoke the alcohol investment permit is the right step and has succeeded in reducing negative comments and rejections on social media, especially Twitter. This paper also covers words that are interconnected and related in Twitter to give an overview of the tweet's contents. Before the policy was revoked, many tweets contained a rejection of Jokowi's policies, rejection of the Papuan government, and asked the MUI to suggest Jokowi revoke this policy. After the policy was revoked, the comments were more directed at criticism of the President's attitude, which stated that he hated foreign products but allowed investment in alcohol and had made policies that provoked a public controversy.

Keywords: sentiment analysis, alcohol investment, Jokowi’s policy

1. Introduction

In the conceptualization of the policy process, evaluation is the last stage to monitor and analyze the policy's implementation or impact (Sutcliffe & Court, 2005). From the evaluation process, the policymaker gain feedback from many stakeholders, including society. Then, this feedback will be the data to consider whether the policy should be continued or stopped.

The evaluation process can be carried out using data and information posted on the internet along with advanced technology. Nowadays, people often express their opinion, critique, and support a policy or social issue in social media. Their pros and cons can be measured using sentiment analysis and giving insight to the policymaker about the next strategy they should decide.

In February 2021, President of Indonesia Joko Widodo (Jokowi) published President Regulation No. 10 of 2021 about investment in Indonesia. This regulation aims to stimulate the growth of investment in Indonesia and increase the national income. However, this rule includes an attachment that concerns investment legalization on alcoholic drinks in some regions (Muthiariny & Afifa, 2021). This legalization enables people to invest in the alcoholic drink industry. People can sell the product at retail with the condition that distribution and space have to be specially prepared (Santoso, 2021). In the following condition, the government will implement an alcoholic drink investment policy in 4 provinces, including Bali, East Nusa Tenggara, North Sulawesi, and Papua, concerning the local culture and wisdom. However, many rejections come from the public for this regulation. Many mass organizations, political parties, District heads, and individuals believe that the legalization of alcoholic drink investment brings a negative impact. Finally, the President revoked the regulation on alcoholic drink investment on March 2, 2021, after deliberation with MUI (Indonesian Council of Ulama), the chairman of Islamic mass organizations such as Nahdlatul Ulama, and Muhammadiyah, and some district heads. The repeal of this policy also reaps many pros and cons from the public. Some of them appreciated the President, who was willing to listen to the public's request. Still, the rest think the President should not cause uproar in people and consider the policy's impact before it is promulgated.

The public's pros and cons are actively discussed on social media before and after the policy is repealed. They use their social media account such as Facebook and Twitter to express their comments. From the statement on social media, their sentiment towards the policy can be seen, and it can be used as a source of data in sentiment analysis.

As one of the popular social media, Twitter can provide extensive data about sentiment analysis in Indonesia. Statista.com published that in January 2021, Indonesia reached the 6th rank worldwide of Twitter users, at around 14.05 million users (Tankovska, 2021). With the high number of users, the data and information provided on Twitter can portray people's sentiment towards the President's policy. Therefore, by using sentiment analysis, this research will measure people's reactions to the President's decision and the tendency of this policy to gain support and rejection. Generally, this research will help the government better understand public will and response toward their policy to evaluate their performance and increase public satisfaction.

2. Literature Review

2.1 Technology and effective policy

Along with the advancement of technology, political content on the internet also grew extensively and continuously. The content has many forms, such as a statement on social media postings, comments, sharing articles, or writing on the blog/ website. However, the public prefers to use social media compared to other channels to respond to political issues because social media is assumed to be more efficient and potentially reach a large number of people (Charalabidis, Maragoudakis, & Loukis, 2015). In this situation, social media can be a data source to capture public opinion and public satisfaction towards government performance. Charalabidis et al. (2015) mentioned that content about political issues in social media could produce more effective public policy. By analysing public feelings and perceptions, the government will better understand society's actual needs. They will also be capable of producing an approach to solve the existing problem more effectively. However, the extensive growth of political content in social media requires the technology to handle the data and process it into valuable insight.

2.2 Why Twitter

With many users, Twitter, Facebook, and Instagram have the potential to provide data about political content in Indonesia. However, these platforms have characteristics, including the type of data, the data content, and the length of the data. Twitter data type mainly consists of text instead of videos/ pictures, with the maximum length of text 280 characters (Ferdiana, et al., 2019). Twitter content is also dominated mainly by the idea, perspective, or opinion towards news and issues. Meanwhile, Facebook data type consists of text, pictures, and videos with more varied content such as experience, story, news, and opinion. However, Facebook provides more maximum length that is 63.206 characters. Lastly, Instagram has the opposite character to Twitter. This platform consists of pictures and videos, and the text provided is more to be the caption of the picture/ video. Instagram has the maximum length of data as 2.200 characters. By considering the character above, Twitter is chosen as the most suitable platform to provide a dataset that will be analysed using sentiment analysis.

2.3 Sentiment analysis

Sentiment analysis is a study to analyse text sentiment using Natural Language Process (NLP), text analysis, and computational language (Susilowati, 2016). Sentiment analysis is also defined as the process to identify users' behaviour from their expression and comments towards issues, news, review products, and government policy (Sukma, et al., 2020). This analysis is categorized as a supervised learning method that needs to supervise and train the data to classify the polarity of the data (Suroso, et al., 2020). This research will classify the data into positive, negative, and neutral sentiments by identifying the polarity.

The attention on sentiment analysis (SA) increased significantly from 2004 onwards, particularly on products, movie reviews, and other commercial purposes (Dandannavar, Mangalwede, & Desh, 2017). The growth of SA started to reach the government area in 2010 by collaborating with the SA agency, which helped the government monitor social media. Dandannavar et al. also mentioned that the SA allows the government to evaluate public satisfaction. Using the feedback gained from social media, the SA could capture the user sentiment, whether they are happy or not, toward policy or service from the government. Moreover, as a social media analytical tool, SA will provide more insight into a new policy that is more suitable and desirable by the public and enhance the policy to be more sustainable and prosperous (Dandannavar, Mangalwede, & Desh, 2017).

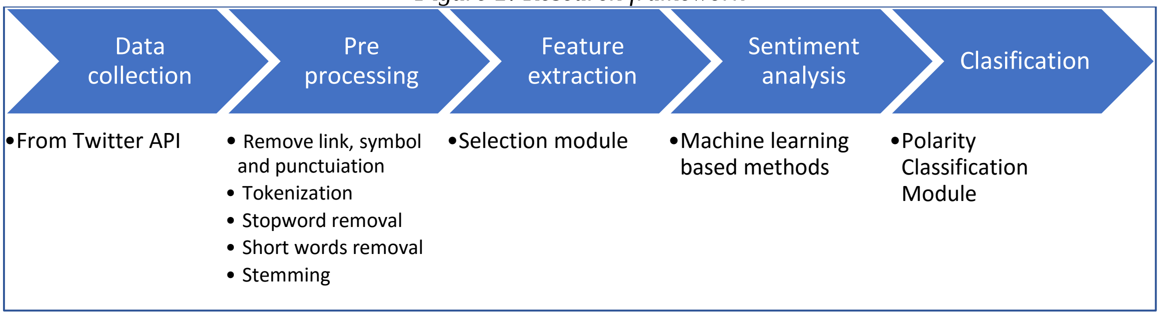
2.4 Support vector machine

Support Vector Machine (SVM) is one of the classification methods that is used in sentiment analysis. This method requires many training data sets and enhances better results than other sentiment analysis algorithms (Sukma, et al., 2020). One of the advantages of the SVM is its effectiveness in analysing high-dimensional space. It can also investigate the cases even though the number of samples is smaller than the number of dimensions (scikit-learn, n.d.).

3. Data sources and methodology

Explicitly, this research question is "How is the response of the public towards President policy to legalize alcoholic drink investment?" and "How is the public's response towards President policy that revokes the rule of alcoholic drink investment?". Since most Indonesian society uses Bahasa Indonesia, this research will be scraping the data in Bahasa Indonesia. The proposed framework used in this research consists of data collection, pre-processing data, feature extraction, sentiment analysis, and classification (Dandannavar, Mangalwede, & Desh, 2017).

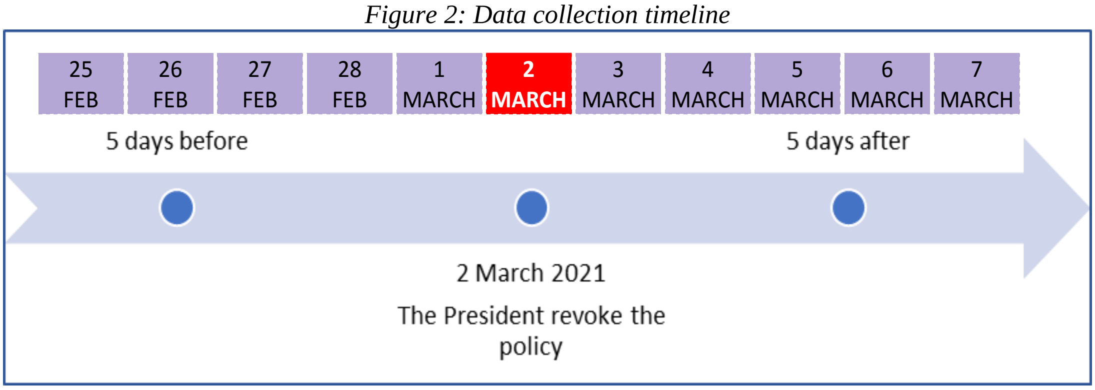
Figure 1: Research framework



3.1 Data collection

This research will utilize Twitter API to collect the data from Indonesian Twitter users on a specific date five days before the President revokes the rule and five days after. The President revokes the regulation on the legalization of alcoholic drink investment on March 2, 2021, so that the Twitter data will be collected from February 25 to March 7 and exclude the revoking date. By using this period, this research aims to portray the public sentiment towards two decisions taken by Jokowi: the regulation to legalize alcoholic drink investment and the President's decision to repeal this regulation. Therefore, public satisfaction can be measured by looking at the sentiment trend during this time.

Figure 2: Data collection timeline



The data collection process utilizes the R program with rtweet package to collect data from Twitter API. This package possibly scraps data within the last 30 days by using a 30-Days Sandbox environment. However, this environment has a limitation on the number of tweets that can be pulled per request, at maximum of 100 tweets. Therefore, this research conducts 10-time request per day with the specific hours from 00.00 until 24.00. The maximum result that can be collected is 1000 tweets per day. However, several days when the data pulled cannot reach the maximum result due to the decreasing number of discussions about the policy on Twitter. The keyword used in scraping data is "Jokowi miras" which means "Jokowi alcoholic drink". This keyword helps to minimize the possibility of other issues being pulled during data scraping.

Next, the data collected will enter the filtering stage by selecting which data that appropriate to be analysed. The data must fulfil the criteria that are discussion or comment about President policy on alcoholic drink investment. After the filtering process, the dataset collected for this research has a total number of 6,963 tweets.

3.2 Pre-Processing

At the first step of pre-processing data, this research divides the dataset into two groups: pre-annotated data and data testing. Then, the first group is labelled manually into three sentiments that are positive, negative, and neutral. The total number of tweets that get manual labelling is 963 tweets. After manually labelling like illustrated in Table 1, the pre annotated data has the label -1 (negative sentiment) at 473 tweets, label 0 (neutral sentiment) at 326 tweets, and label 1 (positive sentiment) at 164 tweets.

Table 1: Example of manual labelling on tweets

Tweet	Label	Sentiment
Pencabutan perpres miras menunjukan sikap demokratis Presiden Jokowi https://t.co/rdU1zUWfZj	1	positive
Berikut lampiran Perpres terkait investasi miras yang dicabut Presiden Jokowi https://t.co/w66Lh8kMRX	0	neutral
Sy pribadi sangat prihatin dgn kabar ini : Oknum polisi pun bisa menjadi brutal akibat mabuk miras. https://t.co/gQHzuZWcCs Sementara di sisi lainnya : Justru dibuka Investasi produksi miras. https://t.co/s8KKBPWenV	-1	negative

The next step in pre-processing data is cleaning data by using python. In this process, the tweet will be turned to be lower case and remove the link or URLs, symbols, and punctuation. As a result, the data will be clean and ready for the next steps. Table 2 shows the difference in data before and after the cleaning process. It is clear that the link, symbol, and punctuation disappear after cleaning. The data tweets also change the tweets into the lower case.

Table 2: Tweets before and after cleaning process

Before	After
Jokowi Buka Pintu Izin Investasi untuk Industri Miras Besar sampai Eceran 😟😟 https://t.co/2S0DMNWt4G https://t.co/kFVXeEuayz	jokowi buka pintu izin investasi industri miras ecer
Kalo Bener Berita ini.... Gue Berpendapat: 1□Jokowi Sedang Menentang & Menantang HUKUM TUHAN & AGAMA Yang MENGHARAMKAN MIRAS 2□Jokowi Sedang Merusak PANCASILA Yang Didalamnya Berisi	kalo bener berita ini gue berpendapat 1 jokowi tentang tantang hukum tuhan agama haram miras 2 jokowi rusak pancasila dalam isi nilai2 tuhan

NILAI2 KETUHANAN, KEMANUSIAN & KEHIDUPAN SOSIAL #TolakLegalisasiMiras #TolakLegalisasiMiras https://t.co/mG2YuP3ePm	kemanusian hidup sosial tolaklegalisasimiras tolaklegalisasimiras

After that, the data will be tokenized before applying the stop words removal. Tokenization is the process that segment the tweet into tokens by using word delimiters (Dandannavar, Mangalwede, & Desh, 2017). Since the tweet data using Bahasa Indonesia, this research loads the stop words Sastrawi library in python to remove useless words in Bahasa Indonesia. Looking at Table 2, the word "yang" in point 2 of the second tweet in the before column disappears after the cleaning process. This example confirms that the Sastrawi library succeeds in removing useless words in Bahasa Indonesia. In addition, this research also eliminates the short words which have less than four characters. Lastly, the data will enter in the stemming process, which will turn the words into the roots, such as turn the words "connection", "connected", and "connecting" to be "connect" (Dandannavar, Mangalwede, & Desh, 2017). This process can be seen in Table 2, which stems the word "merusak" into the root "rusak", and "menentang" into the root "tentang".

3.3 Feature Extraction

In the feature extraction stage, the data from pre-processing will be vectorized text by applying Term Frequency – Inverse Document Frequency (TF-IDF) weight. TF-IDF is word2vec based feature extraction process that gives the weight on the features based on how frequent the feature appears on a data or tweet, divided by the frequency of the features that appear in all datasets (all tweet) (Ferdiana, et al., 2019). In addition, TF-IDF itself consists of two terms that are term frequency (TF) and inverse document frequency (IDF). First, term frequency (TF) is used to identify the frequent terms that appear in a dataset by computing the frequency of the term "a" in a document then divided it with the total number of terms in the document (tfidf.com, n.d.). Meanwhile, inverse document frequency (IDF) is utilized to measure the importance of the term in a dataset by computing: log_e (the total number of document/ the total number of the document which has the term an inside). By applying TF-IDF, the accuracy of the sentiment analysis model can be enhanced by giving different weights on each feature.

3.4 Sentiment Analysis and Polarity classification

A three-based method can be used in performing sentiment analysis: the Lexicon-based method, machine learning-based method, and the hybrid method (Dandannavar, Mangalwede, & Desh, 2017). However, this research utilizes a machine learning-based method by dividing the data set into two, a training data set and a test dataset. As mentioned in data pre-processing, there is 963 tweet that has manual labelling and treated as the training dataset. Meanwhile, the rest (6000 tweets) is treated as a test dataset. After the training dataset is pre-processed using the natural language processing (NLP) technique, this research uses a support vector machine to classify the tweets. The classification model has been successfully built and can be used to generate the testing dataset from this stage.

In order to test how to fit the prediction towards the testing dataset, Table 3 provides F1 scores on negative, positive, and neutral sentiment, and also the macro and weighted average and its accuracy. F1 score that is known as F measure, is used to measure the balancing towards the precision and the recall by using the following calculation (Brownlee, 2014):

F1 Score = 2*((precision*recall)/ (precision + recall))

The best value of F1 score is if the result is close to or at 1 (as the maximum result), and if the value is at 0 (the worst result), it will be considered the failure result (scikit learn, n.d.). Because the dataset has a multi-label case, the F1 score average depends on the average parameter, including macro and weighted average. The average macro value is derived by calculating the metrics per label and finding the unweighted mean, while weighted average also calculates the same metrics but finds the average weighted (scikit learn, n.d.).

Table 3: SVM test score

	Negative (-1)	**Neutral (0)**	**Positive (1)**	**Macro Avg**	**Weighted Avg**	**Accuracy**
SVM	75%	61%	46%	60%	65%	66%

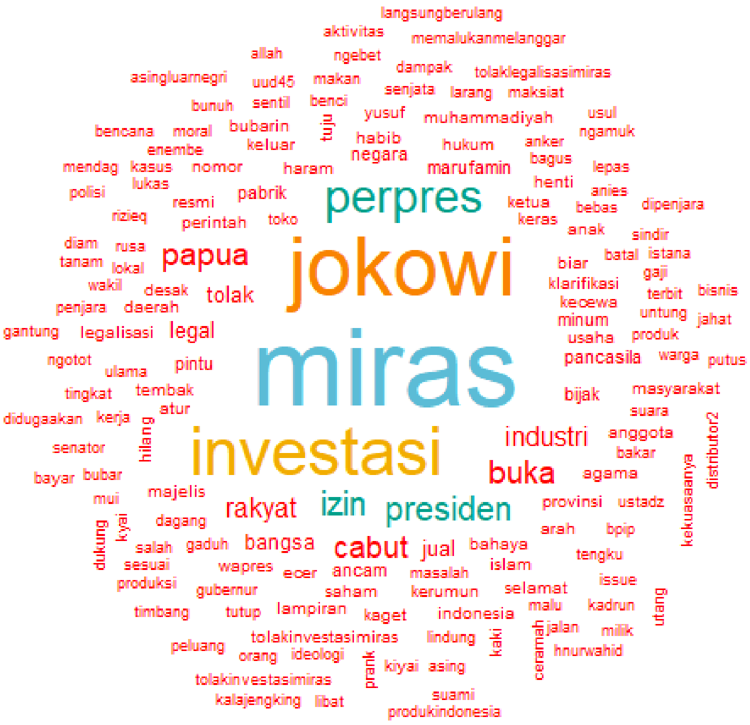
The F1 score in Table 3 indicates that the data has a good value of the F1 score, especially on negative sentiment. Meanwhile, the positive sentiment has the lowest score at 46%. However, this score is still suitable to predict the rest dataset.

The next step is assigning the polarity from the data training classification model to the testing data. The range number of polarities are 1 (positive), 0 (neutral), and -1 (negative). After loading the rest data and predict the polarity, this research has the polarity for data testing as followed: label 1 with 441 tweets, label 0 with 1,640 tweets, and label -1 with 3,919 tweets

4. Result and discussion

By combining training and testing datasets, this research has 6,963 tweets and will be visualized using the python and R programs. Firstly, this research will visualize the words that often appear on the tweets in a word cloud. The bigger size of words represents, the more frequently these words exist in the dataset. Figure 3 displays that "Jokowi" (Indonesia President), "miras" (alcoholic drink), "investasi" (investment), and "perpres" (President regulation) are the top four words that frequently appear on the tweets. These words illustrate the general topic of this issue which is related to the investment of alcoholic drink in president regulation

Figure 3: Word cloud of President policy on alcoholic drink investment



Next, by providing the barplot in Figure 4, it displays the high number of negative sentiments before revoking the policy. From February 25 to March 1, the public tends to produce negative comments on Twitter related to the alcoholic drink investment. It reflects that the public has low satisfaction with the President's policy. Moreover, from February 25 to 27, the positive sentiments are almost disappearing, with only 2 from 934 tweets, 5 from 955 tweets, and 7 from 979 tweets. Although the increasing number of positive sentiments showed in February 28 and March 1, the negative sentiment still dominated the public sentiment.

Compared to the trend after revoking the regulation, the decreasing number of negative sentiments is significantly seen day by day. This condition is in line with the decrease in tweets that discuss president regulation on alcoholic drink investment. However, it can be noticed that after repealing the policy, the number of positive sentiments increases significantly along with the decreasing number of negative sentiments. It indicates an appreciation from the public towards the President's decision, even though some people still have negative comments on this topic. After revoking, the discussion about alcoholic drink investment starts to be left. The public gives low attention to this issue, indicated by the total tweets on March 7 at 116 tweets.

Figure 4: Trend of sentiment analysis of President Regulation on alcoholic drink investment

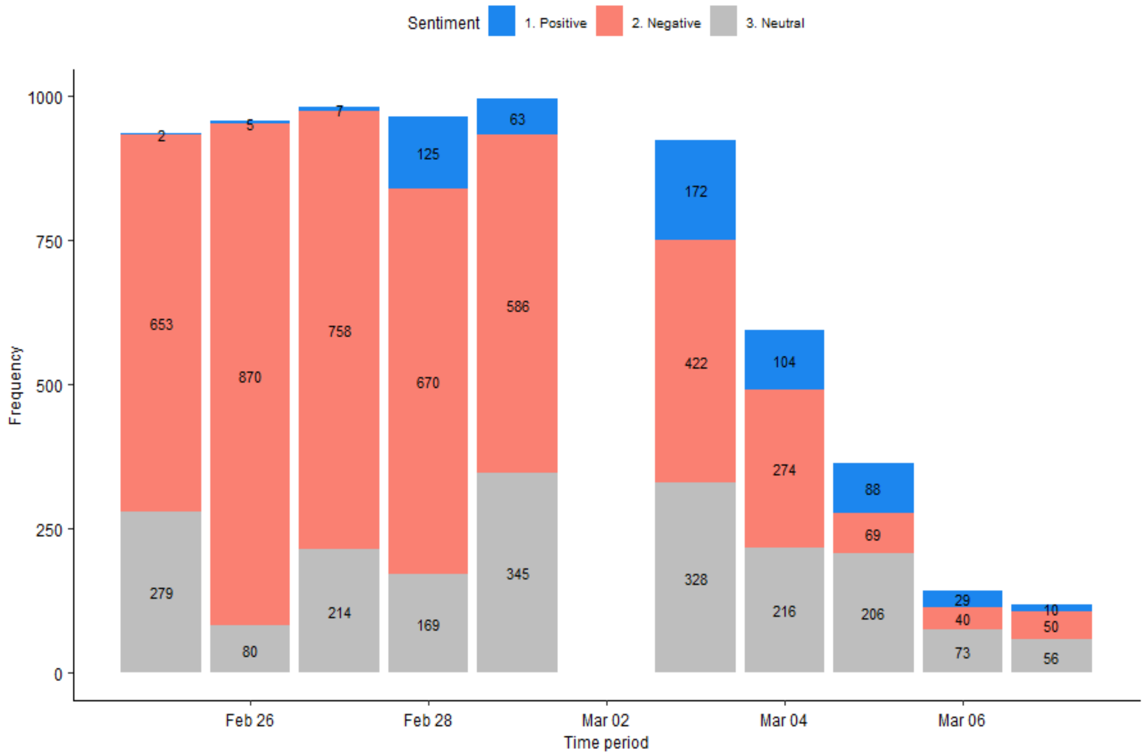


Figure 5 displays how close each word to other words in a dataset before the President revoke the regulation. The thicker line and the closer position reflect more frequent of the words mentioned with other words in a tweet. It can be seen that the word "Jokowi" is relate to the words "izin" (permit), "industri" (industry), "presiden" (president), "cabut" (revoke), "bubarin" (disperse), "desak" (urged), "legal"(legalize), "hilang"(lose), and "buka" (open). From these words, the discussion about Jokowi has a close relation to the decision taken by the President who gives permit/ legalize the investment of alcoholic drink. It also indicates that there is an urged from the public to revoke the regulation. It is also assumed that President has lost direction to decide a policy by publishing this regulation. Meanwhile, the term "perpres" (president regulation) close to the words "tolak" (reject), "cabut" (revoke), "rakyat" (society/ people), "Papua", "larang"(prohibit), "majelis" (refers to MUI). These relations explicitly illustrate that when they post a tweet about president regulation, they will also tend to discuss the rejection and revoking the rule. It also has close relation towards the rejection by the Papua government who stand to cons the President policy. It also mentioned MUI (Indonesian Council of Ulama) that should suggest the President revoke the rule due to alcoholic drink is prohibited in Islam. A non-ministry government agency directly responsible to the Indonesian President called BPS -Statistic Indonesia reported that in 2017, the percentage of Indonesians who adhere to Islam reached 97.76% (BPS Statistic Indonesia, 2020). Therefore, the MUI, as representative of Islamic ulama, played an important role in considering the government policy.

Figure 5: Words relation before revoking the regulation

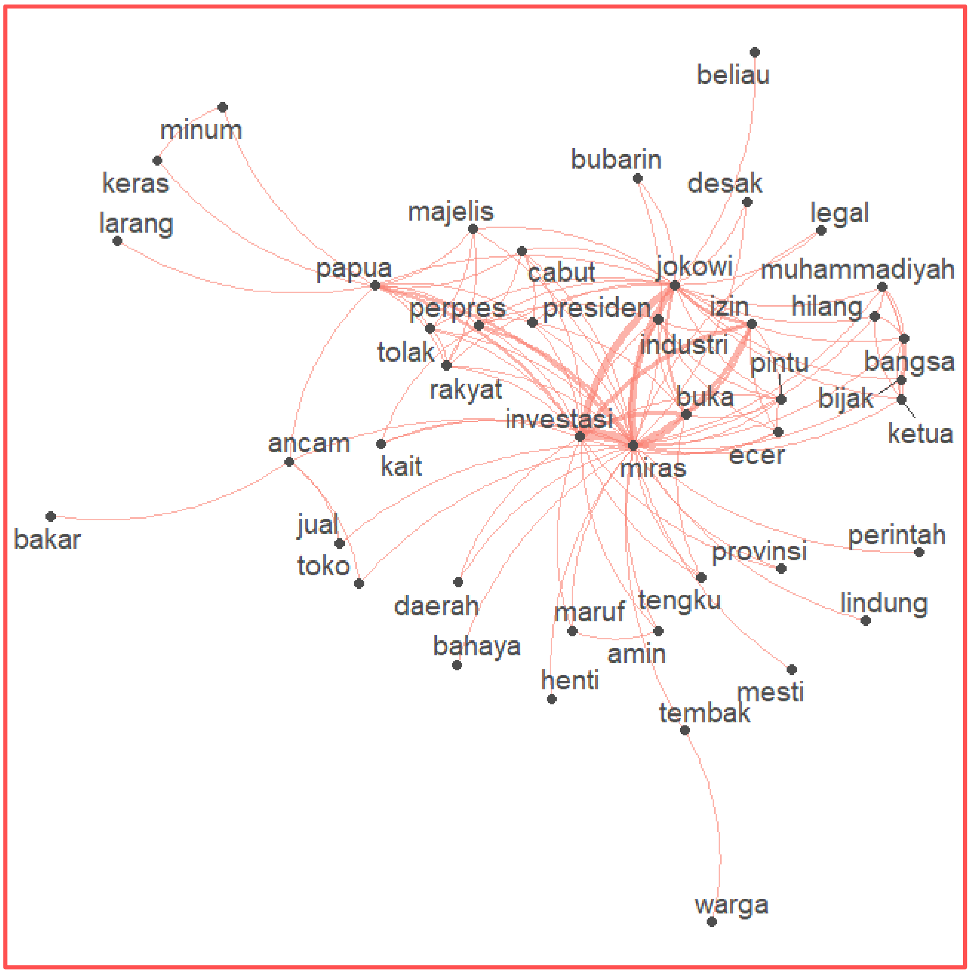
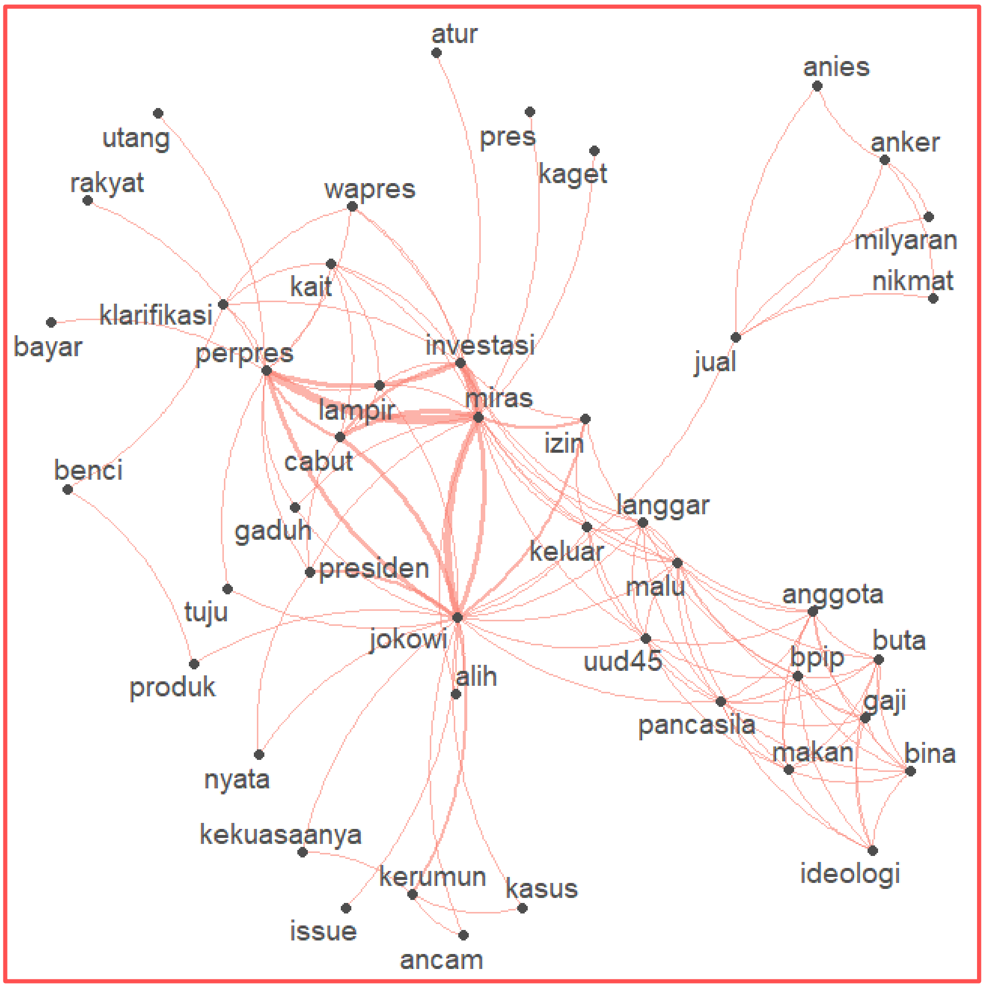


Figure 6 shows the relation of the words after the President revoke the regulation. The words which relate to "Jokowi" has been changed including "alih" (diversion), "issue", "kerumunan"(the crowd), "kasus" (case), "nyata" (refers to evidently), "pancasila" (national ideology), "UUD 45" (national constitution), "keluar" (refers to publish) and "izin" (permit). These words show that after revoking the rule, the public tends to discuss that the publishing of alcoholic drink investment is related to the national ideology and constitution and issue diversion. Interestingly, this issue is relate to the long line which relates to the words "langgar" (breaking), "jual" (sell), Anies (the name of Jakarta governor), "nikmat" (enjoy), "milyaran" (billions), "anker" (merk of an alcoholic drink). The public assumed that the President intentionally publishes this regulation to lead public attention towards alcoholic investment in Jakarta. The public also discusses the Jakarta governor, which enjoys the billions of rupiahs of profit taken from the alcoholic drink. Next, the words "perpres" (president regulation) also relates some words that did not appear before revoking the rule, including "gaduh" (commotion), "tuju" (goals), "bayar" (pay), "utang" (debt), "klarifikasi" (clarification), "benci" (hate), and "wapres" (vice president). These words relate to the discussion about President's clarification who hate foreign products but allow foreign investment on alcoholic drink. It also relates to the clarification about the involvement of the vice president in drafting the regulation. This policy is also perceived to trigger commotion in society and relate to the national debt that must be paid.

Figure 6: Words relation after revoking the regulation



From the word's relation before and after revoking, it can be seen that negative sentiment still has a significant portion in this topic. However, the repealing of the rule succeeds in reducing public upheaval. It indicates by the decreasing number of people who discuss this regulation.

5. Conclusion

This research discusses the President's regulation on alcoholic drink investment 5 days before and after revoking. The data was collected from Twitter API and processed using the NLP technique and using SVM in the classification process. The total number of tweets that are used in this research is 6,963 tweets.

Evaluating policy becomes crucial things to determine whether the policy will succeed or not. By using sentiment analysis, this research finds that Jokowi's policy on alcoholic investment was not successful. From the result and discussion, it is found that this topic is more to gain contra from the public. It can be seen from the negative comment that dominates the trend during the research period. However, the decision to revoke the rule is the right choice. This is evidenced by the decreasing rejection and negative comments on public tweets.

Recommendation

This research has several recommendations that need to be enhanced in the next study. First, the number of tweets can be added by collecting the data within the last 7 days. Second, improving F1 score by increasing the proportion of the training dataset. By having more tweets, it is expected to get the result that more representative of public sentiment. Meanwhile, having a better value in F1 score will improve the fitting predict towards the testing data and help gain better analysis.

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