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Sentiment Perspective of Government's Free Nutritious Meal Policy on Social Media X using Indo-BERT and Bi-LTSM

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Abstract:

This research has the potential to make an important contribution to the development of computationally-based sentiment analysis, especially in the context of government policies regarding the Free Meal Program that will be implemented throughout Indonesia. This research was conducted using Indo-BERT and Bi-LSTM algorithms. These approaches were used to categorize emotions into three groups: neutral, negative, and positive. Data is obtained from posts on social media X, then after processing the data, it will be applied to both algorithms, namely Indo-BERT and Bi-LSTM. The research findings show that the model's performance in determining the public sentiment of government policies. Validation and valuation were conducted using the f1 score, recall, and precision metrics. The evaluation findings show that the Indo-BERT algorithm is better than the Bi-LSTM algorithm with an accuracy value of 80% for Indo-BERT and 78% for the accuracy value of the Bi-LSTM algorithm, and the Indo-BERT accuracy value is included in the good classification accuracy value. The sentiment analysis results are also represented by word clouds for each positive, negative and neutral class, providing an intuitive picture of the words frequently used in public discourse on free nutritious meals.

INTRODUCTION

One of the current government's policies is Free Nutritious Meals. This is done one of them to reduce the stunting rate which is the focus of the Indonesian government. Based on the prevalence of stunting in Indonesia of 21.6% in 2023, this value is still high because the target in 2024 is 14% [1] . Due to its severe and diverse impacts, the government initiated the Free Nutritious Meal program. This program emerged because it was initiated by the 2024 Presidential and Vice Presidential Candidates who are currently President and Vice President, which aims to provide nutritional assistance in the form of free lunch and milk in schools, Islamic boarding schools, and pregnant women as a step to alleviate stunting.

One of the most trending topics on X is the free nutritious meals implemented by the government. This discourse actually appeared during the campaign period in the choice of President and Vice President in 2024, but the discourse became trending after the government released free nutritious meals. There is controversy in society from those who feel pro and con, and each has its own point of view. This has led to the emergence of a debate phenomenon, especially on X, which actually shows collective concern about public discourse [2]. The tendency of X users to post content can be determined by analyzing sentiment [3], [4].

Sentiment analysis is the process of extracting, understanding and processing data in the form of unstructured text automatically to obtain sentiment information contained in a sentence of opinion or opinion [5]. Sentiment analysis is done to assess the opinion and tendency of an opinion on a topic whether negative, positive or neutral [6]. Sentiment analysis can be applied to opinions in all fields such as politics, economics, social and others. This X social media opens a window for researchers to study public emotions, moods, and opinions through sentiment analysis [7].

Sentiment analysis is a process used to identify and classify opinions or feelings in text, usually in a positive, negative, or neutral context. In recent years, sentiment analysis has become a rapidly growing area of research, especially with the increasing use of social media and other online platforms as a source of data [8]. The methods used in sentiment analysis vary from rule-based approaches to more complex machine learning techniques such as Naive Bayes, Support Vector Machine (SVM), and Bi-LSTM [9–11]. IndoBERT has proven to excel in sentiment analysis by providing better results than other models [12]. The model is trained using a large dataset that includes text from various sources, including social media and news, so it is able to better capture the context and nuances of the Indonesian language. While Bi-LSTM is able to process information from both directions, so it can capture better context in text analysis. Bi-LSTM can be used to demonstrate that it is effective in capturing temporal patterns in text data [13].

Some previous research on government policies used SVM, Naive Bayes and Random Forest methods [14–16]. The Indo-BERT and Bi-LSTM methods have never been used by previous studies, therefore researchers use these two methods, hoping to get good accuracy results. In this study, it is proposed to use the Indo-BERT and Bi-LSTM methods to analyze the sentiment of government policies regarding Free Nutritious Meals by classifying into 3 namely positive, negative and neutral. By doing this sentiment analysis, it is hoped that the problems contained in the controversy over the topic of free nutritious meals can be known, so that it can be used as evaluation material for further interests.

This research has the urgency of the need for sentiment analysis to find out the policies of the government regarding government policies regarding free nutritious meals. Therefore, this research is expected to be a reference or evaluation material for further interests.

METHOD

Research stages can be carried out to make it easier to conduct research. The research design of the Sentiment Perspective of the Government's Free Nutritious Meal policy on social media x using Indo BERT and Bi-LTSM comparisons, can be seen in Figure 1, below:

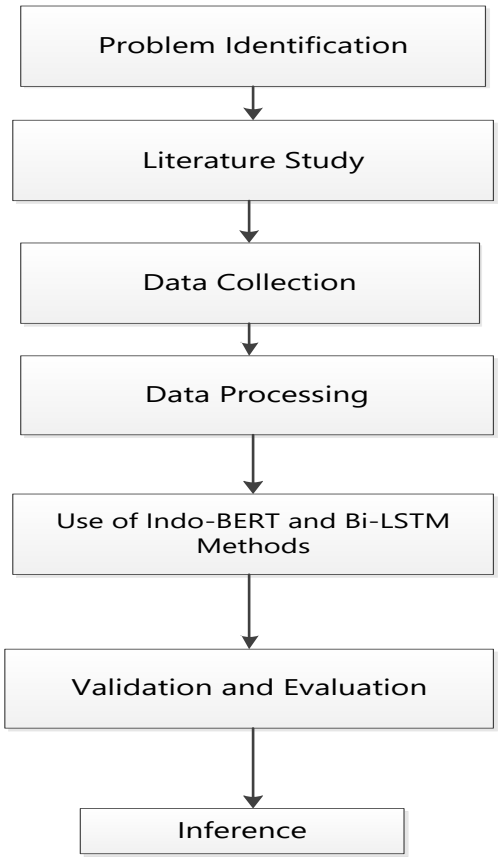

Figure 1. Research Flow

Literature Study

Literature studies are used to find theories that are relevant to similar research that has been done before regarding the results of their findings. Of course, it is a reference to get a solution to the problems that researchers face. literature study comes from several journals, books and websites related to sentiment analysis of government policies, namely regarding free nutritious meals.

Data Collection

This research was conducted using data sources from X social media. The data source used was taken using the X social media API. The tools used in this research are using Google Colabs python language. The data collected was 3319 data. Furthermore, the data will be processed after crawling the data then cleaned and filtered and processed into a dataset that will be used in research.

Data Processing

The stages of this research are performing the data filter stage, normalizing data, using stopword removal, and labelling data sets. Labelling aims to determine where the data belongs to the positive, negative and neutral classes. If the dataset is ready to be processed, it will then proceed to the next stage, namely the use of the Indo-BERT and Bi-LSTM algorithms.

Use of Indo-BERT and Bi-LSTM Methods

The use of Indonesian Bidirectional Encoder Representations from ransformers (IndoBERT) is a language model designed specifically for Indonesian, which is a variant of BERT (Bidirectional Encoder Representations from Transformers). IndoBERT has proven to excel in sentiment analysis by providing better results than other models. The model is trained using a large dataset that includes text from various sources, including social media and news, so it is able to better capture the context and nuances of the Indonesian language. Next is the use of

Bidirection Long Short Term Memory (BI-LSTM) Bi-LSTM is able to process information from both directions, thus capturing better context in text analysis. Bi-LSTM are capable of performing both long-term and short-term memory tasks with more time steps. Most regression & classification tasks require features learned in the future and past over a period of time [17][18].

Validation and Evalution

This validation and evaluation stage aims to measure the accuracy with the confusion matrix value of the results of the two Indo-BERT and Bi-LSTM algorithms. Next in the stage of drawing conclusions from the results that have been obtained on the confusion matrix based on the precision, recall, F-Measure values of each algorithm with the assessment level is excellent classification = 0.90 – 1.00, good classification = 0.80 – 0.90, fair classification = 0.70 – 0.80, poor classification = 0.60 – 0.70 and failure = 0.50 – 0.60[19][20].

RESULTS AND DISCUSSION

Data Collection

Research data obtained from crawling data using google colabs python language and the Tweet (X) API obtained a total of 3319 data. The following is a display of the research data:

Table 1. Dataset

No	Full Text	Username
1	Momen Prabowo Tanda Tangani Sepatu Siswa di Bogor saat Tinjau Makan Bergizi Gratis	okezonenews
2	Pemprov Babel dan DPRD Bahas Anggaran Program Makan Bergizi Gratis di APBD 2025	Inlens_id
3	#SahabatBahari Kementerian Kelautan dan Perikanan (KKP) tancap gas merealisasikan program revitalisasi tambak Pantura Jawa untuk mendukung pencapaian target swasembada pangan serta mendukung pelaksanaan program makan bergizi gratis (MBG)	Bppmhkp_merak
4	Adapun peruntukkan penghematan uang kembali Prabowo tegaskan guna merealisasikan program yang langsung mengena ke masyarakat seperti Makan Bergizi Gratis dan pembangunan sekolah	bugiswarta
5	Pangdam IV/Diponegoro Mayjen TNI Deddy Suryadi meninjau program Makan Bergizi Gratis (MBG) di Kota Semarang pada Senin 10 Februari 2025.	Suaramerdeka
6	@tvOneNews Mungkin pemerintah sekarang berpikir hutang adalah menggadaikan masa depan daripada habis buat orang yang mati lebih dulu buat memperbaiki kualitas generasi muda yg akan jadi pemimpin 20 th lg dg makan bergizi gratis buat biar mampubayar hutang yg telah dibuat tahun 2015-2024.	YogYas12914
7	Program Makan Bergizi Gratis atau MBG ini sejalan dengan visi Bapak Presiden yaitu menuju Indonesia Emas 2045. Untuk itu program ini wajib diberikan untuk anak-anak kita guna mewujudkan generasi unggul dan emas #Nusantara #AdadiKompas	Hariankompas

Data Processing

To decrease data dimensions while maintaining text meaning, data processing entails turning data or tweets into a "bag-of-words" format. Prior to analysis, the text needs to be cleaned and processed because it is highly dimensioned unstructured data. Depending on the sort of study, there are several steps involved in preprocessing the data. Cleaning the textual data is the first step in the text preparation process before moving on to the analysis phase.

Text preparation typically involves identifying and eliminating non-textual components from the data, like hyperlinks and hash tags.

Tokenization, case folding, cleaning, stopword removal, stemming, and filtering are all examples of data preprocessing[21]. Cleaning entails removing extraneous elements such emoticons, hashtags, usernames, URLs, and punctuation. Tokenization is the process of dividing sentences into smaller components called tokens. Case folding is the process of changing each letter to the same form, like lowercase. Stopword removal is a technique used to get rid of unnecessary words.

Stemming is the process of removing affixes to obtain the base word. To maximize the computation of the frequency of occurrences of words with comparable meanings, filtering involves choosing tweets that contain non-standard Indonesian words and either adding those non-standard words or replacing them with synonyms (standard words), as demonstrated in figure 2.

	created_at	full_text	username	lang	cleaned_text	normalized_text	stemmed_text	stopword_text
0	2025-02-10 15:00:22+00:00	Makan Siang Bergizi Gratis https://t.co/f27alt...	banten_berita	in	makan siang bergizi gratis	makan siang bergizi gratis	makan siang gizi gratis	makan siang gizi gratis
1	2025-02-10 14:55:49+00:00	Momen Prabowo Tanda Tangani Sepatu Siswa di Bo...	okezonenews	in	momen prabowo tanda tangani sepatu siswa di bo...	momen prabowo tanda tangani sepatu siswa di bo...	momen prabowo tanda tangan sepatu siswa di bog...	momen prabowo tanda tangan sepatu siswa bogor ...
2	2025-02-10 14:46:41+00:00	@lenteradata Semoga program makan bergizi grat...	Sofffyannn	in	semoga program makan bergizi gratis dri mda te...	semoga program makan bergizi gratis dri mda te...	moga program makan gizi gratis dri mda tetap l...	moga program makan gizi gratis dri mda program...
3	2025-02-10 14:44:56+00:00	Pemprov Babel dan DPRD Bahas Anggaran Program ...	Inlens_id	in	pemprov babel dan dprd bahas anggaran program ...	pemprov babel dan dprd bahas anggaran program ...	pemprov babel dan dprd bahas anggar program ma...	pemprov babel dprd bahas anggar program makan ...
4	2025-02-10 14:41:03+00:00	@lenteradata Menurutku berhasil skliki program...	putriiisofiii	in	menurutku berhasil skliki programnya mda yg ma...	menurutku berhasil skliki programnya mda yang ...	turut hasil skliki program mda yang makan gizi...	hasil skliki program mda makan gizi gratis buk...

Figure 2. Sample dataset after dataset processing

After the dataset is processed through the processing stage, the dataset class is obtained, from 3319 datasets, consisting of 2513 positive classes, 735 negative classes and 71 neutral classes. Furthermore, it is implemented in the Indo-BERT and Bi-LSTM algorithms. The following is an image of the dataset.

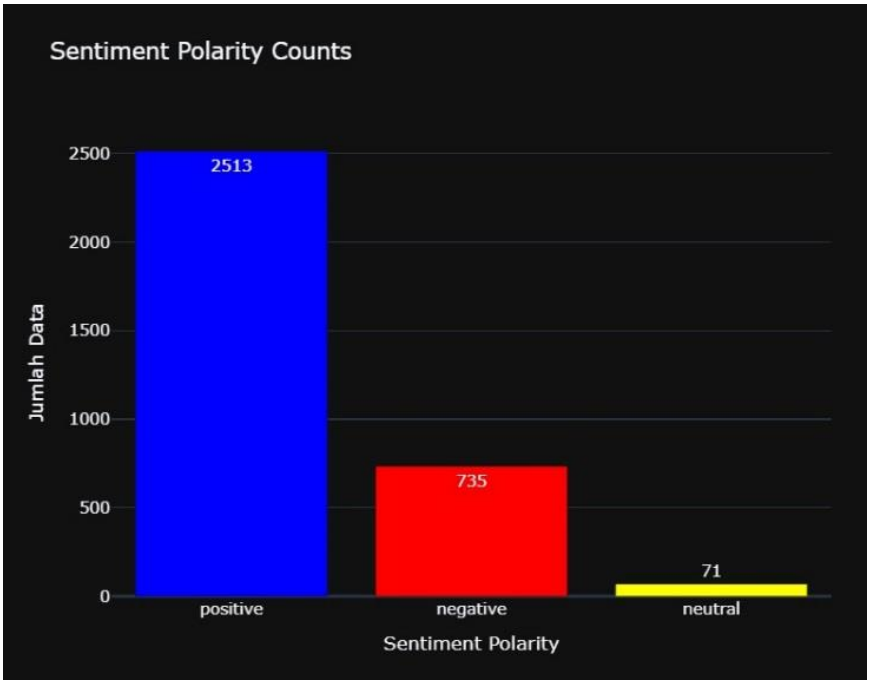

Figure 3. Sentiment Polarity

Result Use of Indo-BERT and Bi-LSTM Methods

A. Results Indo-BERT

The results of the application of the Indo-BERT algorithm using the Free Nutritious Meal dataset and with the training data and testing data scenarios; 80:20, obtained an accuracy value of 80%. Here are the details of the accuracy value, in table 2.

Table 2. Indo-BERT Results

	Precision	**Recall**	**F1- Score**
Negatif	0.56	0.65	0.60
Positif	0.88	0.86	0.87
Neutral	0.00	0.00	0.00

Based on the findings of the Indo-BERT algorithm study in table 2 above, the algorithm has high sentiment accuracy for positive sentiments but produces inconsistent sentiment results for negative sentiments and low sentiment results for neutral sentiments. These findings clearly indicate that the Indo-BERT model has a tendency to categorize positive attitudes and struggles to identify neutral sentiments associated with discussions on healthy nutrition.

B. Results Bi-LSTM

The results of applying the Bi_LSTM algorithm using the free nutritious meal dataset and with the scenario of training data and testing data; 80:20, the accuracy value is 78%. Here are the details of the accuracy value, in table 3.

Table 3. Bi-LSTM Results

	Precision	**Recall**	**F1- Score**
Negatif	0.53	0.50	0.52
Positif	0.85	0.88	0.86
Neutral	0.00	0.00	0.00

Based on the findings of the Bi-LSTM algorithm study in table 3 above, the algorithm has high sentiment accuracy for positive sentiments but produces inconsistent sentiment results for negative sentiments and low sentiment results for neutral sentiments. This finding clearly shows that the Indo-BERT model has a tendency to categorize positive attitudes and struggles to identify neutral sentiments associated with discussions on Free Nutritious Meals.

Validation and Evaluation

Based on the results of using the two algorithms, namely Indo-BERT and Bi-LSTM on the Free Nutritious Meal dataset, it gets an accuracy value of 80% on the application of the Indo-BERT algorithm and gets an accuracy value of 78% on the application of Bi-LSTM. This is certainly included in the good classification and the application of the Indo-BERT algorithm is superior to the Bi-LSTM algorithm. The following graph of the difference between the two algorithms Indo-BERT and Bi-LSTM, presented in Figure 4.

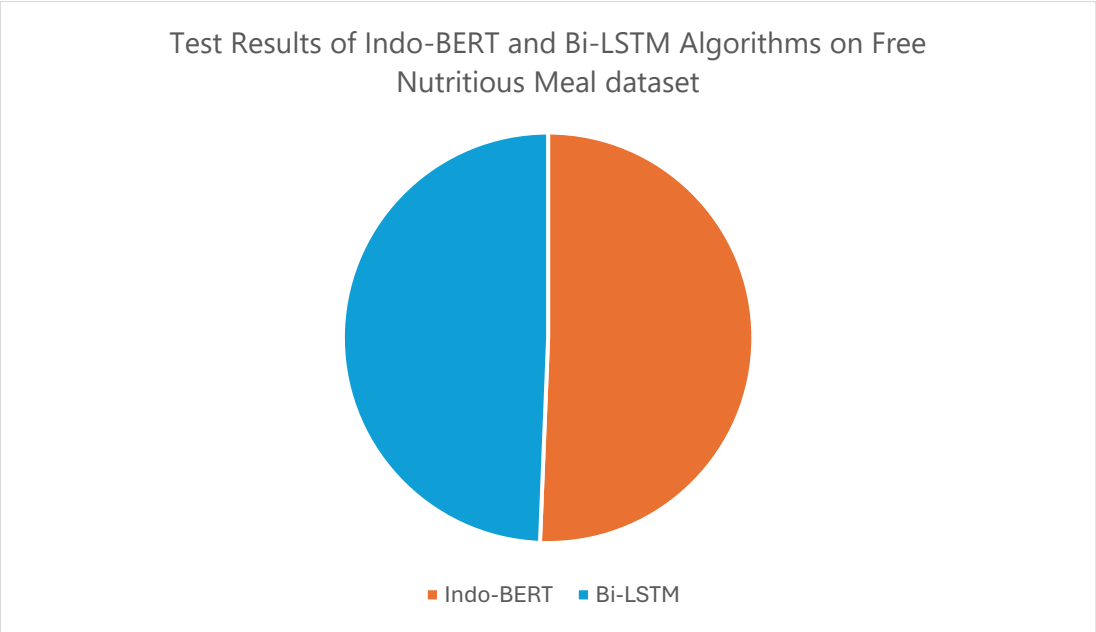

Figure 4. Test Results of Indo-BERT and Bi-LSTM Algorithms

Based on the Indo-BERT and Bi-LSTM Algorithm Test Results on the Free Nutritious Meal dataset in Figure 4, that there is a 2% difference between the two algorithms used in the free nutritious meal dataset. This makes the Indo-BERT algorithm superior to the Bi-LSTM algorithm. Due to its superiority, Indo-Bert is able to effectively capture contextual meaning using transformer-based models [22].

Results Word Cloud

In addition to the evaluation results previously described, we also analyzed the most frequently occurring words in the tweet data classified as positive, negative and neutral classes. We used the word cloud method to visualize the most dominant words in public conversations related to the government's policy on free nutritious meals. Word clouds provide an intuitive overview of the most frequently used words and can provide additional insights into the dominant sentiments related to the government's free nutritious meals policy.

A. Positive Class

Figure 5. Word Cloud Positive Class

B. Negative Class

Figure 6. Word Cloud Negative Class

C. Neutral Class

Figure 7. Word Cloud Neutral Class

Using this word cloud visualization, we can easily identify words that are frequently classified with each class regarding the government's policy on free nutritious meals and gain a deeper insight into the main sentiment patterns in the public discussion of the government's policy.

CONCLUSIONS AND SUGGESTIONS

Based on the findings of this research, the use of Indo--BERT algorithm and Bi-LSTM algorithm has been successfully applied to sentiment analysis of tweet data related to perspective views on government policies regarding free nutritious meals. The findings of the evaluation of the model's performance in categorizing positive, negative, and neutral attitudes

have been achieved through the data pre-processing stage, the training procedure of both algorithms used in the study. The results obtained in the use of both algorithms are the use of the Indo-BERT algorithm getting better results, getting an accuracy value of 80%, while the Bi-LSTM algorithm gets an accuracy value of 78%. The 2% difference between the two algorithms used in sentiment perspectives on government policies for free nutritious meals and the Indo-BERT algorithm accuracy value of 80% includes good classification.

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