



# **Sentiment Analysis of ChatGPT Exploration Based on Opinions on Platform X Using Naïve Bayes Algorithm**

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**Abstract** - ChatGPT (chat generative pretrained transformer) developed by OpenAI and launched in 2021, quickly gained widespread attention for its ability to understand and generate human-like text responses. ChatGPT can handle a variety of tasks, including answering questions, solving maths problems, coding, and creating scientific articles or journals. Despite its versatility, concerns about the accuracy of responses to exploratory results of using chatGPT to perform various tasks have arisen, prompting the need for further evaluation. This research uses sentiment analysis to assess public opinion towards ChatGPT, using data from posts on the X app (formerly Twitter), accessed through the X developer API using Naive Bayes classification. Naïve Bayes classification algorithm was applied to categorise the sentiment. Findings showed that of the 3,001 posts analysed, 59.24% expressed positive sentiment, 17.56% negative, and 23.2% neutral. The Naïve Bayes algorithm achieved 79.84% accuracy in this classification task. The results indicate a generally positive public perception of ChatGPT, despite the concerns.

**Keywords:** Sentiment analysis, exploring chatGPT, naïve bayes, platform X.

## **1 Introduction**

Information and communication technology that is developing very quickly in the era of Society 5.0 makes many changes in all aspects of life. One form of the results of technological development that is currently felt by many people is the use of artificial intelligence (AI). With the ability of AI, several technology products were created that make human work can be done by computers to do various tasks. Therefore, AI products have become technology products that are widely used in making applications today because it is considered to fulfil and facilitate human needs [1]. One of the chat-based AI products is chatbot. One of the most popular chatbot platforms today is ChatGPT. ChatGPT (Generative Pre-Trained Transformer) was developed in 2020 by the company OpenAI based in San Francisco, California, United States and was officially introduced to the public in 2021 which was developed based on the previous version of the generative language model, namely GPT-3 [2]. According to Similarweb, chat.openai.com gets about 600 million visits per month and has been visited about 260.2 million times during the last 30 days in July 2024. ChatGPT is a robot chatbot that uses artificial intelligence to interact with and assist humans in performing various tasks [3].

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Using natural language processing (NLP) capabilities, ChatGPT can understand and translate human language by allowing its users to ask questions and receive answers in the form of conversation. The use of ChatGPT in education suggests that it may not support the development of students' problem-solving and critical thinking skills, both of which are critical to achieving academic success and success throughout life [4]. Scholars also consider that it may make users feel overly dependent and may discourage writing scholarly work with their thoughts because of the ease with which the chatGPT platform can create a journal-level article [5].

With the convenience gained from the utilisation of AI through the creation of chatGPT, more capabilities to generate human-like text responses can be obtained. It is feared that this will lead to a sense of human dependence on AI-generated content, without first evaluating and verifying the information [6]. Therefore, it is necessary to evaluate and verify information to find out the extent to which the public responds to the exploration and use of chatGPT. To analyse public opinion based on information on social media, many analysis methods can be used. One method that can be used is sentiment analysis. Sentiment analysis is a collection of processes including collecting, processing, and evaluating public opinions or opinions about a particular topic or product [7].

In this research, a sentiment analysis is carried out that takes public opinion through the X platform, previously known as Twitter regarding the exploration and use of tasks with ChatGPT using the Naïve Bayes algorithm and the Twitter Harvest library to crawl the X platform user opinion data. Naïve Bayes is chosen over methods like SVM or deep learning due to its efficiency and high performance on text classification tasks with relatively small and noisy datasets. X is one of the social media platforms previously known as Twitter. Based on information obtained from famewall.io statistics media, the X platform has 237.8 million daily active users in 2023, which has increased by 47% from the previous year. Where based on statistical data announced in October 2023, Indonesia entered the top five of the 4th largest users of platform X globally, namely 27.05 million active users. This research uses the keywords '#chatGPT OR #exploringchatGPT OR #taskwithchatGPT OR #usingchatGPT OR chatGPT OR exploring chatGPT OR task with chatGPT OR using chatGPT since:2023-01-01 until:2024-07-24 lang: en' on X users' posts in English and processed using Naïve Bayes algorithm as a classification algorithm to produce sentiment analysis on the exploration and use of tasks with chatGPT. The Naïve Bayes algorithm can divide statements into several features or keywords to determine the probability of each keyword representing positive, negative, and neutral sentiments [8].

## **2 Materials and methods**

The stages carried out in this research to see the accuracy level of the method used are described in Figure 1. The tools used in this research include Google Collaboratory is a machine learning service provided by Google, Python is a high-level programming language that has a strong and consistent construction using the concept of Object Oriented Programming (OOP), Numpy is a library from Python that focuses on scientific computing, Pandas (Python Data Analysis Library) is an open source python package that provides data structures and data analysis so that it is easy to use and high-performance, Seaborn is an open source python data visualisation library based on the matplotlib library, TextBlob is a python library used to process textual data, NLTK (Natural Language Toolkit) is a python library that works with text modelling, and Tweepy is one of the python libraries used to access the API from Twitter.



**Fig. 1. Methods**

### 2.1 Crawling Data

Crawling is a technique used to collect secondary data automatically. This process utilises special programmes or scripts to extract data from various sources. The data collected through crawling can be utilised for various purposes, such as sentiment analysis, dataset development, and market trend prediction [9].

### 2.2 Wrangle Data

Data wrangling takes unorganised raw data and transforms it into a structured, usable format for analysis and decision making. This process involves various tasks such as cleaning, transforming, and combining data to improve its overall quality and usability, which ultimately leads to more accurate data analysis and informed business decisions [10], [11].

### 2.3 Modelling data with TextBlob

TextBlob assists in sentiment analysis by allowing users to interpret sentiment from text data, categorising phrases into negative, positive, or neutral, facilitating opinion scoring on social media samples [12]. TextBlob is used for initial labeling because it provides a quick and automated way to generate sentiment labels. These labels are then used to train the Naïve Bayes classifier, making TextBlob function as a weak labeling tool in the overall classification process.

### 2.4 Visualisation of Modelled Data

Visualisation is an important step in data presentation that needs to be considered. The visualisation stage, can show the results of data processing and processing so that it becomes a presentation that is clearer and easier to understand.

### 2.5 Data Classification with Naïve Bayes Classifier.

The last stage of this research is data classification using the Naïve Bayes Classifier. The Naïve Bayes classifier is a classification method based on Bayes' theorem. The Naïve Bayes classifier performs very well compared to other classification models such as decision trees or neural networks. The advantage of this method is that it requires very little training data to determine the parameter estimates required in the classification process. Method must be written in a concise and clear manner. This part must be able to explain to the reader about the method used during the research.

## 3 Results and discussion

### 3.1 Crawling Data

Crawling means a data collection technique that is done automatically using a script or program through a website automatically using a computer programme. This is done for various purposes, such as to conduct sentiment analysis, create data sets, or predict market trends based on datasets.

Data crawling allows data retrieval from various sources in an efficient and structured manner so that it can be used for various types of purposes such as analysis, research, and application development [13]. The dataset used is a collection of the results of X account user posts in English using Twitter Harvest. At this stage, the data retrieval process is carried out which contains the following conditions or keywords:

#chatGPT OR #exploringchatGPT OR #taskwithchatGPT OR #usingchatGPT OR chatGPT OR exploring chatGPT OR task with chatGPT OR using chatGPT since:2023-01-01 until:2024-08-10 lang:en'. In English, the data is taken from 01 January 2023 to 24 July 2024.

```
# Crawl Data

filename = 'chatgpt_new22.csv'
search_keyword = '#chatGPT OR #exploringchatGPT OR
#taskwithchatGPT OR #usingchatGPT OR chatGPT OR exploring
chatGPT OR task with chatGPT OR using chatGPT since:2023-
01-01 until:2024-07-24 lang:en'
limit = 3000

!npx --yes tweet-harvest@2.6.1 -o "{filename}" -s
"{search_keyword}" --tab "LATEST" -l {limit} --token
{twitter_auth_token}
```

**Fig. 2.** Crawling Data

### 3.2 Wrangle Data

Wrangle data or data cleaning is done using the tweet-processor library. The first step is to check whether there is empty data or not. Next is the tokenising process or the process of separating words based on the spaces found. This process aims to make it easier to analyse each word in each sentence of the collected tweet data. The next step is data stemming, which aims to find the base word by removing affixes from the word.

```
data.isnull().sum()

def preprocessing_data(x):

    return p.clean(x)

def tokenize_data(x):

    return p.tokenize(x)

data['tweet_clean'] = data['full_text'].apply(preprocessing_data)

data['tweet_clean'] = data['tweet_clean'].apply(tokenize_data)

data = data.drop_duplicates()
```

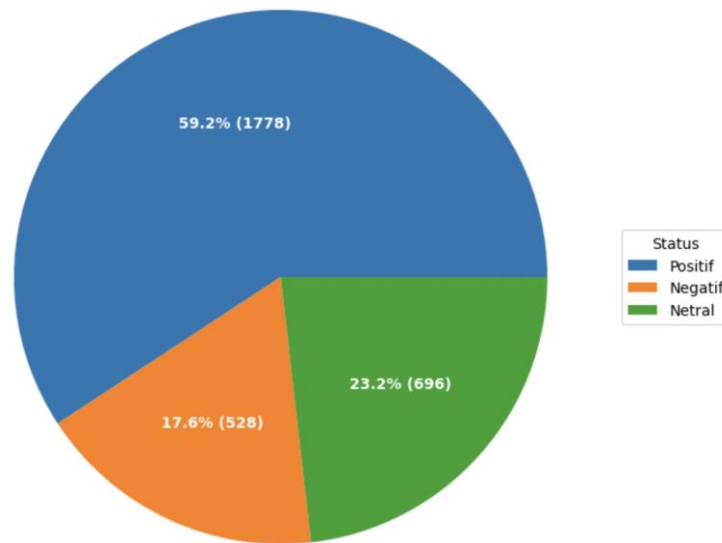
**Fig. 3.** Wrangle Data

### 3.3 Modelling Data with TextBlob

```
status = pd.DataFrame({'klasifikasi': status})  
data['klasifikasi'] = status  
data.tail()
```

### 3.4 Visualization of Modelled Data

The next step is to present the data as a pie chart presented in Fig 6. The provisional conclusion based on the pie chart is that most ChatGPT users responded positively.



**Fig. 6.** Chart Pie Diagram Visualization

### 3.5 Data Classification with Naïve Bayes Algorithm

At the data classification stage using the Naïve Bayes Classifier method and the Natural Language Toolkit (NLTK) Library, there are four steps, namely:

1. The first step is preparing the data to be processed and classifying the data.

```
dataset = data.drop(['conversation_id_str', 'created_at', 'favorite_count', 'full_text', 'id_str',  
'image_url', 'in_reply_to_screen_name', 'lang', 'location', 'quote_count', 'reply_count',  
'retweet_count', 'tweet_url', 'user_id_str', 'username'], axis=1, inplace=False)  
  
dataset = [tuple(x) for x in dataset.to_records(index=False)]
```

**Fig. 7.** Data classification

2. The second step of this research is to take a dataset and then use it as training data used to predict. The results of the previous classification method are regrouped on new variables based on their labels and samples of each label are taken randomly. At this stage, the results are obtained in the form of training data on the train\_set variable. Furthermore, the accuracy of the train\_set variable is calculated using the Naïve Bayes Classifier from the TextBlob library. The resulting accuracy is 0.79 or 79%, which means that the prediction results are said to be positive towards exploring the use of chatGPT for social media users on account X.
3. The third step is data relabeling using the Naïve Bayes Classifier method. At this stage, the analysis classifies the data into 3 positive, neutral and negative categories and calculates the total data and the amount of data based on its classification on the data tested. The results at this stage are 2256 positive data, 526 neutral data, and 219 negative data.
4. The fourth step is the visualization of the classification data results with the Naïve Bayes Classifier method in the form of pie charts. Fig 8 is the result of data visualization using the Naïve Bayes Classifier method which shows that the percentage of positive data is 75.2%, neutral data is 17.5%, and negative data is 7.3%.



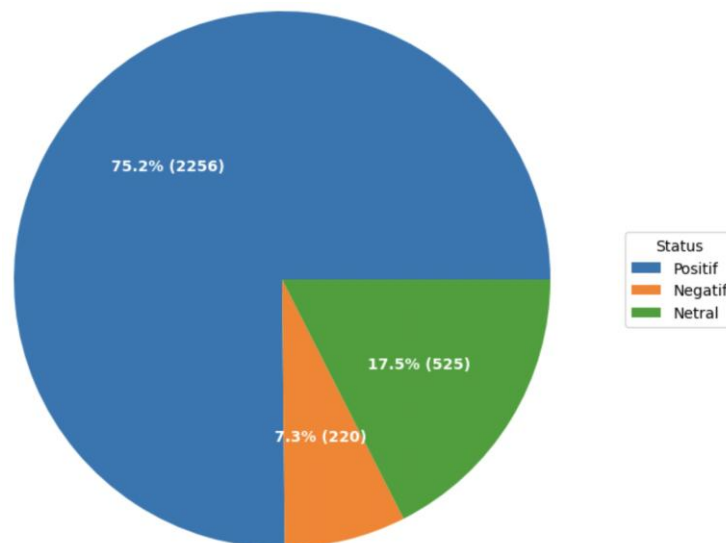


Fig. 8. Chart Pie After using Naïve Bayes Classifier Method

## 4 Conclusion

This research utilizes public opinion data related to the use of ChatGPT for assignments on Application X with a total of 3001 posts collected using the Data Crawling technique on Google Collaborator. After preprocessing the data with labelling using TextBlob, 1778 positive data, 696 neutral data, and 527 negative data were generated. The Naïve Bayes Classifier method is effective for use in sentiment analysis with an accuracy rate of 79.84% and with positive sentiment of 75.2%, neutral sentiment of 17.5%, and negative sentiment of 7.3%. With the results of 75.2% positive sentiment, it can be concluded that the response or public response taken from users of application X is positive because ChatGPT users feel helped in doing tasks on the exploration results from using ChatGPT. However, it should also be noted that there are negative sentiments that can be used as an evaluation for OpenAI for future development to provide more accurate quality information for ChatGPT users so that the perceived benefits are significantly better.

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