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Analyzing Sentiments of ChatGPT Users: Philippine Setting

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Abstract: The research is focused on a statistical examination of data from Twitter, a popular social networking platform where lively debates may be exchanged on a wide range of topics, including ChatGPT. The primary goal of this research is to conduct sentiment analysis on the ChatGPT-related tweets in order to get insight into how Twitter users in the Philippines feel about this AI-powered language model. In addition, the study delves into the n-grams and most commonly used words associated with AI, highlighting the preponderance of AI-related phrases and their practical significance. However, 16.57% of tweets expressed negative sentiments, suggesting areas for improvement and privacy concerns. In conclusion, this research provides valuable insights into user sentiments surrounding ChatGPT during a period of significant milestones and growth. The findings offer guidance to developers and stakeholders for addressing potential challenges and further enhancing ChatGPT's success in the ever-evolving AI landscape.

Keywords: ChatGPT, sentiment analysis, artificial intelligence, NLP

1. Introduction

Artificial intelligence (AI) has recently emerged as a game-changing technology that has the potential to significantly impact many fields. AI is a field of computer science that aspires to program computers to do tasks that normally require human intelligence. AI's core goal is to create machines with human-level intelligence (Wang et al., 2023). Language comprehension, pattern identification, problem solving, and deductive reasoning are all necessary for this task. Machine learning, natural language processing (NLP), robotics, and many more technologies are all part of the wide subject of AI. The widespread implementation of technologies that use AI has had a tremendous impact on the areas of industry, healthcare, education, the military, cyber security, and even defense (Firat, 2023).

The use of NLP algorithms to simulate human speech in conversational bots like ChatGPT (Generative Pre-trained Transformer) is a notable use of artificial intelligence in various fields. ChatGPT is considered as a language-based artificial intelligence system that belongs to a wider group of transformers. As stated by (Kooli, 2023), deep neural networks such as transformers, were developed specifically to process and create sequences of data, such as text. OpenAI's ChatGPT, which was opened to the public in November 2022, has quickly gained popularity, with one million people signing up in just five days. Facebook took 300 days, Twitter 720 days, and Instagram 75 days to reach this number (Biswas, 2023). Moreover, Iskender (2023) emphasizes that ChatGPT is a chatbot that can create responses that resemble those of actual people to a variety of inquiries and prompts since it was trained on a sizable dataset of text from the internet. Despite ChatGPT's novelty, understanding its users' sentiments is crucial for a number of reasons. To begin, ChatGPT adopters' opinions and sentiments can contribute to shaping the general public's image of new technology. The success or failure of ChatGPT may be determined in large part by the insights revealed by this data. Second, ChatGPT adopters may have discovered issues or problems with this new

technology; their feedback can aid in finding and fixing these problems before they become common. As a result, the potential of ChatGPT's success on the market might be improved by investigating the perceptions of the tool's users.

Researchers collected data from Twitter, which enables users to read and post short messages (called "tweets"), in order to get insight into the sentiments of ChatGPT users. The ability of the Twitter platform to present daily trending topics on a national and global scale and to allow a large number of users to voice their thoughts and opinions on these subjects at the same time makes it more timely and popular than other social media platforms (Taecharungroj, 2023). Twitter was chosen for this research because of its widespread use and open data policy. Twitter is used for sentiment analysis research because, unlike other platforms like Facebook and Instagram, it makes its data and tweets public. Twitter is ranked number 4 on Alexa's list of the most frequented websites throughout the globe (Munggaran et al., 2023). Twitter's public nature encourages more conversation and the development of a larger user base that can quickly respond to and discuss breaking news and popular issues.

2. Objectives

Despite the advancements in sentiment analysis and AI language models, several gaps remain in the literature concerning sentiment analysis in the Philippine setting. The purpose of this research is to delve into and dissect the feelings and thoughts of ChatGPT users in the Philippines. Because of its cultural richness, multilingual environment, and particular emotional manifestations, the Philippines provides a fascinating and novel context for the study of sentiment analysis. The widespread use of AI technologies in the Philippines makes it all the more important to investigate the emotions conveyed by users in conversations with Generative AI language models like ChatGPT.

3. Research Questions

a. What are the predominant sentiments expressed by ChatGPT users in the Philippines?
b. What is the polarity of sentiments by ChatGPT users in the Philippines expressed on Twitter?

4. Research Framework

Leveraging data obtained from Twitter tweets specifically mentioning ChatGPT, this study employs sentiment analysis techniques to discern the prevailing attitudes of users towards the language model.

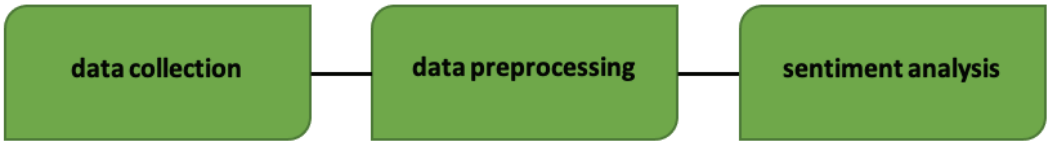

Figure 1. Three main stages of the research framework

The research framework involves three main stages: data collection, data preprocessing, and sentiment analysis. First, Twitter's API is utilized to gather a substantial dataset of tweets containing references to ChatGPT. Next, the collected data undergoes preprocessing to eliminate noise, handle privacy concerns, and convert text into suitable formats for analysis. Finally, sentiment analysis is conducted using lexicon-based approaches to determine whether the sentiment expressed in tweets is positive, negative, or neutral.

5. Literature Review

5.1 Related Studies

Due to the novelty of ChatGPT, the researchers were unable to locate any large studies that dealt specifically with this topic. There is, however, a body of work devoted to the GPT family of text-generating AIs (including, but not limited to, GPT-2 and GPT-3). Furthermore, we found enough information on Twitter data mining to investigate users' sentiments. Therefore, we describe certain papers that are very relevant to our study below.

To study public opinion on hybrid work arrangements using tweets, Trivedi et al. (2022) developed a Robustly Optimized BERT Pre-training Approach (RoBERTa). According to the RoBERTa, the consensus opinion of users is favorable toward the hybrid work approach. Another article by Alhijawi & Awajan (2022) used Twitter temporal data mining to forecast the popularity of a film. In order to foretell user pleasure and the popularity of movies among users, the authors suggested a rating prediction model and a temporal product popularity model. Similarly, Sanjaya et al. (2022) presented a sentiment analysis using Twitter data to discover perceptions of electronic wallets usage. The results of the sentiment analysis reveal that Twitter users in Indonesia are less likely to have a positive opinion of electronic wallets. Moreover, Haque et al. (2022) performed sentiment analysis to qualitatively analyze selected set of tweets. Results showed that the vast majority of early adopters are enthusiastic about the potential benefits of this technology in areas like software development disruption, entertainment, and creative expression. And only a limited percentage of users worried about things like the possible abuse of Chat-GPT.

5.2 Generative AI models

In recent years, generative AI models have received a great deal of attention and interest from the general public due to their capacity to generate material that is very similar to that generated by humans. These models are capable of responding to a wide variety of inputs, from pictures and text to audio and video (Dwivedi et al., 2023) and even human voice. The two most well-known GPT-based AI products published by OpenAI in 2022 are ChatGPT (OpenAI, 2022b) and DALL-E (OpenAI, 2022a). Some other Generative AI models may also make user images called Magic Avatars (Pavlik, 2023); for example, Stable Diffusion from Stability.ai and Lensa. The Language Model for Dialogue Applications (LaMDA) is the foundation of Google's latest Generative AI system, Bard (Pichai, 2023) which was launched recently.

5.3 Sentiment Analysis

Since the development of NLP, texts have been seen as data sources, and studies have started to look at the subjective meanings of phrases in the context of data extraction. Information on how individuals feel about certain events, circumstances, goods, or even political beliefs may now be gleaned from their online discussions of these topics, thanks to techniques known as "opinion mining" and "sentiment analysis." Many new academic subfields have emerged in response to the proliferation of social networking sites, all with the goal of mining useful data from these platforms (Wankhade et al., 2022). Several practical contexts call for in-depth exploration using sentiment analysis. For example, doing a product analysis to learn what features or characteristics a client's value.

Subhashini et al.'s (2021) article offers the findings of a thorough evaluation of current research on opinion mining. It also discusses representing knowledge in views, classifying them, and extracting text characteristics from opinions that include noise or ambiguity. A method for adaptable aspect-based lexicons for sentiment categorization is proposed by

Mowlaei et al. (2020). The authors presented a statistical technique and a genetic algorithm-based strategy for building two dynamic lexicons to help in the categorization of attitudes based on their characteristics. More accurate scoring of ideas dependent on context is made possible by an automatically updated dynamic lexicon (Kumar & Uma, 2021).

To the best of the researchers' knowledge, the study presented is the first to perform a comprehensive examination of the Twitter sentiments on ChatGPT in the Philippines. This research contributes to the existing body of knowledge by giving a glimpse of Twitter sentiments to this newest innovation.

6. Research Methodology

In this investigation, sentiment analysis method was utilized to understand perception of ChatGPT users in the Philippines. The users' perception toward AI chatbots like ChatGPT can be used as a measure of sentiment because of the widespread impact of its outputs. In the dictionary-based sentiment analysis, each word is given a value that is derived from its definition in the dictionary, beyond its positive or negative connotations. The sum of these values identifies the emotional value of the sentence. Natural Language Toolkit (NLTK) was used to perform sentiment analysis of the obtained tweets in this study. NLTK represents a Python library. It offers a solid foundation for constructing Python applications and organizing data. The toolkit is also crucial in transforming textual data into a certain format, from which sentiments may be retrieved (Tunca et al., 2023). The primary purpose of the NLTK is to analyze human language data for use in natural language processing. Additionally, NLTK also offers a variety of pre-processing functions to support all NLP techniques, such as part-of-speech tagging, tokenizing, lemmatizing, stemming, parsing, and performing sentiment analysis for selected datasets.

7.1 Data Collection

The data comprising the tweets used in this study were obtained from Kaggle, a free and online community platform which allows users to find and publish data sets. The data is formatted as CSV (Comma Separated Value) which is a flat text file about tweets. The Twitter dataset consists of 478,379 tweets from public Twitter accounts related to the search term "ChatGPT". Twitter's Stream API was used to accumulate records in the dataset from January 4th to March 29th, 2023. In addition, only general tweets in the English language were processed. Other types of tweets such as mentions, replies retweets, and retweets with comments were discarded.

7.2 Data Preprocessing

When expressing their thoughts and feelings about an issue, individuals often fail to employ correct proper language structure. Instead, the study of these structures becomes more challenging by the use of slang, misspelling, alternative emoticons, and abbreviations, and sometimes puns. As the quality of the output is dependent on the quality of the input, the complexity of the textual data has a major impact on the efficiency with which sentiments are analyzed (Elbagir & Yang, 2019). Therefore, a number of preprocessing procedures have been executed to remove unnecessary data from the collected tweets in order to make the data more suitable for mining and feature extraction, consequently increasing the reliability and precision of the results. Preprocessing the tweets also removed retweets and duplicates, resulting in a dataset containing 507 tweets. To preprocess these data, NLTK was utilized. To begin, a regular expression (Regex) was executed in Python to identify and remove URLs ("http://url"), retweets (RT), user mentions (@), and undesired punctuation from tweets. Hashtags (#) are included as part of the tweet, but the "#" sign has been deleted since they frequently clarify the subject of the tweet and provide important information relevant to the

topic of the tweet. After a dataset has undergone the preprocessing steps, it is ready to be classified based on sentiment using the VADER algorithm. For the purpose of determining the frequency of words and, consequently, their visualization in Word Cloud, a number of NLTK functions are employed as additional preprocessing steps.

7.3 Sentiment Classification

In general, sentiment analysis may be used to investigate the polarity of a given context, whether that context be positive, negative, or a neutral sentiment. In this phase, Valence Aware Dictionary for Sentiment Reasoning (VADER) was employed. VADER is both a language for expressing emotions on social media and a rule-based tool for analyzing user sentiment (Tunca et al., 2023). VADER analyzer was used to examine both the polarity of sentiments and intensity in each tweet.

8. Results

This section provides the results of a Twitter sentiment analysis conducted using VADER and NLTK.

8.1 Descriptive Analysis

During the data collection period from January 4 to March 29, 2023, there were primarily 478,379 tweets associated with the ChatGPT topic, which provides ample opportunities to observe trends.

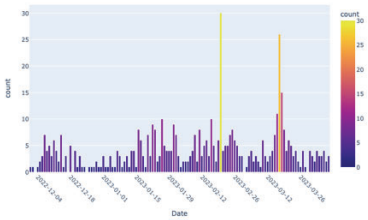

Figure 2. Number of Tweets per Day

A large number of tweets were observed between November 30, 2022 to April 8, 2023 during which ChatGPT reaches 100 million monthly users at a faster rate than Instagram or TikTok (Chow & Perrigo, 2023), and receives an estimated 1 billion visitors, an average of over thirty-five million visitors per day (Brandl & Ellis, 2023).

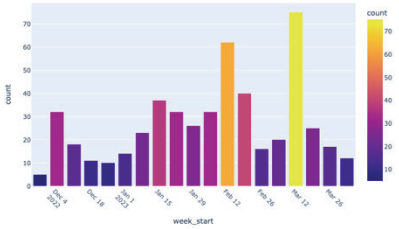

Figure 3. Number of Tweets per Week

Figure 3 reveals that the week beginning March 12 had a high number of tweets, most likely because ChatGPT Plus was released as a subscription service, providing faster responses and priority access to new features than the free version of ChatGPT (Deutscher, 2023), and possibly because ChatGPT experienced a data breach when a bug exposed users' personal information (Wagenseil, 2023).

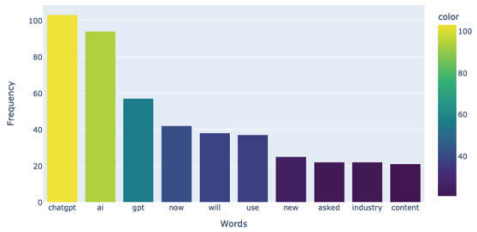

Figure 4. Top 10 Most Unigram Frequent Words

As shown in Figure 4, numerous words are associated with artificial intelligence, such as “chatgpt”, “ai”, “gpt”,“just”, “use”, “new”, “like”, “asked”, “openai”, and “industry”. In the same way, Figure 5 depicts the ten prevalent bigrams and common words, including (artificial, intelligence), (powerful, dominating), (dominating, industry), (dominating, crypto), (crypto, industry), (large, multimodal) and so on. For instance, the terms “ai” or “artificial intelligence”, and “industry” can be seen in both unigram and bigram graphs, indicating that people believe artificial intelligence will be the dominant industry of the near future.

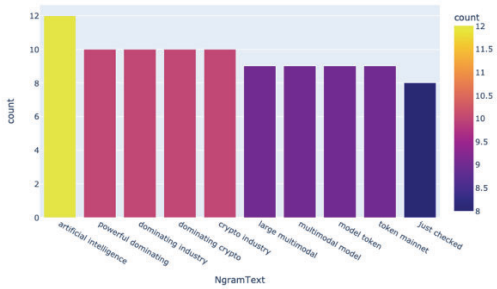

Figure 5. Top 10 Most Bigram Frequent Words

It is worth noting that the terms 'chat', 'gpt', 'chatgpt' were excluded from these n-grams to get better results focusing on other aspects related to ChatGPT.

Figure 6. Word Cloud of Tweets

Figure 6 shows a visual representation of the most frequently occurring words in the processed tweets from the dataset. This Word Cloud is a useful tool for evaluating widespread sentiment since it illustrates at a glance the most discussed topics related to ChatGPT on Twitter. Words like "chatgpt," "ai," "use," "new," and "will" stand out because they are frequently used in discussions about ChatGPT.

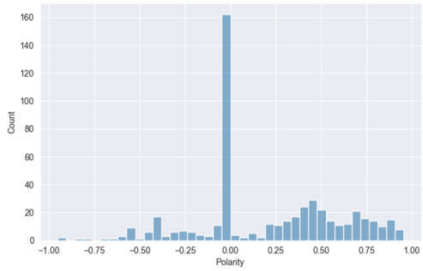

Figure 7. Distributions of sentimental polarities

The lexicon-based VADER technique was used to extract features by loading the appropriate NLTK library. The module's applied techniques yielded three sentiment scores (positive, negative, and neutral) as the module's output scores. These scores are measure whether each tweet is a positive tweet, a negative tweet, or a neutral tweet with a value ranging from [−1 to +1]. Figure 7 presents the tweets' sentiments with corresponding values. The values of [-1, 0, 1] were set to refer to positive, neutral, and negative sentiments.

Table 1. *Count of Tweets According to Polarity*

	Count	Percentage
Positive Tweets	263	51.87%
Neutral Tweets	160	31.56%
Negative Tweets	84	16.57%
Total	507	100.00%

Table 1 depicts that the majority of tweets contained positive and neutral sentiments about ChatGPT. Remarkably, (263) 51.87% of the collected tweets contained positive sentiments, (160) 31.56% contained neutral opinions, and (84) 16.57% expressed negative sentiments. In comparison to other classifications, the number of positive tweets was the highest, indicating that the majority of users expressed a positive attitude toward ChatGPT.

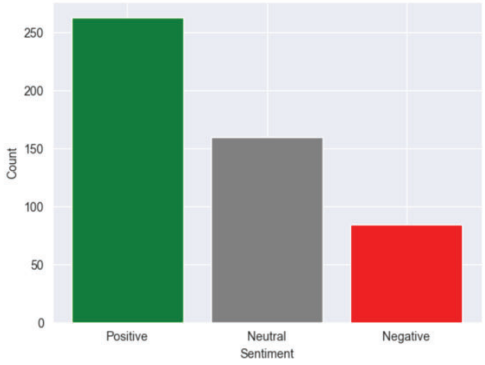

Figure 8. Sentiment Analysis of Tweets

Figure 8 displays number of tweets by sentiment of each polarity in a bar chart. Positive tweets constitute the majority of the dataset, accounting for 263 of all the analyzed tweets in the Philippines. This suggests that a significant portion of the Twitter users' sentiments were positive during the time the data was collected. The high percentage of positive tweets could indicate that people were expressing joy, satisfaction, excitement, or contentment in their experience with ChatGPT is probably because users perceive it as a viable means of enhancing commercial operations (Taecharungroj, 2023). The capability of ChatGPT is exerting a significant influence on different technology industries. For example, the platform gives the opportunity for students to pose inquiries and address any uncertainties, augmenting

the whole educational encounter. Despite the inherent restrictions, ChatGPT is anticipated to have practical applications in real-world scenarios, and businesses have a strong inclination to utilize it for the sake of generating profits (Haleem et al., 2022).

Neutral tweets account for 160 tweets or 31.56% of the tweets in the Philippines. These tweets represent a balance between positive and negative sentiments, as they do not strongly lean towards any particular emotion. Neutral tweets may include informational tweets, facts, or updates on ChatGPT without expressing a specific opinion or emotion. This significant proportion of neutral tweets could indicate that many users were simply sharing information or updates about ChatGPT rather than explicitly expressing their emotions.

On the other hand, there are only 84 negative tweets which make up about 16.57% of the tweets in the Philippines. While this percentage is lower than positive tweets, it still represents a considerable proportion of the analyzed tweets expressing negative emotions, such as anger, sadness, disappointment, or frustration about ChatGPT is likely due to the potential of this technology to generate and disseminate deceptive news and information that appears credible has caused significant concern among many individuals (Taecharungroj, 2023).

In order to mitigate negative sentiments expressed towards ChatGPT, developers can employ several strategies, like educating users about the capabilities and limitations of the system, which can help manage their expectations and reduce potential frustrations. Granting users, a sense of control over the system, for instance, by allowing them to customize its behavior within certain bounds, can enhance user satisfaction and mitigate negative sentiments. Lastly, developers should promptly address specific concerns raised by users, demonstrating responsiveness and a commitment to resolving issues.

Overall, the sentiment analysis provides valuable insights into the prevailing emotions among Twitter users in the Philippines during the data collection period. The higher percentage of positive tweets might suggest a generally positive atmosphere on ChatGPT, while the presence of negative and neutral tweets also reflects the diversity of opinions and discussions happening on Twitter.

9. Conclusion

The findings from the analysis of the Twitter dataset related to ChatGPT provide valuable insights into the sentiments and discussions surrounding the AI-powered language model. The dataset was obtained during the time which ChatGPT witnessed a significant surge in popularity, reaching 100 million monthly users at a faster rate than Instagram or TikTok. During the week beginning March 12, there was a notable increase in the number of tweets, possibly driven by the release of ChatGPT Plus, a subscription service offering faster responses and priority access to new features. In addition, concerns about privacy and security may have contributed to the spike in tweets after a data breach in which user information was exposed due to a security breach.

The examination of n-grams and frequently-used terms found a strong connection with AI, showing the importance of this issue in ChatGPT-related talks. It also reflects a view that AI will play a preponderant role in defining future sectors and a curiosity with AI technology and its possible uses. However, the VADER lexicon-based system for analyzing sentiment found that most tweets were either neutral or favorable towards ChatGPT. Around 51.87% of tweets were positive, indicating that the platform garnered a favorable response from users. Neutral tweets constituted 31.56% of the dataset, reflecting informative and objective discussions without strong emotional sentiments. Negative tweets represented 16.57% of the tweets, expressing concerns, criticisms, or frustrations about certain aspects of ChatGPT.

It appears that users are generally pleased with ChatGPT, as seen by the positive attitude of the majority of tweets. However, the existence of critical tweets indicates that the platform has room for development and may face issues that need to be addressed. Limitations of the approach and context-specific elements that may impact the sentiments expressed on social media platforms should always be taken into account when doing any sort of sentiment analysis. ChatGPT's developers and stakeholders may utilize the insights collected from this study to better understand user impressions and input, which might lead to future enhancements and improvements.

As a result of its impressive performance and widespread popularity, ChatGPT may now be considered a frontrunner among AI-powered language models. Its promise as a game-changing technology is evidenced by both its subscription model and its quick user growth. If ChatGPT is to sustain its current success in the rapidly changing AI world, its developers and stakeholders will need to stay cautious in responding to user concerns and protecting user data. In addition, a proactive strategy to monitoring user sentiment is essential as the platform continues to explode in popularity. This necessitates persistent monitoring of social media for conversations, user input, and emerging issues. Engaging with users actively through official channels, such specialized support teams or feedback mechanisms, can aid in addressing issues promptly. Further research and development are anticipated for ChatGPT and natural language processing in order to augment their capabilities and address existing constraints. Some of the areas that can be focused on for further development are enhancing comprehension of context, refining training methodologies, mitigating biases, advancing dialogue systems, accommodating many languages, and integrating with other artificial intelligence technology.

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