Exploring Sentiment Extraction from Dota 2 Update 7.33 "The New Frontiers" Tweets Using STANZA and NLTK

Iqbal Sabilirrasyad[*], Mas'ud Hermansyah[2], Difari Afreyna Fauziah[3]

Institut Teknologi dan Sains Mandala, Jember, Indonesia

Corresponding Author:

Iqbal Sabilirrasyad, Institute Teknologi dan Sains Mandala, Sumatra 118 - 120, Jember, Indonesia

Email: iqbal@itsm.ac.id

Abstract

Updates of a game can give a different experience while playing and sometimes it becomes the most awaited and decisive point for players who have left the game to return. Updates can come in the form of gameplay changes or character skin updates. Dota 2 game has complex game elements ranging from choosing heroes to choosing the right items to counter the opponent's hero. The big updates provided by the Dota 2 game are always awaited by casual to professional players and also enthusiasts of the game, some update may lead to negative impact in gameplay and otherwise. In this study, a classification will be carried out from the results of sentiment analysis given by people on the biggest Dota 2 ver 3.33 update from twitter. This update overhauls many elements in the game and to find out whether there are many people who like it or not, the test was conducted. From the results of the sentiment analysis, a comparison of the automatic targeting using the Stanza and NLTK libraries is also performed, which results in a different number of positive, neutral and negative statement values.

Keywords : Dota2; Sentiment Analysis; Twitter: Stanza; NLTK

1   INTRODUCTION

In the ever-evolving world of online gaming, game updates play a critical role in shaping the player experience. These updates include the introduction of new content, game elements, and features designed to engage and keep players engaged. Beyond their superficial impact, game updates have the potential to evoke powerful emotions and significantly affect player behavior. Game updates serve as catalysts for player engagement and motivation. By introducing new stimuli such as items, game modes, and ranking systems, game updates provide players with new challenges and experiences within the virtual world. These updates not only provide excitement, but also contribute to player retention and overall game enjoyment . As such, game companies have recognized the importance of regular updates, with a typical frequency of three to six months. However, it is critical to recognize that game updates involve much more than simply adding content; they require careful decision-making and management to maximize their impact on player emotions and behavior.

Dota 2, developed and published by Valve Corporation, is a free-to-play team-based strategy game that has garnered a massive following since its release in 2013. It is the sequel to the original Defense of the Ancients (DotA) mod for Warcraft III: Reign of Chaos, which laid the foundation for the MOBA genre. Dota 2 offers an immersive experience that pits two teams of five players against each other in a battle to defend their Ancient - a central structure in their respective bases. With a vast roster of heroes, complex gameplay mechanics, and strategic depth, Dota 2 has captivated millions of players worldwide. The development journey of the Dota 2 game is very long, with each update providing new mechanisms, new items and also new heroes, from each update there is also balancing and bug fixing done in the game. The Dota 2 game is now at version 7.33 with the latest gameplay update called "The New Frontiers". This update is the biggest update ever given by Dota 2, this update provides an overhaul of the entire map of Dota 2, provides a larger game arena space than the previous map, offers several new mechanical systems in the map and also updates items and heroes. Updates released by Dota2 sometimes have either positive or negative comments depending on the performance of the gameplay updates released. It is natural that people who spend their time in playing only casual to professional players look forward to these updates, hoping to get a new and fresh experience on the game mechanics of the game that has been released since 2013. These comments are usually expressed in the form of words on social media [1]. From the performance of existing updates, we can find out whether the

.

released updates are interesting for players or even hated by the comments they post on social media. The most popular social media in this case is Twitter.

Due to its extensive user base and real-time nature, Twitter has emerged as a prominent platform for global conversations, news dissemination, and opinion sharing. It provides users with the freedom to express their thoughts, emotions, and perspectives on a wide array of topics, making it an invaluable resource for conducting sentiment analysis studies. The platform's key features, including retweeting and direct replies, facilitate the seamless sharing of information and foster engaging discussions that encompass a diverse range of viewpoints and sentiments [2]. We can determine the sentiment of a tweet through sentiment analysis.

Sentiment analysis, also referred to as opinion mining, serves as a powerful tool for researchers to extract and analyze subjective information from textual data. By leveraging techniques in natural language processing and machine learning, sentiment analysis endeavors to uncover the underlying sentiment or emotion expressed within a given piece of text [3]. This analytical approach holds significant implications across various fields, including marketing, politics, customer feedback analysis, and public opinion research [4] [5] [6]. Social media platforms like Twitter offer researchers an exceptional opportunity to tap into the collective consciousness of society and assess public sentiment on a large scale. By analyzing the sentiments expressed in tweets, researchers can gain valuable insights into individuals' perspectives on specific events, products, policies, or social issues. This information proves instrumental in understanding trends in public sentiment, identifying emerging topics, predicting consumer behavior, and informing decision-making processes. Many researchers have conducted research to find the sentiment emanating from a tweet.

2   RESEARCH METHOD

The process of research is done by taking data from existing tweets, then performing an automatic sentiment assessment process using the STANZA [7] library and Sentiment Intensity Analyzer from NLTK Vader Algorithm. The existing tweet data will then go through preprocessing. The results of each sentiment analysis used as a target will later be compared using Naive Bayes, Decision Tree, and Linear SVC classifications. From the existing results, the value that comes out is analyzed.
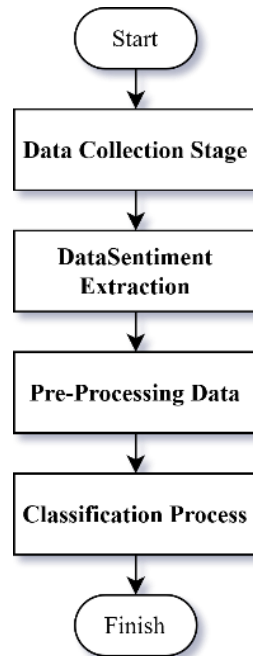

Figure 1. Reaserch Flow Diagram

2.1 Data Collection Stage

The data retrieval process is conducted using a simple crawler application created through a Python program. Data collection was performed one day after the release date of the Dota 2 ver 7.33 update, namely on April 21, 2023, until this research was conducted. From the search query in Twitter's advanced search settings, the tweets displayed will not contain links, and the search query is only for "#Dota2" with a focus on

English language only. This one-day delay is intended, to give players a chance to check out the updates that were released on April 20th, and also to give players time to express their feelings about the latest updates that are released. In addition to the tweets, the user ID and time of the tweets are also stored as additional data. The data that has been obtained is 790 unique tweets in total from the process of data collection. The data obtained is stored in csv form, which is then carried out by automatic extraction of sentiment analysis using the Stanza library and NLTK.

2.2 Data Sentiment Extraction

From the 790 unique tweets collected, a sentiment analysis process is performed using two different libraries. The libraries used in this process are the Stanza and NLTK Vader algorithms, where there are many studies using these libraries to determine the sentiment value of a tweet. Research conducted by Madhu Gautam using several libraries including stanzas and NLTK Sentiment analysis compared the results of sentiment mapping from tweets about COVID 19. [8] Or research conducted by Waqar Ahmad to create Urdu speech and text for sentiment analysis using several existing libraries including stanza and NLTK Vader [9]. There two library was known best for extracting sentiment out from text. From the assigned results for the NLTK Vader algorithm being used, it will be rounded up to -1, 0, 1, whereby the value generated by the Sentiment Intensity Analyzer from NLTK is a float value. The value -1 represents a negative value of 0 for neutral tweets and 1 for tweets with positive sentiment.

2.3 Pre-Processing Data

In the pre-processing, starting with cleaning the data from , then from repeated words, and then from links in the tweets. The removal of links is still performed to avoid hidden links embedded in tweets. The next step is to remove the number value from the tweets. After that, the process of converting tweets into tokens is carried out. Then the existing tokens are checked to remove the words in the specified stop words. After that, the existing tokens go through a lemmatizes and stemmer process. These results are used in the classification process with the target sentiment from two different libraries

Data Pre - Processing
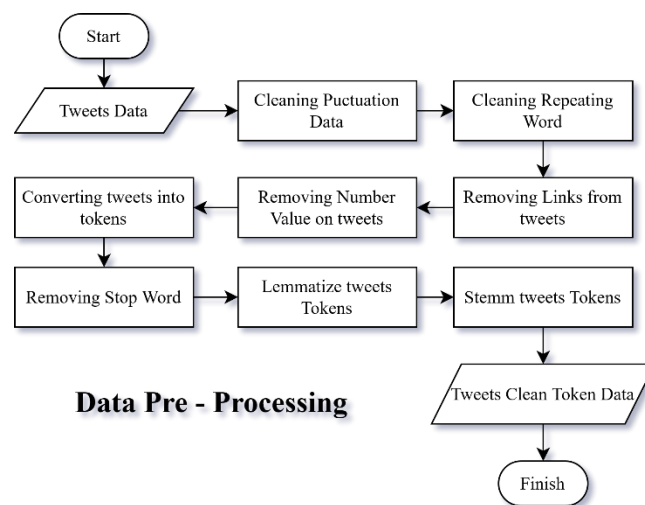
24. Classification Process

Classification process carried out through Multinomial Naive Bayes, Decision Tree, Linear SVC with train test percentages of 90:10, 80:20, 70:30, 60:40, 55:45.

3   RESULTS AND ANALYSIS

The result of the total data retrieval from Twitter is 790 unique tweets. From the 790 unique tweets data that have been collected, some of the available tweets have a different focus from the Dota 2 ver. 3.33 game update. However, the existing data is still used in the classification process, where after the big update, Dota 2 ver. 3.33 was also released after a small update that contained patches and bug fixes of the latest game update. The sentiment element of the tweets from the small update is also included in the classification process, because most of the small updates are just a refinement of the major updates released. Meanwhile, for several tweets that have different topics but are still on the same subject, namely

the Dota 2 game, they will still be used because they can indirectly have an element of sentiment in the ongoing update. The results of using tweets can be seen in the following table

Index	UID· Time	Tweets
0	Noah@knowaghÂ·1h	I feel like Doom has the same balancing issues as Alch, where their ….
1	dota2_brief@dota2_briefÂ·5h	Ame will team up with XinQ, Somnusä¸¶M, Pyw and Fantasy at the Asian Games. ….
3	Jonathan@jo__chuuÂ·9h	(WTS DOTA BALI MAJOR TICKETS STANDARD) 2 STANDARD TICKETS …
4	Harukatsu@_harukatsuÂ·10h	To all those who witnessed my #DOTA2 stream when I got nasty party and guild …
5	CubanRonin.Moxta@XXVIIJangoÂ·13h	@moba_aof This game is as fun as #LeagueOfLegends #dota2, …

From the collection of tweets, the data then perform sentiment extraction using Stanza and NLTK. The result of the sentiment extraction carried out is that the pattern issued by these two lexicon based algorithms is similar, with the lowest number was on negative sentiment then followed by positive sentiment and the highest total tweets was on neutral sentiment.
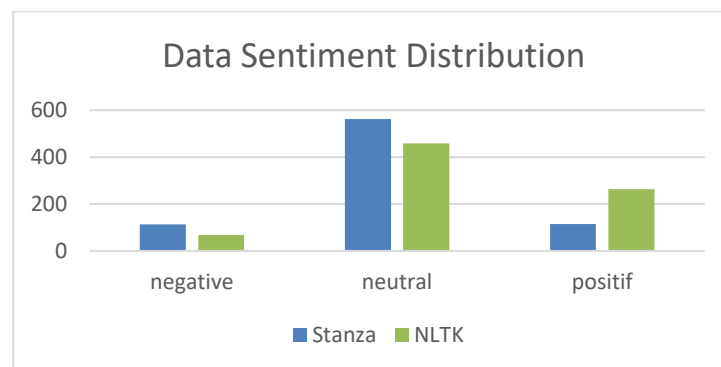
Although the two algorithms used are lexicon based, the difference in the number of positives and negatives produced is different. in a way that the NLTK Vader algorithm calculation process will detect capital cases and emoji, which will affect the value of the sentiment issued, which can be seen in table below.

Input	neg	neu	pos	compound
"This computer is a good deal."	0	0.58	0.42	0.44
"This computer is a very good deal."	0	0.61	0.39	0.49
"This computer is a very good deal!!"	0	0.57	0.43	0.58
This computer is a very good deal!! :-)"	0	0.44	0.56	0.74
This computer is a VERY good deal!! :-)"	0	0.393	0.61	0.82

Stanza uses adjectives in sentences and assigns values based on these words. There is also a hypothesis that the data taken has many subject on the tweet sentences, which makes the neutral value, which is quite high by the two existing algorithms, (Can be seen in the table). On Twitter, apart from the discussion of the updates, there are also several tweets that mention the players that will compete in the Bali Major. Not to mention the several hero names mentioned in tweets regarding the balancing and skill revamp carried out by Dota 2 can affect the value of the sentiment issued. In the previous statement, because the update in Dota 2 ver 3.33 is still being played in general, it can be said that the issue that does not specifically

talk about the update, but still have been in the Dota 2 field can change the point and have view and sentiment value indirectly. From the existing sentiment results, the next step is to preprocess the tweet data. The results of the existing preprocessing can be seen in the following table.

Cleaning Punctuation Data	I feel like Doom has the same balancing issues...
Cleaning Repeating Word	I feel like Doom has the same balancing issues...
Removing Links from Tweets	I feel like Doom has the same balancing issues...
Removing Number Value on Tweets	I feel like Doom has the same balancing issues...
Converting Tweets into Tokens	[I, feel, like, Doom, has, the, same, balancin...
Removing Stop Word	[feel, like, Doom, balancing, issues, Alch, ",...
Lemmatize tweets Tokens	[feel, like, Doom, balance, issue, Alch, ", ad...
Stemm tweets Tokens	[feel, like, doom, balanc, issu, alch, ", addi...

After the tokens data is clean, we can use the existing data to classify the accuracy of sentiment extraction from NLTK and Stanza. Existing tokens go through a vectorization process, which allows the existing tokens to be more easily processed in the calcification. Classification was done using Multinomial Naive Bayes, Decision Tree, and Livear SVC. These three classifications were performed with a total of 5 comparisons of train and test data on the two existing sentiment results. The comparisons of train and test data are 90:10, 80:20, 70:30, 60:40, 55:45, which is done on the 3 existing classification methods. The classification results are shown in the following table

	Stanza					NLTK				
Train Test	90:10	80:20	70:30	60:40	55:45	90:10	80:20	70:30	60:40	55:45
MN NaiveBayes	71	73	70	69	69	58	59	63	60	59
Decision Tree	65	62	66	66	62	61	61	62	63	62
Linear SVC	71	73	70	69	70	59	62	62	65	63

From the previous table, we can notice that the highest accuracy results for the Multinomial Naive Baeyes and Linear SVC methods are 73% with a test data ratio of 80:20, which is the result of the Stanza library sentiment. Compared with the existing method and the percentage comparison of the train test data, this result is the highest result. In the Decision Tree algorithm, the highest accuracy value is also generated using the Stanza library with a total accuracy of 66% in 60:40 training test data. From the two results, in general, the percentage of Stanza is superior to the 3 existing classification algorithms with an average classification of Stanza with an accuracy of 69%, while using NLTK the average accuracy is 64%.

4   CONCLUSION

Here we can conclude that the sentiments issued regarding the existing updates are neutral. Which can be seen from the sentiment extraction pattern using two Stanza libraries and the NLTK Vader algorithm. If we look at the neutral values that exist, it can also be said that people's opinions regarding the Dota 2 ver 3.33 update are positive. Which of the two existing libraries produces more positive values than sentiment analysis. From the classification results, we know that Stanza is better at handling tweets data with this topic. Using NLTK using data characteristics with various text sizes greatly influences the final results. The characteristics of the existing data can be better or worse if sentiment extraction is carried out using other methods outside of this paper. The existing discussion can still be continued by using other methods to see the existing performance with data tweets about Dota 2. The nonetheles area that can be done is still very broad in sentiment analysis.

.

REFERENCES (11 PT)

[1] E. M. Ghazali, H. A. Halbusi, F. A. M. A. Fattah, M. U. H. Uzir, D. S. Mutum and F.-L. Tan, "A study of player behavior and motivation to purchase Dota 2 virtual in game items," *Kybernetes,* vol. 52 , no. 6, pp. 1937-1961, 2021.

[2] A. KARAMI, M. LUNDY, F. WEBB and O. K. DWIVEDI, "Twitter and Research: A Systematic Literature," *IEEE Access,* vol. 8, pp. 67698-67717, 2020.

[3] K. L. Tan and K. M. L. Chin Poo Lee, "A Survey of Sentiment Analysis: Approaches, Datasets, and Future Research," *Appl. Sci.,* vol. 13, no. 7, p. 1, April 2023.

[4] M. Hermansyah, "ANALISIS SENTIMEN TWITTER UNTUK MENGETAHUI KESAN MASYARAKAT TENTANG PELAKSANAAN POMPROV JAWA TIMUR TAHUN 2022 DENGAN PERBANDINGAN METODE NAÏVE BAYES CLASSIFIER DAN DECISION TREE BERBASIS SMOTE," *JURNAL JITEK,* vol. 2, no. 3, pp. 249-255, November 2022.

[5] D. Musfiroh, U. Khaira, P. E. P. Utomo and T. Suratno, "Sentiment Analysis of Online Lectures in Indonesia from Twitter Dataset Using InSet Lexicon," *MALCOM,* vol. 1, pp. 24-33, 2021.

[6] S. F. Pratama, R. Andrean and A. Nugroho, "Analisis Sentimen Twitter Debat Calon Presiden Indonesia Menggunakan Metode Fined-Grained Sentiment Analysis," *JOINTECS,* vol. 4, no. 2, pp. 39-44, Mei 2019.

[7] P. Qi, Y. Zhang, Y. Zhang, J. Bolton and C. Manning, "Stanza: A Python Natural Language Processing Toolkit for Many Human Languages," *Association for Computational Linguistics (ACL) System Demonstrations,* 2020.

[8] M. Gautam, N. Sahai, A. S. Yadav and M. Tomar, "Sentiment Analysis about COVID-19 vaccine on Twitter data: Understanding Public Opinion,," *International Conference on Intelligent Computing and Control Systems,* pp. 1487-1493, 2022.

[9] W. Ahmad and M. Edalati, "Urdu Speech and Text Based Sentiment Analyzer," *Comput. Lang.,* 2022.