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Review Paper

A Comprehensive Review of Sentimental Analysis of Covid-19 Tweets

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Abstract: Positive, negative, and neutral tweets concerning COVID-19 have all lately increased in volume. The broad variety of themes covered by tweets encouraged investigators to use sentiment analysis to assess the public's response to COVID-19. Conventional sentiment analysis algorithms can only assess polarity, categorizing tweets as positive, negative, or neutral. Logistic Regression sentiment analysis, BLSTM sentiment analysis, and LSTM sentiment analysis are all employed to identify the sentiment of tweets at this advanced phase of the intended research effort. While the offered research methodologies may be used across domains, they are particularly well-suited to detecting emotional expressions in social media situations. With the exception of the sentiment analysis approach, the pretreatment and subsequent operations will be the same despite the employment of three separate algorithms. Using the identical processing processes, the three recommended sentiment analysis algorithms will be compared. Furthermore, the proposed analysis has a broad range of practical applications since it gives a public opinion to government officials or even health officials and assists them in basing their judgments on that viewpoint.

Keywords: Positive, Negative, Covid-19, Tweets, Lockdown, LSTM, BLSTM.

1. Introduction

The explosion of material on social media has aroused the interest of social scientists and psychologists seeking a better understanding of the human condition, psychology, and mental health [1]. Twitter and other social media platforms have been used to gather data for research in psychology and behavioral science. It has also been used to predict personality types and interpret internet users' routines and histories [2]. It has also been fascinating to see how people express their emotions in the wake of horrific events such as natural disasters, extreme political beliefs, and terrorism. In the case of a terror attack in Kenya, for example, Twitter became a key information route between the government, emergency response team, and general public.

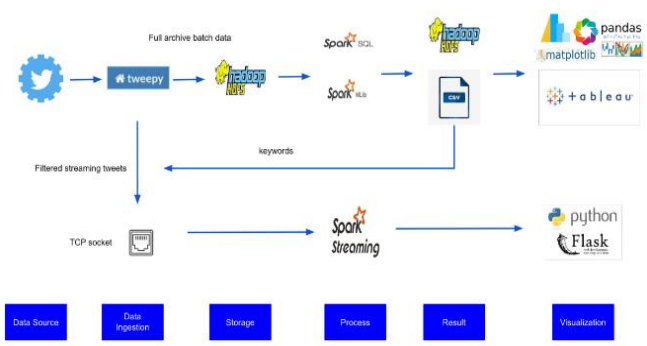

Figure 1. Filtering Process of Twitter Data [5]

The worldwide pandemic of coronavirus illness 2019 (COVID-19) has been a devastating event with a considerable impact on the global economy, leading in a rise in unemployment, psychological disorders, and despair. The enormous changes in social, economic, and transportation have inspired research in a wide range of fields, including computer modelling and machine learning. However, it ran into certain issues as a consequence of case testing and reporting [5]. Deep learning algorithms have been used to forecast COVID-19 infection rates in various parts of the world.

Covid-19 of reaction to the increase of COVID-19 cases and stricter lockdowns, people have voiced a range of feelings on social media channels such as Twitter. Social media played an important part at COVID-19, leading researchers to do NLP and machine learning studies. According to a study that used deep learning sentiment analysis, World Health Organization (WHO) tweets were unsuccessful at providing public advice [6]. In India, a sentiment analysis study was done to assess the effect of a nationwide lockdown due to the COVID-19 pandemic, and it was determined that people regarded the fight against COVID19 positively, with the majority agreeing with the government on the first nation-wide shutdown. Social media posts and tweets give a new degree of knowledge when combined with sentiment analysis. The COVID-19 outbreak was investigated using topic modelling, which revealed themes such as "virus origin" and "the economy." Topic modelling was integrated with Twitter-

based sentiment analysis during the early stages of COVID-19, when sensations such as fear predominated.

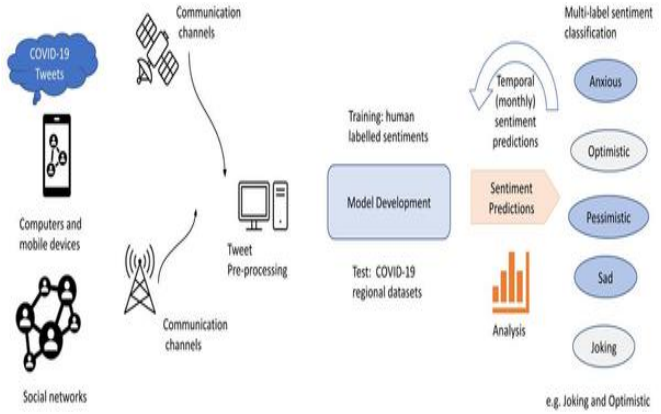

Figure 2. Sentiment Analysis of Covid 19 Tweets [1]

Tweets from the US were utilized in district explicit examinations to recognize the organization of prevailing points and feelings. In the example of China, further work was finished for pattern, subject, and feeling examination using bi-directional encoder portrayals from transformers (BERT) language model. Two further contextual investigations remember local area opinion examination for Australia and feeling examination in Nepal, where most of good feelings were displayed to have components of fear. In Spain, opinion research was directed to decide what advanced stages meant for Coronavirus [7, 8]. During the initial two months of the Coronavirus episode, a cross-language feeling investigation of European Twitter remarks uncovered that lockdown declarations related with temperament crumbling, which quickly recuperates.

The next sections follow the introduction; part II describes the background aspects of sentiment analysis. Section III provides an overview of the issue detection in sentiment analysis using Twitter data. Section IV discusses the research purpose. A comparison of the various strategies mentioned in Section V. Section VI provides a brief explanation of potential conclusions.

2. Related Work

When it comes to identifying psychological hotspot concerns, an exclusive focus on bibliometric data causes a publication delay. To solve this issue, we suggest analysing current online academic discourse on Twitter to identify psychological research participants. We collected the whole 69,963 tweets sent between August 2007 and July 2020 from 139 accounts of German-speaking psychology professors, departments, and research institutes, as well as divisions of the German Psychological Society (DGPs) [1].

The emerging Coronavirus Disease 2019 (COVID-19) outbreak has had profound repercussions on people's daily lives all across the world. Throughout the pandemic period, governments adopt numerous techniques and strategies to combat the sickness, such as lockdown and social distancing. Individuals may suffer a variety of mental health issues as a result of these methods and policies, as well as the virus itself, such as sadness, anxiety, melancholy, and so on. In this research, we explore the sentiment dynamics of people living in the Australian state of New South Wales (NSW) during the outbreak using massive text data supplied by Twitter users [2].

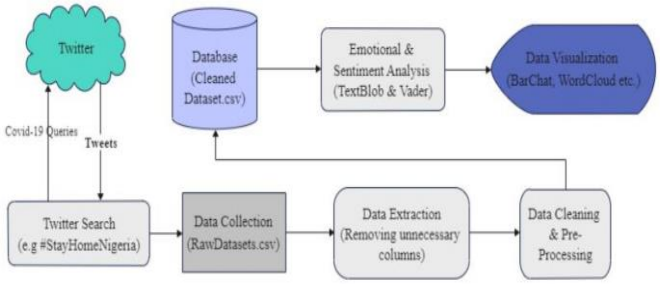

Figure 3. Processing of Covid-19 Tweets [3]

Corona viruses are a kind of RNA illness that infects warm-blooded and feathered animals. In humans, these infections cause respiratory plot pollution that may vary from moderate to deadly. Milder diseases include a few instances of the common cold (which is also caused by other infections, such as rhinoviruses), but more fatal strains of SARS, MERS, and COVID-19 are possible. The negative effects differ depending on the species: they cause upper respiratory tract illness in hens, while loose bowels in dairy animals and pigs. There are currently no antibodies or antiviral medications available to prevent or treat human coronavirus infections [3]. Corona viral sickness (COVID 19) is a new viral infection that arose in 2019. The virus has now spread all across the world, and almost every nation is battling it and doing all they can to stop it. The World Health Organization has declared it a pandemic (World Health Organization, 2020) and is doing everything necessary to contain it while waiting for a cure [4].

The present coronavirus disease (COVID-19) outbreak is putting a burden on the world's health-care system, as well as the social, economic, and psychological well-being of mankind. Individuals, organizations, and governments are using social media to talk about the COVID-19 outbreak. There is little information available on the COVID-19-related topics being discussed on social media platforms. Such data analysis may aid policymakers and health care organizations in analyzing and reacting to the needs of their stakeholders. The goal of this study is to identify the most frequently mentioned COVID-19 pandemic problems on Twitter [5].

Cloud computing offers individuals and businesses massive computing power and scalable storage capacities to support a wide range of big data applications in domains such as health care and scientific research; as a result, an increasing number of data owners are outsourcing their data to cloud servers for greater convenience in data management and mining [6].

Social media is becoming a means for opinion sharing as more people go online. A gang of four terrorists assaulted security troops on September 18, 2016. We investigate the attitudes and survivability of tweets after a terrorist event

using tweets extracted from Twitter in this work. Factors such as the most recent retweet, the number of retweets, and the number of likes are used to investigate the information flow of data provided on Twitter. The greater the number of retweets, the greater the reach. The incident sparked tremendous outrage on social media. We examine our sentiment statistics as well as the survivability of tweets [7].

Social networking is becoming a great resource for corporate decision assistance. This article describes how to integrate social opinion data into multidimensional designs by integrating sentiment analysis methods with ETL design to provide a fresh approach to social ETL design. This paper's primary contribution is the definition of a lexical opinion analysis technique that extracts the sentiment polarity of informal language presented in the Twitter social network [7].

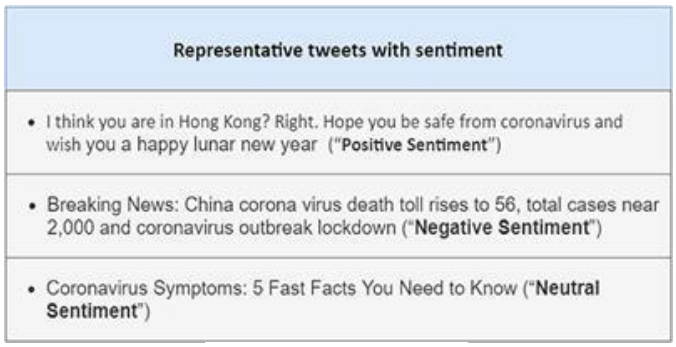

Figure 4. Sentiments Facts [6]

The extremity shift issue is a main consideration that influences order execution of AI based opinion investigation frameworks. In this paper, we propose a three-stage overflow model to address the extremity shift issue with regards to report level feeling grouping. We initial split each record into a bunch of subsentences and construct a half and half model that utilizes rules and factual strategies to distinguish express and certain extremity shifts, separately. Furthermore, we propose an extremity shift disposal technique, to eliminate extremity shift in refutations. At last, we train base classifiers on preparing subsets isolated by various sorts of extremity moves, and utilize a weighted blend of the part classifiers for feeling grouping. The outcomes on a scope of investigations represent that our methodology fundamentally beats a few elective strategies for extremity shift discovery and disposal [8].

Feeling examination, which tends to the computational treatment of assessment, opinion, and subjectivity in text, has gotten impressive consideration as of late. As opposed to the customary coarse-grained feeling examination errands, for example, report level opinion order, we are keen on the fine-grained perspective-based feeling investigation that means to distinguish viewpoints that clients remark on and these angles' polarities. Angle put together opinion investigation depends intensely with respect to syntactic elements. In any case, the surveys that this undertaking centers around are regular and unconstrained, subsequently representing a test to syntactic parsers. In this paper, we address this issue by proposing a system of adding a feeling sentence pressure (Sent_Comp) step prior to playing out the viewpoint-based opinion examination. Unique in relation to the past sentence pressure model for normal news sentences, Sent_Comp tries to eliminate the opinion pointless data for feeling examination, in this manner packing a convoluted feeling sentence into one that is more limited and simpler to parse. We apply a discriminative contingent irregular field model, with specific unique highlights, to consequently pack feeling sentences. Utilizing the Chinese corpora of four item spaces, Sent_Comp essentially works on the exhibition of the angle based feeling examination. The elements proposed for Sent_Comp, particularly the expected semantic highlights, are helpful for feeling sentence pressure [9].

The characteristic of the Internet has, over the most recent couple of years, been changed by Web 2.0 advancements and applications and the appearance of the alleged Social Web. While clients were simply data buyers in the conventional Web, they assume a considerably more dynamic part in the Social Web since they are presently likewise information suppliers. The mass engaged with the most common way of making Web content has driven numerous public and confidential associations to concentrate on dissecting this substance to determine the overall population's viewpoints as respects various points [10].

Given the continuing Web size and growth pace, computerized methods are critical if viable and adaptable solutions are to be obtained. Assessment mining is a very dynamic research topic that combines natural language processing, computational semantics, and text analysis methodologies with the goal of eliminating various types of added-value and instructional components from customers' perspectives. Regardless, flow evaluation mining procedures are restricted by a variety of drawbacks, for example, a lack of semantic relationships between concepts in highlight search processes or a lack of cutting-edge numerical strategies in sensation examination processes. In this research, we offer a novel evaluation mining strategy that makes use of new Semantic Web-directed replies to enhance the results obtained using traditional regular language handling methods and opinion examination procedures. The suggested philosophy has two key goals: (1) to advance highlight-based assessment mining by applying ontologies at the element determination stage, and (2) to provide another vector investigation-based approach for opinion examination. The theory has been carried out and thoroughly tested in a genuine cinema survey related circumstance, generating very favorable results when compared to other conventional approaches [11].

Many individuals had various mental disorders during the COVID epidemic, causing their emotions to shift. People utilized social media to convey their feelings. As a result, social media platforms give a massive quantity of data for understanding people's sentiments and responses to the events they experienced throughout the epidemic. Table 1 shows the data sources for COVID-19 study. It demonstrates that Twitter was the primary data source during COVID [12].

Twenty-four out of thirty main papers utilized Twitter as a research source. The remaining data sources, however, were a WeChat account, Yelp, Reddit, and other Media forums. Twitter: Twitter has become a popular platform for people all around the globe to share their views and opinions. With 81.47 million users [9], it is the most popular app. People use "tweets" to express themselves. According to [10], about 200 billion tweets are published in a single year.

Social distance was used to restrict the spread of COVID, which decreased human-to-human contacts. Many nations implemented a lockdown and restricted airspace, educational institutions, and other facilities. Due to the lockdown, individuals, particularly students, were forced to remain away from their homes, in their hostels, and to discontinue their educational pursuits, causing worry and tension among students. Students communicate their feelings via social media, and researchers attempted to investigate their feelings and students [13].

Coronavirus has directly or indirectly influenced the lives of billions of people. It has generated an economic crisis all throughout the globe, making reopening difficult. Long-term economic closure is a danger to any country's survival. People are being forced to reopen companies and resume regular life as a result of these factors. As a result, the researchers focused their efforts on determining what individuals thought of reopening following COVID-19 [14].

Customers may offer their opinions and comments regarding the quality of products or services they utilize from various companies in today's digital world. These evaluations assist other consumers in making purchasing selections when they are going to utilize the service or product. Online reviews are related with star ratings, which affect the restaurant's income. Special SOPs for restaurants were issued during COVID, and people were quite worried about the COVID-spread. As a result, numerous eateries received unfavourable feedback for their frigid outside areas and poor service. Researchers studied people's opinions about restaurants, which assisted restaurant management in maintaining high-quality cuisine and ambiance [15].

COVID vaccine development may be beneficial in controlling COVID spread. As a result, numerous firms are putting forward effort to create various types of vaccinations [16]. However, the essential necessity for controlling COVID with vaccinations is vaccine uptake and receipt. If individuals are unwilling to help themselves, COVID's control will be hampered. In [17], researchers examined popular attitudes around vaccinations. COVID also increased perceptions of prejudice across borders, leading to an increase in racist behavior [18].

3. Problem Identification

The following are the problem identification of existing work [1, 4]:

- Existing pattern is not suitable for perfect content classification in sentiment analysis.
- The existing model can accept only specific type of content.
- Model take any manual involvement for sentiment identification.

The learning model is not optimizing by reduce the feature vector hence accuracy not improve perfectly.

4. Research Objectives

So, following are the objectives of the proposed work:

- Pattern Lexicon was developed for sentiment content classification.
- The model can accept text content in any format.
- Develop a model which does not take any manual involvement for sentiment identification.
- Optimize the learning model by reducing the feature vector for improve accuracy.

5. Comparative Study

Table 1. Comparative analysis of different sentiment analysis techniques

Methodology	Dataset	Results
Proposed a COVIDSenti dataset and performed sentiment analysis using multiple classifiers [5]	COVIDsenti	Achieved highest result using BERT with 94.8% accuracy
Visualize Sentiments on COVID-19 tweets [6]	Crawled 24000 Covid-19 tweets	Extracts sentiments of India's about COVID-19
Naïve Bayes and Logistic Regression [8]	Created their dataset	91% with Naïve Bayes and 74% accuracy with logistic regression
LSTM [9]	Coronavirus Posts in Reddit Platform	Accuracy 81.15%
BLSTM [10]	SemEval-2010 task 8 dataset	F1 Score 83.6%

6. Conclusion and Future Scope

We used three distinct algorithms in this paper: Nave Bayes, Logistic Regression, LSTM, and BLSTM sentiment analysis algorithms [19]. We standardized the scores of the three methods to be between -1 and 1. This is done to ensure that the comparison is fair and clear to understand. Because it looks for the aspect of the phrases, LSTM is more accurate than other algorithms. Logistic regression does not search at the tweets' polarity strength or aspect [4, 20]. Furthermore, since we used this technique on enormous amounts of data, the processing and output took a long time. Our study has a restriction in that it is domain-based, and we have not considered the user's mood [21]. As a result, we retained the notion of mood-based sentiment analysis for future work.

Sentiment categorization on Twitter is a new paradigm in social media research. Our study included a review of over thirty main papers. With regard to COVID-19, a comparison of data sources utilized, amount of data used, methodologies, and application scenarios was created. This survey makes a

contribution to the area of emotive analysis while also opening avenues for future scholars. According to this survey article, Twitter is the most used data source for sentiment analysis, and the algorithms utilized for sentiment analysis during COVID were Naive Bayes and SVM. numerous researches studied on numerous variables such as student mental health, reopening feelings, restaurant ratings, and vaccination attitudes during COVID-19. Thus, sophisticated machine learning and deep learning approaches combined with social media data may be used to investigate more intriguing themes in the future.

References

[1] Bittermann A, Batzdorfer V, Müller SM, Steinmetz H., "Mining Twitter to detect hotspots in psychology", Zeitschrift für Psychologie. **2021.**

[2] https://en.wikipedia.org/wiki/Fuzzy_logic, Anonymous, retrieved 8th August, **2020.**

[3] Abd-Alrazaq A, Alhuwail D, Househ M, Hamdi M, Shah Z, "Top Concerns of Tweeters During the COVID-19 Pandemic: Infoveillance Study", J Med Internet Res **2020.**

[4] Li, S., Wang, Y., Xue, J., Zhao, N., & Zhu, T., "The impact of COVID-19 epidemic declaration on psychological consequences: a study on active Weibo users", International journal of environmental research and public health, Vol.**17**, Issue.**6, 2020.**

[5] Koyel Chakraborty, Surbhi Bhatia, Siddhartha Bhattacharyya, Jan Platos, Rajib Bag and Aboul Ella Hassanien, "Sentiment Analysis of COVID-19 tweets by Deep Learning Classifiers – a study to show how popularity is affecting accuracy in social media", Elsevier Journal of Applied Soft Computing, Volume 97, Part A, December **2020.**

[6] https://en.wikipedia.org/wiki/Naive_Bayes_classifier, Anonymous, retrieved 12th September, **2020.**

[7] Abd-Alrazaq A, Alhuwail D, Househ M, Hamdi M, Shah Z., "Top concerns of tweeters during the COVID-19 pandemic: infoveillance study", Journal of medical Internet research. **2020.**

[8] Chakraborty K, Bhatia S, Bhattacharyya S, Platos J, Bag R, Hassanien AE, "Sentiment Analysis of COVID-19 tweets by Deep Learning Classifiers—A study to show how popularity is affecting accuracy in social media", Applied Soft Computing, 97: 106754, **2020.**

[9] Barkur G, Vibha GBK, "Sentiment analysis of nationwide lockdown due to COVID 19 outbreak: Evidence from India", Asian journal of psychiatry, 51:102089, **2020.**

[10] Zhou J, Yang S, Xiao C, Chen F., "Examination of community sentiment dynamics due to COVID-19 pandemic: A case study from Australia", arXiv preprint arXiv: 200612185. **2020.**

[11] Organization WH, et al., "Coronavirus disease 2019 (COVID-19): situation report", 72; **2020.**

[12] GuixianXu ,Ziheng Yu , Haishen Yao, Fan Li, Yueting Meng, And Xu Wu., "Chinese Text Sentiment Analysis Based On Extended Sentiment Dictionary", IEEE Access April 13, **2019.**

[13] Farkhund Iqbal, Jahanzeb Maqbool Hashmi, Benjamin C. M. Fung, Rabia Batool, Asad Masood Khattak, Saiqa Aleem, And Patrick C. K. Hung, "A Hybrid Framework for Sentiment Analysis Using Genetic Algorithm Based Feature Reduction", IEEE Access Vol.**7** February 8, **2019.**

[14] Truşcă, M. M., "Efficiency of SVM classifier with Word2Vec and Doc2Vec models", In Proceedings of the International Conference on Applied Statistics, Vol.**1**, Issue.**1**, pp.**496-503, 2019.**

[15] Sharma, R., Mondal, D., and Bhattacharyya, P., "A comparison among significance tests and other feature building methods for sentiment analysis: A first study", In Gelbukh, A., editor, Computational Linguistics and Intelligent Text Processing, pp.**3–19, 2019.**

[16] Tyagi, Abhilasha & Sharma, Naresh., "Sentiment Analysis using Logistic Regression and Effective Word Score Heuristic", International Journal of Engineering and Technology (UAE). 7. 20-23. 10.14419/ijet.v7i2.24.11991, **2018.**

[17] Ying Fang, Hai Tan, And Jun Zhang, "Multi-Strategy Sentiment Analysis of Consumer Reviews Based on Semantic Fuzziness", IEEE Access May 2, **2018.**

[18] Lei Wang, JianweiNiu, And Shui Yu, "Sentidiff: Combining Textual Information and Sentiment Diffusion Patterns for Twitter Sentiment Analysis", Journal of Latex Class Files, Vol.**14**, Issue.**8**, **2018.**

[19] Ali Sadollah, "Introductory Chapter: Which Membership Function is Appropriate in Fuzzy System?", Fuzzy Logic Based in Optimization Methods and Control Systems and Its Applications, Ali Sadollah, Intech Open, DOI: 10.5772/intechopen.79552.

[20] A. M. Shah, X. Yan, A. Qayyum, R. A. Naqvi, S. J. Shah, "Mining topic and sentiment dynamics in physician rating websites during the early wave of the COVID-19 pandemic: Machine learning approach", Int. J. Med. Inform. 149, **2021.**

