

Chapter 2

BERT–Based Deep Learning Models for Analyzing Sentiments of COVID–19–Related Social Media Tweets

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ABSTRACT

Social media data has become an important tool for understanding public attitudes. All over the world, the COVID-19 pandemic impacted people's lives in various ways. People worldwide utilize social media to express their thoughts and feelings about the pandemic. Because of the diversity of Twitter posts, researchers analyze sentiment and examine the public's numerous sentiments concerning COVID-19. In the meantime, people have shared their thoughts about immunization protection and efficacy on social media sites such as Twitter. Studies have demonstrated that it may strengthen ideas and impact the general opinion. This study focuses on analyzing the sentiment of Twitter data connected to the COVID-19 pandemic using bidirectional encoder representations from transformers (BERT) with random forest (RF), convolutional neural networks (CNN), and recurrent CNN (RCNN) classifiers.

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INTRODUCTION

Social media data analysis is beneficial for understanding individuals' views on various issues (Amangeldi et al., 2024). Analyzing the feelings and emotions portrayed in blogs is crucial for various reasons. Analysis of COVID-19 hashtags on Twitter can reveal people's views and ideas about the problem (Jalil et al., 2022). Realizing the thoughts hidden beneath a word or phrase could assist you in comprehending more fully the emotions expressed on social networking sites (Rodríguez-Ibáñez et al., 2023). This can be achieved through Sentiment Analysis (SA). Evaluating sentiment on social media can help discover major topics and issues, as well as trends of public perception and feelings toward any issues. Sentiment and emotion analysis can assist in uncovering variables that attract people to participate in conversations on social media (Lighthart et al., 2021). In today's world, social media has become a massive library of user opinions. Data is generated from various sources, including websites and social blogging, as the internet has become more sophisticated and technologically advanced. Websites and blogs are being utilized to collect real-time product reviews (Maaskri et al., 2024). Conversely, the explosion of blogs stored on cloud servers has resulted in a large volume of data, including views, opinions, and evaluations. As a result, strategies for extracting actionable insights from huge amounts of data, categorizing it, and forecasting end-user actions or emotions are urgently required. Nowadays, people use social media sites to share their opinions rapidly. It is challenging to interpret and derive inferences from this data for sentiment analysis (Mohbey et al., 2024).

Sentiment analysis techniques carefully scrutinize texts from a range of sources, including spam mail, phony scrutiny of public opinion, malevolent retrospection, media posts, and web articles, extracting meaning from these various repositories of human expression (Jlifi et al., 2024). The behavioral analysis uses various language learning and ML techniques to value feelings based on entities, topics, themes, and categories, allowing for a more thorough assessment of sentiments (Qorib et al., 2023). People worldwide utilize social networking sites to share opinions and ideas about this phenomenon that has taken over the cosmos (Srivastava et al., 2024). Individuals share their opinions on social media during the estrangement phase; nevertheless, while social media provides lively updates and helpful knowledge about COVID-19, sometimes the information obtained from public media may be misleading (Budiman et al., 2024). Pain is compounded if they uncover erroneous and dismal content on social media. Social media platforms have been widely utilized to communicate news, thoughts, feelings, and assistance (Xiong et al., 2024). False views are described as attempting to confuse or deceive others with misleading or incorrect data, such as “eating papaya leaves is a preventive for the coronavirus disease.” An individual suffering from this ailment has several physical and mental changes. This necessitates the speedy use of logical processes to grasp information (Kumar and Sadanandam, 2024).

Digital social networking sites like Twitter and Facebook receive unnecessary data, making it difficult to derive meaningful content from them. However, once cleaned, this chaotic information contains human emotions, feelings, expressions, and thoughts. When examined attentively, it reveals a great deal about a vast group of people's current state of mind, behavior, and character (Kumar et al., 2024). As a result, the goal is to fill a knowledge vacuum about the sentiment and emotion portrayed in social media about the COVID-19 pandemic (Tripathi and Al-Zubaidi, 2023).

SA methods are divided into two broad groups: lexicon-based and machine learning (ML)-based techniques (Kuragayala, 2023). Lexicon-based methods are further separated into dictionary and corpus-based strategies. These techniques use established dictionaries to measure sentiments using positive, negative, or neutral terms and statistical frameworks based on big text datasets to comprehend context.

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