

Online Guard: Identifying the misinformation in social media and its impact on COVID-19 vaccination progress in different countries

Sanjida Akter Sharna (Student), Dr. William Eberle (Advisor)
Department of Computer Science, Tennessee Tech University

Background and Major Contributions

- The emergence of the novel coronavirus pandemic has caused a myriad of problems worldwide. One such problem is misinformation, which in itself should be considered a risk.
- Since the outbreak of the COVID-19 pandemic, popular social media platforms are flooded by exaggerated phony news which is affecting our society.
- Although the pertinent tools and existing techniques can support fact-checking and identification of conspiracy, misinformation, and negative sentiment at various stages, a complete end-to-end solution is complicated.
- We propose a thorough analysis and identification system named Online Guard using natural language processing tools and supervised learning techniques to identify the relationship between misinformation from the negative sentiment of COVID19 vaccine-related tweets and vaccination progress rate and its impact in different countries for a particular time period.

Data Collection and Pre-processing for the Experimentations

we have collected two data set from the Kaggle site. One is **COVID-19 all vaccines tweet** dataset and another is **country vaccination** dataset.

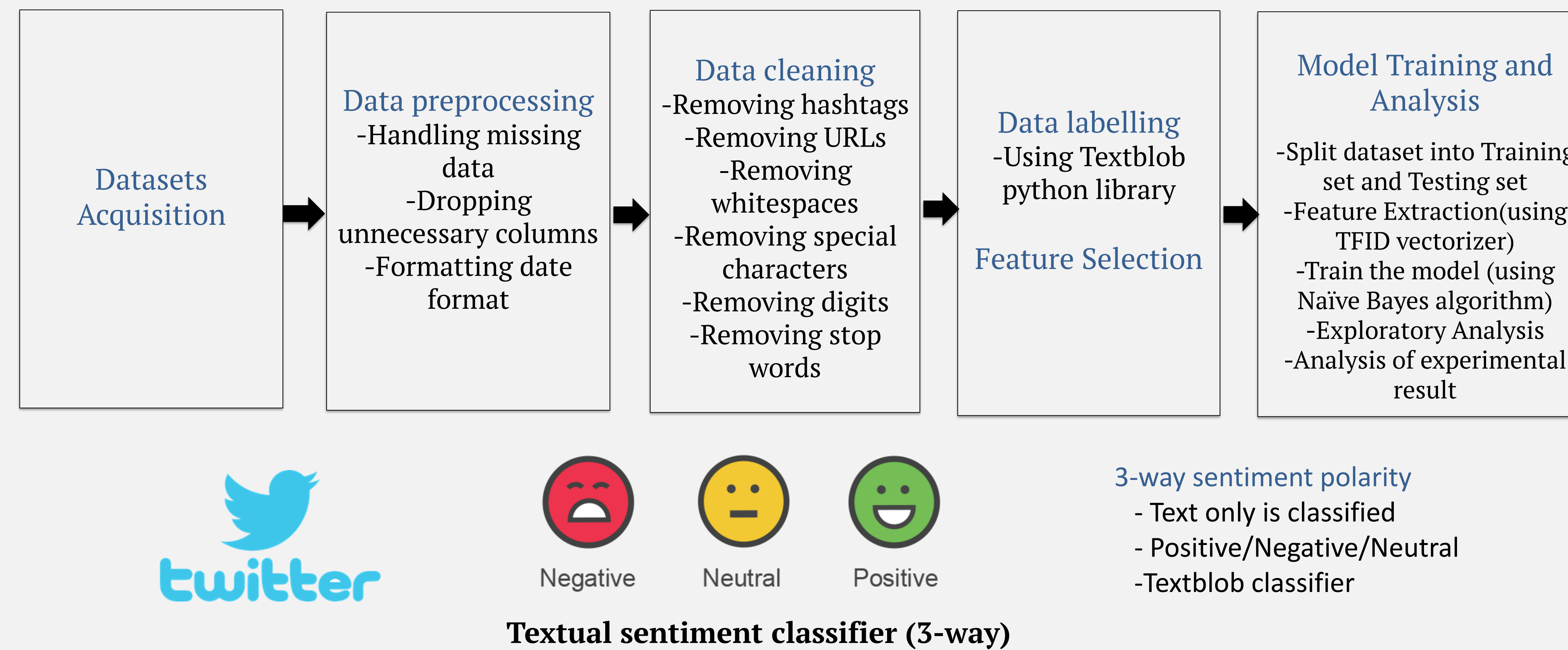
Table 1: Attribute description For COVID-19 all vaccines tweet dataset

| Attribute Name | Attribute Description |
|----------------|-------------------------------|
| User location | The location the twitter user |
| text | Text content of the tweet |
| date | Date of the tweet |

Table 2: Attribute description For Country Vaccination dataset

| Attribute Name | Attribute Description |
|-------------------------|---|
| country | The country for which the vaccination information is provided |
| date | Date for the data entry |
| total_vaccinations | The absolute number of immunizations in the country |
| people_vaccinated | The number of people who receive at least one vaccine shot |
| people_fully_vaccinated | The number of people received entire set of vaccine immunization scheme |

Understanding Experimental Analysis using Flow diagram



Experimental Result Analysis

| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| Negative | 0.87 | 0.33 | 0.48 | 6755 |
| Neutral | 0.77 | 0.98 | 0.87 | 40992 |
| Positive | 0.90 | 0.61 | 0.73 | 20716 |
| accuracy | | | 0.80 | 68463 |
| macro avg | 0.85 | 0.64 | 0.69 | 68463 |
| weighted avg | 0.82 | 0.80 | 0.79 | 68463 |

Figure 1: Performance of the ML model (Naïve Bayes)

| | pred:negative | pred:neutral | pred:positive |
|-----------------|---------------|--------------|---------------|
| actual:negative | 2232 | 3862 | 661 |
| actual:neutral | 63 | 40253 | 676 |
| actual:positive | 273 | 7856 | 12587 |

Figure 2: Confusion Matrix

Training Accuracy: 80.721%

Test Accuracy: 80.4405%

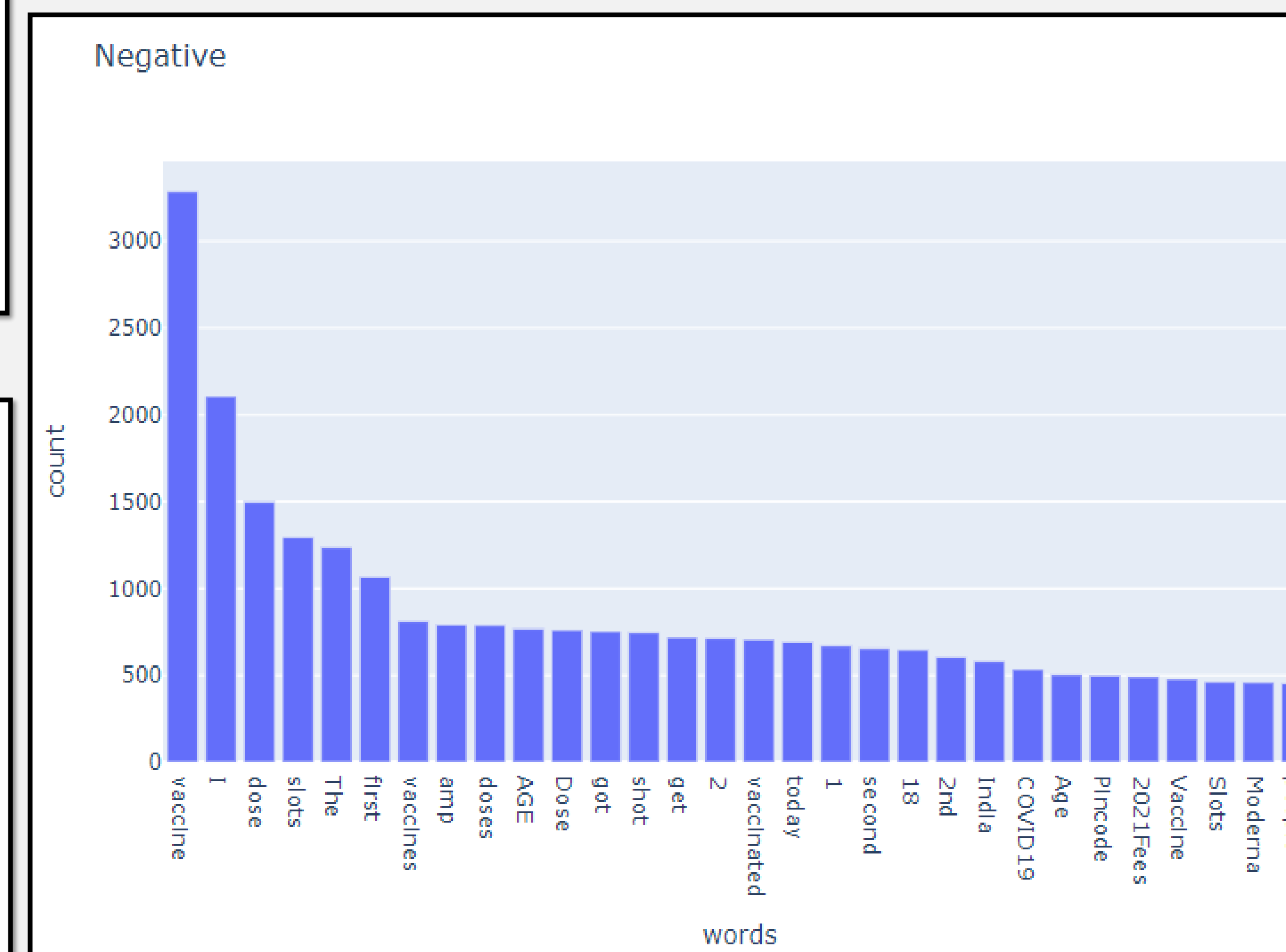
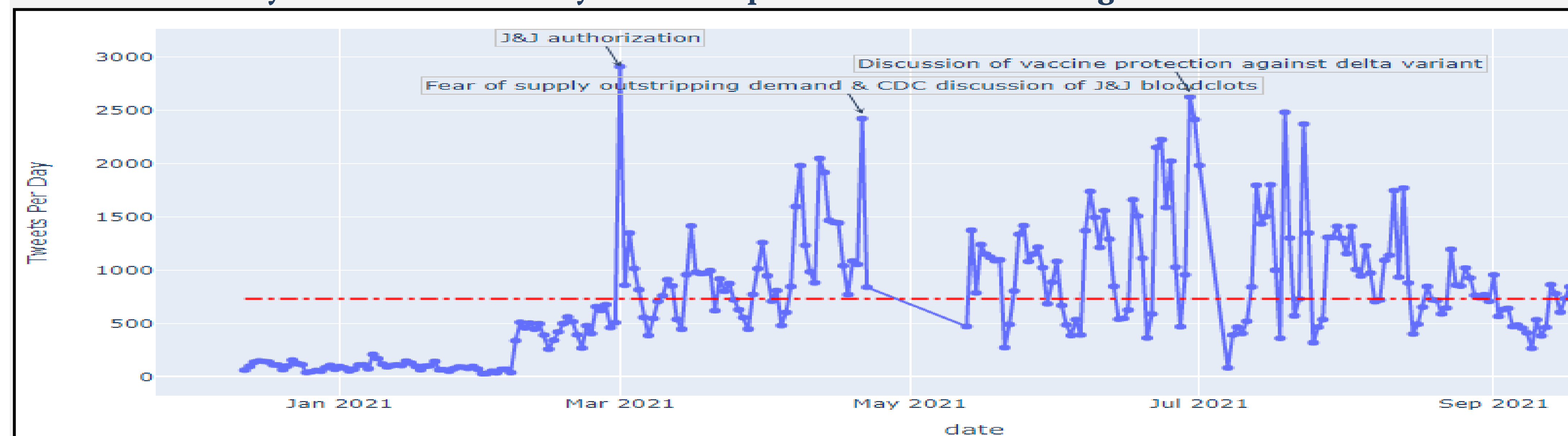


Figure 3: Bar chart of negative word count

Time Series Analysis of Tweets Per Day and its Impact on Vaccination Progress



Exploratory Analysis of Vaccination Progress in Different Country

From the below figure we can see that in most of the countries total vaccination progress is near to zero

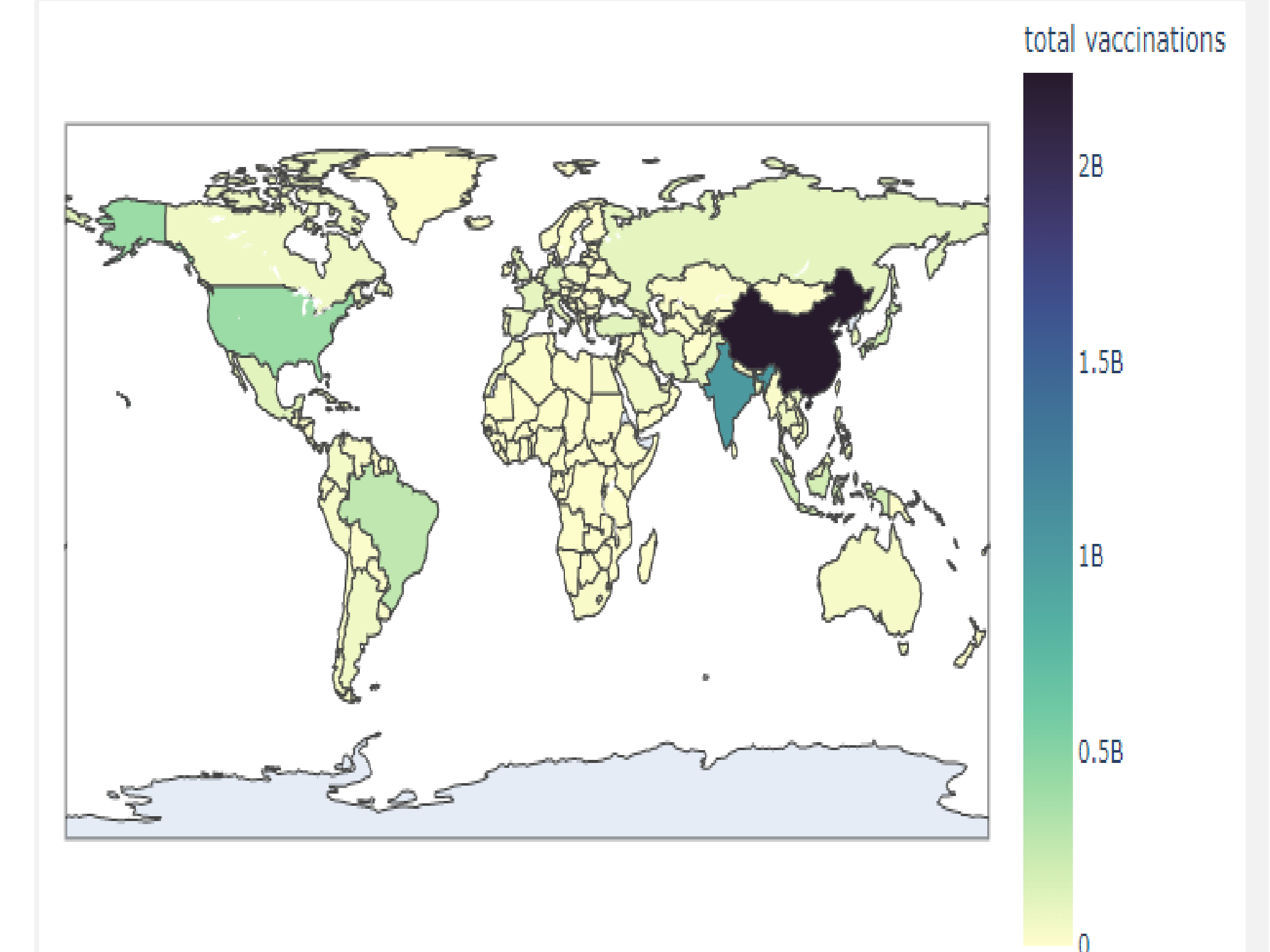


Figure 4: Total vaccination in different countries (January 2021- September 2021)

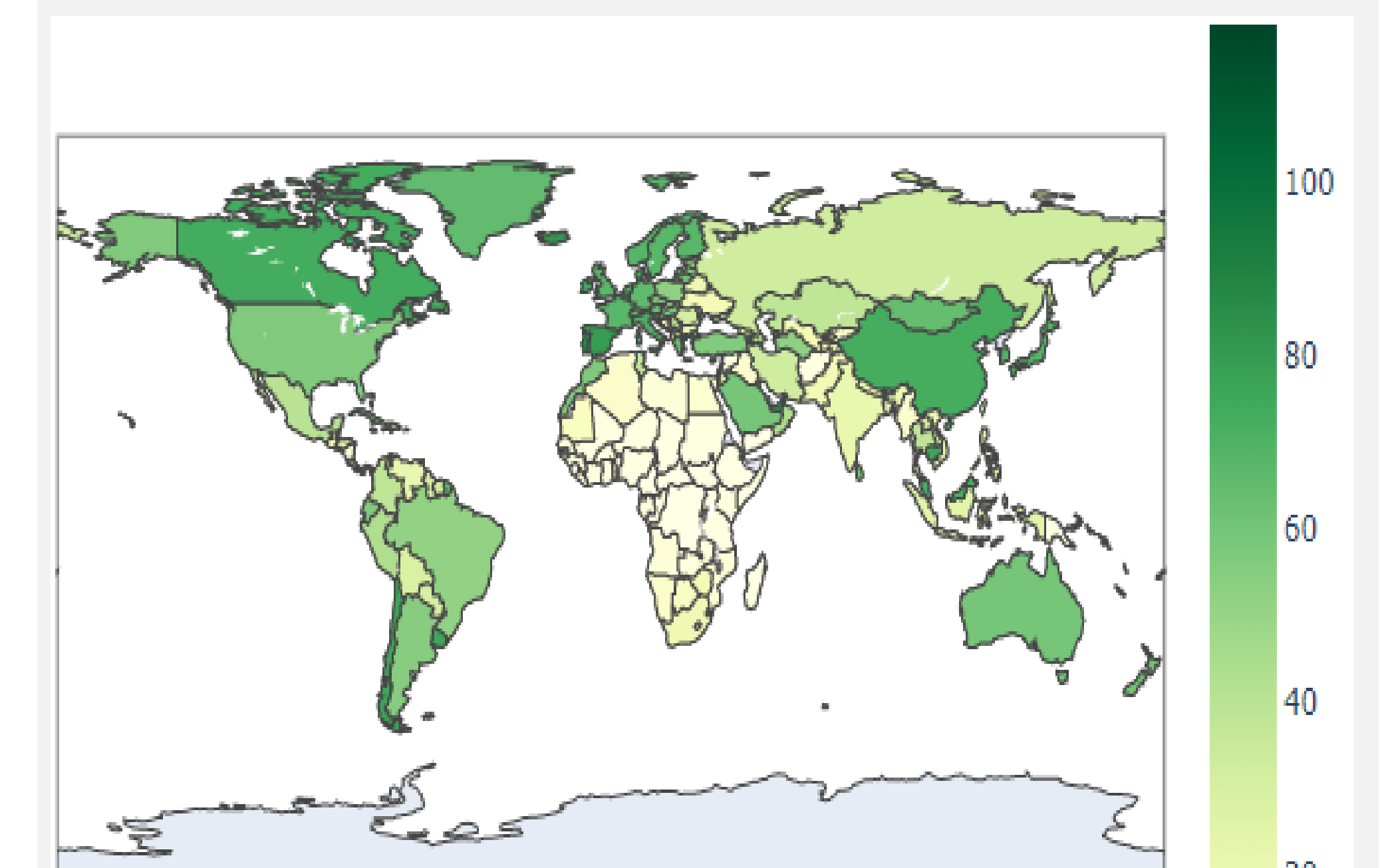


Figure 5: Fully vaccinated percentage in different countries (January 2021- September 2021)

Conclusion: Empirical Findings Observations

- Identifying misinformation and negative emotions are important to provide an intimation of terrors lurking inside social media platforms (Twitter) during the pandemic crisis
- Propagation and acceptance of covid vaccine activities are negatively co-related (hypothesis) with social media platforms' increasing misinformation

Reference

- <https://www.kaggle.com/gpreda/all-covid19-vaccines-tweets>
- <https://www.kaggle.com/gpreda/covid-world-vaccination-progress>