Russia-Ukraine War: A Topic Modeling and Sentiment Analysis Study based on X (formerly Twitter) Data

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Abstract

Purpose: The purpose of this study is to explore and analyse the discussed topics and sentiments expressed by individuals in their tweets related to the Russia-Ukraine War.

Methodology: The Tweet Archiver was used to retrieve the data regarding the Russia-Ukraine war from August 30 to September 30, 2022. During this specified timeframe, a total of 49994 Tweets were retrieved for analysis. A comprehensive analysis of data was performed by employing Python and its libraries. Topic analysis was carried out using BERTopic. The VADER library was used for sentiment analysis.

Findings: The study found ten predominant topics around which the discussions revolved. The most prevalent topic with the highest number of tweets is "NATO's Involvement in Russia-Ukraine Conflict", followed by "Geopolitical Tensions and Energy Politics in China, India, Russia, and Ukraine". Moreover, the sentiment analysis demonstrated that the majority of tweets reflect negative sentiments, while the least emulate positive sentiments. However, a good number of tweets assumed a neutral standpoint towards the war. The geographical distribution of tweets highlights that tweets were poured in from 124 countries across the globe, with a significant contribution from the USA.

Originality: The study illustrates the sentiments and the topics of discussion regarding the Russia-Ukraine war, gains some insights into overall public communication about the war, and complements the existing literature.

Keywords: Topic Modelling; Sentiment analysis; Crisis communication; Social media Analytics

Introduction

Russia, formally known as the Russian Federation, is the world's largest country by land area, including Eastern Europe and northern Asia. Russia is a vast and diversified country with a complicated history and a broad spectrum of thoughts and ideologies among its residents **(World Atlas, 2021)**. After Russia, Ukraine is the second largest Eastern European nation. It is a heterogeneous country with regional variations in language, culture, and political beliefs **(Makuchet al., 2024)**. Russia and Ukraine have a lengthy history that spans several centuries, so the war between the two nations is quite ancient. However, Russia's invasion of Crimea in February 2014 **(Kuzio, 2018)** heightened tensions between the two countries. The situation quickly grew in scope, capturing the attention of people worldwide and becoming a heated topic of debate **(Clinch, 2022; Ray, 2023)**. The Russia-Ukraine crisis again

uproared in 2022 when Russia annexed many provinces of Ukraine, and the act was condemned by leaders across the globe **(Chen & Ferrara, 2023; Mbah & Wasum, 2022; Shah & Gedamkar, 2022)**. Although several nations and leaders interfered to get the situation under control and establish peace between the nations. However, all such efforts were in vain. The continuous attacks by the Russian troops on Ukrainians have resulted in the death of thousands of innocent people and left people with irreplaceable casualties, creating a state of trauma among the masses **(The World Factbook, 2023)**.

The political aspect of the Ukrainian invasion by Russia was of global importance and, within a short span, caught the attention of the whole world. National and international media broadcasted the news. In recent times, social media has evolved and is being used by every community in the world for networking, sharing thoughts, ideas, opinions, and views about themselves or other diverse topics **(Bialy & Svetoka, 2016)**. Social media has been used as a very potent communication channel in warfare, having a powerful impact on the target audience and, to some extent, changing their behaviour or opinion regarding what is being shared **(Svetoka, 2016)**. As such social media became a focal point for sharing and receiving updates about the Russia-Ukraine conflict. The use of social media in Ukraine promoted fear and uncertainty about the whole situation but spread positive emotions about Russia's take on Crimea and eastern Ukraine **(Ionatamishvili & Svetoka, 2015)**. Different sectors of the world have used various social media platforms, ranging from political leaders to common people, to share news, pictures, and other information related to the Ukrainian invasion by Russia. Social media usage at such a critical point in both countries differs. Social media has been used more actively in Ukraine to spread information about the escalating tension **(Specia, 2022)**. Contradictory to this, in Russia, the usage of such platforms has been restricted owing to the spread of news about Russian troops barbarically attacking innocent Ukrainians **(Bond & Allyn, 2022)**. Nowadays, social media has gained momentum in spreading news or information quickly during conflicting times **(Smart et al., 2022),** and Twitter is one of the platforms used by political leaders, influencers, and other sections of society to share information about the disaster in Ukraine's war-like situation **(Chen & Ferrara, 2023)**. During the Russian-Ukrainian situation, Twitter played a crucial role by acting as a medium of communication for the suppressed people and reaching out to the rest of the world **(Pohl et al., 2022)**. Twitter acts as a social network whereby it is easy to gauge the emotions and opinions of people more simply and easily. Thereby being a good choice for researchers who are keen on knowing about the feelings and perspectives of the masses on the topic of interest **(Alonso et al., 2022)**.

Gaining insight into current community patterns by analyzing the online data can aid in more efficient and effective decision-planning by concerned stakeholders. Sentiment analysis "entails studying and analyzing the opinions, feelings, evaluations, attitudes, and emotions that people include in written documents on a given topic" **(Alonso et al., 2022)**. Sentiment analysis is

> the study of analyzing people's sentiment expressed towards services, products, mandates, organizations, etc. **(Pathak et al., 2021)**

According to **Rana et al. (2016),** sentiment analysis refers to "the extraction of opinions/sentiments from user-generated text" and "Topic modeling approaches extract aspects from customer reviews and categorize these aspects into similar classes simultaneously". Sentiment analysis also known as opinion mining is "the process of extracting people's opinions, emotions, attitudes, and feelings about a topic or situation from a large amount of unstructured data" **(pp. 1-2)**. Topic modeling is "an approach to extract hidden topics from large documents" **(Mujahid et al., 2021)**. Sentiment analysis is the process "of identifying the emotions and opinions expressed in a particular text whereas topic modeling "refers to any technique that discovers the hidden semantic structure in a corpus which provides insights into the different themes present in the texts" **(Dahal et al., 2019)**.

Literature Review
The shift from Web 1.0 to Web 2.0 has also paved the way for the growth and development of different social media platforms. People from across the nation have made use of these platforms to express their views, opinions, and thoughts about diverse topics, using which one can comprehend the emotional state of the users about a particular subject/topic **(Nejad et al., 2023; Wang & Wang, 2022)**. As a social media platform, Twitter is a vital source of users' emotions, opinions, and views **(Nejad et al., 2023)**. **Shevtsov et al. (2022)** explored the tweets on the Russia-Ukraine war to gain insight into the sentiments of people. They found a majority of the people expressed negative emotions about the situation. **Garcia and Yabut (2022)** used a combination of methods to analyse the masses' emotions associated with tweets about the Russia-Ukraine conflict. The authors observed that most people had negative emotions about the war, with sadness being the most common feeling among people, followed by fear and anger. Using a mixed strategy to explore the views of Twitteratis' on the Ukrainian invasion, **Mir et al., (2023)** unveiled a maximum number of tweets by users who were in support of Ukraine and the Ukrainians further, reaching out to the global community to jointly aid in their help by providing daily essentials and

other items. Moreover, most tweets came from the USA, followed by Ukraine and the UK. Examining the sentiments associated with the communication of a political leader, Volodymyr Zelensky, on Twitter during the conflicted times **Nisch, (2023)** employed the Bidirectional Encoder Representations from Transformers (BERT) technique and discovered mainly feelings of love, sadness, and anger prevailed in the tweets by the Volodymyr Zelensky. Moreover, by analyzing the content of tweets the author concluded a higher portion of the tweets were about "dialogue" accompanied by "countermeasures" and "solidarity". **Agarwal (2022**) uncovered the views of Twitter users regarding the tension escalating between Russia and Ukraine. The authors used the Kaggle Russia Ukraine war - Tweets Dataset to examine sentiments and discovered negative tweets largely dominated over positive and neutral ones. Investigating the feelings of Twitter users about the Russia-Ukraine war **Vyas et al. (2023)** utilized *Kaggle.com* to extract the dataset and presented a vivid picture of the sentiments of the audience about the crises. The authors brought to light that the tweets containing hashtags of war and Ukraine were more prevalent than those of Russia. Most of the tweets were neutral, followed by tweets confirming optimistic behaviour and instilling feelings of hope, love, joy, and so on. **Sirisha and Chandana (2022)** examined the views and opinions of the Twitter audience, extracting tweets from the Kaggle about the Ukrainian invasion by Russia and showcasing that a maximum of the tweets were negative, followed by neutral and positive ones. Inspecting the emotions of social media users, particularly Twitter users, from their tweets during Russia-Ukraine discord, **Sazzed (2022)** found the majority of the tweets were from the USA accompanied by UK and France, where negative feelings in tweets surpassed the positive ones. Moreover, the authors identified the themes of the tweets, in general, revolved around humanitarian support for the people of Ukraine, invasion, female warriors, fundraising, and support from the West. Extracting the tweets about Russia invading Ukraine via Webscraper. **Xu et al. (2023)** unveiled the sentiments associated with those tweets. The authors highlighted a maximum of the tweets (54.7%) exhibited positive character; a significant portion (35%) displayed neutral feelings while the least number of tweets (10.2%) held negative feelings. **Patil and Lokesha (2022)** performed sentiment analysis on live Twitter data on the "Russian-Ukraine World War" and found a bulk of the tweets were neutral, followed by negative and positive ones respectively **(p.9)**. **Garcia and Yabut (2022)** performed a sentiment study on the Russian-Ukraine conflict to better understand global sentiment patterns and found the majority of the tweets displayed negative emotions. Furthermore, the authors affirm that most tweets originated in European nations, followed by Asian countries. Taking into consideration the news media tweets on

the Russia-Ukraine crisis posted on Twitter **(Hakimov and Cheema, 2023),** it was determined that the majority of the tweets had a neutral tone, followed by negative ones, with the tweets carrying favorable feelings being the fewest. Additionally, the authors assessed nations' perspectives on the conflict and observed a majority of the tweets belonged to an undecided group, with 7.3 % in favor of Ukraine, and only 2.7 % in support of Russia. Adopting a bidirectional LSTM technique **(Shlkamy et al., 2023)** performed sentiment analysis on the Russia-Ukraine tweets. The authors confirmed that negative characters were portrayed in the greatest number of tweets, followed by neutral and positive tweets. **Al Maruf et al. (2022)** used the machine learning method to depict the emotions of the people on Twitter and affirmed a significant number of tweets carried negative feelings about the Russia-Ukraine tension, which were complemented by tweets expressing neutral and positive emotions, respectively. **Ramos and Chang (2023)** performed a sentiment analysis of the tweets on the tension escalating between Russia and Ukraine using the RoBERT a technique. The authors discovered that the tweets in the English language predominantly showed terror among people followed by rage and neutral emotions respectively. However, the tweets in the Russian language mainly carried negative emotions followed by positive sentiments. Additionally, the authors found *"Russia, Ukraine, Troops, NATO, and Putin"* among the most commonly used phrases by Twitter users throughout the crises. **Haq et al. (2022)** collected the Twitter dataset on the Russia-Ukraine situation via. Twitter API. The dataset indicated the majority of the tweets cited Russia, Ukraine, and Putin. However, Zelensky was mentioned in more tweets as compared to Putin. Also, the most commonly used terms include 'breaking', 'news', and so on, all of which portray current situational changes. Analyzing people's emotions about the Russia-Ukraine disturbance **Poleksić and Martinčić (2023)** performed the sentiment analysis on Twitter data, and found for the Russian dataset, negative sentiments prevailed in the majority of the tweets (51%) followed by positive tweets (32%) and neutral tweets (17%). In the Ukrainian sample, 47% of the tweets depicted negative emotions, with the remaining displaying positive (35%) and neutral (18%) sentiments. Probing into the impact of the conflict between Russia and Ukraine on the economies **Polyzos (2022)** investigated tweets to gain insight into the feelings for the same. The study showed US and China stock markets remained unaffected by the conflict thus, exhibiting a positive approach towards the situation while a negative response was observed in European markets confirmed by the negative tweets. Additionally, moving on to the commodities market the authors found crude oil exhibited a negative response, gold showed a positive attitude while natural gas didn't display any response at all. **Pathak et al. (2021)** examined how the sentiments of people regarding

the energy sources on Twitter evolved during the crises in the Russia-Ukrainian conflict. The authors affirmed the majority of the users from the USA followed by the UK actively tweeted mainly tweets carrying negative emotions accompanied by positive and neutral tweets.

Objectives
- To analyze sentiments expressed by people about the Ongoing Russia-Ukraine war.
- To visualize the latent topics appearing in Tweets.
- To highlight the geographical contribution of Tweets.

Research Questions
- What are the prevailing sentiments expressed by individuals regarding the ongoing Russia-Ukraine war on Twitter?
- What latent topics emerge prominently within the content of tweets discussing the Russia-Ukraine conflict?
- How can the geographical origins of tweets contribute to understanding the distribution and perspective of opinions on the Russia-Ukraine war?

Methodology
Data Retrieval Process
The 'Tweet Archiver' was used to retrieve the Tweets against selected hashtags. Tweet Archiver is an add-on to save Tweets centred on popular hashtags, brand mentions, geo-tagged Tweets, keywords, and more. It polls Twitter every hour and extracts all matched Tweets into a Google Spreadsheet using basic searches, Boolean searches, or sophisticated Twitter search operators to generate more complicated queries. The app runs in the background and auto-downloads the Tweets matching the query.

The following search query was employed in Tweet Archiver to retrieve the data regarding the event.

Query:

> #UkraineRussiaWar   OR   #RussiaUkraineWar   OR #UkraineRussiaCrisis   OR   #RussiaUkraineCrisis lang:enexclude:retweetsexclude:replies

A total of 49994 Tweets with accompanying metadata was harvested from August 30 to September 30, 2022.

Topic Modeling
The data analysis was conducted using Python and its libraries.

Topic analysis was carried out using BERTopic **(Grootendorst, 2022)**. Data for the topic analysis was prepared using the usual preprocessing steps. In

the first step, we removed stop words[1], links, emojis, punctuation marks, and other non-relevant characters from the tweets'' texts. Following, texts were tokenized[2] and lemmatized[3]. In the last step cleaned data was analyzed using the HDBSCAN model of the BERTopic[4] library. The probability threshold was set to 0 for all the tweets that would be assigned to a defined topic. Number of searched topics was set to 10. We tried different amounts of topics starting from 5 to 20. 10 seemed to be the optimal number of topics, as a smaller amount did not cover all the topics, and a bigger amount created similar clusters. The distribution of topics[5] and working scripts[6] can be found in footnotes.

Sentiment Analysis
Sentiment analysis[7] was performed using the VADER[8] library. Data for the study was preprocessed using the same procedure as for the topic analysis. The output of the VADER model was interpreted as follows: tweets with a score higher than 0.05 were marked as positive, and tweets with a score lower than -0.05 were marked as negative. Tweets with the score that lies in between these values were marked as neutral.

Results
Topic Modeling
The Probability threshold was set to 0 for all the tweets that would be assigned to a defined topic. Number of searched topics was set to 10. The names of the topics were identified manually based on the top ten words, using consensus between authors (See Appendix I). As evident from Fig. 1, it is clear that there are ten predominant topics around which the discussions revolve. Notably, a significant portion of tweets predominantly

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[1]https://www.nltk.org/search.html?q=stopwords

[2]https://pypi.org/project/segtok/

[3]https://www.digiasset.org/html/pattern-en.html

[4]https://maartengr.github.io/BERTopic/index.html#:~:text=BERTopic%20is%20a%20topic%20modeling,Semi%2Dsupervised

[5]https://docs.google.com/spreadsheets/d/1Mwl4U0QxelJxxY6qgxYSVOX7iA1R_oY7/edit#gid=1778489189

[6]https://colab.research.google.com/drive/1mj6QDQDUpqCu6wwZhSfkAh3ktPhYhG-2

https://colab.research.google.com/drive/1c6jz-QEUuD88Vpzjy67GtPP3Lb7liL1X#scrollTo=0008da68

https://colab.research.google.com/drive/1Xa6GT-ZWHB0Ij0mDtSSwtuxo8lcLvaQc

[7]You can find python code for the sentiment analysis under the following link: https://colab.research.google.com/drive/1Xa6GT-ZWHB0Ij0mDtSSwtuxo8lcLvaQc#scrollTo=90ab7b40

[8]https://github.com/cjhutto/vaderSentiment

centred on topic four related to the discussions about the involvement of
NATO in the ongoing Russia-Ukraine Conflict.

Fig. 1: Top Ten Words Based on their Corresponding Weights
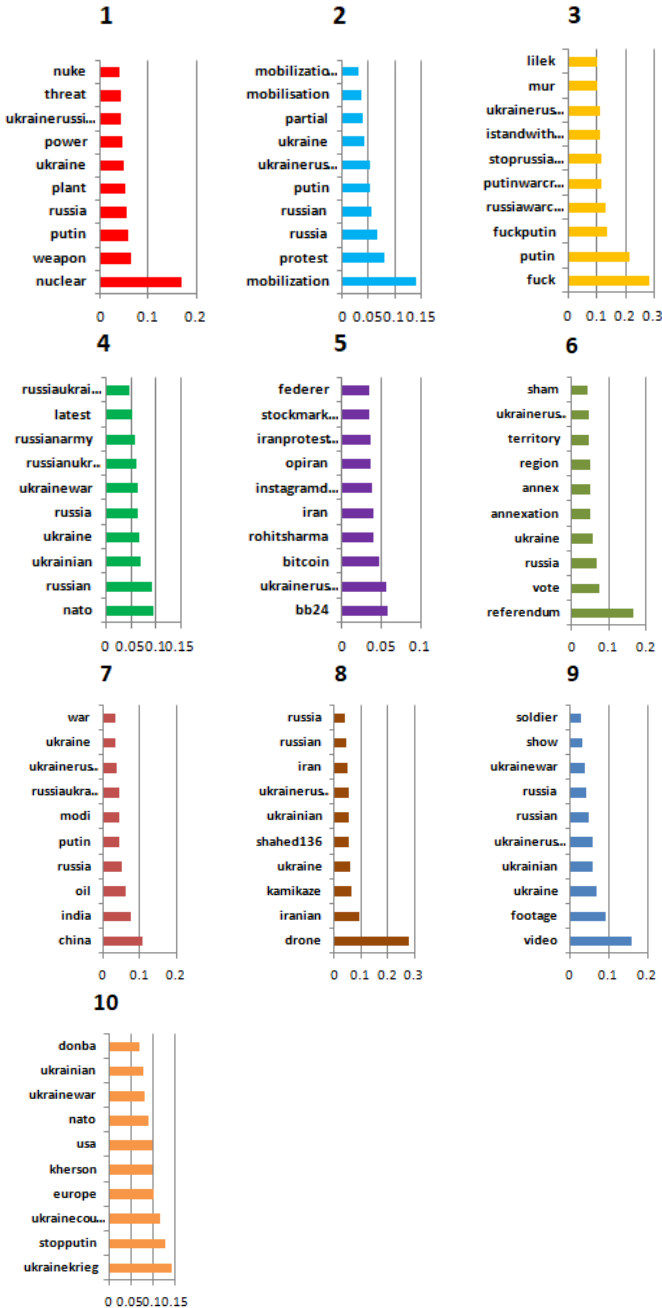
Overall Sentiment Analysis of Tweets
A majority (25044; 50.09%) of tweets reflect negative sentiments, while 13165 (26.33%) emulate positive sentiments and 11785 (23.57%) adopt a neutral stance towards the conflict. This signifies that the majority of Twitter users hold unfavourable views or sentiments concerning the ongoing "Russia-Ukraine war"

Geographical Distribution and Sentiments of Tweets
The geographical distribution of the majority of tweets (35493; 70.99%) was not mentioned by the Twitter users, limiting the geographical mapping to 14501 tweets. The tweets were poured in from 124 countries across the globe, with a significant contribution from the U.S.A. (3275; 6.55%), followed by Ukraine (3252; 6.50%), India (1444; 2.88%) and Canada (739; 1.47%) respectively. The other countries among the top ten with the highest proportion of tweets are the United Kingdom (725; 1.45%), Indonesia (560; 1.12%), Russia (350; 0.70%), Belgium (343; 0.68%), and Sweden (305; 0.61 %). The countries that post less than 300 tweets each about the event constitute Malaysia, Australia, Italy, Nigeria, Greece, France, Pakistan, Egypt, the Netherlands, Portugal, and Germany.
The sentiment-level analysis further enriched the findings by classifying tweets as positive, negative, and neutral. The results highlight that the U.S.A. outscores all the countries in terms of negative tweets (1825), followed by Ukraine (1599) and India (760). Interestingly except for Nigeria, France, and Kenya, the majority of tweets from all other countries exhibited negative sentiments. This indicates a prevailing negative outlook towards the "Russia-Ukraine war"**.** The detailed Geographical Distribution and Sentiments of Tweets can be found in Appendix II.

Findings and Discussion
The topic modeling of the tweets highlights that there are ten predominant topics around which the whole discussion revolves. Notably, a significant portion of tweets predominantly centred on topic four, which discusses the involvement of NATO in the ongoing Russia-Ukraine Conflict. The tweets falling under this category highlight the participation of the North Atlantic Treaty Organization (NATO) in response to the tensions and hostilities between Ukraine and Russia. While Ukraine remains outside the membership of NATO, the alliance assumes a pivotal role in the ongoing confrontation with Russia **(Hindustan Times, 2023).**

> The security of Ukraine is of great importance to NATO and its member states. The Alliance fully supports Ukraine's inherent right to self-defense, and its right to choose its security arrangements. Relations between NATO and Ukraine date back to the early 1990s and have since developed into one of the most

substantial of NATO's partnerships. Since 2014, in the wake of Russia's illegal annexation of Crimea, cooperation has been intensified in critical areas. Since Russia's full-scale invasion in 2022, NATO and Allies have provided unprecedented levels of support to Ukraine **(NATO, 2023).**

The study further reveals that the majority of tweets reflect negative sentiments, while the least emulates positive sentiments, and a good number of tweets adopt a neutral stance towards the conflict. This signifies that the majority of Twitter users hold unfavourable views or sentiments concerning the ongoing Russia-Ukraine war. The findings highlight that the U.S.A. outscores all countries regarding negative tweets followed by Ukraine and India. Interestingly, except for Nigeria, France, and Kenya, the majority of tweets from all other countries exhibited negative sentiments. This indicates a prevailing negative outlook towards the ongoing Russia-Ukraine war.

The study encapsulates the overarching significance of the Russia-Ukraine conflict as a complex geopolitical event that has captured global attention. The involvement of various international actors underscores the interconnectedness of the world stage and the profound implications that extend far beyond the borders of Ukraine and Russia. The geographic distribution of tweets found that tweets were poured in from 124 countries across the globe, with a significant contribution from the U.S.A. followed by Ukraine, India, and Canada, respectively. The findings are in line with the previous research conducted by **(Chen and Ferrara, 2023; Mir et al., 2023)** also found the USA's active engagement on the Twitter platform, indicating a substantial vested interest in reinstating Ukraine's sovereignty and effectively resolving the conflict with Russia. Furthermore, the "Russia-Ukraine conflict is causing substantial damage to the global economy" **(Ibar et al., 2022),** and the United States being one of the global economic leaders wants an end to this war so that its economy won't be affected in the long run".

Conclusion

The study delves into the digital traces (tweets) related to the ongoing Russia-Ukraine War, focusing specifically on sentiment analysis and topic modeling. By harnessing the power of sentiment analysis, the study discovered the perceptions and attitudes prevalent in the tweets related to the event. The sentiment analysis of tweets allows us to identify the public perceptions surrounding the attack and the subsequent events, shedding light on how the online community (Twitter users) reacted and felt about the ongoing Russia-Ukraine War. Furthermore, the study employed topic modeling techniques to categorize the tweets into distinct topics or themes. This helps us identify the main discussions, concerns, and

issues that emerged on social media platforms about the Russia-Ukraine War. By uncovering the latent topics, the study provides valuable insights into the prevalent narratives that captured the attention of Twitter users during the period. The study can contribute to a deeper understanding of the impact of significant events on digital conversations and the public's sentiments while also offering valuable insights into war communication in a digitized society by depicting the multifaceted nature of war communication in a digital society, showcasing how social media platforms like Twitter serve as channels for global discourse, opinion dissemination, and geopolitical implications of conflicts such as the Russia-Ukraine war. The study underscores the Russia-Ukraine conflict's global significance as a complex geopolitical event that has garnered worldwide attention. The involvement of numerous international actors highlights the interconnectedness of global affairs and the extensive implications that extend well beyond the immediate borders of Ukraine and Russia.

Limitations
The study's findings cannot be generalized to the larger population since not everyone uses Twitter. It focused on a restricted set of tweets using a particular hashtag, ignoring those from other hashtags. Moreover, it specifically examined English tweets, but it would be intriguing to include tweets in various languages in future research to highlight the diverse perspectives of individuals.

Acknowledgement

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Appendix I: Top Ten Topics Based on their Corresponding Weights

Topic	Topic Name*	Count	Top ten words
1	Nuclear Weapons and Russia-Ukraine Conflict	1565	nuclear, weapon, putin, russia, plant, ukraine, power, ukrainerussiswar, threat, nuke
2	Russian Mobilization and Protests amid Russia-Ukraine War	1706	mobilization, protest, russia, russian, putin, ukrainerussiawar, ukraine, partial, mobilisation, mobilizationinrussia
3	Russia-Ukraine War and War Crimes	1954	fuck, putin, fuckpu, tin, russiawarcrime, putinwarcrime, stoprussianaggression, istandwithukraine, ukrainerussiawar, mur, lilek
4	NATO's Involvement in Russia-Ukraine Conflict	34809	nato, russian, ukrainian, ukraine, russia, ukrainewar, russianukraine, russianarmy, latest, russiaukrainewar
5	Recent World Events and Notable Personalities	3389	bb24, ukrainerussiawar, bitcoin, rohitsharma, iran, instagramdown, opiran, iranprotests2022, stockmarketcrash, federer
6	Russia-Ukraine Conflict and Annexation Referendum	962	referendum, vote, russia, ukraine, annexation, annex, region, territory, ukrainerussiawar, sham
7	Geopolitical Tensions and Energy Politics in China, India, Russia, and Ukraine	3506	china, india, oil, russia, putin, modi, russiaukrainewar, ukrainerussiawar, ukraine, war
8	Geopolitical Tensions and Drone Warfare in Ukraine, Iran, and Russia	779	drone, iranian, kamikaze, ukraine, shahed136, ukrainian, ukrainerussiawar, iran, russian, russia

9	War Footage in Russia-Ukraine Conflict	491	video, footage, ukraine, ukrainian, ukrainerussiawar, russian, russia, ukrainewar, show, soldier
10	The Russia-Ukraine Conflict and International Involvement	833	ukrainekrieg, stopputin, ukrainecounteroffensive, europe, kherson, usa, nato, ukrainewar, ukrainian, donba

Note: Topic Names have been identified manually based on the top ten words using consensus between authors.

Appendix II: Geographical distribution and Sentiments of Tweets

Rank	Country	Count	Negative	Neutral	Positive
1	USA	3275	1825	703	747
2	Ukraine	3252	1599	829	824
3	India	1444	760	292	392
4	Canada	739	373	194	172
5	United Kingdom	725	393	147	185
6	Indonesia	560	249	252	59
7	Russia	350	169	115	66
8	Belgium	343	203	53	87
9	Sweden	305	126	99	80
10	Malaysia	253	183	10	60
11	Australia	247	140	40	67
12	Italy	229	68	118	43
13	Nigeria	200	58	55	87
14	Greece	196	82	51	63
15	France	162	64	27	71
16	Pakistan	146	65	32	49
17	Egypt	132	88	17	27
18	Netherlands	116	44	35	37
18	Portugal	116	50	26	40
19	Germany	111	55	26	30
20	Singapore	90	58	16	16
21	Ireland	81	35	15	31
22	Bangladesh	73	37	15	21
23	Hong Kong	72	58	7	7
24	South Africa	69	29	17	23
25	Turkey	60	25	21	14
26	Kenya	53	18	10	25
27	Finland	50	22	8	20
28	Czech Republic	47	22	20	5
29	United Arab Emirates	45	29	8	8
30	Israel	44	21	13	10
31	Japan	38	20	14	4
32	Tunisia	37	20	13	4
33	Ghana	34	14	16	4
34	Bulgaria	33	19	1	13
35	Denmark	31	10	9	12
35	Slovakia	31	8	22	1
35	Spain	31	16	10	5
36	Qatar	30	10	4	16

Rank	Country	Count	Negative	Neutral	Positive
37	Azerbaijan	29	26	3	0
38	Sri Lanka	28	16	5	7
38	Switzerland	28	16	7	5
39	Brazil	26	17	5	4
39	New Zealand	26	10	13	3
39	Poland	26	5	13	8
40	Mexico	24	9	10	5
41	Georgia	23	10	10	3
42	Puerto Rico	22	11	5	6
43	Norway	20	10	8	2
44	Iceland	19	9	4	6
44	Luxembourg	19	11	5	3
44	Romania	19	6	7	6
45	Austria	16	7	6	3
45	Chile	16	3	3	10
45	Korea	16	12	3	1
46	China	15	7	4	4
47	Iraq	14	5	5	4
48	Argentina	13	9	3	1
48	Syria	13	4	5	4
49	Uganda	12	4	5	3
50	Estonia	10	4	4	2
51	Nepal	9	3	3	3
51	Serbia	9	5	2	2
52	Lithuania	8	2	6	0
52	Tanzania	8	6	2	0
53	Croatia	7	4	1	2
53	Cyprus	7	5	2	0
53	Somalia	7	3	1	3
53	Sudan	7	3	4	0
53	Venezuela	7	3	2	2
53	Vietnam	7	2	2	3
54	Armenia	6	4	2	0
54	Lebanon	6	4	1	1
54	Thailand	6	3	3	0
55	Afghanistan	5	3	2	0
55	Algeria	5	3	1	1
55	Ethiopia	5	2	2	1
55	Malta	5	3	1	1
55	Peru	5	4	1	0
55	Philippines	5	4	1	0
55	Saudi Arabia	5	3	2	0
56	Hungary	4	3	1	0
56	Iran	4	3	1	0
56	Jordan	4	1	3	0
56	Kuwait	4	3	1	0
56	Latvia	4	2	1	1
56	Monaco	4	2	2	0
56	Panama	4	3	0	1
56	Yemen	4	2	1	1

Rank	Country	Count	Negative	Neutral	Positive
56	Zimbabwe	4	2	1	1
57	Belarus	3	1	1	1
57	Costa Rica	3	2	0	1
57	Greenland	3	2	1	0
57	Jamaica	3	1	2	0
57	Kazakhstan	3	0	1	2
57	Mauritius	3	3	0	0
57	Morocco	3	2	1	0
58	Bahrain	2	0	1	1
58	Colombia	2	0	0	2
58	Guam	2	1	1	0
58	Kyrgyzstan	2	2	0	0
58	Uzbekistan	2	1	1	0
59	Barbados	1	0	1	0
59	Belize	1	1	0	0
59	Benin	1	0	1	0
59	Cameroon	1	1	0	0
59	Cayman Islands	1	1	0	0
59	Central African Republic	1	0	0	1
59	Chad	1	0	0	1
59	Ecuador	1	0	0	1
59	Eswatini	1	1	0	0
59	Gibraltar	1	1	0	0
59	Isle Of Man	1	1	0	0
59	Kosovo	1	0	1	0
59	Moldova	1	0	0	1
59	Oman	1	0	1	0
59	Republica Dominicana	1	0	0	1
59	Rwanda	1	1	0	0
59	Sierra Leone	1	0	1	0
59	Slovenia	1	1	0	0
59	Tuvalu	1	1	0	0
59	Uruguay	1	0	1	0
59	Zambia	1	1	0	0

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Aasif Ahmad Mir holds a PhD in Library and Information Science from Pondicherry University. He is associated as an author with reputed journals, like Journal of Information Science, International Journal of Disaster Risk Reduction, Library Hi Tech, Annals of Library and Information Studies etc. Besides, he has presented papers at various international and national conferences. Additionally, he was serving as a research staff member for the UGC-DAAD Project-Based Personnel Exchange Programme

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