

# Informational war: Analysis of Twitter discourse on Russia's invasion of Ukraine

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## ABSTRACT

Following the 2016 US presidential elections, Russian influence operations on social media have received significant attention. Their interference has raised grave concerns about the spread of foreign disinformation on social media sites. Another Russian information warfare started with their full-scale invasion of Ukraine in the beginning of 2022. Even though social media platforms, like Twitter and Facebook, are banned in Russia, the dissemination of the Russian narrative continues in the online realm. This study uses Topic Modeling to analyze what are the prominent topics of international discourse on Twitter about the war. In addition to that, the study explores popular hashtags shared, because they give an insight to the narrative of the discussion.

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## 1 INTRODUCTION

Armed conflicts in eastern Ukraine started in 2014, when Russia annexed Crimea. A year before that, former president of Ukraine, Viktor Yanukovich, decided not to integrate with the European Union which caused public protests that were met with violence from the state security forces. The conflict escalated and Yanukovich fled the country in the beginning of 2014. In March 2014 Russian President Putin, under the excuse of protecting Russian speakers of Crimea, took control of the region and then annexed it after a local referendum. This act only contributed to ethnic divisions in the region and strengthened pro-Russian separatists in the Donetsk and Luhansk regions of eastern Ukraine [12].

Putin launched "peacekeeping" troops in the separatists regions of Luhansk and Donetsk. Shortly the United States imposed sanctions on those regions and the Nord Stream 2 gas pipeline, one of the largest gas transmission systems in the world, which is owned by the Ukrainian government. After an unsuccessful attempt to stop Russian aggression by the United Nations Security Council, Putin announced a full-scale military invasion on Ukraine.

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2022-05-14 20:50. Page 1 of 1-9.

In addition to the armed violence, Russia spreads their pro-Kremlin, pro-war propaganda using news sources and social media. International news sources, like Bloomberg News and the BBC stopped their work in Russia, because of the new censorship law. Under the law, even calling the war - "war" is a crime [4]. Since there was a lot of information on the war spread on social media, and some platforms started labeling Russian state profiles, Roskomnadzor blocked access to Facebook, Instagram on 14 March, and Twitter on 4 March [2, 31]. Russia works on totally brain-washing their population by cutting off any sources of credible news.

While Russia cuts off their public from Twitter, the Kremlin actively spreads misinformation on the invasion through the huge network of the Russian government official accounts. Twitter has confirmed that they did not prevent those accounts from being recommended to other users, so the state has been actively using foreign embassy and missions accounts to amplify fake stories and pro-Putin propaganda [10].

Unfortunately, pro-war propaganda has found support from some US news sources as well. Russia, while trying to back up their "special operation", starts a thread that US funded Ukrainian biolabs are building serious bioweapons. On the day of the Russian invasion this thread appeared on Twitter and gained frightening popularity within far-right Americans. It is not helpful that some political figures and public individuals took part in amplifying the conspiracy theory: Fox News host, Tucker Carlson, had segments of the show where he promoted the conspiracy theory, and Donald Trump Jr. tweeted that the theory was in fact true [18]. Chinese state media also repeated Russia's claims on the biolabs conspiracy [18]. In addition to that, some Republican lawmakers propagate ideas that this "operation" is saving innocent people, who are being tortured under neo-Nazi regime, and promote denying support to Ukraine [34]. On 20 March, Right-wing Rep. Marjorie Taylor Greene posted a tweet, where she said "The US must demand Zelensky stop his military from torturing his own people".

Russia's pro-war, pro-Putin propaganda has caused thousands of people dead or injured, and millions of people to leave their homes. Since misinformation on social media also affects Ukraine gaining support and allies, it is important to analyze what conversations are being had about the war and what kind of information people are reading about it. Therefore, this study will collect tweets regarding the current situation in Ukraine and analyze the kind of topics are being discussed. The following research questions will be answered in this study to shed light on English-language discourse about the war:

- Q1: What popular hashtags are being shared on Twitter?
- Q2: What are the topics of online Twitter discourse about Ukraine?

## 2 LITERATURE REVIEW

To understand how Russia's online propaganda works this study examines research done on the previous issues where Russia had its hand in. In general, Russian state propaganda works on dividing the public opinion on the issue and increasing tension amongst populations. They do not come up with totally new stories, their misinformation is usually based on some truth, like in the case of biolabs in Ukraine, which are, indeed, funded by the US and that's not a secret [7]. Social media made it only easier to spread huge amounts of misinformation and provided Russian sources with anonymity.

The interest in Twitter was picked up after the 2016 U.S. Presidential elections, when the influence of Russian propaganda and disinformation was identified. [14] analyzed Russia's online propaganda strategies during the elections. Their research was focused on hyperlinks provided in the tweets of Russian troll accounts. They have identified that Russian Trolls promoted both sides, conservative and liberal views, and used an interconnected information system by linking Youtube videos to their tweets. [14] concluded that in the case of the elections, Russian propaganda was aiming to increase already polarized views of the population and attempted to support Trump. Using Youtube videos to provide evidence for their claims might be a strategy that the Russian state could find in the current war, because there were already several attempts to spread fake video messages, although they might have been using TikTok in addition to Youtube [33].

[8] in their study analyze state-backed media content on Facebook regarding the #BlackLivesMatter Movement. They focused on examining the overt propaganda strategies of six Russian state-backed news organizations, like RT, Ruptly, Sputnik, In The NOW, Soapbox and Redfish. Their study showed that these organizations use the strategy of "playing both sides" of a problem to increase existing tensions and deepen the divide between communities. Older news providers, RT and Sputnik, produced mostly negative content about the BLM movement, whilst newer ones were more positive about the movement and supported it. All of the six sources, however, targeted the civil unrest across the United States and points of pressure of left-leaning and right-leaning audiences. Their study also mentions that sharing video content and livestream became an important feature of state-backed media outlets, because they bring a lot of engagement.

Similar polarization affected by Russian intervention was observed in the German Tweetsphere according to [16]. The Kremlin influenced public opinion division on the existence of the pandemic, vaccination and the war in Ukraine. According to Dariusz Jemielniak, the Kremlin worked on discrediting Western vaccines on Twitter and amplified ideas suggesting that the pandemic is not real. After Covid-19 restrictions were eased in Germany public discourse was shifted to the war in Ukraine. German Tweetsphere was also influenced by pro-Russia propaganda and popularity of the "IStandWithPutin" hashtag was suspected. The findings of [16] suggest that there is a strong overlap between vaccine and pro-Kremlin Twitter accounts, and even stronger overlap between coronasceptic protests and pro-Kremlin accounts.

[13] did a study on examining the scope of pro-Kremlin disinformation about Crimea. In this case, Russian disinformation was

primarily focused on well-known news outlet - RT. The study came to the conclusion that Russian state-controlled news sources had a lesser impact on Twitter users than Western news entities. And, in fact, pro-Kremlin propaganda was challenged by international news providers and Ukrainian activist and civil movement groups. This study was particularly interesting, because previous literature reviewed was focused on the impact of Russian disinformation in the online discourse, and [13] provided us with systematic evidence of how the state propaganda was not that broad or effective.

In the context of informational warfare the general public is mostly seen as the target of misinformation. A different view on citizens' role in disinformation was provided by [15] on the example of the tragic downing of the Malaysian Airlines Flight 17 (MH17) in 2014. Their findings show that citizens were the most important producers and consumers of disinformation and counter-disinformation on the issue, even surpassing state-sponsored and state-controlled sources. This study emphasizes the importance of the public opinion in formulating and guiding specific discourse.

[25] in their study talk about the importance of hashtags in Russia creating their local and international narratives. In the present world of the surge of social media, hashtags reflect the narratives that countries want to build around themselves. Some of Russia's main narratives are: the West is against Russia, Russia is a great force and a great nation, and Russia is protecting Russian people. [25] suggest that Russia's strategic narratives can be traced to specific Twitter hashtags, due to the following reasons: 1. Their strategic narratives are easily identifiable through governmental speeches and documents, 2. The lack of opposition results in the state narratives being clearly identified, 3. They have a history of pervasive activity on promoting their opinions on social media, 4. The state has a history of hijacking hashtags to control the online discourse, like in the case of #UnitedforUkraine in 2014, 5. The country has a consistency of creating narratives around itself. [25] explore four hashtags (#Skripal, #mh17, #Donetsk, and #Russophobia) that they link to the strategic narratives listed above. One of their findings was that analyzing user behavior across multiple hashtags, that are somehow linked to the Russian narrative, can be useful in detecting the dissemination of misinformation.

## 3 METHODOLOGY

This study uses LDA (Latent Dirichlet Allocation) as a topic modeling technique in order to identify topics of the Twitter discussion on the invasion of Ukraine. Also, the hashtag co-occurrence network was constructed to analyze the use patterns of hashtags during selected periods of time.

### 3.1 Latent Dirichlet Allocation (LDA)

LDA is a probabilistic topic model that is employed for discovering hidden theme structures in documents. The probabilistic sampling rules behind the model provide us with the words with documents that define the document in some way, however we still have to infer the theme of the document ourselves [36]. LDA is one of the most widely used techniques for topic extraction [23].

This study used the LDA model on collection of tweets from the beginning of March (03.02-03.12) to identify common clusters of topics. This relatively short period of time was chosen because

the issue itself is very broad and includes different aspects, like: international politics, sanctions, military actions, Covid, refugees, Russian propaganda, far-right American propaganda and etc. When Topic Modeling was conducted on the tweets from the whole month of March, it was difficult to identify specific topics. Even though, the chosen period of time was short, it still included important discourse about events, like: the beginning of the invasion, troops entering Kharkiv and Mariupol, bombardment of Kyiv, attacks on nuclear power plants, deployment of Chechen Republics' military units, Belarus' armed forces joining Russian invasion, occupation of Kherson, NATO's rejection of Ukraine's request for imposing a no-fly zone. [28].

The generation process depends on the pre-decided parameter  $k$  - number of topics, which usually depends on the theme of the study [29]. 5, 7, 10, 15, 20, 25, 30 numbers of topics were used to build the LDA model, in order to compare the coherency results and choose the best  $k$  for the corpus. CV coherence score was chosen to evaluate the model in this study and to achieve a highest correlation with available topics in the documents. CV generates word vectors by their co-occurrences and then calculates the score using cosine similarity and normalized point-wise mutual information [29]. The model was generated using Python and the Gensim package.

### 3.2 Hashtag co-occurrence network construction

"Co-occurrence" in this study is defined by the incidence of any pair of hashtags used together in the same tweet. For instance, if #Ukraine and #NFT appeared in one tweet, this instance is recorded. Following this definition, two non-directional top-25 hashtag co-occurrence networks were constructed: one used hashtags from tweets from March; and another from tweets from 22 February.

## 4 DATA COLLECTION

In order to answer previously posed research questions I had to gather a considerable amount of tweets on the war in Ukraine. I would do that by requesting related to the war query words from Twitter API. However, Essential Access of the Twitter Developer Access allows to gather tweets that only go a week back in time, and since the data collection started way after the first day of the war in Ukraine, I used a public dataset of Twitter discourse on the issue provided by [9]. They used Twitter's streaming API to request tweets on the list of trending and related to the war keywords starting from 22 February. Because of Twitter's Terms of Conditions regarding privacy [9] published only tweet IDs of the resulting tweets. I used Twitter API's 'get\_tweets' endpoint to gather important information about the tweets, like: text, author id, urls, public metrics and time created. In addition to that, I gathered information about each user that tweeted, like: if the user is verified or not, username, time of account creation, id, name and location, if provided. Table 1 displays some of the queries that [9] used in their data collection process, the whole list can be obtained in their github repository.

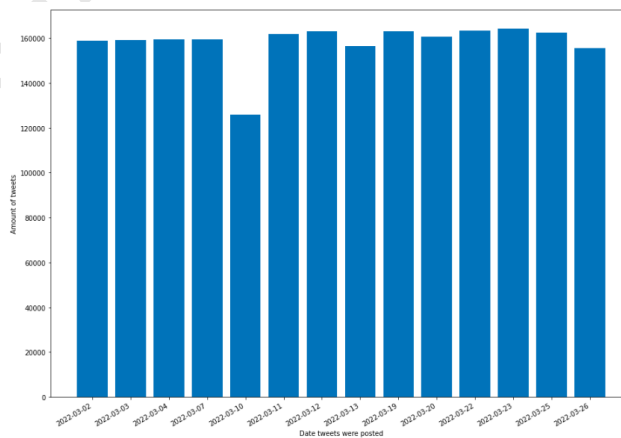
To analyze how the war discourse changed overtime I have randomly chosen tweet IDs from the public dataset, because the full dataset was too huge. As a result, I have retrieved 553,055 from the first day of the invasion and 2 million tweets throughout March.

**Table 1: List of Queries**

Query	Date
ukraine	02/22/2022
russia	02/22/2022
putin	02/22/2022
soviet	02/22/2022
kremlin	02/22/2022
minsk	02/22/2022
ukrainian	02/22/2022
NATO	02/22/2022
luhansk	02/22/2022
donetsk	02/22/2022
kyiv	02/22/2022
kiev	02/22/2022
moscow	02/22/2022
zelensky	02/22/2022
fsb	02/22/2022
KGB	02/22/2022

## 5 DATA SUMMARY

After collecting the tweets preliminary exploration of the data was conducted. In total 2,213,227 tweets were collected from 14 days chosen randomly in March 2022. Out of those, only 595,887 were original, not retweeted tweets. On average 158,087 tweets were collected from each of the 14 days.

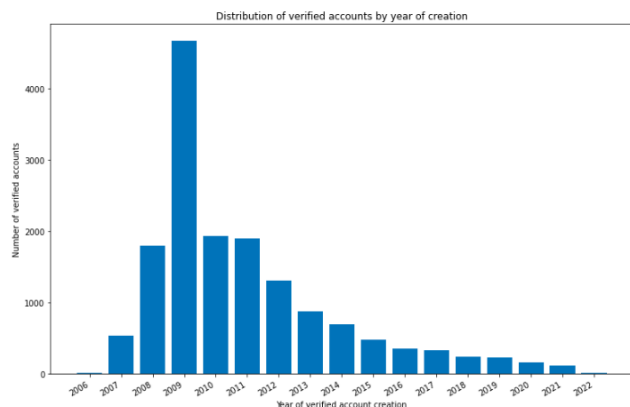


**Figure 1: Distribution of the number of tweets throughout March**

After seeing that original tweets were taking only 27% of all the collected tweets, I wanted to see what original tweets are the most retweeted. 6 out of 10 profiles that had the most retweets for their tweets were unavailable because of violation of Twitter Media Policy.

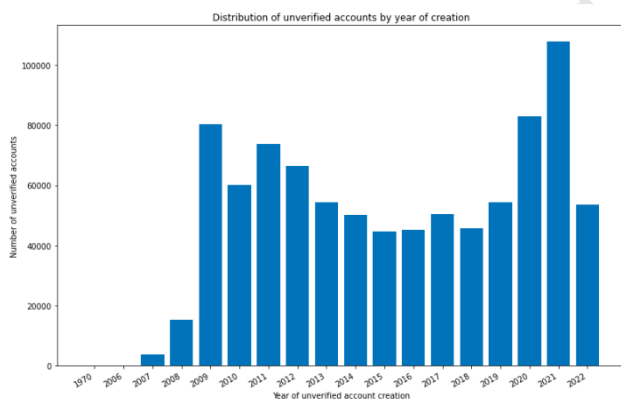
In total there were 905,118 unique users who tweeted during the selected time period. Out of those only 1,7% of users were verified (15,706). Majority of the verified profiles were created before 2022, reaching the peak in 2009. Almost 5,000 (32%) of the verified profiles

were from the US, 159 (1%) from Ukraine, 62 (0,4%) from Russia, and 1,932 (12%) did not specify their location.



**Figure 2: Distribution of verified accounts by year of creation (March)**

However, unverified users (889,412 users), who tweeted during the selected time period, were comparatively new to Twitter. Only in 2022 there were 53,478 (6%) new accounts and 23,959 of them were created in February. 107,658 (12%) of all unverified accounts are from the US, 8,025 (0,9%) from Ukraine, 2,290 (0,3%) from Russia, and 362,893 (41%) did not specify their location.



**Figure 3: Distribution of unverified accounts by year of creation (March)**

In order to compare the topics of the discourse, tweets from 22 February were collected and similar data exploration was conducted. As mentioned before, there were 553,055 tweets and information about 288,965 users, who tweeted, collected from 22 February. Similarly to the verified users from March, most of the verified profiles were in the beginning of 2010's. Out of all the tweeters during the selected time period only 6,257 (2%) profiles were verified. 1,494 (24%) of them were from the US, 52 (0,8%) from Ukraine, 25 (0,4%) from Russia, and 752 (12%) did not specify their location. Unverified users from 22 February follow a similar pattern as those from March, the accounts are fairly new, and 3,5% of them were created

in 2022. 39,306 (14%) of them specified the US as their location, 1,331 (0,5%) were from Ukraine, 577 (0,2%) from Russia, and 110,174 (38%) did not include their information.

From the exploration of data about users we can summarize that there were a lot more unverified users in the discourse of Ukrainian invasion, and most of them did not disclose their location. Also, unverified accounts were fairly new to the platform, to the point that 6% of all unverified accounts from March and 3,5% of all unverified accounts from 22 February were created in 2022 and it is only the beginning of the year. This might point to the assumption that there might have been dummy, troll accounts created specifically for spreading misinformation and propaganda.

Verified users on the other hand tend to mention their location, and most of the accounts were based in the US. A Large number of accounts was created in the beginning of the 2010 decade. However, even though these accounts are "old", it does not always mean that they are credible or not affiliated with the Russian state. Their troll accounts sometimes can be dormant and emulate normal behavior for a long period of time, so that they can be used in the future [19, 27].

As mentioned before there have been conspiracy theories spread about biolabs in Ukraine, neo-Nazi regime and nuclear weapons, and some far-right political and public figures have even fueled these claims. In order to see how conspiracy theories about Ukraine and the war resonated with the public, I wanted to find such tweets from the collected data. I have written some keywords, that could potentially help find such tweets, like: 'biolabs', 'bio', 'bioweapons', 'biological', 'nuclear', 'nuclear war', 'nuclear weapons', '#fake', 'nazi', 'liberate', 'DNR', 'LNR', '#Donbas', '#Luhansk'. I have read some tweets to see what kind of narrative is observed. These are some examples of tweets that back Russian invasion, claiming that it is a protection and liberation operation, saving Russian speaking population of Ukraine from nazis and biolabs: 'Fun facts. The nazi Azov battalion were funded by a Jewish billionaire and both Putin and Zelenskyy are WEF people.'; 'Ukrainian Deathlabs fully funded by US DoD to study and manufacture bioweapons: "Biowarfare scientists under diplomatic..."; "Zelensky's wealth & bio lab's".

## 6 ANALYSIS AND RESULTS

The following part begins with exploration of popular hashtags shared in the tweets from March and February. Then the results of topic modeling by LDA, the categories of topics and how the topics are represented in the tweets.

### 6.1 Hashtags

Since hashtags play a big role in Russian warfare propaganda and disinformation, this study explores popular hashtags and what they might entail. The top 25 most shared hashtags were identified from the March tweets, and projected onto a network of co-occurrence. Such networks are useful for modeling similarity between certain hashtags that are used together and inferring what topics are talked about in conjunction [40]. Similar network of hashtag co-occurrence was created for tweets from the beginning of the invasion.

In Figure 4 the edges between hashtags mean that they were used together in a tweet, and node size represents the node degree. From



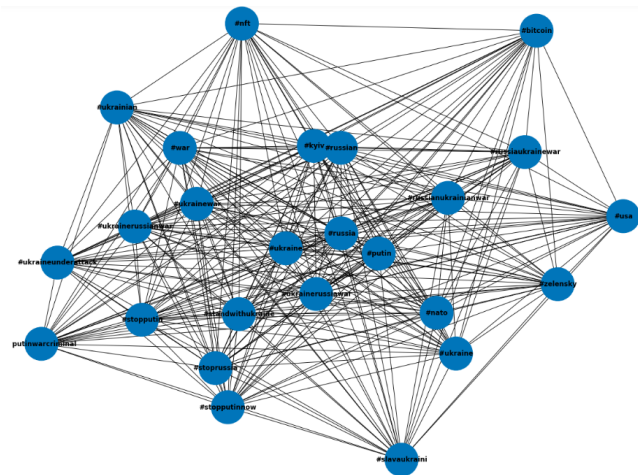


Figure 4: Co-occurrence network of top 25 hashtags shared in March

the resulting network there can be drawn a conclusion that the hashtags are predominantly against the invasion, like #PutinWarCriminal, #StopPutin, #StandWithUkraine, #StopPutinNow, and etc. There are also #NFT and #Bitcoin hashtags present, which corresponds to the fact that Ukraine raised funds to fight against Russia through cryptocurrencies, and virtual currency is very influential for Ukrainian forces [3]. Anti-war hashtags were closely used with #NATO and #USA, suggesting that there is a strong demand from the Twitter users to support Ukraine.

A similar network for the tweets from the beginning of the invasion (22 February) is in Figure 5. The #StandWithUkraine hashtag was already present in the Twitter discourse, and was connected to another popular hashtag #NordStream2, which might suggest that tweets at the beginning of the invasion were discussing sanctions against Russia and pro-Russia regions. The #JohnsonOut29 hashtag appeared both with #NordStream2 and #Ukraine hashtags. The collected tweets that mentions #JohnsonOut29 depict British public's concern about their government and their connection to Russia and its oligarchs [41].

## 6.2 Topic Analysis

According to the chosen coherency measure, tweets from the beginning of March (03.02-03.12) can efficiently be divided into 15 topics. The topics were inferred by the top-30 Most Relevant Terms and 100 of randomly selected tweets belonging to each of the clusters created by the model. Identified topics are listed in descending order from the highest proportion to the lowest in Table 2.

For three of the resulting clusters (14,12,0) it was hard to identify a topic, because there was no specific thread observed.

5) *Biden, NATO's Interference*. From the gathered data, it was observed that Trump's politics and his influence are at the top of the most debated topics on English Twitter when it comes to the war in Ukraine. This cluster in particular is on to criticizing President Biden and undermining the authority of the Liberal party, by using people's concern of rising prices in the US. Here are some

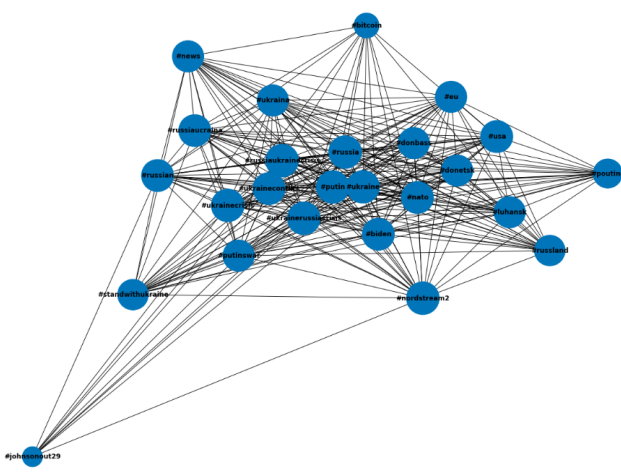


Figure 5: Co-occurrence network of top 25 hashtags shared on 22 February

Table 2: List of Topics

Topic Number	Topic Name
5	Biden, NATO's Interference
14	N/A
11	Russian army war crimes
1	EU, NATO, US
6	Military, troops, weapons
12	N/A
7	Demanding Support for Ukraine
10	US and Russian oil, energy sanctions
13	Trump and Putin
0	N/A
3	Zelenskyy: Hero or Nazi
8	Trump Supporters and Zelenskyy
4	Refugee crisis in Ukraine
9	Western Sanctions against Russia
2	Russian vs Ukrainian propaganda

examples of such tweets: "It's already hit double digits. The Biden administration/government is just trying to hide that fact. Many things have almost doubled in price. That's 10%. Most things have gone up 20% or more before Russia's invasion of Ukraine. Biden is our worst president ever."; "Seriously If he were a true leader, we would not be witnessing an invasion".

There is also a thread of approval and justification of Russia's actions. Some users from the far-right believe that Russia is just protecting itself from NATO's expansion to the East and from bio-labs, secretly sponsored by democrats. This creates an even bigger gap between the American left and right, since "democrats try to blame Russia for the rising prices". On that note, there have been propagandic links shared about how Ukrainians are grateful to Russian operation, like for example reports from Alina Lipp, one of the most influential voices of Russian propaganda in Germany [38, 39]. Alina Lipp has her own Telegram channel with more than

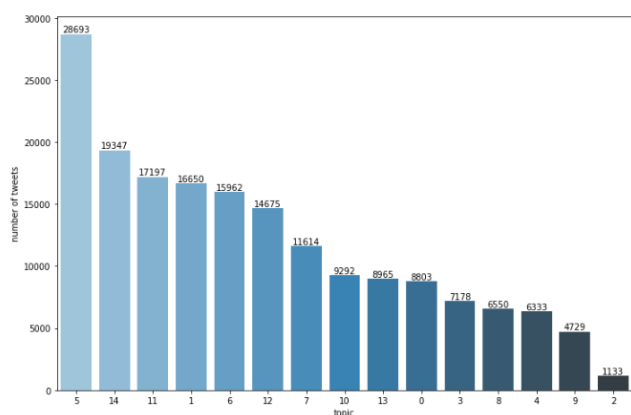


Figure 6: Distribution of tweets per topic

120,000 followers where she spreads Russian propaganda; she was also noticed reporting from Donbas exploiting a typical Russian narrative like in this propaganda article [21], which was found while reading tweets from this cluster.

11) *Russian army war crimes*. The topic of Russian army war crimes comes third in the proportional size of topics. It centers on the killings of the civil population of Ukraine by Russian soldiers. According to the tweets people are sympathizing with the population that was affected by military violence. There are also a lot of mentions of the Russians bombing a maternity and children's hospital in Mariupol, even though Russian propaganda tried to make it look fake [32].

1) *NATO, EU, US*. Three kinds of threads were identified in this particular cluster: a) NATO's expansion to the East made Russia defend itself, b) NATO is supplying serious weapons to Ukraine thus provoking Russia, c) calling EU and US to action and demanding a no-fly zone over Ukraine. Here are some typical examples: "Once again: Not started by Putin. Started by NATO making overtures towards Ukraine, which Russia said 20 years ago they would not stand for and would be treated as an exigent threat to their nation."; "No dialogue with NATO is possible when its member states are supplying lethal weapons to Ukraine, Director of the Russian Foreign Ministry's European Cooperation Department Nikolai Kobrinets said in a press statement."; "The US must enact a no-fly zone now!". In addition to the themes mentioned above, there also were bio-labs propaganda present, like such: "secret US bio-labs in Ukraine #ukraine #biolabs", with links to a map of Russian missile strikes targets that correspond to American bio-labs in Ukraine. Such maps are quite frequent under #biolabs hashtag on Twitter.

6) *Military, troops, weapons*. The next topic extracted from data is about military actions on the territory of Ukraine and news briefings about troops and weapons: "Ukraine gives civilians direct incentives to capture tanks and other equipment. #UkraineRussiaWar"; "Ukrainian forces are now on the offensive. Mykolaiv International Airport taken back by UA military"; "Russian forces land in Kharkiv as bombardment of Ukraine cities intensifies 21 people killed +

## Secret US bio-labs in Ukraine

[radiopatriot.net/2022/02/24/sec...](http://radiopatriot.net/2022/02/24/sec...)

#ukraine #biolabs

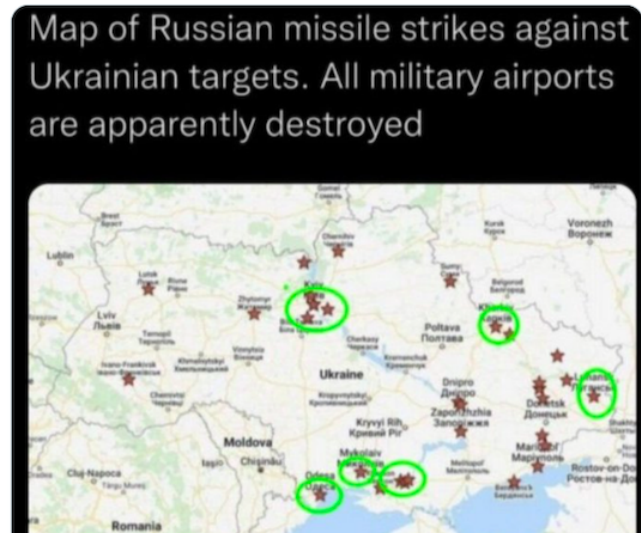


Figure 7: Example of tweet with a map of biolabs in Ukraine

112 others wounded in the Kharkiv bombardment after Russian airborne troops landed in the city about 8:30pm Tuesday ET, according to Ukrainian officials".

7) *Demanding Support for Ukraine*. Even though there is a strong disinformation campaign that downplays the invasion and intensifies the division of the American left and right, there are still a lot of Twitter users supporting Ukraine and demanding international cooperation. People post about different organizations that accept donations, fundraisers, and demand peace and closing the sky. Since the top-30 most related keywords for this cluster included "children", there were also tweets about Russian children in different contexts. For example, there were tweets about Hospice care children forming a letter "Z" in support of the Russian army [11]. "Z" became a symbol of the Russian army and people who support the war, it is also actively promoted in Russia [20].

Another keyword for this cluster is "God", which reflects itself in numerous tweets of people that "pray" for Ukraine. An interesting detail is that some users mention Ukraine as being Christian: "Send committed Polish Jets to Christian Ukraine, stop Evil Putin, Stop lying, Remember Land Lease (WWII); Syrian no-fly Zone, NK war, fear Evil Putin is to hate God". This might be due to the majority of Americans identifying as Christian, so they can "sympathize" with other Christians.

10) *US and Russian oil, energy sanctions*. Again there is an observed concern among Americans about rising gas prices and, in general, the cost of living. Examining the tweets more closely, two general trends were found. In the first one people talk about how

Russia still supplies oil and energy to the US and EU. Indeed, European countries are very dependent on Russian gas, importing 40% of its natural gas from the aggressor country. Germany alone imports half of its gas supply from Russia [17].

Another trend is targeting democrats and Biden for dependency on Russian energy: "As businesses isolate Russia, China fills the gap. Given our debt to China, we just strengthened the Eurasian Alliance. Reminder: Trump was trying to end our dependence on China"; "@TheDemocrats @JoeBiden Can you explain how we went from energy independent to begging Russia, Iran, OPEC, and Venezuela for more oil? I will wait for your thoughtful reply". Biden's administration is already blamed for the 7% inflation, but the economical situation might get even worse with more sanctions of Russian energy from the US [17].

13) *Trump and Putin*. This invasion strengthened the link between Trump and Putin in the eyes of the public that comes from the elections in 2016, showing how both benefit each other: "Trump made Putin strong again #GOPtheRussianParty"; "GOP = Grand Ole Putin Party"; "@TuckerCarlson Why are Fox News and Tucker Carlson pushing Putin propaganda? That is the question everybody should be asking". People mention pro-Putin propaganda on Fox News and Tucker Carlson's show.

3) *Zelenskyy: Hero or Nazi* 8) *Trump Supporters and Zelenskyy*. Since these two clusters have overlapping points they are going to be discussed together. Three kinds of narratives were highlighted here: conspiracies or disinformation about Zelenskyy, Democrats' connection to the Ukrainian biolabs, Trump as a savior.

Some tweets mention that Ukrainian President is funded by Israeli billionaires and is connected to neo-Nazis, thus undermine Zelenskyy's credibility and authority to justify the invasion. Others develop the connection of Democrats to biolabs, like: "Hunter Biden Connected To Ukraine Bio-Labs..."; "@TheDemocrats Remember... it was Biden's request to fire the Ukraine prosecutor investigating hunters involvement or one billion in aid gets withheld... world war 3 is on Biden". There are numerous "exposing" videos and articles on this topic, and Youtube even returns a fact check informational panel when searched.

Whilst Biden is depicted as corrupt, Trump gains supporting voices. Some people claim that the invasion would not have happened if Trump was still a President.

4) *Refugee crisis in Ukraine*. According to the United Nations, there were 12 million people displaced because of the war in Ukraine. People fled their homes to the neighboring Poland, Romania, Hungary, Moldova, Slovakia, Belarus and Russia [5]. Immigrants from Africa and other people of color said that amidst humanitarian crisis in Ukraine, they experienced discrimination and racism. Several students have expressed that they were not let into the trains to leave the country, or they were required to pay to be transported [24]. Social media helped in spreading information about this unequal treatment and Twitter users were discussing it as well: "Reports of pushbacks of individuals of African and Asian origin at the Ukrainian border must also be condemned in the strongest terms. Discrimination and unfair treatment of refugees is always intolerable, but it is especially so when conflict is intensifying by

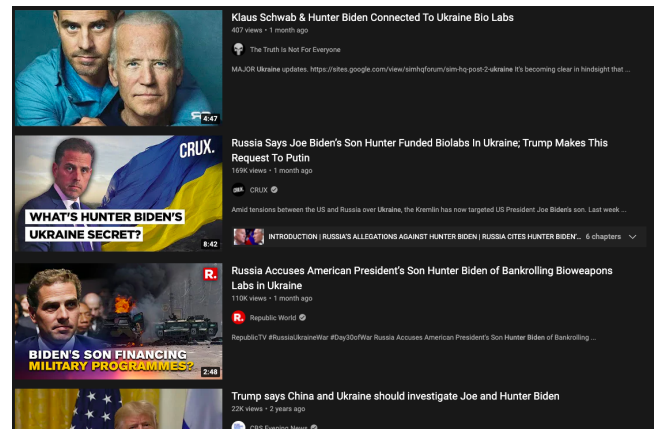


Figure 8: Youtube search result for "Hunter Biden Ukraine Bio-Labs"

the hour"; "@MoscowTimes Ukrainian refugee evacuation train throws out black people including kids".

Human trafficking rings used this humanitarian crisis to kidnap disoriented women and children, who managed to leave Ukraine [1]. While some people try to raise awareness about the problem, there are also completely blatant tweets that downplay it: "Danish chatter around organizing for Ukrainian refugees, indicates that feminism is a complete obstacle, increasing the chaos, it makes refugees paranoid about human trafficking. And single men paranoid about offering rides or rooms in their homes for refugees to stay in".

9) *Western sanctions against Russia*. In addition to sanctions on Russian oil and energy, almost 1000 companies curtailed operations in Russia to some extent, like VISA, Uber, H&M, Netflix, and so on [26]. Russian banks have also been removed from the SWIFT messaging system since 26 February, which means that they will not be able to conduct financial transactions with foreign entities [30]. Information about these sanctions and their influence was shared in tweets from this cluster. There were also concerns raised about Israel, who has yet to join sanctions against Russia [35].

2) *Russian vs Ukrainian propaganda*. "Nazi" and "propaganda" were in the top-30 most relevant terms for topic 2). This cluster includes the least amount of tweets, but traces an interesting narrative, which is that Ukraine is spreading its own propaganda to cover their "connection" to neo-Nazis and blame Putin for the invasion: "Well, Ukraine is using their CIA-trained Nazis, so....."; "Ukraine's propaganda machine is intense. Much more effective than their army". Some tweets included a link to an article about American TikTok stars being briefed about the invasion by the White House. While the government officials say that it was done to educate young people of the US about the geopolitical situation [6], Fox News claims that the White House is spreading propaganda and one sided opinion to solely blame Putin for the inflation [22].

## 7 DISCUSSION

According to the results of topic modeling, the main attention of the English Twitter discourse is the financial crisis brought by the



war. Russian war crimes, refugee and food crisis are overshadowed by the top public concerns, which are rising cost of living, gas and energy prices. They are also the main components for successful propaganda. Current administration of the US is highly criticized, which is useful for Trump Supporters, because they are using the public's concerns to push forward their agenda, that Trump would have prevented all of their issues. Russian propaganda about "secret" biolabs, neo-Nazis and NATO's expansion to the East, not only strengthen beliefs that the invasion is justified and protects Russia, but also creates a stronger divide between Americans. Far-right Trump Supporters undermine the authority of the current President and Democrats by depicting them as corrupt and incompetent.

The co-occurrence networks of hashtags, however, do not fully show such division, because pro-war and pro-Russia hashtags are not present in the list of popular hashtags. More qualitative analysis needs to be done on the resulting hashtags, as sometimes even those that show support for Ukraine can be hijacked [37]. On the other hand, the networks were useful in giving an insight on the general narrative, like in the case of the UK's Prime Minister.

Even though the study was able to identify the topics of Twitter discourse, the chosen time period is too short to get a grasp of the whole issue, as opinions and narratives change over time. Also, analysis of the content of the tweets might have been influenced by personal biases or lack of knowledge on the issue, because it was done only by the author of this paper.

## 8 CONCLUSION

This study collected 2,766,282 tweets about the current situation in Ukraine, using a public database and Twitter API. From this data 11 significant clusters of topics emerged, such as: Biden, NATO's Interference, which was the most prominent cluster and included criticism of President Biden and his administration; Russian army war crimes, where people share about such incidents and their concerns; EU, NATO, US, where Russian propaganda accuses NATO in the expansion, and people demand a no-fly zone from these entities; Military, troops, weapons, this topic is about Russian and Ukrainian military forces; Demanding support for Ukraine; US and Russian oil, energy sanctions, that stems from people's concern of the financial crisis; Trump and Putin, covers their interdependence in the political world; Zelenskyy: Hero or Nazi, includes a debate with Russian propaganda on one hand, and sudden rise of Zelenskyy's popularity on the other; Trump Supporters and Zelenskyy, which closely follows the previous topic; Refugee crisis in Ukraine, containing a discourse about providing help to the refugees, African and Indian students stuck in Ukraine, and human trafficking; Western Sanctions against Russia, companies that left Russia and general sanctions; Russian vs Ukrainian propaganda, the smallest cluster, which includes tweets indicating Ukrainian "propaganda".

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