

Opinion mining and socializing networks

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Abstract

The context of this article is a larger, ongoing postdoctoral research that looks into the relationship between opinion mining – more precisely sentiment analysis – and the conflict between Russia and Ukraine that started in February 2022. The postdoctoral research aims to analyze political speeches in the context of the war by using available sentiment analysis tools, the purpose being to discover the real emotions behind the speeches per se: are they indeed negative as they pretend to be, or are they rather neutral, in fact, or perhaps even positive. Furthermore, the political speeches selected, coming from official bodies and governments, are focused on the sanctions applied to Russia since invading Ukraine, so both context and sentiment should converge. This article has therefore meaning in the larger context of that research and it aims to offer a short exercise into using a sentiment analysis tool for investigating the presence on social media, this time, of the realities of this conflict. For this purpose, a couple of relevant key words were selected and they were analyzed using opinion mining in the framework of social media platforms and their numerous users. The article investigates the results of this search, discusses them and offers a personal perspective on the topic.

Keywords: opinion mining, Russia, Ukraine, conflict, sentiment analysis

Introduction

The context of this research is mainly related to several issues of concern nowadays: the conflict in Ukraine, which has already lasted far too long and the overwhelming amount of fake news surrounding it, linked to the immense popularity of social media and its considerable influence on people's opinions and in the end, mentality. It has been stated that 'The emergence of social media enables billions of people to share their content and in doing so they influence others and are being influenced themselves' (Snijders and Helms, 2014). This symbiotic influence can become problematic when fake news prevail and tend to be considered as true. Authors have talked about the 'convergence of conspiracies' during the pandemic period, which polarized the society and created an unfaithful trend of disinformation worldwide (Jankowicz, 2020). In her book entitled *How to lose the information war: Russia, fake news and the future of conflict*, Jankowicz discusses sensitive

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aspects like the Twitter wars which spread Russian messages directed against Ukraine way before the armed conflict itself began or the ‘troll factory’ of news and posts on social media (Jankowicz, 2020). These not only spread rumors and fake news, but proved to be ‘relentless, offensive and misleading’, an intrinsic part of Russia’s information war against Ukraine. A major problem, according to the author, is that misinformation and fake news are not clearly defined and categorized as phenomena, so as ‘to successfully understand and counter them’. This ‘confusing landscape’ needs clarity and to be placed under close scrutiny. Because the problem is much larger than it appears – real online influence operations take place and these ‘involve the weaponization of emotion’ while ‘the effect of disinformation and online influence campaigns [...] is anything but fake’ (Jankowicz, 2020).

This article is part of an ongoing postdoctoral research that looks to the conflict between Russia and Ukraine from the perspective of opinion mining, more precisely sentiment analysis. The postdoctoral research aims to analyze political speeches in the context of the war by using available sentiment analysis tools, the purpose being to discover the real emotions behind the speeches per se: are they indeed negative as they pretend to be, or are they rather neutral, in fact, or perhaps even positive, contradicting the speech itself. Sentiment analysis can easily analyze that, as it will be explained further on. To this purpose, a large number of speeches were gathered directly from official bodies and governmental institutions, speeches focusing on the sanctions applied to Russia since invading Ukraine. These speeches were analyzed using opinion mining in order to discover if the words of the speech itself and the general emotion, as highlighted by the sentiment analysis, converge and to what extent. This article, part of the larger context of the research, represents only a short excursion into opinion mining, using a free, online-available sentiment analysis tool for investigating the presence on social media of this conflict. The article investigates the results of this search, discusses them and offers a personal perspective on the topic.

1. Context

Marketing has always been interested in obtaining feedback from customers and has always taken into consideration the opinions of consumers, because of the symbiotic relation between user and the product. This has reached new heights in fields like advertising and tourism, for instance. As early as 1980s, Richard L. Oliver proposed a famous theory of customer satisfaction and its relation to cognitive processes, including expectations, what the actual purchase meant, and post-purchase feedback. In his words, ‘satisfaction remains a worthy pursuit among the consumer marketing community’ (Oliver, 1980). The Oliver model discusses consumer’s feedback under the name of ‘Post-Purchase Evaluations’, meaning that a satisfied customer will probably repeat the purchase over

and over, becoming a loyal consumer, whereas a dissatisfied customer will not only refuse to buy the product again, but will also offer negative feedback (Oliver, 1980).

With the advent of internet and social media, people have become more vocal about their likes and dislikes and the expression of opinions on platforms in plain sight have become an overwhelming force, capable of enticing advertising campaigns and bringing change to products and services. The classic feedback form in writing or the occasional survey have been slowly replaced with the voice of the consumer, to be heard large and wide from the comments' sections, forums, social media websites etc.

Modern studies like the concept of Marketing 5.0, following the precursors 3.0 and 4.0, all concepts developed by Kotler, creator of the 4Ps of the Marketing model and his co-authors Kartajaya and Setiawan state there are no longer barriers to stand in the way of social media today; nowadays, people connect and communicate continuously, turning purchasing into a social phenomenon, becoming customers who 'are increasingly wary of marketing communications from brands and instead rely on the f-factor (friends, families, fans and followers). [...] They look for advice and reviews, both online and offline' (Kotler *et al.*, 2021). This type of behavior emphasizes the increasing importance of feedback and its analysis through performant tools.

Over time, several marketing theories have emerged to analyze customer behavior, including the need for feedback: from the old, yet still relevant theory of Lewis' customer journey or the AIDA formula, referring to customers' behavior patterns and motives, their preferences and habits to Kotler's modern concept of Marketing 5.0, describing the Human-Centric Approach, which means that customers represent the center of all marketing: their needs, preferences and emotions influence and finally determine the marketing strategies. (Kotler *et al.*, 2021). All theories have shed light on the importance of feedback and the technologized world of today offers feedback a central position, due to its spread and influence.

In order to be able to analyze the enormous quantity of posts and comments available online, specialists have come up with various solutions of what is today called opinion mining. NLP stands for Natural Language Processing and represents the use of natural language processing technology to search for and extract opinions (hence the name of opinion mining), feedback, impressions, evaluations and even emotions from various written texts like reviews, comments on social networks, blogs or any available online information sources. Out of the many types of opinion mining tools, this paper will focus on one in particular: sentiment analysis.

Sentiment analysis basically extracts and analyzes people's opinions, sentiments, attitudes, perceptions, regarding various topics, and offers a fast instrument to navigate through the 'enormous

‘powerful tool for businesses, governments, and researchers to extract and analyze public mood and views, gain business insight, and make better decisions’ (Birjali and Kasri, 2021).

Sentiment analysis can be used by any interested party to detect and assess feelings, opinions and emotions embedded in a written text, like a comment, review, social media post or any other type of text. Using this useful instrument allows the analyzer to determine whether the sentiment expressed is negative, neutral or positive. These are the three possibilities envisaged by this tool which has proved extremely useful in marketing research and not only there. It has eased the work of many people, as gathering hundreds of opinions and researching them could have been an exhausting work. Nowadays, artificial intelligence can extract opinions from numerous sources, and analyze them in large numbers, offering quite accurate evaluations for them. Sentiment analysis has been used before to analyze social media posts – for instance the correlation between the Brexit phenomenon and Twitter posts’ sentiments towards Brexit: ‘SA of tweets has potential as a real-time barometer of public sentiment towards negotiating outcomes to inform government decision-making [...] Our findings indicate that the preferred or least preferred Brexit outcomes could have been inferred by the emotions expressed by Twitter users’ (Georgiadou and Angelopolous, 2020).

Other authors connected public opinion polls with sentiment measured from the accompanying texts, as well as analyzed several surveys on consumer confidence and political opinion over a longer period of time, and also correlated Twitter messages to sentiment analysis, discovering a large percentage of correlation (O’Connor *et al.*, 2010).

This article aims at performing an exercise and assess the sentiments and reactions of social media users in the case of the Russian-Ukrainian conflict, as a measure of how it reflects into the comments of the worldwide community.

2. How it works

The way sentiment analysis functions is rather simple, as the tool is meant for wide use. ‘The principal approaches to sentiment analysis are the use of sentiment lexicons, machine learning techniques, or combinations of both’ (Alnashwan *et al.*, 2023). First of all, the tool identifies the sentiments expressed in a text and then quantifies them by using special processing algorithms. The degree of sentiment present in a text also determines the percentages of positive, negative or neutral feelings. For instance, in a touristic website like booking.com, the sentiment analysis tool would be employed to determine whether the clients’ reviews are positive, negative or neutral in the case of a certain hotel. The hotel’s standing will modify on the site according to the customers’ reviews. The

processing algorithms are used to identify expressions, words and sentences associated with sentiments. This also considers certain key words and even nuances expressed by the clients. The more sensitive the tool, the better the results, as it can analyze subtler differences of language used in context. In the end, the software will generate analyses indicating whether the text in question expresses a positive or negative point of view. In other words, after looking into hundreds, sometimes thousands of reviews of a hotel on booking.com, sentiment analysis will offer a clearer picture of the quality of that particular hotel. As said, this will modify its standing and the number of stars it is awarded for its quality and services. This is important in the context of customers searching for good hotels, with a higher score. So, the better the score of a hotel, the more future customers.

The same with any other product marketed. The more positive the reviews of customers, the larger the sales. Furthermore, the negative or even neutral comments can add value to the marketing process by incorporating feedback in future developments of the product, or by adjusting the advertising campaign, for instance. Feedback is a valuable tool, essential in the development of products and services, and sentiment analysis is a useful auxiliary, allowing the management of large quantities of comments and written feedback and offering, at the same time, a general image on categories: positive, negative or neutral. The help of machine learning algorithms, trained to recognize sentiment tags in various types of text is essential in this respect.

Nowadays there are numerous, various types of sentiment analysis tools available. All perform an automatic process and provide the same types of results, offering the needed analysis of feedback and texts, and ultimately the needed insight for any marketing campaign, advertising promotion or media monitoring activity. This article will investigate briefly the last one, prompting a sentiment analysis software with some keywords in order to analyze its results.

Opinion mining or sentiment analysis tools are, as said, numerous today. However, they are not always free. In fact, the best ones, which are more advanced, are usually rather expensive. Some platforms offer more Artificial Intelligence tools, sentiment analysis being just one of them. Different tech websites and magazines also offer classifications of this analysis tool, grouping platforms on categories like price, or lack of it because some of them are completely free, performance or complexity. One such classification retrieved from a publicity website entitled *Brand24* mentions several such useful platforms, along their description and offered services. In order to use them, one must pay a fee, if the case, and register on the website, the contact form being the starting point for an eventual subscription and also for securing the results of the analyses. Some of these become unavailable the moment one exits the site, as this is often a feature of the free services. For a company needing those results and analyses, it is important to be able to save the results. Hence the

subscriptions available on most of these platforms. The cost-free ones are also mentioned. It appears that some of the most popular ones today are: Clarabridge, OpenText, Lexalytics, Social Mention, Social Searcher, Sentiment Analyzer, Tweet Sentiment Visualization, Rapidminer etc.

The manner in which sentiment analysis tools are being evaluated by tech experts is detailed for instance on the popular website CX Lead, where editor Hannah Clark asks some pertinent questions on how one can choose the best opinion mining tool for one's needs. Such pertinent questions include the value for money offered by the tool, but most importantly, how user friendly the interface of the tool is, how easy is it to use, its features and functionality, how complex is the text analytic software 'in order to analyze sentiment across a wide variety of conversation types', if it includes features like Social Media Analysis and last but not least, if the reporting tools are 'robust, customizable, flexible, and visually appealing' and also 'easy to connect with other tools.' (Clark, 2023)

For the purposes of this research, we investigated some of the sentiment analysis tools available on the world wide web, choosing one that is free, in order to observe its performance and usefulness. For this article in particular, we stopped at one of the free platforms mentioned above, more precisely, Social Searcher. We decided to interrogate the opinion mining tool using two very actual keywords, that refer to a sensitive reality the world is dealing with at the moment: the Russian-Ukrainian conflict. The 2 words were 'Russia' and 'Ukraine'. Social Searcher only looks into social media platforms, 11 of them more precisely, and displays various aspects related to the search, such as how often the keywords are mentioned and on which particular social media websites, if these mentions are positive, negative or neutral, what are the trends related to the selected keywords and which users have discussed about them. As a novelty that indicates how fast technology is advancing, it also displays results concerning videos or images related to the chosen keywords.

3. Case study

Social Searcher, a free AI tool in the form of a social engine researching all social media sites available, no less than 11 and offering real time results, is a popular engine used by people worldwide. It is a user-friendly, straightforward tool, offering three types of searches, as obvious from the picture above: mentions, users and trends. Within seconds after being prompted with a certain topic, being asked about 'mentions', it displays a screen offering various type of info, more or less relevant.

For the purpose of this research, the keywords used were 'Russia' and 'Ukraine'.

Figure 1. Social Searcher website - interface

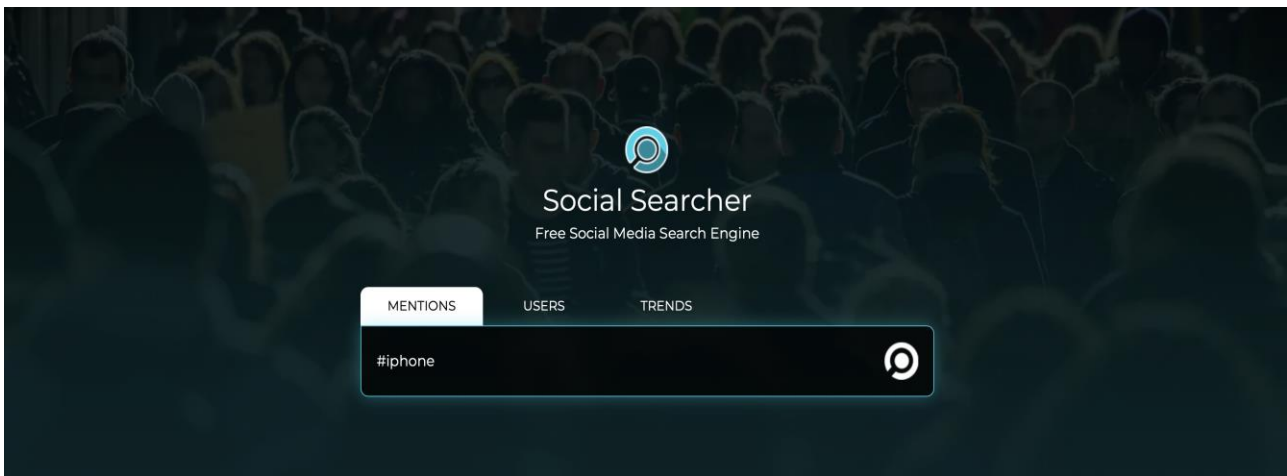
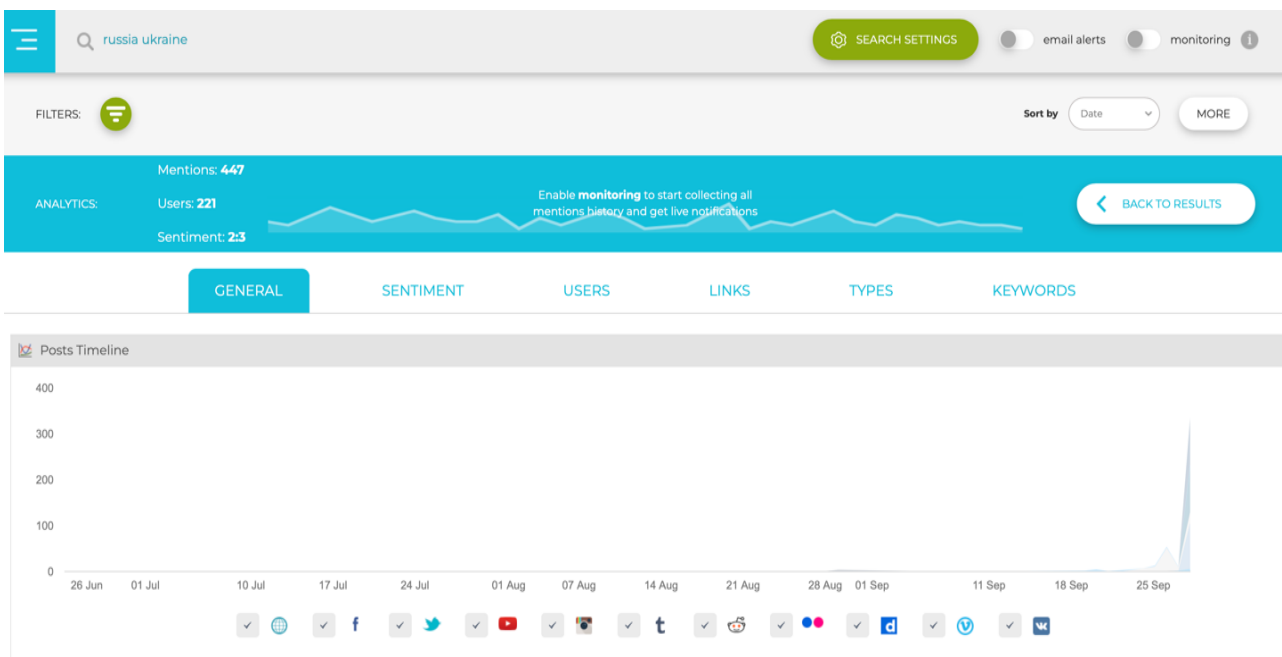
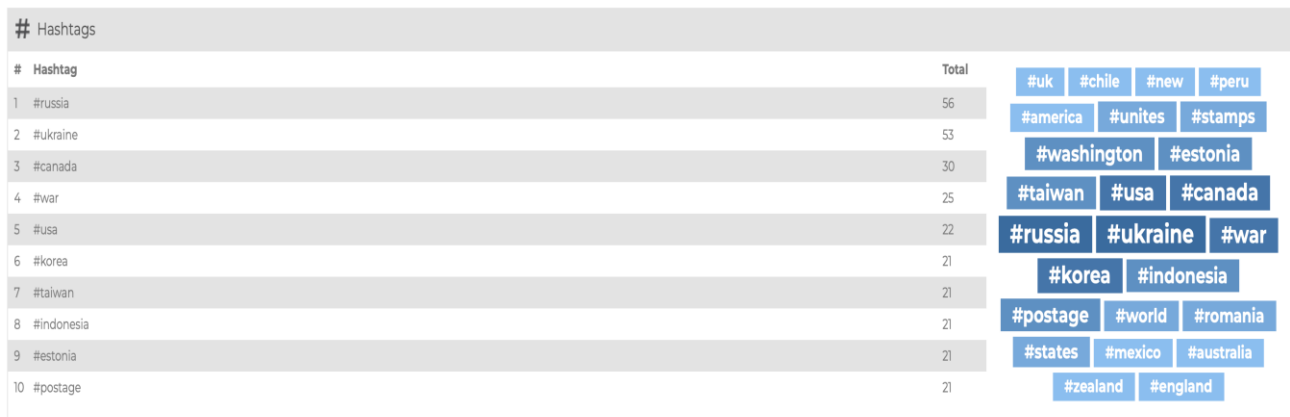


Figure 2. The first set of search results prompted by the keywords ‘Russia-Ukraine’



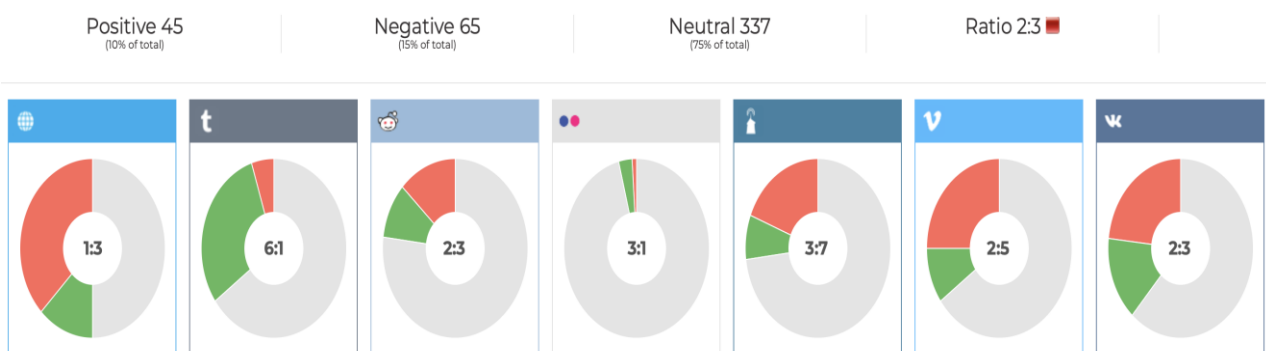
As figure 2 indicates, Social Searcher displayed, for the above-mentioned keywords, several types of useful data. Starting with a short analytics at the top of the screen, as a general overview, it continues by providing 6 categories of information to be perused: from a general graphic indicating which social media was most active related to the keywords, to a sentiment analysis, names of users and even key words most frequently mentioned. However, for the purpose of this research, not all categories were relevant: for instance, the names of users discussing the topic have little significance. On the other hand, the sentiment analysis section, which is quite detailed, does offer some interesting information.

Figure 3. A classification of most popular hashtags used on social platforms



This classification indicated by figure 3 above indicates what hashtags users have been employing when discussing or referring to the keywords ‘Russia Ukraine’. A hashtag is a well-known tool, using a pre-existing key on all electronic devices, which was made highly popular by the social platform Twitter. The main purpose of this keyword, the “#” sign placed in front of one or more words is to group more posts with the same topic, in order to make them easier to follow, as well as to help users find them and interact on the same topic of interest. When a user clicks on such a hashtag, he or she is allowed to see all other posts referring to the same discussion topic, that particular event or piece of news. In the case of this article, the most widely used hashtags prompted by the keywords on this platform were, obviously, ‘Russia’ and ‘Ukraine’.

Figure 4. Reactions indicated by the sentiment analysis software: negative, positive and neutral



As already mentioned, the most important purpose of this exercise was to highlight the sentiment analysis preponderance regarding the keywords ‘Russia’ and ‘Ukraine’. The tool employed in this case indicated, perhaps surprisingly, that at the time this article was written, the reactions of people on social media websites were mostly neutral, with a staggering 337 points

(79% of the total reactions). The negative trend was much lower, at 65 (15% of the total reactions) and the positive ones a mere 10% of the total. Figure 5 also indicates the ratio of these reactions as appearing on various websites, like Twitter (mostly written comments) or Vimeo (a platform providing mostly videos) or Reddit (with a mix of the two, as well as links or images).

As described in the beginning, the main purpose of the software called sentiment analysis is to analyze a large quantity of written content in order to highlight the positive, negative or neutral side of it. The tool perfected in a short period of time, and it can now analyze video content, images, links and other types of content in order to provide a more accurate response. The online tools that require a fee are more accurate and provide more complex answers, of course. For a most precise response in relation to a certain research topic, the best idea would probably be to employ several of these payable tools, as well as a free one per comparison. Finally, the human touch will make the difference, because results need not only interpretation, but also filtering and categorizing.

Figure 5. Popular posts related to the selected keywords

Popular Positive Posts	Popular Negative Posts	Popular Neutral Posts
PIS fuels new conspiracy theory Zelensky to overthrow the P... 49	WSJ Scholz blocks transfer of Taurus missiles to Ukraine due... 57	ALTALTALTALTALTALTALTALTALTALT Putin and the Presidents Marie Yova... 5
Ukraine War Weekly Update 2.9282023 Hello fine people of rde... 47	shocking levels of delirium of these people 27	Combats sur le flanc d'Artyomovsk la 123e brigade de l'ar... 1
[OC] Satellites detected fires in Eastern Ukraine past 24 hour... 38	115 destroyed artillery pieces in the last 3 days alone as U... 11	Les forces armées russes frappent un train militaire ... 1
Free Russia Movement "We'll talk about this with Caesar in 2... 37	Regarding all the posts about the war in Ukraine Look lots o... 8	"Route de la mort" pour les combattants Ukrainiens qui ... 1
Roboquest Progress Playtest Pricing amp Preparing for Launc... 16	The ruble value somehow holds and yet it creates problems in... 8	Un tireur d'élite russe ayant traqué un mitrailleur... 1
Jan. 30, 2023 - Ukraine Under Attack Documenting the Russia... 732	Holy Russia, Moscow Architecture, Russian Orthodox Old Beli... 807	Russia's air force has lost 90 planes in Ukraine and is beco... 10.7K
red call on top This woman was hiking in front of us over th... 343	Wie gehen die Kriegsparteien Russland und Ukraine mit Kriegs... 2.7K	Moscow by Christmas is back on the menu 1.6K
At least one civilian was injured during the Russian bombard... 378	Der russische Außenminister Sergej Lawrow hat erklärt dass R... 539	NATO Secretary General Jens Stoltenberg The stronger Ukraine... 179
Super Sixer Ukraine के America के F16 विरोध Ukraine के F16... 6	Trudeau apologizes for honoring Nazi war veteran in Canadian... 122	Italiano explains flat Earth 176
Brentford vs Arsenal 01 CARABAO CUP HIGHLIGHTS 2023 Nelson... 3	Um avião soviético explodiu ao pousar em uma pista no Mali A... 69	Ukraine's drone warfare strategy has brought war home to 'Mo... 88
Visit our website Like us on Facebook Follow us on Twitt... 1	ministro de Minas e Energia Alexandre Silveira disse nesta q... 57	UR-GAH 2 Boeing 737-32QW Ukraine International Airways MAN 2... 2.6K
Inter Miami vs Houston Dynamo 12 Final Highlights All Goals... 1	9sec of Rafal Milach The Archive of Public Protests Museu... 1	Feb. 14, 2023 - Ukraine Under Attack Documenting the Russia... 2.3K
28th September 2023 Moscow Russia Briefing of the offici... 2	Ukraine wants to fight until the "death of the Russian empir... 5	Feb. 12, 2023 - Ukraine Under Attack Documenting the Russia... 2.2K
Average Wake Up Time By Countries 1 South Africa 624... 1	Russia's "Big Push" Next year by JULIAN MACFARLANE Everyone... 3	Feb. 20, 2023 - Ukraine Under Attack Documenting the Russia... 2.2K
	OS NEOCONSERVADORES AMAM A GUERRA NA UCRAÍNIA Escrito por Ca... 3	Holy Russia, Moscow Nature & Architecture, Golden Autumn nea... 1.4K
	"It seems to me that this war concerns not only the proble... 2	Le secrétaire général de l'Alliance a effectué une visite su... 14.7K
	THE MEDIA FORGOT TO TELL YOU THAT UKRAINE LOST ABOUT 85 OF L... 1	Laut dem ukrainischen Militärportal "Defense Express" hat da... 4.7K
		Comment l'armée russe se réinvente dans la guerre face à l'U... 4.2K
		Port of Odesa sa Ukraine napinsala sa panibagong drone strik... 797

Figure 5 highlights the most popular positive, negative or neutral posts prompted by the search of the Russian-Ukrainian keywords used. These posts are grouped on social media platforms, and categories. The classification indicates the first lines or title, if any, of the post itself and the number of likes that post has received. They are ordered according to the time of the post, the most recent on top. These categories

are user-friendly and easy to employ: a simple click will enlarge the respective posting for an easier reading and will also offer the link to the integral article or comment. For instance, the first one in the positive reactions’ column dates from September 2023, comes from the popular comments site Reddit and states: ‘PiS fuels new conspiracy theory: Zelenskyy to overthrow the Polish government? I respectfully inform you that the [PiS](https://en.wikipedia.org/wiki/Law_and_Justice) media are already claiming that Zelenskyy wants to overthrow the Polish government’ and continues with offering more explanations on the topic (reddit.com).

On the other hand, the most popular mention in the neutral mentions, gathering more than 2500 appreciations from users, is a post from former airline manager Ken Fielding, who posts about the football team of Donetsk, who played against the team Manchester City FC the previous day. and about the gloomy weather conditions of their trip back home. This posting is in fact quite irrelevant for any research on the war in Ukraine, and this indicates, at the same time, the need of human intervention in such cases, as well as the limitations of this software tool. The human intervention is not just needed, but required in such cases, in order to filter the results and select the relevant ones. Searching closer, there are many neutral postings which gathered a lot of online attention, even if less than the previous one, whose merit might have been to be connected to yet another popular topic worldwide: football.

Figure 6. Users and platforms indicating the analytics of this search topic

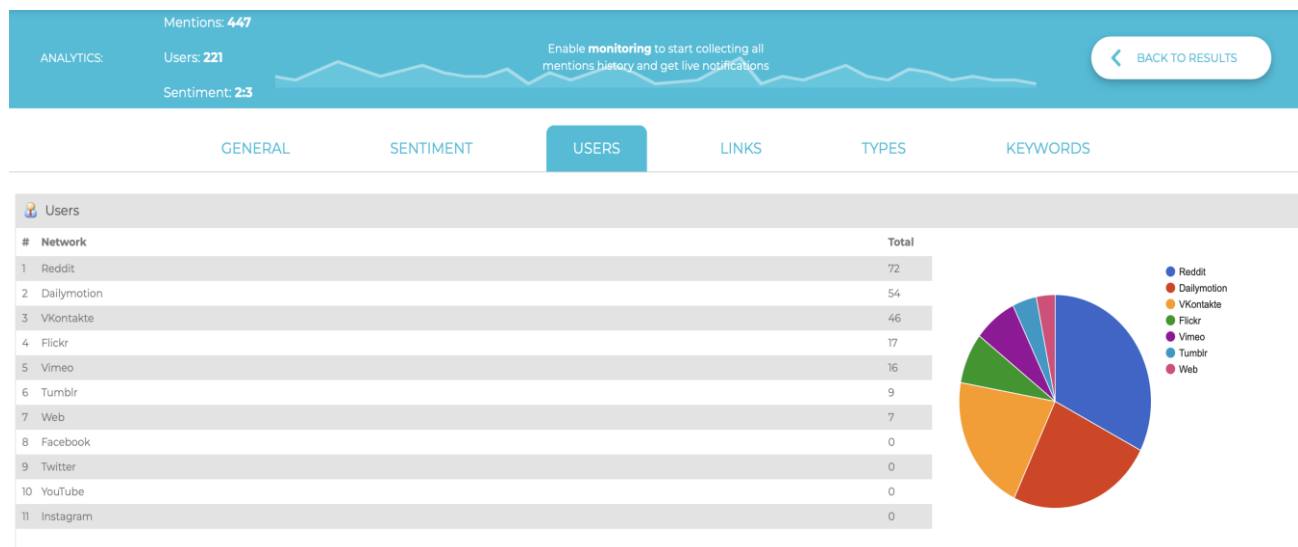
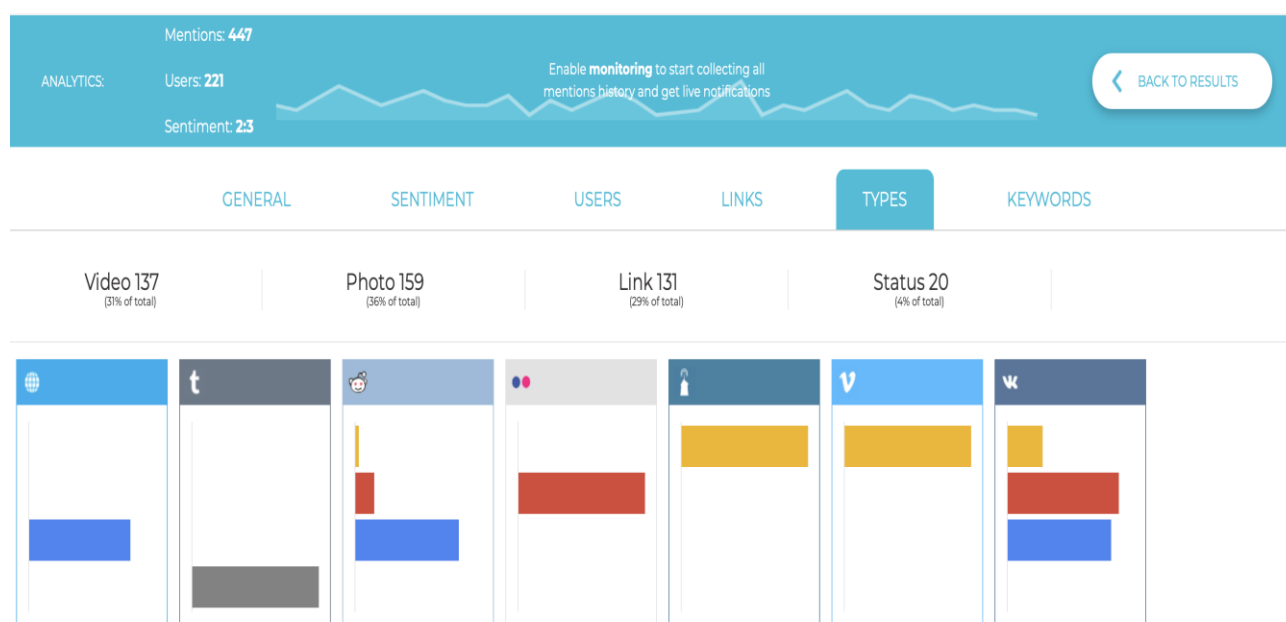


Figure 6 displays the users’ section of this search item, indicating the most popular social platforms in the recent period, the number of mentions on that particular social media: 72 on Reddit, 54 on Dailymotion or 46 on Vkontakte etc., along with a pie chart to clearly show the percentages.

Figure 7. Types of postings on social media platforms. The red color represents Dailymotion, yellow Vkontakte, grey stands for Vimeo and blue color represents Tumblr, all social media platforms



An interesting aspect is highlighted by figure 7, which indicates what types of postings have been popular on social media platforms and other online websites dealing with the Russian-Ukrainian conflict. The most viewed were the photographs, with 159 visualizations, followed by videos, with 137 views by various people. This indicates the preponderance of users' preferences, and it is in line with worldwide trends showing that internauts favor video and photographic content and tend to read less.

An empirical study on internet usage showed as early as 2008 that highly intelligent people, even some higher education persons tend to scan a text, rather than read it properly (Weinrich *et al.*, 2008). Another interesting study (Nielsen, 2008), looking into the results of the previous one and completing it, asserts that people are not used to reading 'pages containing between 30 and 1,250 words' whereas 'Pages with a huge word count are probably not "real" pages anyway — they're more likely to be either academic papers or "terms & conditions" pages' which are of little interest to internet users/readers.

Conclusions

The use of a sentiment analysis tool proved satisfactory and straightforward, offering a clear image of what is going on social platforms, how often the keywords appear, in which contexts and

what reactions do people actually have. Furthermore, such an analysis can be used to monitor not just social media platforms, but also online forums, in order to gauge public sentiment and reactions connected to a conflict, like in this case, or other sensitive topics. Sentiment analysis can help differentiate between genuine public sentiment and propaganda. It can even identify manipulative campaigns and sentiments on social media and other platforms, indicating a clear understanding of how a sensitive situation is perceived online. To a certain extent, it may even be possible to predict escalations of conflicts and perhaps. Identifying fake news and propaganda can also be very useful for authorities. And last but not least, policy makers may employ sentiment analysis in order to test the opinion of population regarding some policy interventions and then adjust their actions accordingly. There are numerous uses of opinion mining and the one described in this article is just one of them. As already mentioned, it seems surprising that in this particular case, the reactions and comments are mostly neutral when it comes to the Russian-Ukrainian conflict news. In this respect, however, sentiment analysis proved useful and very fast. The entire search through all 11 social media platforms it investigates lasted under 3 minutes. This would definitely constitute an asset for the marketing teams who are looking for fast and reliable solutions.

The tool employed for this article is free of charge, and some other ones, that require a fee, would probably offer a more comprehensive perspective. However, for a first impression, the outcome was reasonable. Some results of the search may prove to be irrelevant, and they must be looked into. However, most of the results are not only useful, but also quite relevant, as they refer directly to the conflict between the two countries, as opposed to mentioning any other, less important, things. That means, obviously, that users on all platforms are very much aware of what is going on in the world. Furthermore, the general tone of all posts is in favor of Ukraine, which again is a good thing. However, there are large numbers of neutral posts or pieces of news distributed on social media. Beyond that, a further study which would analyze 2 or more different sentiment analysis tools by comparison would be welcome. Such an overview of social media may prove useful, depending on the topic researched and the purpose of the study. Perhaps for a more thorough research, various combinations of keywords might be required, too. Also, gathering data from more than one sentiment analysis tool would provide more accurate results. Analyzing trends and the general sentiment correlated to a political event such as an armed conflict etc., might be very useful in itself or part of a larger research. Techniques based on Artificial Intelligence are relevant in understanding public sentiments on different topics of interest, and the discussions, reactions and comments from different social media platforms indicate the general opinions of online users. Further research projects dedicated to social media platforms is needed, perhaps in a larger context.

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