

Unveiling the Emotional Landscape of Ukrainian War Narratives Using Large Language Models

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Abstract: Social media platforms serve as a dynamic environment where narratives, sentiments, and ideologies intermingle, catalysing the amplification and dissemination of ideas and experiences. As the ongoing endurance war in Ukraine represents a significant inflection point in the contemporary geopolitical landscape, revealing the urgency for comprehensive understanding and analysis of the implications and consequences of the activities therein. While traditional media outlets as well as research and practitioner efforts tackle various social, economic, and political dimensions of this conflict, efforts directed to capturing and reflecting on the nuanced thoughts and emotions of Ukrainian people are still incipient in relation to unconventional social media platforms like TikTok and Telegram. To address this gap, this research develops a novel LLMs (Large Language Models)-based modelling solution that captures, structures, and analyses the discourses characterizing the sentiments and emotions of Ukrainian Telegram users. This is done pursuing a Data Science methodological approach focusing on the insights collected in the first year of war, thus between February 24, 2022, up to February 23, 2023. By harnessing the analytical capabilities of LLMs, this research aims to bridge the gap between conventional understanding and the nuances of human sentiments, thereby advancing comprehension of the multifaceted dimensions of the ongoing war in Ukraine.

Keywords: Russia-Ukraine war, Generative AI, Large Language Models, LLMs, Sentiment analysis.

1. Introduction

“Theory becomes infinitely more difficult as soon as it touches the realm of moral values.”

(Carl von Clausewitz)

The ongoing war in Ukraine has emerged as a defining geopolitical crisis of the 21st century, catalysing a shift in global dynamics and international relations. Being carried out beyond traditional battlefield boundaries is having far-reaching political, ideological, social, and economic impacts on a global scale. This implied the re-evaluation of a series of strategic alliances, foreign policies, and domestic programs in response to this evolving crisis. In this sense, the attention of both conventional as well as unconventional media channels (e.g., from social media platforms) was captured, fact that created a multifaceted information landscape and a multi-angled battlefield. In this way, social media platforms serve as both an environment for information dissemination and a chronicler of personal experiences and sentiments. This dual role of social media platforms has enabled a broader and more immediate engagement with the war, influencing public perception and policy responses globally. Moreover, the integration of advanced technologies based on AI, in analysing social media data has further enriched both strategic and public understanding of the conflict's psychological, social, legal, and ethical dimensions, highlighting the complex interplay between modern warfare and digital communication.

At the same time, social media manipulation mechanisms such as disinformation and misinformation, have become intricately entwined with authentic war insights, creating a challenging information landscape (Käihkö, 2020; Fard & Maathuis, 2021; Sufi, 2023). This represents a critical aspect for both practitioner and academic efforts that aim to understand the narratives and sentiments of those directly affected by the conflict, enabling a clearer distinction between truth and falsehood while reflecting the war's broader effects (Alibudbud, 2022; Scharbert et al., 2024). In particular, Telegram emerged as a prominent unconventional social media platform during this conflict, gaining popularity due to its diverse channels and capacity to deliver up-to-date war-related information (DFRLab, 2024; Ptaszek, Yuskiv & Khomych, 2023). Nevertheless, based on the extensive literature review conducted in this research, it can be seen that both research and practitioner efforts dedicated to understanding the dynamics or the narratives and feelings of Telegram users in relation to this war, are still in an incipient phase.

To this end, this research aims to contribute to the ongoing efforts of building intelligent solutions that support and enhance the understanding of the sentiments and emotions experienced in the ongoing war in Ukraine particularly focusing on Ukrainian content. It does that by employing a Data Science methodological approach

(Shearer, 2000; Peffers et al., 2007) and building an innovative LLMs-based modelling solution to process and analyse Telegram data collected from February 24, 2022, to February 23, 2023. This platform was selected based on two arguments: first, its raise in popularity, significance, and use in the last years, and especially during this war; and second, the fact that there is a need of objective analysis of existing narratives discussed in such platforms. By combining LLM-derived insights with traditional analytical techniques, the study offers a comprehensive and multi-faceted perspective on the conflict, encompassing both factual events and the underlying psychological and social dynamics that influence public perception and policy decisions. The goal is to enhance public understanding of the Ukraine war, potentially informing more effective strategies for conflict resolution and humanitarian intervention, and further contribute to ongoing research and practitioner efforts designed to counter various disinformation and misinformation campaigns (Maathuis & Godschalk, 2023) meant to alter or deceive the public opinion in relation to the events, activities, experiences, thoughts, and sentiments experienced in this war.

The outline of this article is structured as follows. Section 2 discusses the background and relates studies to this research. Section 3 presents the methodological and modelling approach considered in order to achieve the objective of this research. Section 4 shows and interprets the results obtained. At the end, in Section 5 concluding remarks and future research perspectives considered are discussed.

2. Related Research

Rodríguez-Ibáñez et al., (2023) conduct a comprehensive examination on sentiment analysis in various social media platforms highlighting its significance in diverse domains like finance, health, marketing, politics, and emergency management. The authors stress the importance of joining academic with practitioner efforts when using such methods and point the importance of considering in this analysis or when interpretation its findings, the temporal dynamics and causal relationships between concepts. Al Maruf et al., (2022) build an emotion detection model and examine the meaning and implications of racism in the context of the first months in the ongoing war in Ukraine. For this, the authors use a combination of machine learning, ensemble, and NLP methods applied to Kaggle and Twitter data. The findings show the effectiveness of the boosting approach in categorizing tweets as racist or non-racist, showcasing the model's ability to analyse and identify instances of racism in textual data. Jaradat et al., (2023) presents a hybrid sentiment-discourse analysis model for analysing Facebook posts related to the war in Ukraine in Jordanian dialect. The model combines lexical-based and machine-learning techniques to improve sentiment analysis by incorporating discourse structure and relations. In this way, the authors aim to extract and classify users' opinions and sentiments, particularly focusing on the polarity of the posts. The study collected data from Facebook posts using specific hashtags: a total of 7198 posts and comments in Arabic. The model achieved a high accuracy of 94.68% in detecting sentiment polarity, showcasing the effectiveness of integrating discourse analysis with sentiment analysis in the Jordanian-Arabic context.

Aslan (2023) conducts a Twitter-based topic modelling and sentiment analysis on the war in Ukraine applying various deep learning techniques like CNN (Convolutional Neural Networks) and BiLSTM (Bidirectional Long Short-Term Memory). The study aims to provide a comprehensive understanding of people's emotional tendencies and situational awareness during crisis periods, offering a unique data source for unbiased press reports and articles. Along these lines, Maathuis & Kerkhof (2023) analyse the discourses together with their corresponding sentiments in the first months of war in Ukraine focusing on Telegram. As the complexity of this conflict is high implying the use of both conventional and unconventional means and methods, the authors emphasize that the effects of these events impact various aspects of human life and cognition. Focusing on the Reddit platform, Guerra & Karakus (2023) analyse the sentiments of users expressed in relation to the ongoing armed conflict in Ukraine. The study aims to understand the emotional responses in relation to this war, particularly focusing on feelings of hope and fear. Focusing in particular on the Western side, various emotions are captured in respect to aspects like influence diplomatic decisions, aid provisions, and military support to Ukraine, facts that are seen as potentially shaping the course and outcomes of the war. In their Twitter-based sentiment analysis, Garcia & Yabut (2022) find a general negative trend in the sentiments, with sadness being the most prominent emotion. Next to these, the authors consider emotions such as anger, joy, fear, disgust, and surprise. The prevalence of sadness in the tweets indicates a strong emotional response to the conflict, reflecting the sombre and distressing nature of the situation. In addition, sadness as the dominant emotion suggests a collective sense of empathy, sorrow, and concern among individuals engaging with the topic on social media platforms like Twitter.

Taking into account recent AI developments in the area of LLMs, Zhang et al., (2023) explore the application of LLMs like ChatGPT in sentiment analysis tasks, ranging from basic sentiment classification to more complex analyses like aspect-based sentiment analysis and multifaceted subjective text analysis. On this behalf, the study stresses the importance of structured data for better summarization and detailed sentiment analysis. Nevertheless, the article focuses on the importance that evaluation of LLMs plays in respect to specific tasks, but is not considering their application in the context of the Ukrainian war or any other specific conflict. Accordingly, Sirisha et al., (2022) discuss different machine learning and deep learning techniques used in order to analyse the emotions and opinions of people regarding the Russian-Ukrainian war through Twitter data. To this end the authors introduce a novel approach that combines RoBERTa with Aspect Based Sentiment Analysis (ABSA) and LSTM (Long Short-Term Memory) for sentiment analysis, achieving a high accuracy of 94.7%. Along these lines, Ramos & Chang (2023) analyse the sentiments in tweets related to the ongoing war in Ukraine focusing on the first part of the current conflict. The study uses event-related hashtags and DistilRoBERTa variant for the English tweets (603.552) and XLM-RoBERTa-Base model for Russian tweets. The findings obtained reveal that fear and anger were seen as predominant emotions in the English tweets, while the majority of the Russian tweets exhibited negative polarity. Moreover, the authors stress the widespread concern and emotional reactions of individuals towards the ongoing war in Ukraine, pointing out the fact that future research needs to be conducted in order to expand and explore sentiments across different platforms and societal groupings. As topics characterizing the discourses analysed could be mentioned crisis, weapons, and fatalities resulting from the conflict, aspects that indicate the emotional impact and humanitarian aspects of the ongoing crisis. Moreover, Hasan et al., (2023) focuses on sentiment analysis in the Bangla language concerning the Russia-Ukraine war, highlighting the scarcity of high-quality datasets for such tasks in Bangla compared to English. Accordingly, a Bangla annotated dataset was created by collecting and labelling 10.861 Bangla comments from YouTube TV news channels in Bangladesh, classifying them into three sentiment categories: neutral, pro-Ukraine (positive), and pro-Russia (negative). Based on the findings obtained, the minority class was constituted by the pro-Ukraine class.

As this extensive literature review shows, various ML and DL-based solutions have been proposed with the scope of analysing diverse aspects related to the ongoing war in Ukraine and beyond. Nevertheless, the efforts dedicated to conducted such an in-depth analytical approach using LLMs is incipient, but needed given their advanced natural language understanding and generation capabilities that allow capturing unique insights and contextual aspects. This is the knowledge gap that this research intends to tackle.

3. Research Methodology

To address the knowledge gap identified in this domain, the main objective of this research is to analyse the sentiments and emotions characterising the events from the first year of war in Ukraine on unconventional, yet increasingly used social media platforms like Telegram. In order to do that, a novel LLMs-based modelling solution is developed in a Data Science methodological approach (Shearer, 2000; Peppers et al., 2007). On this behalf, Telegram data is collected between February 24, 2022, up to February 23, 2023. lows. By integrating LLMs derived insights with conventional analytical methods, this study seeks to provide a more holistic and nuanced perspective on the conflict, encompassing not only factual events but also the psychological and social dimensions that shape public perception and policy responses. Ultimately, this research aims to contribute to a deeper, more nuanced understanding of the Ukraine war, potentially informing more effective conflict resolution strategies and humanitarian responses.

With this purpose, a dataset of 47483 messages in Ukrainian language are collected and translated using the Google Translate API (Maathuis & Kerkhof, 2024). The data is further processed and the lemmatization mechanism is applied. Then the sentiment analysis mechanism is implemented using ChatGPT 3.5 Turbo considering the following sentiment classes: devastated (- 1.0), alarmed (- 0.75), fearful (- 0.5), concerned (- 0.25), neutral (0.0), supportive (+ 0.25), hopeful (+ 0.5), optimistic (+ 0.75), and elated (+ 1.0). Furthermore, word clouds are implemented as a graphical representation that depicts the frequency and prominence of the words used by users in order to reflect on the thoughts and emotions they experience in this conflict setting. By aggregating and visualizing the most frequently occurring terms, word clouds enable researchers and analysts to quickly identify dominant themes, emotional states, and key concerns within large volumes of social media data (Giannoulakis & Tsapatsoulis, 2021; Vanstone et al., 2024). The size of each word in the cloud typically corresponds to its frequency or importance, allowing for immediate recognition of prevalent sentiments and topics. This technique is particularly beneficial in war-related contexts as it can reveal shifts in

and the severity of the conflict there. This demonstrates that public discourse is heavily influenced by concerns over the humanitarian and infrastructural consequences of the war, emphasizing the need for attention to the affected regions and their populations.

In the *neutral* category words like *Kyiv*, *Lviv*, *law*, *rights*, *budget*, *system*, and *adopted* can be found. These terms collectively suggest a more detached, analytical perspective on the conflict, emphasizing governance and policy-related issues rather than emotional responses. The inclusion of "Kyiv" and "Lviv" indicates attention to key Ukrainian cities, likely in the context of administrative or strategic discussions. Words like "law," "rights," and "system" point to considerations of legal frameworks and societal structures, while "budget" and "adopted" suggest a focus on financial implications and policy implementations. This shows that a segment of public discourse maintains a relatively objective stance, concentrating on the structural and procedural aspects of the conflict rather than its immediate emotional or humanitarian impacts.

In the *supportive* category words such as *important*, *help*, *medical*, *country*, *support*, *assistance*, and *united* can be seen. These terms collectively reveal the public's focus on the necessity and provision of various forms of support to Ukraine. The word "important" highlights the perceived significance of the conflict and the need for intervention. "Help," "support," and "assistance" indicate a widespread call for and recognition of aid efforts, both humanitarian and logistical. The inclusion of "medical" points to specific concerns about healthcare and the provision of medical services to those affected by the war. "Country" and "united" reflect a sense of national and international solidarity, emphasizing the collective effort to support Ukraine. This suggests demonstrates that public discourse is heavily influenced by a sense of duty and cooperation, with a strong focus on providing necessary aid and standing together in support of Ukraine during the conflict.

In the *hopeful* category words like *days*, *support*, *good*, *medical*, *future*, *European Union*, and *strength* are present. These terms collectively show a sense of optimism and resilience among the public discourse. The inclusion of "days" suggests a forward-looking perspective, while "support" and "European Union" highlight the importance of international solidarity and assistance. "Good" and "strength" indicate positive sentiments and resilience in the face of adversity. The presence of "medical" points to humanitarian aid efforts, which are often associated with hope for recovery and healing. "Future" emphasizes long-term thinking and aspirations beyond the immediate conflict. This reveals that despite this war, a segment of public discourse maintains a hopeful outlook, focusing on support systems, positive developments, and the potential for a better future, aligning with findings that show varied emotional responses to the conflict across different cultural groups.

In the *optimistic* category words such as *support*, *billion*, *important*, *help*, *partners*, *products*, and *summit* are seen. These terms collectively point out to a sense of optimism driven by substantial financial aid and collaborative efforts. The word "support" highlights the ongoing assistance from various entities, while "billion" indicates the significant monetary contributions being pledged or provided. "Important" and "help" reflect the perceived critical nature of these efforts in aiding Ukraine. The inclusion of "partners" and "summit" points to the strategic alliances and high-level meetings that are fostering a united front. "Products" suggests a focus on the economic and material support being mobilized. This shows that public discourse is influenced by a hopeful outlook on the conflict, emphasizing the positive impact of international aid, strategic partnerships, and economic support in bolstering Ukraine's resilience and future prospects.

In the *elated* category words like *medal*, *youth*, *sports*, *athletes*, *championship*, *beautiful*, and *love* can be found. These terms collectively reveal a resilient spirit and the continuation of normal life activities, particularly in the realm of sports and youth achievements. The presence of "medal" and "championship" suggests celebrations of athletic accomplishments, while "youth" and "athletes" highlight the role of young people in maintaining a sense of normalcy. "Beautiful" and "love" indicate expressions of positivity and appreciation, potentially as a coping mechanism or a deliberate focus on life's pleasures amidst conflict. This indicates that even in war times, public discourse includes moments of joy and pride, particularly centered around sports events and youth activities, which may serve as important morale boosters and symbols of national resilience for the Ukrainian people.

This in-depth sentiment analysis reflects a multifaceted emotional landscape, heavily influenced by both immediate and long-term humanitarian crises, significant threats, and fears of military escalation and territorial losses (Kunertova & Masuhr, 2022; Zasiakin et al, 2022; NATO, 2023; Tong, 2024; Kušen & Strembeck, 2024; UN, 2024) . Moreover, an atmosphere of alarm and distress is seen, with significant concern over the humanitarian and infrastructural effects of the war. Despite these challenges, a segment of the discourse maintains a relatively objective stance, focusing on structural and procedural aspects of the conflict. At the same time, there is a strong sense of duty and cooperation, emphasizing the provision of aid and

support for Ukraine (European Commission, 2023; NATO, 2023; Jaradat, 2023; NATO, 2024). Notably, a hopeful outlook persists among some, driven by international aid, strategic partnerships, and economic support, which bolster Ukraine's resilience and future prospects. Additionally, moments of joy and pride, particularly centered around sports events and youth activities, serve as important morale boosters and symbols of national resilience. This complex emotional response reflects the varied and dynamic nature of the sentiments of Ukrainian people in the face of ongoing hostilities.

5. Conclusions

Social media platforms are dynamic environments where narratives, sentiments, and ideologies intermingle, catalysing the amplification and dissemination of ideas and experiences. The ongoing endurance war in Ukraine represents a significant inflection point in the contemporary geopolitical landscape, underscoring the urgency for a comprehensive understanding and analysis of its implications and consequences. While traditional media outlets and research efforts address various social, economic, and political dimensions of this conflict, efforts to capture and reflect on the nuanced thoughts and emotions of the Ukrainian people remain nascent, particularly concerning unconventional social media platforms like TikTok and Telegram. To address this gap, this research develops a LLMs-based modelling solution to capture and analyse the discourses characterizing the sentiments and emotions of Ukrainian Telegram users. This is achieved through a Data Science methodological approach, focusing on insights collected during the first year of the war, from February 24, 2022, to February 23, 2023. Then, given the clusters of sentiments obtained, this research analyses each of the narratives and positions them in the corresponding war situation in a structured and objective manner. To this end, this research to research and practitioner efforts aimed at using advanced AI technologies and through them, intelligent systems that provide support to the comprehension of the multifaceted dimensions of the ongoing war in Ukraine together with the impact on humans and society. At the same time, the results obtained in this research depict a clear and objective picture of the variety of emotions experienced in this conflict, and have the potential to contribute to ongoing efforts on building conflict resolution strategies and humanitarian responses on this behalf.

While acknowledging the complexity and gravity of this war on the one side, and the significant potential of advanced AI technologies such as the ones based on LLMs, this research continues by designing and building responsible and trustworthy intelligent solutions that analyse this conflict based on multiple sources and various dimensions (Maathuis & Chockalingam, 2023). At the same time, this research presents valuable input that can be considered when building defence modelling and simulation solutions that are meant to understand, analyse, and predict the dimensions, nature, and scale of the impact produced by the strategies taken and events occurring during complex (armed) conflicts.

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