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Network-based Approach to User Engagement and Coordination during the Russo-Ukrainian War

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Extended Abstract

Users of pro-Russia and pro-Ukraine have been active on social networking services (SNSs). A large portion of users interested in the Russo-Ukrainian War topic were bots. During the early stages of the war, it was discovered that more than 20% of pro-Russia users were bots [1]. However, the patterns of user engagement on social networks have not yet been fully elucidated. The patterns are important for understanding the misinformation and fake news that spread on the SNSs during the war. In addition to engagement, coordination also poses its importance in the investigation of amplifying misinformation, hate, and polarization [2]. Research on the coordination of social bots during the Russo-Ukrainian War would be helpful in finding out how bots work synergistically to achieve warfar propaganda goals. This study will foucus on the topic of civilian deaths in Bucha during the first quarter of 2022.

2,339,094 English tweets were collected from March 28 to April 30, 2022, by querying Bucha-related keywords: ("Bucha AND "Russian") OR ("Bucha" AND "Russia") OR ("Bucha" AND "Ukraine") OR ("Bucha" AND "Ukrainian") using twarc[1]. As civilian deaths in Bucha have triggered opinions both against the two counties themselves, we expected to identify a characteristic retweet (RT) network where pro-Russia and pro-Ukraine are segregate. We constructed an RT network (Fig. 1) (3-core, $n = 142,702$) using the collected Twitter data and applied the k-core decomposition to identify pro-Russia and pro-Ukraine users, where each node represented a user and the edges angled between the nodes represented retweets. The modularity-based community detection algorithm, the Louvain method, was applied to the network to identify clusters using the Gephi software[2]. As expected, this resulted in an RT network with two major clusters. Each cluster corresponding to the pro-Russia and pro-Ukraine group was determined by manually examining top 10 indegree users in each cluster in terms of their tweets and profile descriptions.

The pro-Ukraine cluster ($n = 127,322$) was much larger in size than the pro-Russia cluster ($n = 15,366$). In the list of the top 10 indegree users, many accounts associated with the media and government-related accounts were identified. The top one indegree user of the pro-Ukraine cluster is "@KyivIndependent" ($k_{in} = 38,010$), which is a local newspaper in Kyiv, established in 2021. The newspaper was followed by "@kgorchinskaya" ($k_{in} = 23,699$) and "@DmytroKuleba" ($k_{in} = 18,677$), where "@kgorchinskaya" is a Ukrainian journalist and "@DmytroKuleba" is the Minister of Foreign Affairs of Ukraine. We can then find "@olgatokariuk", a journalist working in Ukraine for 15 years and another editor-in-chief, and co-founder of Ukraine-based Zaborona Media, "@KSergatskova" ($k_{in} = 15,566$). Media agencies such as "@nytimes" (The New York Times) and "@visegrad24" ($k_{in} = 17,271$), a suspicious

[1] `https://github.com/DocNow/twarc`
[2] `https://gephi.org/`

fake news spreader, according to RT.com[3], were identified. The president of Ukraine "@ZelenskyyUa" ranked in the top 10. On the pro-Russia side, "@Reuters" ($k_{in} = 6,259$) is the top one indegree user. "@mfa_russia" ($k_{in} = 1,998$) is the official account of the Ministry of Foreign Affairs of Russia. Several "Russia state-affiliated media" tagged by Twitter were identified on the list of top 10 indegree users, including "@georgegalloway" ($k_{in} = 6,259$), "@wyattreed13" ($k_{in} = 1,899$) and "@RT_com" ($k_{in} = 1,828$).

Then, we generated the bot co-retweet coordination network in a 60-second time window (Fig. 2a) using the coordination network toolkit [4]. In the network, each node is a user. If two users retweet the same posts (retweets are excluded.) within 60 seconds, the coordination exists between the two users in order to enhance the propaganda of specific messages. The giant cluster of accounts that exhibit this behavior might suggest a campaign to propagate civilian deaths in Bucha.

We assumed that well-coordinated accounts would be bots. In this study, we extracted bots in two steps. First, users with $k_{in} >= 30$ were extracted, as they might have the opportunity to cooperate well with the other users, and 515 users were extracted. Second, we calculated the bot score with Botometer API v4 for the extracted users. The Botometer computes "complete automation probability" (CAP) for each user that ranges within the range of $[0,1]$; The higher the value, the higher the probability that the user is a bot. In this study, we set CAP=0.7 as the threshold for human/bot classification, which means that if the CAP of a user is greater than 0.7, this user is considered a bot. We found that bots ($n = 396$) are much more than humans ($n = 104$) and that the indegrees of humans are smaller than those of bots. In addition, most of the extracted users are bots, and the bots shared a high CAP score of around 0.8 (Fig. 2b). These results indicate that bots might play a major role in the propaganda on the topic of civilian deaths in Bucha.

Above all, this study used a network approach to analyse user engagement and coordination The analysis suggested that journalists and politicians were the main influences of pro-Ukraine users. Some local newspaper might be more popular than Zelenskii. By contrast, self-media accounts were more active in the pro-Russian cluster and several of them were tagged by Twitter. Furthermore, the coordination network suggests that a closely synergetic cluster of users was diffusing Bucha-related information and the major popular users were bots in the cluster. It is suggested here that we should be very careful about the information about the civilian deaths as they were well diffusing through coordinated bots. These bots might cooperate as a botnet to enhance the information diffusion. Without fact-checking, SNSs users should alter any information related to civilian deaths in Bucha.

References

[1] Dominique Geissler et al. Russian propaganda on social media during the 2022 invasion of Ukraine. 2022. eprint: arXiv:2211.04154.

[2] Thomas Magelinski, Lynnette Ng, and Kathleen Carley. "A Synchronized Action Framework for Detection of Coordination on Social Media". In: Journal of Online Trust and Safety 1(2) (2022).

[3] https://www.rt.com/news/568003-super-fake-news-spreader-visegrad/

[4] https://github.com/QUT-Digital-Observatory/coordination-network-toolkit

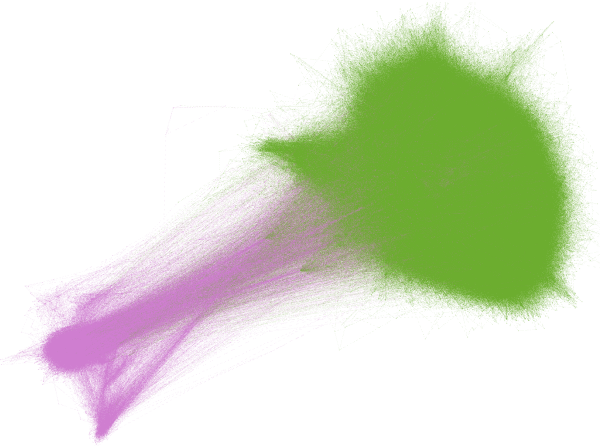
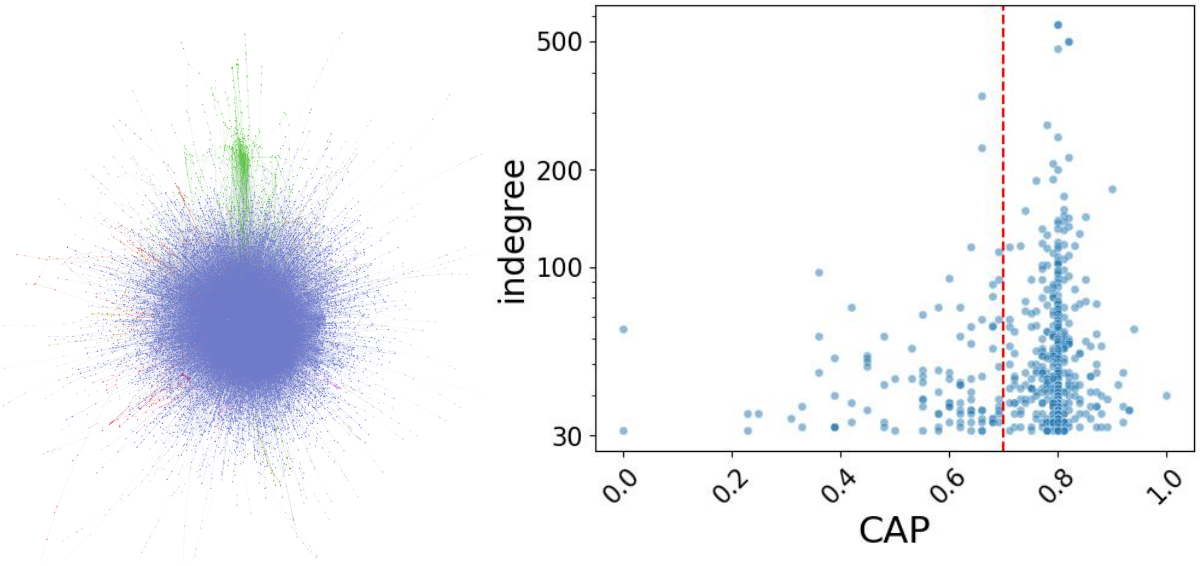


Figure 1: Retweet network of pro-Russia and pro-Ukraine users. Magenta denotes pro-Ukraine and green denotes pro-Russia.



(a) (b)

Figure 2: (a) co-retweet coordination network of all users with a 60s window.(b) CAP and indegree associations of Bots ($k_{in} >= 30$). The red dashed line is the threshold for bots/humans classification (CAP=0.7)