

Lin, Trisha T. C.

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Socialbot representations on cross-media platforms during 2020 Taiwanese Presidential Election

Trisha T. C. Lin, Ph.D.

Professor, Department of Radio and Television, and

College of Communication, National Chengchi University, Taiwan

Research Fellow, Taiwan Institute for Governance and Communication Research

Address: No. 64, Sec. 2, ZhiNan Rd., Wenshan District, Taipei City 11605, Taiwan

Email: trishlin@nccu.edu.tw

Abstract

This big data research uses CORPRO, sentiment analysis and inter-media agenda setting approach to investigate cross-platform representation of socialbots and disinformation during 2020 Taiwanese presidential election. The results show key terms associated with socialbots emphasize Internet armies, election candidates, Facebook and China/Taiwan relations. Sentiment analysis of socialbot-related cross-platform contents tend to be negative, regardless of media types. Forums contents encompassed more diverse topics and negativity than news media and Facebook. Polarized sentiments and political slants were found in three media types. The time-series analysis of the salient socialbot event regarding Facebook's deleting illegal account showed inter-media agenda-setting from news to Facebook and forms. Even though news media set the initial agenda, journalists and social media users alter story angles and extend narratives to fit political inclinations and reflect polarized views.

Keywords: Socialbots, disinformation, Taiwanese Presidential Election, big data, sentiment analysis, inter-media agenda-setting

1. Introduction

In recent years, there have been increasing news reports and research articles about utilizing socialbots, fake accounts controlled by computer algorithms, for political computational propaganda in order to manipulate sentiment in public opinions, spread disinformation virally on social media, and cause risks in democracy, elections and internet security (Bakardjieva, 2015). In 2018 Taiwan's mayor elections, international media reported evidences of China's intervention in election results such as suspicious inflation of candidates' online popularity and spreading fake news to mislead political opinions (Rogin, 2018; Chien, Chung & Chin, 2018). The threats of cyberattacks and disinformation accelerated before the 2020 Presidential election, which partly could result from bot-driven campaigning (Lin & Szeto, 2021).

To understand Taiwanese media's framing and inter-media agenda-setting, this big data research examines how three media types (news media, Facebook and forums) represent socialbots and disinformation during 2020 Taiwan presidential election campaigns. In a multidimensional media landscape, scholarly attention has been paid to the intermedia agenda-setting which refers to the multidirectional effects and relations across a wide range of medium types (Du, 2017). Barclay's integrated political communication model (2015) shows high levels of interactions (aggregating political opinion exchange) between news media reports and social media discussions about elections, augmenting their effects on masses' public opinions. In addition, Shahzad, Syed & Soraj (2020) find a clear agenda setting influence of Twitter on broadcasting TV news coverage agenda.

Increasing big data research that analyzes cross-platform media representation of significant socio-political events and concerned issues can reveal news framing and online opinions. Many western studies analyzed Tweets to examine voters' sentiments and topical discussions towards election candidates or related important issues (Yaqub, et al., 2017). This mixed-method research takes a web analytics approach to investigate socialbot-related topical issues, political slant, sentiments, and inter-media agenda-setting across news, Facebook and forums during 2020 Taiwanese presidential election. This study extends sentiment analysis and inter-media agenda-setting to investigate the context of socialbots and disinformation in Asia. The findings can enhance the understanding of socialbots' cross-platform media representation during elections in Asia. As for methodology, this mixed-method research utilizes web analytics tools, CORPRO for identifying key phrases and topical issues in Chinese corpus, and SAM for sentiment analysis of cross-platform media texts, in order to generate the holistic comprehension of socialbot websphere.

2. Literature Review

2.1 Socialbot, opinion manipulation and disinformation

Due to alarming impacts of bot-driven campaigns on politics and elections, an increasing number of western scholarly studies investigate computational propaganda effects caused by malicious bots on social media (Lin & Wang, 2019). Woolley (2016) described socialbots' capabilities of mimicking human interactions to purposefully disseminate ill-agenda messages that share by other users unknowingly. This study defines "socialbots" as "chatbots operating on social media with fraudulent accounts and human-like online behaviors." Recent research also found the relationship of socialbots, disinformation and computational propaganda (Al-Rawi, Groshek, & Zhang, 2018; Jone, 2019). Socialbots can be designed strategically for harm, which mislead and manipulate social media users with rumors, spam and disinformation (Ferrara, Varol, Davis, Menczer & Flammini, 2016). They also increase impacts by targeting at controversial and polarized issues and utilizing hate speech (Cresci, 2019). When bot-driven posts that generate sizable online discussions tend to catch media attention due to algorithm and big data analytics, these fake popularity shape news agenda setting to frame political issues and further manipulate public opinions (Bruns, Harrington & Highfield, 2013; Schäfer, Evert & Heinrich, 2017).

According to V-Dem's 2019 Digital Society Project, Taiwan faced the most severe disinformation campaigns disseminated by foreign governments among the 179 surveyed countries. The US government has warned that China spread false information on social media, utilized socialbot fraudulent accounts, and then turned into fake news broadcast on pro-China TV networks, which aimed to intervene in Taiwan's 2020 presidential election (Kurlantzick, 2019). The Digital News Report by University of Oxford and the Reuters Institute also showed that pro-China Taiwan news media frequently reported viral social media posts deriving from fake Chinese military drills during Taiwanese elections (Lin, 2018). As in recent years Taiwan has been facing increasing threat from China's information warfare, Taiwanese government worked with US Department of Justice to catch Chinese hackers behind mass cyberattacks (Huang, 2020). Moreover, China was found to utilize AI bots to disseminate COVID-19 disinformation in order to mislead Taiwanese and stir public panic (Yuan, 2020) but failed.

Experts from various social-technical subsystems revealed that socialbot campaigns in Taiwan were launched both domestically and internationally to boost some political figures' popularity, manipulate public opinions, and even shape

election results in 2018 Mayor Election and 2020 Taiwanese presidential election (Lin & Szeto, 2021). As a result of growing impacts of socialbots on Taiwan's politics, the present study will examine how news media and social media (Facebook and forums) presented and framed socialbots during 2020 presidential elections, which likely affected Taiwanese' perceptions, knowledge and attitudes towards the emerging computational propaganda risks.

2.2 Sentiment analysis

As Internet and social media provide digital spaces for netizens to express their opinions and engage in socio-political discussions and civic engagement (Lin, 2019; Lin & Chiang, 2017), an increasing number of studies analyze web data and social media posts to investigate trends, salient topics and sentiments of the public. Using the web to track political preferences, Ceron et al., (2014) showed reliability and predictability of using social media analysis to forecast electoral results. Sentiment analysis is a task of mining opinions expressed in texts and analyzing entailed subjective feelings, emotions and attitudes regarding issues, topics and events (Liu, 2015). Social media, including Twitter, Facebook, blogs, and forums, encompass massive sentiment data offered by users (Feldman, 2013).

Political studies apply sentiment analysis to track political preferences, examine public opinions and predict election results (D'Andrea et al., 2015). Yaqub et al. (2017) investigated the sentiments of tweets regarding US presidential candidates and demonstrated that Twitter could be a good proxy of public opinions and critical election-related events. Liu and Lei (2018) also revealed significant differences between Clinton's and Trump's rhetoric/discourse strategies and key campaign themes during the 2016 US presidential election through machine-based sentiment analysis. As for public opinions, sentiment analysis is used to monitor and analyze social phenomena, spot potentially dangerous situations, and determine the blogosphere's general mood (D'Andrea et al., 2015). Sentiment analysis of tweets was useful to predict opinion inversion in political conflicts in Israel (Matalon et al., 2021).

Moreover, Park et al. (2021) that examined the temporal dynamics of emotional appeals in Russian 2016 election campaign messages on Facebook and Twitter found that messages on two platforms had different sentimental responses and

showed variations along the election stages. Besides social media, Sigit et al. (2019) had applied machine learning technology to analyze electability sentiments of political figures analyzing comment text data associated with online news media in Indonesia. Thus, this study will compare the sentiments of cross-platform media presentations of socialbot related issues during 2020 presidential elections in Taiwan.

2.3 Inter-media agenda-setting

As an extension of agenda-setting theory, inter-media agenda-setting refers to the influences of media agendas on each other (Du, 2017; Lopez-Escobar et al., 1998). In the early stage, inter-media agenda-setting studies primarily focused on how mass media agendas influenced each other. Reese and Danielian (1989) examined the inter-media influences of newspapers and TV, and identified print media setting the agenda for the TV network. In a multidimensional media landscape, scholarly attention has been paid to inter-media agenda-setting, which refers to the multidirectional effects and relations across a wide range of medium types (Du, 2017). Recent online studies indicated that agenda-setting of traditional media was affected by news websites (Maier, 2010) or trending topics on social media (Valenzuela et al., 2017). Moreover, Harder et al. (2017) found that the "slower" platforms, traditional media, are mainly followers, whereas the "quick" platforms, news websites and social media, both follow and set other platforms' agendas.

According to Groshek & Clough Groshek (2013), traditional media set the agenda for social media and reciprocal agenda-setting effects of social media topics enter traditional media agenda, which intersect around salient political events. Additionally, they found that social intermedia agenda setting topically and across time across social networking sites. For instance, political agendas tend to be formed by traditional media; Facebook agenda is usually set by agendas on traditional media and Twitter is more likely to follow, rather than lead. Nevertheless, when Vonbun et al. (2015) analyzed intermedia agenda-setting during a national election campaign through semi-automatic content analysis and time series analysis, they argued that online news sites challenged the traditional media's roles as intermedia agenda-setters. Meraz (2011) also found that blogs could exert a moderate influence on traditional media's agenda. Moreover, Barclay's integrated political communication

model (2016) shows high levels of interactions (aggregating political opinion exchange) between news media reports and social media discussions about elections, augmenting their effects on the masses' public opinions.

As Twitter is the leading social media for politicians to propaganda policy and political opinion in the U.S, studies found that Twitter feeds suggested newspapers to place similar emphasis on issues (Conway et al., 2015) and Twitter showed the potential to break free from and influences of traditional media gatekeeping (Conway-Silva et al., 2017). Shahzad, Syed & Soraj (2020) also found the apparent agenda-setting influence of Twitter on broadcasting TV news coverage agenda. In the 2014 Belgium election campaign, Harder et al. (2017) found that Twitter had more agenda-setting influence than other online media due to the fast publishing rate. In Taiwan's context, Facebook and forums are the major digital spaces for social media users to engage in socio-political discussions (Lin, 2019; Lin & Chiang, 2017), when Twitter is less prevalent used. Drawing upon the framework of inter-media agenda-setting, this study intends to explore the inter-media agenda-setting effects existing in representing socialbot-related issues by examining news, Facebook and forums during the 2020 Taiwan presidential election campaigns.

3. Methodology

The theory of big data analytics is based on the belief that enormous combined data encompass a huge amount of information than independently analyzing separate, small datasets (Sparks, Ickowicz, & LenzEmail, 2015). The big data driven approach is able to identify important patterns from a gigantic amount of web data (Mazzocchi, 2015) and avoid constraints from past theoretical framework (Shih & Chai, 2016). Sparks et al. (2015) argue that big data analytics search for interesting insights and turn data into information tested by well-designed studies, which can make breakthroughs from existing theories and integrate them into new knowledge. Additionally, exploratory visual analytics for data driven research can be used for seeking explanatory variables or hypothesis generation (Tanaka, Berg & Takahashi, 2016).

Analyzing web news, Facebook posts and forum discussions about socialbots, this big data research aims to answer the following questions:

RQ1: When discussing various topics concerning socialbot and disinformation during 2020 Taiwanese Presidential Election, what are associated key terms

frequently shown on three media types (news media, Facebook and forums)?
RQ2: With respect to sentiment analysis, what are the cross-media differences when stating socialbot-related issues on three media types during 2020 election?
RQ3: What are the observed inter-media agenda-setting effects existing in representing socialbot-related issues during 2020 election?

In terms of methodology, this big data research utilizes uMaxDATA Taiwan to crawl cross-platform data near 2020 presidential election campaigns in Taiwan (2019/10/07-2021/1/17) by setting Boolean logic keywords (i.e., socialbots, disinformation, public opinion manipulation and 2020 Taiwanese presidential election). The period of the data collection is determined by socialbots' online discussions. Initial data crawled by Uminer platform that integrates Chinese text mining and machine learning technologies resulted in 26,144 socialbot-related items deriving from 173 news media, 366 Facebook fanpages or open accounts, and 13 major forums in Taiwan. After manual data cleaning to ensure relevancy, the final sample size encompasses 711 news media reports, 11,620 Facebook data (362 posts and 11,258 comments), and 13,458 forum posts (328 posts and 13,130 comments).

As for data analysis, the study utilized CORPRO¹, Uminer's Sentiment Analysis Model (SAM)², and inter-media agenda-setting approach to examine topical keywords associated with socialbots, sources as actors, sentiment analysis, and inter-media agenda setting cross three media platforms. First, CORPRO, an analytical tool for text mining and phrase frequencies of collected Chinese materials in machine-readable forms, was used to investigate key terms associated with socialbots during 2020 Presidential Election in Taiwan on contents of three media types (news, Facebook and forums). After text mining of keyword frequencies and manual adjusting Chinese word segmentation and recoding, we identified 194 terms related to research foci. Next, top 100 key terms with high phrase frequencies on each media type were input into the wordart software to create word cloud visualization. Second, Uminer SAM's affective analytical framework was utilized to calculate sentiment value of selected items and classify them into "positive," "negative," or "neutral" categories. After setting criteria, SAM calculates word frequencies of selected items and collective affective tendencies based on accumulated daily content quantity and emotional trends by time series on the uMaxData platform. Finally, SAM demonstrates

¹ Developed by Taiwanese scholars, CORPRO is an independent corpus database for analyzing Chinese written or spoken materials in machine-readable form, assembled for the purpose of linguistic research.

² Uminer Sentiment Analysis Model (SAM) is built on techniques of Chinese word segmentation and semantic term meaning database.

sentiment value and trends of socialbot-related content on three media types respectively. Finally, based on Harder et al.'s (2017) inter-media agenda-setting approaches, this study selected the most salient case (news event analysis) from 15 peaks of socialbot-related discussions on three media and analyzed their temporal and topical influences on each other's agenda setting and cross-platform flows (analysis of time-series). The socialbot-related case that show significance and interactive flows on three media platforms is the incident that Taiwan's presidential candidate's fanpage disappearing Facebook: violating community standards (2019/12/13). The analyses examine time-series of interactive flows among news, Facebook and forums as well as influences of their agenda setting and news framing in selecting story angles and narratives.

4. Findings

This big data research uses CORPRO, SAM and inter-media agenda-setting approach for data analysis. The finding section include three segments: key terms associated with socialbots on news, Facebook and forums, sentiment analysis of socialbot-related cross-platform contents, and inter-media agenda-setting of a salient socialbot event.

4.1 Key terms associated with socialbots on three media types

Based on CORPRO's analytical results, overall data's high frequency terms associated with socialbots during 2020 election are "Facebook," "Taiwan/China," "presidential candidates,"³ and "Internet armies." In comparison, news media's key phrases look similar to aggregated data's with highlights of "Facebook," "election candidates" and "Taiwan/China," but emphasize "disinformation." The phrase "socialbots" did not appear often in news reports; instead media use "Internet armies," "fake accounts," and "multiple accounts" to illustrate socialbot-related concepts and false information. To be noted, in news reports, KMT's presidential candidate Han, Kuo-Yu was mentioned more than DPP's incumbent president Tasi, Ying-Wen (later elected).

Analyzing the top 20 media reporting socialbots, the top three news media

³ Han, Kuo-Yu, the 2020 presidential candidate of Kumingtong (KMT), is one of the most mentioned terms based on word frequencies. As KMT with pro-China tendency, Han's sudden online popularity showing data abnormality was questioned by experts and social listening companies. Taiwanese female president, Tasi, Ying-Wen, is the candidate of Democratic Progressive Party (DPP) that is frequently mentioned.

reporting socialbots during 2020 Taiwan’s president election were web-only media (Line Today, Yahoo Kimo News, and Storm Media). Comparing with web-only media’s neutral reports on socialbots, pro-KMT traditional news media tended to show political slant on reporting socialbot issues, such as using “1450” to criticize DPP’s Internet armies. For example, when PTT removed 1,154 problematic accounts in early November, 2019, most pro-KMT media cited China Times⁴ news and attributed this incident to DPP government and its Internet armies. Yet, pro-DPP media tended to associate Internet armies with China and Wu Mao.

The word cloud of Facebook posts resembles forums,’ as both accentuate “Taiwan” greatly, followed by “DPP” (the ruling party). Facebook posts are also concerned about “Internet Armies (Internet trolls for China government),” and its high frequency terms related to socialbots include “fake account” and “1450 (DPP’s internet armies).” In addition, forum discussions mention “media platforms” (PTT, Facebook, and news), “China” and “accounts.” Among the top 100 forum posts include various versions of phrases related to “accounts,” such as fake accounts, zombie accounts, multiple accounts, deleting accounts, etc. These show forum users feel very concerned about the misuse of accounts on PTT and Facebook.



Figure 1. Word clouds of socialbots-related key terms

(Right-up: Total data; Left-up: News; Right-bottom: Facebook; Left-bottom: Forum)

When Facebook and forum users responded to the posts, they could emphasize and integrate differently. Comparatively, Facebook’s comments discussed more about “Facebook,” “Taiwan” and “Han” (KMT candidate), while forum’s responses centralize “cockroaches” and “Wu Mao” (nicknames of China’s trolls), “Internet

⁴ China Times is regarded as a pro-China traditional newspaper in Taiwan.

armies,” and “1450” (Figure 4). With a strong sense of Taiwanese identity, forum discussions reveal critical and diverse cultures. In sum, Internet armies are popular topics on Facebook and forums than news reports.



Figure 2. Word clouds of socialbots-related Facebook comments (left) and forum responses (right)

In addition, Facebook fanpages/groups and open accounts that discussed socialbots and elections revealed polarized partisan preferences. Pan-blue⁵ facebook fanpages/groups discussed frequently with more posts about socialbots than pan-green’s. The former was inclined to associate concepts of Internet armies with Tasi president (DPP presidential candidate) and imply their connection with the ruling party. Although 328 socialbot discussions were collected from 13 forums, PTT, Taiwanese leading forum, generated 85% of socialbot-related posts and 94% responses. The results showed that socialbot-related forum contents showed pan-green political slant.

4.2 Sentiments analysis of socialbot’s cross-platform discussions

Based on SAM’s sentiment analysis, overall socialbot-related data show more negative sentiments than positive ones, regardless of media types, before 2020 Taiwanese presidential election. With respect to cross-platform comparisons in sentiment value, socialbot-related news reports have slightly negative sentiments; forums’ accumulated sentiments reveal most negative than news media and Facebook posts and comments; Facebook posts show more negative sentiments than their comments. When looking at sentiment trends, news and forums show multiple peaks, while Facebook only has a prominent spike related to deleting accounts in late December with related flat waveforms.

Sentimental socialbot-related news media reports outnumbered Facebook posts

⁵ Taiwanese support two big political parties, DPP (the ruling party) and KMT. The former and alliances are called pan-green camp, while the latter is pan-blue camp.

and forum posts. Among 711 socialbot-related news items, negative reports (49%) are slightly more than positive ones (42%), showing polarized sentiments with little neutral content (7%). Surprisingly, traditional news media utilize more negative news framing (53%) to report socialbot-related issues than web-only media (46%). In Taiwan, traditional media have influential agenda setting and framing power as their news contents are often reprinted, cited, or shared by many web-only counterparts. Socialbot issues that focus on eliminating Facebook fanpages/groups violating community standards, Taiwan's combating China's fake news, and internet armies show negative sentiments in news framing during Taiwanese 2021 presidential elections.

Socialbot-related Facebook posts usually include URL links with photos to show expert views, investigations and evidences. Facebook posts that present extremely polarized emotions show a high percentage of negative sentiments with little neutrality, comparing with contents on other two media types. The salient peak occurring when Facebook deleting illegal accounts in late December reflected heated debates and antagonism from pan-blue and pan-green supporters. As for socialbot-related forum contents, they discuss diverse issues, compared with Facebook contents and news reports. Forums that contain 14% more negative posts than positive ones still have more neutral sentiment contents than Facebook. Differently, forum posts that tend to disfavor pan-blue camps and China showed high concern about fraudulent accounts and Internet armies. Several sentimental peaks of forum posts discussed about China's purchasing PPT accounts for Taiwan's elections, Internet armies causing problematic PPT accounts and deletion, China spies, and Facebook's removal of KMT candidate Han's fanpages.

Figure 3 Sankey Diagram compares results of sentiment analysis of three media types (news media report, Facebook posts and forum posts) excluding comments and replies. News reports contribute more to negative narrations towards socialbot related issues. Positive sentiments on posts of three media types appear second to negativity, indicating polarized affective attitudes towards socialbot-related issues.

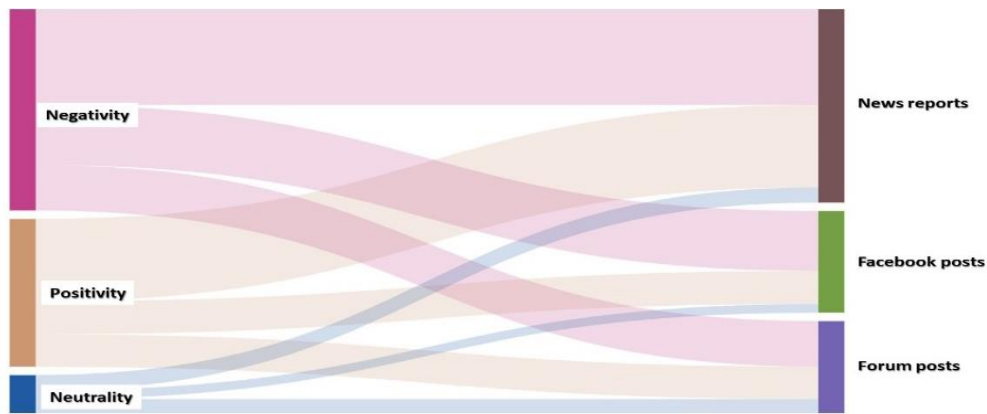


Figure 3. Sentiment analysis of socialbot-related news, Facebook & forum posts

In comparison, 11,258 Facebook comments show relatively balanced sentiments (36.2% negativity, 33.7% positivity, 30.1% neutrality). Interesting, negative Facebook posts easily triggered responses and “like” outnumbered “sharing” and “haha.” Among the top three forums (PTT, Mobile01 and Dcard), users’ replies regarding socialbot issues demonstrated strong negative sentiments. Although negative socialbot-related forum posts (162) that primarily derive from PTT (141) are slightly more than positive ones (117), among 13,130 replies, 47% are negative and only 25% positive, indicating forum responses are much more negative than the posts.

The striking spike of negative sentiments regarding socialbot data occurred on December 13, 2020, when Facebook deleted 118 fanpages, 99 groups and 51 suckpuppet multiple accounts, as their coordinated inauthentic behaviors (CIB) violated Facebook’s community standards. Most of the deleted groups supported KMT’s presidential candidate Han, which stirred angry and aroused criticisms of censorship and conspiracy. To be noted, negative news media reports on this incident are nearly five times of positive ones, while negativity of social media contents is slightly more than positivity: Facebook (1,423 negative items, 1,314 positive items) users discussed the CIB deletion event more enthusiastically than forum users (457 negative items, 355 positive items). That is, news reports’ negative sentiment towards Facebook’s account deletion is much stronger than social media’s in response to this salient socialbot-related event.

4.3 Inter-media agenda-setting

The Facebook deleting accounts violating community standards incident (2019/12/13) that removed 118 fanpages, 99 groups and 51 multiple identity accounts caused huge online volume. As for news event analysis, this study selects this most salient case from 15 peaks of socialbot-related discussions and examines its six-day

cross-platform discussions (2019/12/13-2019/12/18). Table 1 indicates that this incident generates 60 news stories, 109 Facebook posts and 17 forum posts, which shows 78% negativity overall.

Table 1. Numbers and sentiments of Facebook CIB deletion stories

	News	Facebook	Forum	%
Positive	7 (11.7%)	13 (11.9%)	9 (52.9%)	29 (15.5%)
Neural	0 (0%)	10 (9.2%)	2 (11.8%)	12 (6.5%)
Negative	53 (88.3%)	86 (78.9)	6 (35.3%)	145 (78%)
Sum	60	109	17	186

In Taiwan, socialbot-related issues usually involve Internet armies and problematic social media accounts (e.g., fraudulent accounts, zombie accounts, and CIB account, etc.) When PTT consistently deleted abnormal and fake accounts in October 2019 onwards, pro-China news media framed that PTT removed illegal accounts controlled by President Tasi. Subsequently, PTT discussions counterattacked traditional news reports and criticized their distorted facts of China’s intervention. Later, pan-blue Facebook fanpages reinforced traditional news’ perspectives and most replies decried Tasi but buttressed Han. The aforementioned provides the contextualized understanding of utilizing problematic social media accounts (socialbots) for computational propaganda in Taiwan.

Next, this study conducts the analysis of time-series observations regarding the incident that Facebook deleted hundreds of accounts violating CIB, in order to examine temporal and topical influences on inter-media agenda-setting among news media, Facebook and forums. In term of temporal analysis, Central News Agency’s (CNA) factual report started the first relevant story which was soon re-printed by newspapers’ websites (e.g., Independence Evening Post, Keng Sheng Daily News), followed by web-only news media (Yahoo Kimo News) and then TV news websites (e.g., TVBS, FTV Network). With respect to the inter-media agenda-setting, 43% of news stories were cited from CNA’s objective report by news media, Facebook and forum users. The interactive flows of stories started from news media, reposted by Facebook with news links, and then discussed by forums such as PTT’s Gossiping and Hatepolitics versions.

Observing the evolving news, four versions of updated reports were produced within 69 hours. First, after 15 hours, Apple Daily News posted a follow-up news reporting the deletion of a highly popular Han Facebook Group with screenshots, complemented by Facebook's account removal content. Waiting for another three hours, UDN news reported Han's office objecting Facebook's movement. After 38 hours, SET TV news broadcasted that Han's fanpage manager felt upset and proposed to sue Facebook. The final version of SET TV news that occurred after 69 hours, which reported that Han fans called for spamming Facebook CEO's walls for protesting. The results show that once traditional media set the agenda, many news media and social media just followed and reprinted similar stories on their websites.

Different news media holding polarized political slant report stories from distinctive political positions: pan-blue and pan-green standpoints. For instance, pro-DPP Formosa TV News reported Facebook's largest-scale, strongest cleaning movement and Han's biggest fanpage was permanently removed; yet, several pro-blue news media reported this incident and even framed it as "Green Terror" that the ruling party, DPP, controlled Facebook to suppress pro-Han speech. They framed dozen thousands of Han's fans suffering after Facebook's big movement to cut 99 pro-Han groups. The extended reports of this incident also showed different framing of Han's fans as victims of censorship or irrational political fans. Polarized news reports are likely to be cited and discussed by Facebook and forums users with political slant.

In the context of Facebook account removal, related Facebook posts outnumbered forum posts. Usually Facebook posts appeared after news, followed by PTT reposted news content with critical comments. With respect to Facebook contents, web-only media's fanpages (e.g., Yahoo Kimo News and Taro News) tend to briefly write about key facts with news links for users to comments, but Facebook groups with political inclinations provided opinionated posts that appealed to like-minded users and attracted lots of cynical and emotional responses. Examining 109 related Facebook posts, they showed similar polarized political standpoints: the pan-blue authors' core narrations focus on "green terror," "election bad trick," or "Facebook favoring certain political positions," while pan-green supporters argue "Han's abnormal online popularity," "Han's fans and Wu Mao same as China's Internet armies" or "KMT as China's proxy." Although PPT's 11 posts on Gossiping and Hatepolitics versions were derived from news stories, their posts and replies were inclined to take the pro-green and anti-Han approaches. The analyses show that as most PTT users with a strong sense of Taiwanese identity are inclined to support pro-

DPP and pan-green standpoints, they supported Facebook's proper practices to remove illegal accounts and prevent election suppression.

5. Concluding remarks

To understand Taiwanese media's framing and inter-media agenda-setting, this big data research examines how three media types (news media, Facebook and forums) represent socialbots and disinformation during 2020 Taiwan presidential election campaigns. The big data driven approach can identify crucial patterns from a huge amount of web data (Mazzocchi, 2015) without past theoretical constraints (Shih & Chai, 2016). With respect to key terms associated with socialbots, news media's high frequency phrases look similar to the accumulated dataset, while social media posts emphasize Taiwan and Internet armies and forum responses show cynical culture and diverse topics.

In the context of political campaigns and elections, sentiment analysis is useful to analyze embedded subjective emotions and attitudes towards selected issues through examining media data (D'Andrea et al., 2015; Feldman, 2013; Matalon et al., 2021). The results show that socialbot-related contents tend to show political slant and negative sentiments, regardless of media types. Sentimental socialbot-related news media reports outnumbered Facebook and forum posts, contributing more to negative narrations towards socialbot related issues. And traditional news media utilized more negative news framing than web-only media. Facebook posts present extremely polarized emotions about socialbot issues, while forums contents tended to negative and emotional, especially in their critical and cynical responses. Additionally, forum posts show high concern about problematic accounts and Internet armies.

Inter-media agenda-setting that demonstrates multidirectional effects and relations across media types was found in time-series analysis of salient socialbot event regarding Facebook's deleting illegal accounts. When analyzing the salient socialbot-related evolving discourses, the results showed that traditional news media were influential to set agendas and select framing in reporting important updated versions of reports, similar to Groshek and Clough Groshek (2013). Most web-only news echoed these key contents with minor variations, while Facebook and forums key offered digital spaces for affective discussions about news. Unfortunately the increasing number of web-only news media and social media in fact do not reflect democratized mediasphere with quality stories or diverse voices, but reinforce a few mainstream, dominant frames.

Finally, the findings reveal that inter-media agenda-setting is affected by political inclinations beheld in media organizations or users. Supposedly “objective” news reports with a gatekeeping mechanism tended to utilize negative news framing and emphasized conflicts due to their normative practices, whereas user generated contents on social media that expressed various views or polarized opinions reflected unfiltered netizens’ authentic voices affectively. Inter-media agenda-setting in a polarized media ecosystem is highly likely to reflect paralleled universe. What is worrisome, Taiwanese publics selectively expose themselves to biased news media that comply with their political preferences and reinforce personal perspectives and augment key narratives with like-minded users on Facebook and forums, which dangerously deepen the gaps in polarized politics and society.

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