# Developing Situational Awareness from Blogosphere: An Australian Case Study

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***Abstract*— Analyzing topics of interest from online discourse can be challenging. One well-known approach is to conduct topic modeling to study the topics of interest. In this paper, we use a multi-method analytical framework to analyze topics in addition to characterizing their influence. We analyze 20,066 blog posts and 10,113 comments from July 2019 through December 2020 that deal with diplomacy, defense, trade, and election related topics surrounding Australia and China. Our results show that COVID-19 discourse absorbs much of the attention of bloggers during the time period considered, even though no COVID-related keywords were incorporated in the data collection. Our findings suggest that a topic can be influential even when it is not trending and vice-versa. It also showed that Australian bloggers were dominant and discussed the topics of interest compared to Russian and US bloggers. The Australian blogosphere simultaneously discussed climate change along with defense related topics, and they prefer to give attention to long-term topics over short-term topics. Finally, popular election topics in Australian blogosphere tend to have a more analytical tone in the text.**

***Keywords-COVID-19; Australia; China; trade war; election; South China Sea; Indo pacific; influence.***

## I. INTRODUCTION

The increasing proliferation of social media provides tremendous opportunities for gaining situational awareness to assist with strategic policy making, particularly in security, defense, and foreign policy. However, social media data are often riddled with challenges such as high volume and velocity, noisy data, missing data, and incomplete data. Analysis of trending topics, influential topics, and key influencers, afford computational, systematic, and rigorous methods to study big social media data and surmount these challenges [1][2]. The benefits of identifying trending and influential content from social media are already evident: they are often discourse-movers and key indicators that are worthy of additional attention. Identifying these contents can help stakeholders to better understand the key issues and detect, analyze, and monitor new trends by focusing on content generators. Significant previous work has offered solutions but primarily focused on developing single method analysis to solve the issue of accessing relevant information [3][4]. However, by considering the nature of real-world online discourse, we argue that usage of a single method or a tool is limited and instead a multi-method integrated analytical framework can yield multifaceted information well suited for the complex objective oriented studies [5][6].

In this paper, we therefore present a framework to build an interchangeable multimethod analysis with available methods and computational tools to study relevant information or topics of interest from the targeted online discourse. We turn to the blogosphere discourse related to defense, trade, diplomacy, and elections surrounding Australia and China between July 1, 2019, to December 31, 2020 as a case study due to growing diplomatic dispute with USA at the center of the narratives [16][17]. Our research contributes to the growing body of literature on social media analytics to access core, relevant, and influential information from trending online discourse. This illustrative study offers guidelines and strategies for policy makers to identify and monitor key actors from the influential discourse and address the key concerns that may need attention.

The subsequent sections in this paper are arranged as follows. First in section II, we review prior work on natural language processing, influential blogposts, dynamic network analysis and explain how they can be employed in a complementary way tailored toward multiple facets of situational awareness information. In section III, following an overview of the data collection, we summarize how each component of our proposed pipeline maps to our blog dataset. Finally, we present the results of our integrated analysis, assessing topics and their influence trends, the narrative they spread, and their core influential bloggers in the overall online discourse in section IV. With our findings, we concretely demonstrate how our integrated multimethod analytical framework can refine trending influential topics and bloggers through gathering and triangulation of different streams of analysis. We conclude with a discussion of enhancing methodological frameworks for situational awareness information from blogs in section V.

## II. LITERATURE REVIEW

Ever-growing scholarship has studied how to monitor trending information and their influential operators with notable success. In this section, we present a review of this literature, highlighting methodologies and gaps in the current state of research on blog analysis.

Latent Dirichlet Allocation (LDA) is a probabilistic generative model that is used to extract topics from a corpus of text documents. While other distributional semantic models can be used to learn latent features from text, the latent features, or topics, that LDA learns tend to be more interpretable by humans than other methods. The topics are

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represented as probability distributions over words, since the topics that LDA learns are in the form of probability distributions over the vocabulary of a corpus, reflecting the probability of each word within each topic [7]. Other topic models have been proposed that capture how the topics are spread out in corpus by extracting key information relevant to time of interest [8].

However, even if the dominant or main topics are trending in the blogosphere during a certain period it is not necessary that they are also influential. Researchers have formulated influence as a factor of four parameters: *Recognition, Activity generation, Novelty,* and *Eloquence* [9]. A topic may become influential when a blogger posts content that attracts participation and recognition. Identification of influential topics is therefore important to our multimethod approach.

Finally, we are also interested in the bloggers that posted influential content and asking if they share the same interest in different topics. Influential bloggers prefer to join forces and work in closely interconnected networks. They build their own interest groups, where they gather support, initiate socio-political discussions, and spread awareness [1]. We leverage previously published work to identify a network of core users from online information operations using Organization Risk Analyzer (ORA) [10]. ORA enables analysis of multi-modal networks to shed light on the core influential bloggers that participated in multiple topics.

In this paper, we demonstrate that our multimethod analysis pipeline can provide comprehensive and relevant insights on influential trending topics and users from the topics of interest in the blogosphere. Past studies have shown how accessing situational awareness information requires a multimethod analysis model for comprehensive insights [11][12]. Our proposed framework consists of a multimethod analysis using topic modeling and influence analysis in parallel to discover key insights from blog data.

## III. METHODOLOGY

In this section, we describe the data used for the study and our research methodology.

### A. Data Collection

We collected the data using a set of keywords provided by subject matter experts at the University of Sydney and Australian Department of Defense. Relevant keywords were identified by an iterative cycle of studying coverage related to diplomatic, defense, trade, and election news between Australia and China. News coverage was reviewed from a sample of news articles published between January 1 and April 30 of 2020, which constituted the first step of the search string. Further reviews of the coverage provided additional keywords to enhance the inclusiveness. The finalized set of keywords used in the study were *'Australia', 'China', 'South China Sea', 'Military Region', 'Fight', 'Tensions', 'Election', 'India' 'Road Belt Initiative', 'Thai', 'Defence' 'Defense' 'Indo pacific', 'Asia Pacific'*.

We then deployed an in-house custom web crawler that invokes Google Custom Search API to collect the URLs that have the required keywords in their articles [13]. Since this study focuses on blogs, we initially targeted the sites known to host blogs, such as blogpost.com, wordpress.com and livejournal.com. We then deployed the crawler on blogrolls obtained from these platforms to target sites that are outside the initial searched domains.

We collected data for 18 months starting from July 1, 2019, to December 31, 2020, and curated 20,066 relevant blog posts in total. We found that the data set yielded many COVID-19 related articles, which in turn skewed away our analysis from the topic of interest. Therefore, we divided the data into two groups to study the effect of COVID-19 over the blog discourse separately: 1) a dataset including all 20,066 blog posts (i.e., All data) and 2) a dataset that excludes any COVID-19 related data (i.e., No COVID data), consisting of 10,113 blog posts. We performed a trial-and-error method to identify required COVID-19 related terms in 'All data' and used the following keywords *'+Australia -(covid covid-19 coronavirus pandemic vaccine)'* to exclude the related posts.

Table I shows the high-level statistics. The data is available for public use through the BlogTracker application [14][15].

TABLE I. BLOG DATA STATISTICS

| Data elements | All data | No COVID data |
|---|---|---|
| Total posts | 20,066 | 10,113 |
| Total blog domains | 679 | 344 |
| Total blog authors | 4,217 | 2,494 |
| Comments | 417,050 | 84,798 |

### B. Topic modeling

In order to identify the primary themes of the blog posts, we trained two LDA models. One model was trained on the All data set and a second model was trained on the No COVID data set. Prior to model training, basic preprocessing was performed on the text including the removal of stop-words and punctuation. Each model was specified to have five topics. After training, we interpreted the five topics in each data set based on the highest-probability words in each and by reading exemplar blog posts for each topic.

### C. Influence

Influence of a blogpost can be visualized as an influence graph or i-graph, where influence flows through the nodes for any given blogpost and each node of a single blogpost in an i-graph is characterized by four variables: 1) Recognition (number of in-links, represented by ι), 2) Activity generation (number of comments, represented by $\gamma$), 3) Novelty (number of outlinks, represented by $\theta$), and 4) Eloquence (length of the blogpost, represented by λ) [9]. In a directed i-graph, if $f(x)$ denotes the influence flow of a blogpost $x$

with $I$ being the influence of $x$. The influence of each blogpost $I(x)$, can be calculated as

$$I(x) = w(\lambda) \times \left( w_{com}\gamma_x + f(x) \right) \quad (1)$$

where $w(\lambda)$ represents the weight of the blogpost length and $w_{com}\gamma_x$ represents the weight of the total number of comments from blogpost $x$. $f(x)$ is defined as

$$f(x) = w_{in} \sum_{m=1}^{|\iota|} I(x_m) - w_{out} \sum_{n=1}^{|\theta|} I(x_n) \quad (2)$$

where $w_{in}$ and $w_{out}$ are the weights of the incoming and outgoing influence, $x_m$ is the number of incoming links to blogpost $x$, and $x_n$ is the number of outgoing links of $x$. The total number of inlinks and outlinks of $x$ are denoted by $|\iota|$ and $|\theta|$ respectively.

As defined in (2), $f(x)$ measures the difference between total incoming links and total outgoing links of blogpost $x$. We calculated these four variables from the collected blogposts and calculated the influence of each post as defined in (1). We then mapped the influence scores to the respective topics to generate influence trends for each topic. To do so, we multiplied the influence score *I(x)* of each blogpost with the topic density (*p*) score of each blogpost *p*(topic|blogpost).

$$m(x) = I(x) \times p(topic|blogpost) \quad (3)$$

where, $m(x)$ is the product value for each blogpost. Next, we calculated the mean $m(x,t)$ of each topic for all posts during a given time-period $(t)$ to get the average influence of each topic.

In the next section, we explain our results in the following sequence:

- Conduct topic modeling to identify themes and trends of the discourse in blogosphere qualitatively.
- Assess influence of the identified topics over the period.
- Extracted network of closely connected bloggers from the identified topics and their influence scores to evaluate their interest in various topics.

## IV. RESULTS

The highest probability words in the five topics trained on All Data can be seen in Table II. Topics 0, 1, and 2 primarily focuses on Australia and China, whereas topics 3 and 4 focuses on COVID-19 and USA politics, accounting for 44% of the posts. Similarly, the highest probability words from the five topics learned from the No COVID dataset are given in Table III. Our following results focus only on topics relevant to our interests.

### A. South China Sea, China, Australia, USA, Defense tension

Discourse in this theme focuses on topics such as the Quad alliance [16] and New Silk Road [17]. Content from topic 2 is a crossover between Quad alliance and climate change issues. It discusses Quad by embedding it in a broader context related to Pacific Island foreign policies. Many of these posts simply described the ongoing activities in the South China Sea and Indo-Pacific region. Others were divided based on their stance and opinions on China's actions in the South China Sea and Indo-Pacific region. We observed there were five types of blogposts in this theme: 1) Pro-Australia 2) Pro-China 3) Military and Technology 4) Critical towards Australia government 5) News carrier. Topic 1 from 'All Data' and topic 3 from 'No COVID data' maintained a low profile in 2019 (see Figures 3 and 4) and were not very influential even though these topics were trending in 2019 (see Figures 1 and 2). In other words, bloggers may be actively posting or publishing blogs on certain topics but may not gain enough traction to trigger the required influence parameters [9]. We observe the opposite scenario with topic 2 in 2019, which further indicates that a topic can be influential without trending.

TABLE II. LDA TOPICS FROM 'ALL DATA'

| |
|---|
| **Topic 1.** china, chinese, military, india, war, states, security, power, trump, united |
| **Topic 4.** covid, vaccine, health, coronavirus, virus, cases, pandemic, public, deaths, care |
| **Topic 2.** climate, global, market, trade, energy, economics, china, change, australian |
| **Topic 3.** trump, see, america, great, biden, news, get, html, video, know |
| **Topic 0.** election, party, vote, policy, bank, zealand, voters, per, labor, think |

TABLE III. LDA TOPICS FROM 'NO COVID DATA'

| |
|---|
| **Topic 3.** china, chinese, states, war, government, military, power, united, may, use |
| **Topic 0.** women, get, much, life, well, made, see, way, back, know |
| **Topic 1.** government, australian, china, state, climate, media, per, much, news, change |
| **Topic 2.** china, australian, india, south, water, sea, government, pacific, country, fire |
| **Topic 4.** party, government, election, vote, labor, australian, votes, parties, preferences, candidates |

Most of the influential content were produced in May, November, and December of 2020. In May 2020, blogposts extensively published about the Hong Kong protests regarding security law and raised concerns about a possible exodus of Hongkongers to Australia, New Zealand,

Malaysia, or Taiwan. In November 2020, influential blogposts mocked the Australian Elite Special Forces in the killing of Afghans. We noticed much of this influential content was posted by Russian bloggers. In December 2020, influential content expressed disdain for participants in the Quad exercise such as Japan and Australia and suggested they will denigrate the relation with Pacific Islanders.

TABLE IV. MAPPING TOPIC THEMES BETWEEN 'ALL DATA' AND 'NO COVID DATA'

| Theme of the topic | All data | No COVID data | Sample blogposts |
|---|---|---|---|
| **A.** South China Sea, China, Australia, USA, Defense tension | Topic 1 | Topic 2, Topic 3 | *'Beijing's Hong Kong plans may lead to an exodus, and Australia must be ready'. 'huh, fuck the quad'. 'The massive, systemic and grave crimes committed over the years by fighters of Australian elite'. 'Singapore-Australia exercise activities involves Singapore's F-15SGs'.* |
| **B.** Climate change, Economy, and Trade | Topic 2 | Topic 1, Topic 2 | *'Too much fuel causes extreme bush fires, not climate change'.* |
| **C.** Federal and Regional elections in Australia | Topic 0 | Topic 4 | *'Scott Morrison is up two on approval to 66% and down two on disapproval to 30%, while Anthony Albanese is up one to 44% and up two to 41%, with Morrison's lead as preferred prime minister out from 58-29 to 60-28'* |

## B. Climate change, Economy and Trade

Most of the content in this theme were produced during Australia's bushfire incident in January 2020 and trade tension from April through December of 2020. We found blogposts on bushfires to engage in climate change denial and conspiracy theories. Influential blogposts in both periods were largely limited to climate change and renewable energies, discussed by the Australian blogosphere even though Australia experienced a recession for the first time in 2020 after nearly thirty years [18] and experienced a trade war with China [19]. The only influential conversation on trade war occurred in topic 1 in December 2020, and content during this period criticized the Australian government for its trade relations towards China. It appeared the online public-sphere preferred discussion on climate change over the economy and trade war. This reinforces findings from previous studies that the Australian blogosphere considers certain topics as long-term and short-term issues [20]. In this case, climate change is a long-term issue, and the economy and trade war are short-term issues.

## C. Federal and Regional elections in Australia

The Australian election theme appeared to trend low compared to the rest of the topics (see Figures 1 and 2). However, it was influential in both 2019 and 2020. In 2019, the discourse was primarily about the labor party defeat in the May 2019 election including discussions about political studies on the election. The aim of these discussions was to identify why the Labor party failed to appeal to the Australian public with extensive analysis. A possible explanation for these influential topics is that readers prefer comprehensive analysis from blogs. In November 2020, influential content (see Figures 3 and 4) discussed the Queensland election and included articles that compared the candidates from various parties based on the policies they support and the likelihood of their win. We also found blogposts with live election updates were less influential than the blogposts that provide analysis on election news.

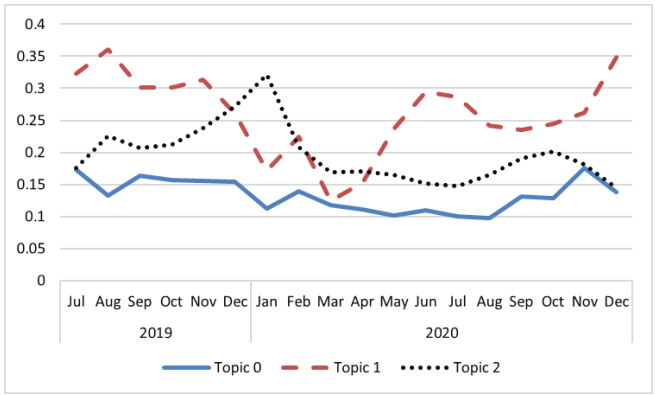


Figure 1. Blogpost topics trends from 'All data'.

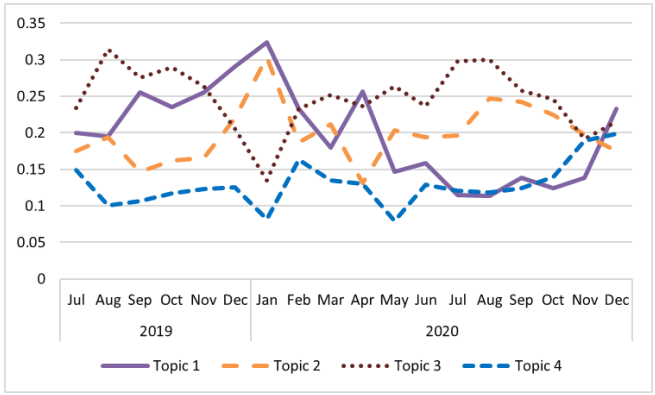


Figure 2. Blogpost topics trends from 'No COVID data'.

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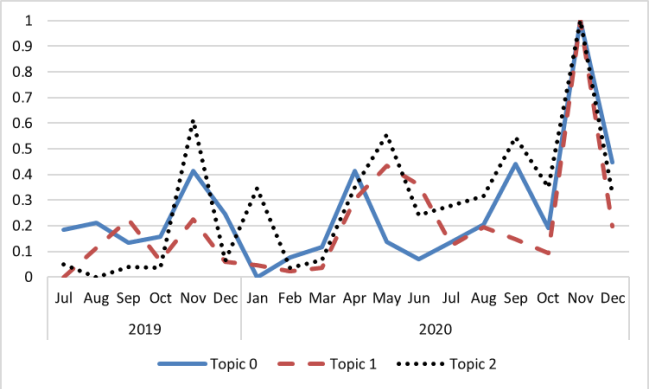



Figure 3. Influence of blogpost topics from 'All data'.

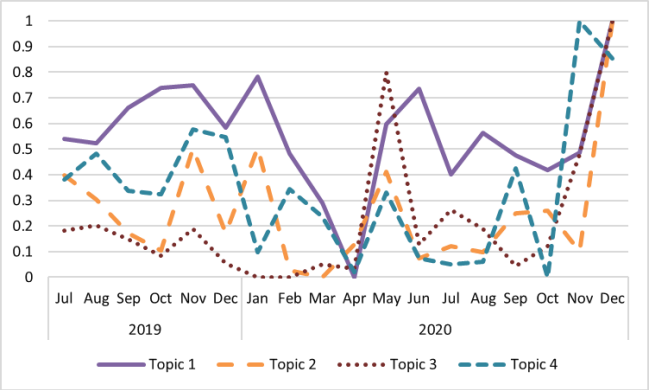



Figure 4. Influence of blogpost topics from 'No COVID data'.

### *D. Topics and Blogger Network*

A network analysis of the top bloggers and their usage of topics provides insights on which bloggers share interest in the same topics. Figure 5 depicts the clusters of bloggers in each topic and network shows the bloggers who blogged in five topics from 'All data'. Similarly, Figure 6 network shows the bloggers and the topics they belong to in 'No COVID data'. We found both topics 1 and 2 from 'All data' and topics 3 and 1 from 'No COVID data' appeared to have a large number of bloggers in their respective networks, indicating a good number of bloggers in both data discussed diplomacy, defense, and trade related topics. However, the cluster of bloggers in the election's topic were comparatively less in both data groups aligning with our findings related to theme 'c' that not many bloggers were active in the election related topic and therefore produced a smaller number of blogposts compared to other topics.

Networks from both groups also show a cluster of bloggers in the center of the network who contributed to multiple topics, indicating that the core bloggers actively participated in all five topics. We wanted to examine the influence of these core bloggers and extracted them by folding the networks based on top valued links. In Figure 7(a) network shows two bloggers contributed to multiple topics from 'All data' based on their edge color. Black nodes represent bloggers, while orange edges represent four topics and red edges represent five topics. Similarly, 7(b) from 'No COVID data' shows the connection between two bloggers in three topics, four topics and five topics, where the edges is blue, green and red.

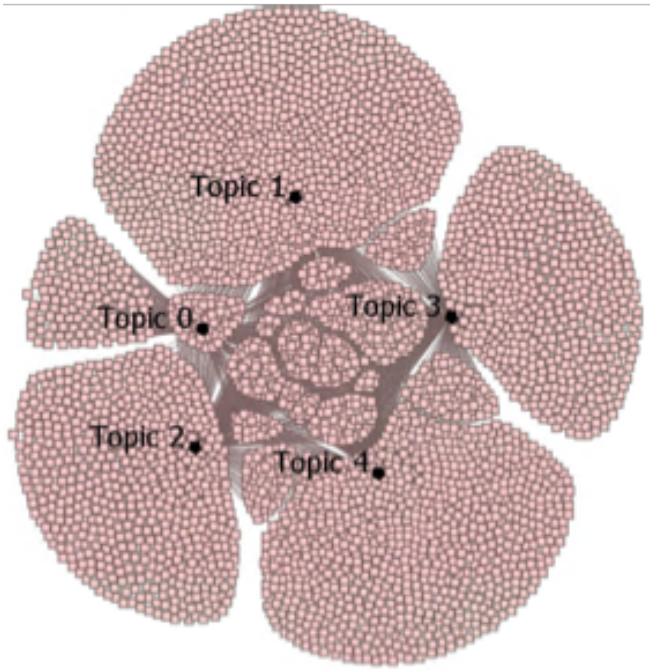



Figure 5. Topics and Blogger network from 'All data'

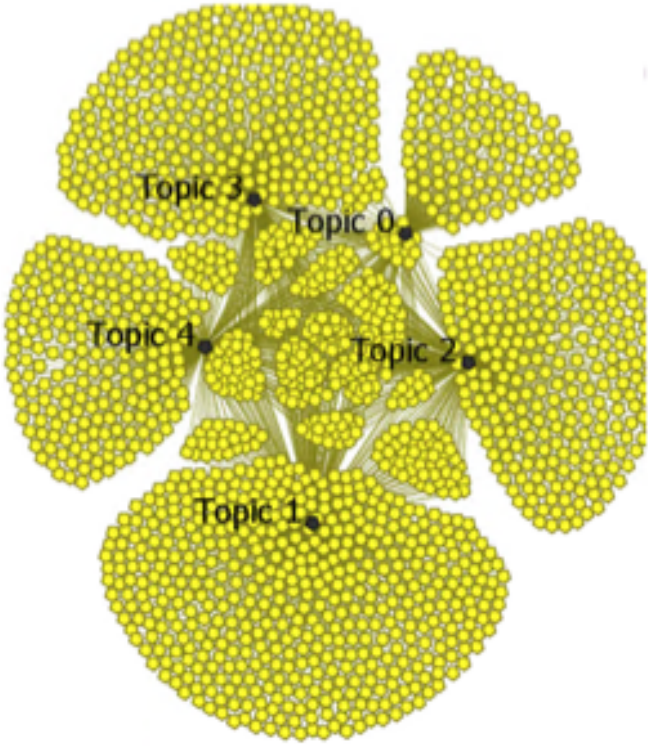
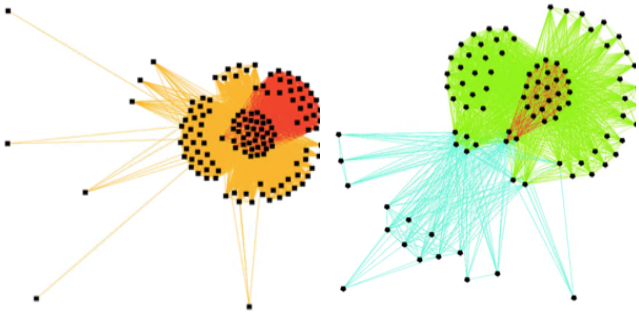



Figure 6. Topics and Blogger network from 'No COVID data'



(a) (b)

Figure 7. Folded Topics and Blogger network from 'All data'(a) and 'No COVID data' (b)

In Table V, we present core bloggers and their cumulative influence score in each group.

TABLE V. CORE BLOGGERS AND THEIR INFLUENCE SCORE

| **'All Data'** | | |
|---|---|---|
| *Blog* | *Blogger* | *Influence score* |
| catallaxyfiles.com | Sinclair Davidson | 11100.6 |
| catallaxyfiles.com | currencylad | 5260.5 |
| theaimn.com | The AIM Network | 4151.4 |
| quadrant.org.au | quadrant | 1566.5 |
| catallaxyfiles.com | Guest Author | 1536.6 |
| theaimn.com | Dr Binoy Kampmark | 1488.3 |
| pngattitude.com | Keith Jackson | 198.6 |
| crikey.com.au | Charlie Lewis | 6.6 |
| **'No COVID data'** | | |
| *Blog* | *Blogger* | *Influence score* |
| zerohedge.com | Tyler Durden | 23678.7 |
| catallaxyfiles.com | currencylad | 2560.5 |
| theaimn.com | The AIM Network | 1925 |
| crikey.com.au | John Quiggin | 753.9 |
| quadrant.org.au | quadrant | 613.5 |
| theaimn.com | Dr Binoy Kampmark | 553.8 |

We found highly influential core bloggers in both groups who participated in multiple topics belongs to Australian blogosphere.

## V. CONCLUSION & FUTURE WORK

In this research, our multi-faceted integrated analysis offers a multidimensional view on blog discourse surrounding Australian defense related topics. Our analysis provides several useful insights. We determined the Australian bloggers were the major discourse movers and produced trending, influential content on defense and climate change related topics. These bloggers' opinions and stance on defense related topics were mostly pro-Australia and disapproved of China's military activities in the South China Sea. Additionally, we identified climate change content largely in denial of climate change and espousing conspiracy theories around renewable energy.

We observed that, even though a topic was trending at a certain period, it was not necessarily influential at the same time. We also captured the behavior pattern of the Australian blogosphere during election that influential content tends to have analytical tone. Additionally, we found that COVID-19 was influential only for a short period of time in the blogosphere despite it being a global health crisis. Further, COVID-19 topic did not gain much traction in the blog discourse compared to the defense and climate change topics. This may indicate that the blogosphere considers COVID-19 as a short-term issue and defense and climate change topics as long-term issues. This observation can be investigated in future work to study bloggers' preferences. Addition, exploration can be done to see whether there is harmonization over transcontinental social communities, in terms of "igniters", "followers", and "passive consumers" that can help various governmental or security agencies to monitor key influencers. Further, an in-depth analysis of the relationship between topical trends and their influence is warranted based on the findings.

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