

Assessing Situation Awareness through Blogosphere: A Case Study on Venezuelan Socio-Political Crisis and the Migrant Influx

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Abstract—The objective of this research is to determine whether the blogosphere, as a type of social media platform, can be used to disseminate information regarding the socio-political views and concerns of citizens within a community. As an example case, we focus on examining information relative to the Venezuelan community regarding the current Venezuelan socio-economic crisis. Are Venezuelan blogs being used to express quality of life concerns that are associated with the crisis? Are Venezuelans using blogs to discuss possible migration away from the region as a result of these concerns? The Blogtrackers tool was used to analyze almost 30,000 Venezuelan blog posts collected between August 2003 and March 2017. Our analysis showed that the blogosphere is indeed being used as a platform for citizens to discuss these issues. We show how the posting frequency, sentiment, and keyword trends have changed over time relative to the changes in the socio-political landscape of the region. Of particular interest is the keyword trend analysis that shows that blogs are being used to discuss issues associated with quality of life factors and interest in migration away from Venezuela as a result of the crisis. We believe that this study can be used as a starting point to show the value of analyzing blogs in facilitating humanitarian assistance efforts.

Keywords—*blogosphere; situation awareness; socio-political; social media data analysis; migrant influx.*

I. INTRODUCTION

Social media platforms, such as Twitter, Facebook, YouTube, and blogs have changed the way citizens express and share their sentiments regarding socio-political situations within their communities, and have created a space for citizen journalism [14]. These new mediums of communication have also allowed for citizen sentiment to be channelized from the online forum to the streets in the form of public debates and protests. Tufekci and Wilson [27], for example, demonstrated that participation in protests, both before and on the first day of the Tahrir Square demonstrations was elicited by information that citizens posted on blogs, Facebook, and Twitter.

A blog is a “personalized webpage, kept by the author in reverse chronological diary form” [10]. Blogs give people a social identity and are a medium for association, self-expression, and dissemination of information [30]. Blogs can be a very effective way to gain an in-depth understanding of issues and events due to the fact that recording, revisiting, and reflecting on the past is possible through previous blog

entries. The ability for readers to leave comments in an interactive environment is an important part of blogging.

Blogs serve as an interactive platform for information exchange and discussion, and provide useful information about events. [2] Blogs serve as a way for citizens to gain situational awareness of the socio-political landscape of their environment, and data experts who track and analyze blogs can gain an understanding of the perspectives and intentions that exist among citizens. In this paper, the Blogtrackers tool [35] was used to analyze a large dataset of Venezuelan blogs to determine whether the blogosphere is being used to disseminate information about issues stemming from the Venezuelan socio-economic crisis, and, if so, how this content is changing over time. This information is particularly helpful for emergency responders, and policy and decision makers leading humanitarian assistance efforts.

The rest of this paper is organized as follows. Section II reviews the currently published literature regarding citizen use of social media platforms relative to the attainment of situational awareness of socio-political issues. Section III explains the methodology used such as the data collection process and the Blogtrackers tool. Section IV provides a discussion of the data analysis results. Section V concludes the study outlining future research directions.

II. LITERATURE REVIEW

Next, we present a review of the literature relevant to this research.

A. Informational Power of Social Media Platforms

Many sources highlight the power of Social Media Platforms such as blogs, Twitter, Facebook and YouTube to be effective tools for allowing citizens to engage in socio-political scenarios such as obtaining information, disseminating information, participating in socio-political discussions, and becoming mobilized to act or to participate in impactful events [1][7][9][15][18][20][26][28][29]. Additionally, some sources focus on or add that the effectiveness of social media platforms as informational and motivational tools can be leveraged by organizations for crisis management and emergency response [6][7][18][21][22][29][31][33]. Much of the literature highlights the power of social media platforms by using the example of the 2010 protests in Egypt, followed by an Egyptian Revolution in 2011, wherein the public used social media to communicate their dissatisfaction with socio-political issues such as

poverty, unemployment, corruption, high prices, repression, and human rights abuse [1][3][9][15][18][32].

B. *New Media Versus Traditional Media*

Many sources refer to Social Media Platforms as “New Media” [1][19][26], “Participatory Media” [9][17], and “Modern Information and Communication Technologies (ICTs)” [1][3][26][32], and draw a contrast with “Traditional Media” platforms such as television, newspaper, and radio (especially state-controlled traditional media) [1][3][9][17][18][19][26][28]. Valentini et al. [28]. showed that crises tend to be communicated or framed differently within the writings of new media (specifically blogs) than they are within the writings of traditional media. Some sources contend that citizens are increasingly using social media sites for obtaining and disseminating socio-political information due to the perceived or real incompetence of or censoring by state-owned media outlets [1][3][19].

C. *A Focus on the Blogosphere*

A small pool of sources focuses specifically on blogs as a means for obtaining and disseminating socio-political information [3][5][26][28]. The number of blogs has been said to double every five months; they are easily found and can be accessed freely by anyone with an internet connection [26]. Al-Ani et al. [3] highlighted the power blogs played in mobilizing citizens during the Egyptian revolution of early 2011. Blogs represent a “counter-narrative” to the government-controlled media especially during times of crisis, and provide a means to voice dissent and to challenge authoritative power [3]. Blogs provide a means to potentially develop and maintain a strong sense of community among citizens interested in certain themed topics [5]. Additionally, blogs often-times represent “citizen-based news sources” that challenge traditional media in terms of the ability to form public opinion [28]. The information posted on blogs and the commentary reactions to the posts, therefore, have become of increasing interest to social media researchers.

D. *Cybersecurity Issues*

Some sources highlight the potential cybersecurity issues related to the use of social media platforms for spreading situational awareness in terms of socio-political issues [12][17][18]. Fearn [12] warns that “cybercriminals” are increasingly using programs called “bots” to attack social media users via Twitter, Facebook, and YouTube with negative comments and to spread disinformation or fake news via these platforms. Since the blogosphere is also a social media platform, the potential for bots to be used nefariously by bots can be argued [17]. Goolsby et al. [17] also argue that social media can be used to broadcast “hoax messages”, which can “hide among the stream of natural messages and be accepted...”.

E. *Methodologies for Analyzing Blog Data*

A review of the literature shows a variety of methodologies for conducting data analysis on blog data. Al-Ani et al. [3] utilized the technique of topic modeling on blog data to ascertain how blog topics changed over time between

2004 and 2011. The topic modeling technique revealed time-specific themes in the blog data that could then be compared with public events and citizen actions such as protests [3]. Berendt et al. [5] used text and graph mining to analyze blog data. The text mining revealed the word themes in the data; whereas the graph mining exposed the connections between the bloggers in terms of their use of these words/themes [5]. In addition to longitudinal content analysis, Valentini et al. [28] applied sentiment analysis to blog data wherein they attempted to assign the sentiment values of neutral, positive, or negative to each blog post. Their analysis revealed interesting time-relevant topics and associated sentiments, such as a strong lack of trust in public and private governing entities surrounding political issues [28].

F. *Migration Potential Resulting from Socio-Political Crisis?*

Google [16] created an interactive data visualization for tracking the interest in migrating to various countries of destination from specific countries of origin. Of particular interest is the data visualization showing a ranking of 1 to 211 based on user search counts about migrating to the United States from within a particular country. For example, Venezuela is “ranked 105 out of 211 countries for Google searches for immigration to the United States from 2014-2015” [16]. According to numerous sources, Venezuelans are protesting against their government due to such reasons as unemployment or low income, lack of access to basic needs such as food and medicine for themselves and their children, and political corruption [13][18][23]. Although the Google search data visualizations [16] precludes many of the Venezuelan issues that have been recently reported, one can still ask the question of whether or not there is potential for Venezuelans to migrate away from the many problems that they have been experiencing in their specific socio-political crisis? An analysis of numerous active Venezuelan-specific blogs was conducted to provide some insights.

III. METHODOLOGY

Next, we present our proposed methodology.

A. *Data Collection, Cleaning, and Indexing*

Using the Blogtrackers tool, three steps were executed in order to crawl and collect the data from an identified set of Venezuelan blogs: (1) exploring the blog site, (2) crawling the blog site, and (3) cleaning and storing the data in a database for analysis and retrieval (Fig. 1). Hussain et al. provide a detailed explanation of the mechanics of the Blogtrackers tool in “Analyzing the Voices during European Migrant Crisis in Blogosphere” [34].

1) *Exploring the blog site:* Several blog sites were identified that specifically discussed issues relevant to Venezuela. Subsequently, each site was explored to determine whether their structure was ideal for use with the Blogtrackers tool. It was also important that the blog continually be focused on Venezuelan topics and contain

specific meta-data attributes for each post such as author, title, and date.

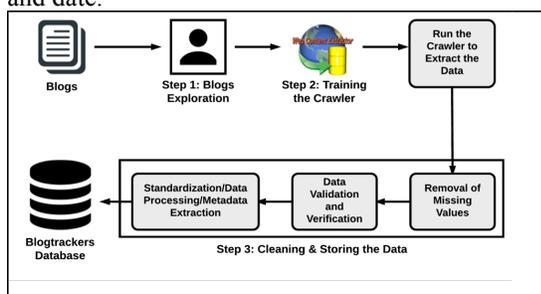


Figure 1. Data collection process.

2) *Crawling the data:* The Web Content Extractor (WCE) tool [36] (Fig. 2) was then used to collect data from each blog site. Once the crawler is set up, the tool begins from a set of seed URLs—the blog sites’ home pages—and advances through each blog post to extract all of the desired attributes.

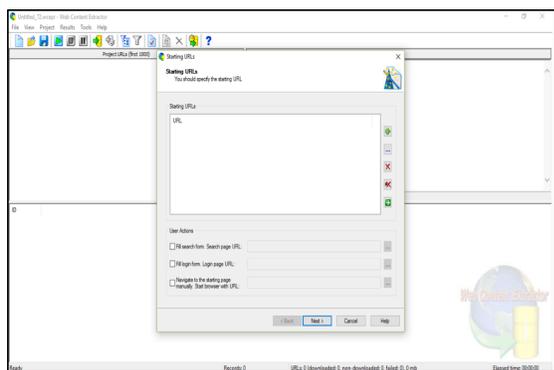


Figure 2. Web Content Extractor.

3) *Cleaning and Storing the Data:* A three-step cleaning process was used. (1) Clean from within WCE by deleting empty fields and advertisement URLs. (2) Clean with SQL queries to select validated and verified data. (3) Clean with a script to standardize attributes, extract metadata, sentiments, and outbound URLs.

B. Analyzing the Data with Blogtrackers

Blogtrackers is a tool designed to explore the blogosphere and gain insights about events and how these events are perceived in the blogging community [25]. After setting up a Venezuelan blog tracker, five features of the Blogtrackers tool were used to analyze the resultant dataset.

1) Posting Frequency

The “Posting Frequency” feature was utilized to identify any unusual patterns in the blog postings. This aids in detecting real-time events that interested the blogging community. The user can click on any data point on the graph to get a detailed list of the named-entities mentioned in blog posts during that time-period. This feature also displays a list of active bloggers with number of posts. Fig. 3 shows

the posting frequency for Venezuelan blogs from 2003 to 2017.

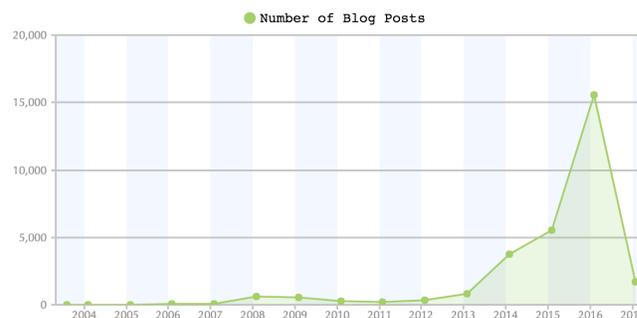


Figure 3. Change in Venezuelan blog posting trends from 2003 to 2017.

2) Keyword Trends

The “Keyword Trends” feature was used to provide an overall trend for keywords of interest. It helps track changes in topics of interest in the blogging community. The user can select any data point on the trendline to view all the blogs and a network of co-occurring named-entities. Fig. 4 shows the keyword trends related to the ongoing Venezuelan socio-political crisis.



Figure 4. Trends for keywords “Venezuela”, “Maduro”, “America” and “Economic crisis” for 2016.

3) Sentiments and Tonality

The “Sentiments and Tonality” feature was used to display the trend of positive and negative sentiments of blogs for a selected time-period (Fig. 5).

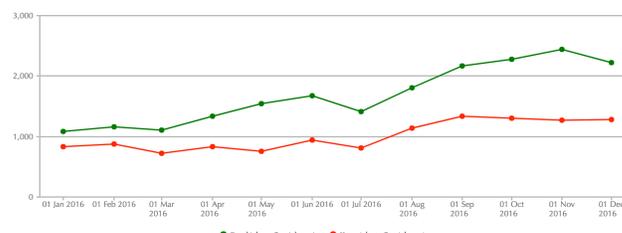


Figure 5. Venezuelan blog sentiment trends for 2016.

The sentiment and tonality features used were as defined by Pennebaker et al. [37][38] and as calculated by the Linguistic Inquiry and Word Count (LIWC) software [39]. Additionally, a data analyst can drill down by clicking on any point of interest and view radar charts (Fig. 6), which display tonality attributes such as personal concerns, time orientation, core drives, and cognitive process.



Figure 6. Tonality of two random Venezuelan blog posts.

4) Influence

The “Influence” feature was used to identify the influence of a blogger or post. Agarwal et al. discussed the concept of *influence* with regard to bloggers [2]. The “Influence” feature of the Blogtrackers tool can display the influence trends over time for the top 5 influential bloggers (Fig. 7). Clicking on a point on the trend line allows a deeper dive into the data by displaying the most influential posts for that period. Additionally, a user can explore the content themes of active-influential, inactive-influential, active-non influential, and inactive-non influential bloggers.

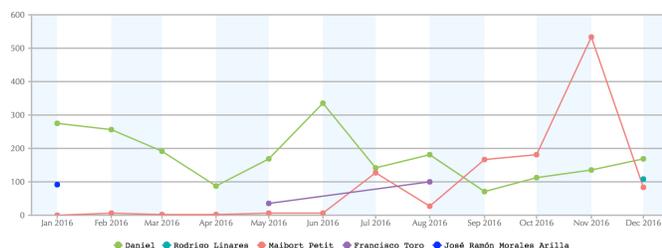


Figure 7. Influence trend for top 5 bloggers for 2016.

5) Additional Blog Info

The “Additional Blog Info” feature was used to provide additional information about a specific blog. A dashboard-like screen is presented to the user, revealing the posting trends and sentiments of the selected blogs, as well as a list of the underlying URLs and domains. Fig. 8 shows this feature being used to look at a specific blog from the database called, “Caracas Chronicles”. At a glance, we can see some interesting things about this particular blog; such as, it is most active on Monday’s; it was most active during the month of February in 2014, December in 2015, and

April in 2016; and more negative sentiment in 2016 than in 2015.



Figure 8. “Additional Blog Info” Blogtrackers feature for selected Venezuelan blog.

IV. DISCUSSION

Next, we present the discussion of the results.

A. Venezuelan Blog Database

To assess whether Venezuelan blogs were discussing issues related to the economic crisis in Venezuela, 40 blog sites were identified. The blogs were found using simple manual search techniques on various platforms, such as google.com, blogsearchengine.org, and fastblogfinder.com. The blogs were reviewed by our research team to ensure that they fit the structure required by the Web Content Extractor and the Blogtrackers tool. A final dataset of 29,493 blog posts was obtained between August 27, 2003 and March 26, 2017. A total of 177,870 links were extracted (120,296 being distinct links) from 13,590 domains and 749,829 entities. The post sentiments were also extracted. Table 1 gives the language distribution for this dataset.

TABLE 1. LANGUAGE STATISTICS

Language	Blogs	Blog Posts
Spanish	23	16,916
English	29	12,490
Italian	3	51
French	3	3
Portuguese	2	2
German	1	2
Breton	1	1
Catalan	1	1
Polish	1	1

B. Posting Frequency of Venezuelan Blogs

Fig. 9 shows a more detailed view of blog posting frequency from January 2015 to March 2017, which indicates a continuous increase. Specifically, blogging activity increased drastically between March 2016 and January 2017. This increase corresponds to news reports of hundreds of thousands of people beginning to take to the streets in protest during early September of 2016 [8].

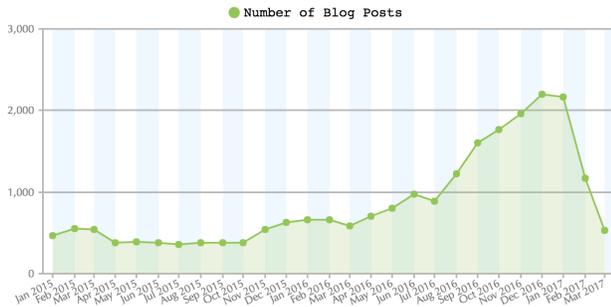


Figure 9. Change in Venezuelan blog posting frequency from January 2015 to May 2017.

C. Keyword Trendlines for Venezuelan Blog

To further assess the extent of the impact of the crisis on Venezuelan citizens, the dataset was searched for quality of life keywords such as “need food”, “need water”, “need petrol”, “need medicine”, “high prices”, and “inflation”. The resultant keyword trendlines indicated that the occurrence of these quality of life factors fluctuated over time (Fig. 10).



Figure 10. English keyword trendlines for various quality of life keywords over time.

Trendlines for the Spanish equivalents for these quality of life keywords were also generated (Fig. 11). For example, similar to the increase in blog posting frequency, the quality of life keywords trends figures each show a large increase in frequency beginning near early September of 2016 [8][4].



Figure 11. Spanish keyword trendlines for various quality of life keywords over time.

These quality of life keywords may represent a set of motivational factors leading to an interest in Venezuelan citizens migrating away from Venezuela. To explore this suggestion, we generated several trendlines for keywords such as “immigrate”, “migrate”, “emigrate”, and “leave Venezuela” (Fig. 12). The frequency of occurrence of the keyword, “leave Venezuela” seems to drastically increase between the end of 2015 and beginning of 2016.

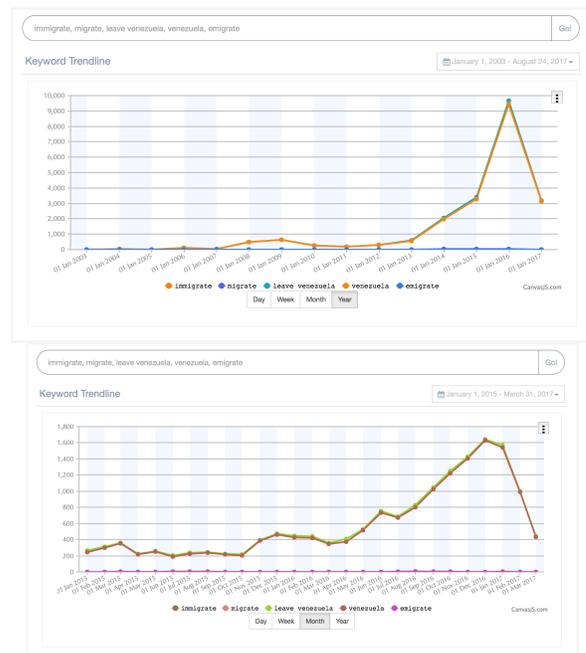


Figure 12. English Keyword Trendlines for various keywords that possibly indicate migration interest over time.

Trendlines for the Spanish equivalents for these migration keywords were also generated (Fig. 13). It was revealed that the keywords “leave Venezuela” and “Venezuela” were almost identical, indicating that every time Venezuela was mentioned it was about leaving or migrating from Venezuela. As with the quality of life indicators, these migration-related keywords trends figures show a large increase in their frequency beginning in 2016, especially near early September.

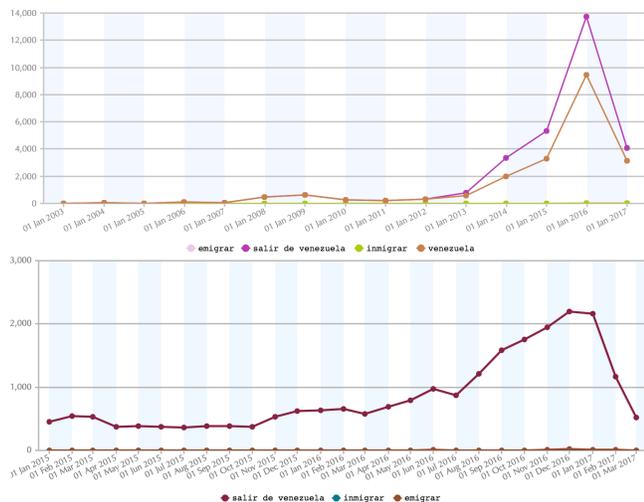


Figure 13. Spanish Keyword Trendlines for various keywords that possibly indicate migration interest over time.

D. Timeline of Sentiments Among the Venezuelan Blogs

Recall that Fig. 5 shows the prevailing sentiment of the blogs for a specific time period. Fig. 14 provides a more detailed and various view of how the sentiment of the Venezuelan blogs has changed over time. The graphical output appears to show a sharp shift to a prevailing positive sentiment in early January 2016. This could correspond to the Venezuelan leader, Nicholas Maduro, declaring a 60-day economic emergency for the region in order to give himself power “to pay for welfare services and food imports” [4]. Subsequently, however—and although many blog posts were identified as having a negative sentiment—the prevailing sentiment of the blogs has been positive for the past two years. This prevailing positive sentiment seems counterintuitive, as we expected to see a prevailing negative sentiment due to the ongoing Venezuelan economic crisis and continued reports of Venezuelan citizens protesting in the streets. Therefore, we believe that the concept of sentiment with regard to this dataset needs to be addressed further in future work involving a more detailed dataset and a possible revision of how sentiment is calculated. Consequently, for this paper, we can only conclude that the graphical output at this time does not seem to reveal any significant differences over time, and appears to only fluctuate along with the recorded count of blog posts.



Figure 14. Change in sentiment of Venezuelan blogs over time.

E. Tonality of Venezuelan Blogs

Recall that Fig. 6 displays the feature of Blogtrackers that shows tonality attributes of individual blog posts. For example, for two random Venezuelan blog posts in our dataset, the predominant personal concerns were “Work” and “Money”. The predominant time orientation was “Present focus”. The predominant attribute for core drives and needs was “Power” (and to a lesser extent “Achievement”). The predominant cognitive process was not as clear, varying among that of “Differentiation”, “Tentativeness”, and “Cause”. The predominant summary variable was “Analytical Thinking”. Finally, the predominant sentiment/emotion for this timeframe was “Anger”. We did not analyze the tonality feature further for this paper, but believe that the concept within the blogosphere should be examined in future work.

F. Influential Venezuelan Bloggers

Recall that Fig. 7 shows the top 5 influential bloggers for a specified time period. Blogtrackers calculates influence based on the blog characteristics of inlinks, outlinks,

comment quality, and blog post content quality [25]. Fig. 15 is another example of the feature, using January 2015 to March 2017 as the selected time-period of analysis. One blogger, “Daniel”, was consistently more influential than other bloggers. We did not analyze this feature further for this paper, but believe that the concept of influence within the blogosphere should be examined in future work.

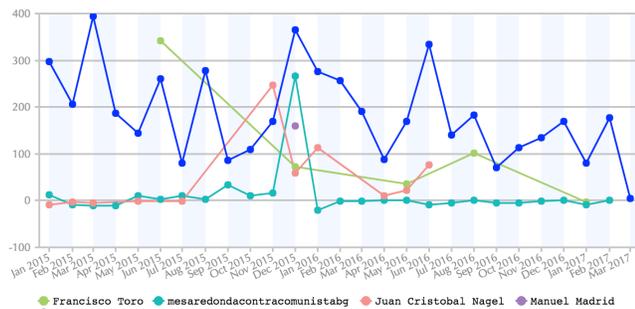


Figure 15. Influence trend of top 5 Venezuelan bloggers from January 2015 to March 2017.

V. CONCLUSION & FUTURE WORK

This paper establishes the basis for using blog analysis for studying socio-political awareness. This approach is novel in that few researchers have specifically focused on analyzing blogs, and instead focus on other social media platforms, such as Twitter and Facebook. As a detailed example, this research showed that Venezuelan blogs are being used to disseminate socio-political information in an attempt to increase awareness during the Venezuelan economic crisis. Our analysis showed that the frequency and content of posts changed over time, reflecting changes in the socio-political landscape of the region—such as protest events, the decline in quality of life factors such as the need for food and medicine, and interest in migration away from Venezuela. The sentiment of the blogs seemed to change over time as well, but the graphical output was inconclusive and the concept needs to be addressed further in future work. We believe, however, that blog analysis—with Blogtrackers and other tools—can continue to be used to gauge socio-political awareness of important issues. This paper sets the stage for future work using Blogtrackers and other natural language processing tools and techniques for blog analysis as a possible approach for anticipating events (e.g., protests, migration, refugee scenarios). Future work may also include further analysis of the concepts of blog tonality and blogger influence. Broadly speaking, this particular study sheds a spotlight on the blogosphere’s role in assessing situation awareness of a region engulfed in socio-political crisis. This information can provide actionable insights to emergency responders, humanitarian assistance organizations, policy and decision makers.

ACKNOWLEDGMENT

This research is funded in part by the U.S. National Science Foundation (IIS-1636933, IIS-1110868 and ACI-1429160), U.S. Office of Naval Research (N00014-10-1-

0091, N00014-14-1-0489, N00014-15-P-1187, N00014-16-1-2016, N00014-16-1-2412, N00014-17-1-2605, N00014-17-1-2675), U.S. Air Force Research Lab, U.S. Army Research Office (W911NF-16-1-0189), U.S. Defense Advanced Research Projects Agency (W31P4Q-17-C-0059) and the Jerry L. Maulden/Entergy Fund at the University of Arkansas at Little Rock. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the funding organizations. The researchers gratefully acknowledge the support.

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