

Chapter 7

Online Collective Action and the Role of Social Media in Mobilizing Opinions: A Case Study on Women’s Right-to-Drive Campaigns in Saudi Arabia

Nitin Agarwal, Merlyna Lim and Rolf T. Wigand

7.1 Introduction

Citizens and government alike may benefit from many facets of Web 2.0, especially social media developments comprising social networking sites, such as Facebook, Twitter, various forms of crowd-sourcing, as well as the usage and mining of blogs. Social media sites are attractive places and two-way channels to gather information not only about citizens but also for citizens to gather information about government-related issues and strategies. Social media has become integral to the political realm. Consequently, social movements such as recent Tunisian and Egyptian revolts as well as urban anarchic actions such as the London riots can neither be solely seen as social media nor as a non-social media event. To frame such revolts as a “Facebook revolution” or a “people’s revolution” is an oversimplification (Lim 2012, p. 232). People and social media are not detached from each other as in some nations such as Tunisia and Egypt social media has been an integral part of political activism for years (Lim 2012, p. 232). “The power of networked individuals and groups who toppled” authoritarian regimes “cannot be separated from the power of social media

N. Agarwal (✉) · R. T. Wigand
Department of Information Science, University of Arkansas at Little Rock,
2801 S. University Ave, Little Rock, AR 72204, USA
e-mail: nxagarwal@ualr.edu

R. T. Wigand
e-mail: rtwigand@ualr.edu

M. Lim
Consortium of Science, Policy and Outcomes (CSPO), School of Social
Transformation—Justice and Social Inquiry, Arizona State University,
1120 S. Cady Mall, Tempe, AZ 85287, USA
e-mail: Merlyna.Lim@asu.edu

that facilitated the formation and the expansion of the networks themselves” (Lim 2012, p. 232).

However, regardless of the prominent role of social media platforms in such revolts, there is a scarcity of online collective action (CA) research. Mere journalistic accounts on such actions tend to be based on anecdotes rather than rigorously designed and examined research. Existing computational studies focusing on capturing and mapping social media interactions and issues manage to identify the very manifestations of CA. These studies, unfortunately, rarely go beyond a mere descriptive tendency. Our study aims to provide a methodological approach to understand processes involved in the formation of online CAs.

This chapter is organized as follows: First we present a review and discussion of CA theory, as this is the theoretical framework guiding our research. We then address the existing efforts of mapping social media to motivate the need for a more systematic and foundational analysis modeling CA in social media. The following section describes computational social networks analysis (CSNA) and demonstrates how CSNA provides a rich set of social network methodologies to observe and explain various useful patterns such as community extraction, expert identification, and information diffusion. Next, a case study is presented, i.e., the Women’s Right to Drive Campaign in Saudi Arabia that demonstrates the formation of collective sentiment and its manifestation in the form of CA. Our overall research effort is then addressed in three phases: individual, community, and transnational perspectives. The utilized research methods and design are described, including data collection, by examining experiments and presenting our analysis. Lastly, our conclusions are offered by highlighting our major findings, we suggest ideas for future research and we present some research implications for governance.

7.2 The Theory of Collective Action

Collective action refers to the pursuit of a common goal by more than one person. Presumably, the achievement of the goal will then benefit all of society (e.g., Sandler 1992). The term dates back to some of the work by Vilfredo Pareto in the 1930s and Mancur Olson (1965) in *The Logic of Collective Action: Public Goods and the Theory of Groups*. CA problems arise when each individual in a group pursues a rational strategy, yet the collective outcome is bad for all of those same individuals, thus, in effect, creating “collective irrationality” (Wheelan 2011). Accordingly, transaction costs, especially those pertaining to the cost of organizing of such CA, for a majority attempting to achieve the utility of the goal (typically a public good) are disproportionately higher than the transaction costs for a small minority. An additional problem of CA is the benefit gained by those who do not participate in its achievement. This is generally referred to as the *free rider problem*, elegantly explained by Vilfredo Pareto (1935). The concept of CA has been used extensively also by several scholars in the standards evolution, standards diffusion, as well as the standards adoption literature (e.g., Markus et al. 2006; Wigand et al. 2005).

New ICTs, especially the Internet, “have completely transformed the landscape of collective action” (Friedland and Rogerson 2009, p. 2). Facilitated online communications within the network of CAs can be executed with low or nearly no cost, making the success of CA less reliant on the size of the groups. However, “some experts believe the collective action effects of the Internet are overstated and may prove ephemeral” (Friedland and Rogerson 2009, p. 2). A capacity to communicate globally or internationally does not automatically translate into successful international CAs as the online environment is not sympathetic to the formation of strong interpersonal ties needed to build successful CA (Lim 2009; McAdam 1996). Etzioni and Etzioni (1999) argue that online-based communications are less stable than those built with face-to-face interaction. Among the successful CAs, however, many of them were substantially organized online or related to the Internet such as the 1996 Zapatista rebellion in Mexico (Cleaver 1998; Bob 2005), the 1998 Indonesian political revolution (Lim 2006, 2004), and the recent Tunisia, Egypt (Lim 2012), Libya, and Syria revolts.

The pervasive usage of ICT also influences the ways citizens relate with the government by providing a new tool for participation and engagement. The socio-political information provided online has impacted citizens’ decision to participate in politics (Margetts et al. 2011). Internet’s “ability to provide real-time information on the participations of others” (Margetts et al. 2009, p. 17), in particular, has stimulated individuals’ participation in a political CA. Online CAs have expanded the sphere of engagement and participation for citizens in communicating with, monitoring, and even challenging the government.

Using both available successful and unsuccessful online CA “research has now begun identifying aspects of the collective action process that can succeed online as well as shortcomings and disadvantages of online collective action” (Bimber et al. 2005, p. 366). However, such research has not answered many other questions related to the emergence of various forms of CA in the online world. Lupia and Sin (2003) urge to critically assess whether the traditional CA paradigm is even appropriate for explaining contemporary phenomena. Such phenomena have prompted us to examine some fundamental aspects of CA that remain theoretically undeveloped (Bimber et al. 2005, p. 366) and called for innovative fundamental research that can provide insights into reconceptualizing online CA.

7.3 Mapping Social Media

In this section, we assess some of these fundamental efforts to map the social media that motivate the need for a more systematic and foundational analysis modeling CA in social media settings.

Adamic and Glance (2005) mapped the U.S. political blogosphere and observed the dichotomy between liberal and conservative blogs. Examining the link graph between and across these blogs, these authors observed certain interblog citation behavior patterns such as conservative bloggers tend to link more often than the

liberal bloggers, but there is no uniformity in the news or topics discussed by conservatives. However, the study fell short of suggesting a theory to explain these patterns. In a similar study, Kelly and Etling's (2008) analyzed 60,000 Iranian blogs using social network analysis and content analysis. They identified a wide range of opinions representing religious conservative views, secular and reform-minded ones, and topics ranging from politics and human rights to poetry, religion, and pop culture. In yet another study, Etling et al. (2009) analyzed 35,000 active blogs primarily from Egypt, Saudi Arabia, Kuwait, and other Middle-Eastern countries. The authors identified major clusters organized by countries, demographics, and discussion topics around domestic, politics, and religious issues.

These studies show that individuals discuss varied topics in multiple forms of social media. However, there is a lack of methodologies enabling the analysis of how the discussions converge to central themes and a rigorous and fundamental analysis that explains online CAs. In addressing this gap, the proposed efforts will leverage CA theory and computational mapping in order to explain and predict the underlying processes involved in online CAs.

7.4 Computational Social Network Analysis

CSNA provides a rich set of SNA methodologies to observe and explain characteristic patterns, such as community extraction, expert identification, and information diffusion, among others. Here, we review community extraction and expert identification, two methods that are most relevant to the proposed research.

Community extraction—Communities play a vital role in understanding the creation, representation, and transfer of knowledge among people, and are the essential building blocks of all social networks. How does one exactly extract communities from a social network? There are three dominant approaches for community extraction: network-centric, content-centric, and hybrid approaches (Agarwal and Liu 2009). Network-centric approaches leverage network structural properties to identify communities within a social network (Fortunato 2010). Assuming members of a community tend to talk about similar topics, content-centric approaches (Li et al. 2007) extract communities based on the similarity of members' content. Hybrid approaches leverage both content and network information to extract communities. The central tenet behind such an approach is: a set of blogs that are highly linked and tend to share similar content reflect tighter communities (Java et al. 2008).

Expert identification—Influential blog sites exert influence over the external world and within the blogosphere (Gill 2004). The blogosphere, however, follows a power law distribution (Faloutsos et al. 1999) with very few influential blog sites that form the short head of the distribution and a large number of non-influential sites that form the Long Tail (Anderson 2006). Influence is often studied from an information diffusion perspective by identifying the key members who maximize the information spread by leveraging theories from epidemiology (Gruhl et al. 2004), viral marketing

(Richardson and Domingos 2002), cascade models (Goldenberg et al. 2001), greedy models (Java et al. 2006), and submodularity-based models (Leskovec et al. 2007). The casual environment of the blogosphere, where not many blogs cite the actual source, presents significant challenges to employ the above-mentioned purely link analysis-based approaches. Song et al. (2007) define opinion leaders as those who generate novel ideas and opinions, which is estimated using cosine similarity between their posts and the ones they refer. Goyal et al. (2010) showed that the influence probabilities between users can be learned based on their community affiliation logs. Further, a few blogs list most active bloggers for a particular time window based on the number of submitted posts, comments received, etc. (Gill 2004). Such statistics could easily mistake voluble bloggers for influential bloggers (Agarwal et al. 2008). The research mentioned here and other similar efforts provide computational capabilities to analyze online social networks and the various phenomena (such as community formation, affiliations, influence) that can help in modeling online CAs.

7.4.1 Women’s Right-to-Drive Campaigns in Saudi Arabia: A Case Study

Saudi Arabia’s political system is an absolute monarchy without elected institutions or political parties, where the King is both the head of state and the head of government. Decisions are made by the King mostly based on consultations with the senior members of the royal family and the religious leaders. The systems of governance, the rights of citizens, and the roles of the state are set out based on the Basic Law which declares both the *Koran* and the *Sunna* (tradition of the Prophet Muhammad) as the country’s constitutions. In this country, *Sharia* (Islamic law) and tribal customs influence the ways in which gender roles are assigned in society. Women’s rights are thus defined by the (strict) interpretation of these laws and customs. Saudi women predominantly do not see Islam as the main hindrance to women’s rights. They see the cultural interpretation—patriarchal and traditional—as the chief obstacle for any struggles aiming for women’s equality. As Saudis like to say “It’s the culture, not the religion.” “If the Qur’an does not address the subject, then the clerics will err on the side of caution and make it haram [forbidden]. The driving ban for women is the best example.”¹ Saudi Arabia is the only country in the world prohibiting women from driving. While there is no written ban on women driving per se, locally issued licenses are required to drive. The problem is that such licenses are not issued to women, thus driving is effectively illegal for women. In reference to this situation, we choose to study Saudi women’s right-to-drive campaigns. The early version of this

¹ <https://sites.google.com/site/roblwagnerarchives/saudi-female-journalist-defies-stereotypes>, last accessed on 04/29/2012.

campaign was initiated by Wajeha Al-Huwaider in 2008.² The latest one, called Women2Drive campaign,³ was held in June 2011 with Manal Al-Sharif as one of the prominent leaders.

The Al-Huwaider Campaign refers to the series of online campaigns for women's rights originally initiated by Saudi writer and journalist Waheja Al-Huwaider and later became a regional phenomenon.⁴ Her YouTube campaign started in 2007. On International Women's Day 2008, Al-Huwaider drove a car in the Kingdom of Saudi Arabia (KSA), where it is forbidden for women to do so, while videotaping a plea to Saudi officials. She posted the video on YouTube attracting international attention. Despite the obstacles placed by the Saudi government, Al-Huwaider continues to promote her ideas, through her writings online. Her articles analyze the Arab social situation, criticize the status of human rights, and vehemently protest discrimination and violence against women. Her online campaign has not only become an inspiration but also an influential voice for CA, calling for reform, among Middle Eastern women. Al-Huwaider's campaign was mostly centered around YouTube videos and propagated through the blogosphere.

Her actions have motivated other social reformists and women's rights activists to join the cause. In the beginning of 2011, a well-known Saudi blogger Eman Al Nafjan decided to initiate a campaign encouraging women to drive on June 17, 2011 called Women2Drive. As part of the campaign, Manal al-Sharif, one of the Women2Drive activists decided to drive and posted videos of driving a car that were filmed by Wajeha al-Huwaider.⁵ Manal al-Sharif herself did not join the campaign on June 17, 2011 as she was arrested while doing the test drive. After being released, she pledged not to drive. Her arrest, though, propelled the movement to the mainstream media, nationally, regionally, and globally. The arrest also drove the global audience to pay attention to the June 17 Women2Drive campaign. The campaign itself, in addition to YouTube and blogs, also uses social networking platforms, such as Facebook and Twitter (see Tables 7.1 and 7.2). The hashtag #Women2Drive was used for all tweets related to the campaign. On June 17, 2011, there was no mass movement but about 40 Saudi women across the country took the wheel and challenged the ban. These women tweeted from the cars and spread the message all over the world. In short time the movement gained significant attention and traction from national and international audiences as well as received coverage from prominent media such as *Al-Jazeera*, *CNN*, *The Guardian*, and the *Huffington Post*.

² <http://www.thenation.com/article/161224/conversation-saudi-womens-rights-campaigner-wajeha-al-huwaider>, last accessed on 04/29/2012.

³ <http://www.guardian.co.uk/commentisfree/2011/jun/03/saudi-arabia-women2drive-women-driving>, last accessed on 04/29/2012.

⁴ http://articles.cnn.com/2010-09-07/world/saudi.arabia.women_1_saudi-women-wajeha-al-huwaider-saudi-arabia, last accessed on 04/29/2012.

⁵ <http://observers.france24.com/content/20110523-saudi-woman-arrested-defying-driving-ban-manal-al-sharif-khobar>, last accessed on 04/29/2012.

Table 7.1 Data collection statistics from Facebook, Twitter, and YouTube (as of 10/27/2011)

Group page name	Group page web link	Number of subscribed users
<i>Facebook</i>		
Support #Women2Drive	http://www.facebook.com/Women2Drive	17,256
Women2drive—Manal and Bertha— Woman2drive—17 June Saudi Arabia	http://www.facebook.com/pages/Women2drive-Manal-and-Bertha-Woman2drive-17-June-Saudi-Arabia/176962935691371	7,643
Saudi women spring	http://www.facebook.com/SaudiWomenspring	7,432
Saudi women to drive	http://www.facebook.com/pages/Saudi-Women-To-Drive/227817097234537	4,430
Saudi women driving campaign	http://www.facebook.com/pages/Saudi-Women-Driving-Campaign-%D9%84%D9%85%D9%84%D8%A9-%D9%84%D9%82%D9%84%D8%A7%D8%AF%D8%A9-%D8%A7%D9%84%D9%85%D8%B1%D8%A3%D8%A9/215739848446522	304
Let woman drive in Saudi	http://www.facebook.com/pages/Let-Woman-Drive-in-Saudi/105530276205410	592
Saudi women 2 drive	http://www.facebook.com/pages/Saudi-Women-2-Drive/209028675799595	206
The campaign to let women drive in Saudi Arabia	http://www.facebook.com/pages/The-campaign-to-let-women-drive-in-Saudi-Arabia/189662957752570	83
<i>Twitter</i>		
Let the Saudi women drive	http://www.facebook.com/pages/Let-the-Saudi-women-drive/158019944263799	13,054
@W2Drive	http://twitter.com/#/W2Drive	2,772
@Women2Drive	http://twitter.com/#/Women2Drive	1,109
@gwnwiki	https://twitter.com#!/gwnwiki	201
@honk4W2D	http://twitter.com#!/honk4W2D/	1,250
<i>YouTube</i>		
KSAAWomen2Drive	http://www.youtube.com/user/ksawomen2drive	233
Honk for Saudi women	http://www.youtube.com/user/HonkforSaudiWomen	409
SaudiWomen2Drive	http://www.youtube.com/user/SaudiWomen2Drive	47
I support Saudi women driving	http://www.youtube.com/user/Sarah1978Jaber	

Table 7.2 Data collection statistics from blogs (as of 10/27/2011)

Search keyword	Number of blogs	Number of overall search results
Saudi women drive	4,710,000	6,040,000
KSA women drive	249,000	6,060,000
Women2drive	35,100	521,000

While not yet radically changing the traditions that prohibit women from driving, the movement itself has scaled up to the transnational level and gained international recognition and support. The international coverage of the movement has at least put the Saudi government in the national and international spotlight. When a Saudi court found Shaima Jastaina, one of the women who joined the Women2Drive campaign on June 17, guilty of violating the driving ban, Saudi King Abdullah overturned the sentencing.⁶ Arguably, this act is very much related to the global pressure on the issue. In the latest development, Manal al-Sharif and another woman from the campaign had filed the lawsuits for being refused driver's licenses and now are urging judicial authorities to follow-up on the case (In The News 2012).

This case demonstrates how individual sentiment diffuses within the network, shapes into collective sentiment, and transforms into CA. The overarching question anchored in this case is: How are decentralized online individual actions transformed into online CA?

7.5 A Three-Phased Research Approach

In order to cogently address the research question posed above, we propose a three-phased approach: phase 1, Individual Perspective; phase 2, Community Perspective; and phase 3, Transnational Perspective. Figure 7.1 shows the overall architecture of this approach, which highlights the interdependencies and outcomes of the three phases. As illustrated in Fig. 7.1, our data collection strategy focuses on social media and open data sources. The data sources primarily include individual and group owned blogs and statistics derived from search engines and various social media sites. The data collection strategies including the pre-processing are explained in detail in the Experiments and Analysis section. The core of the model analyzes the data from the three different perspectives with findings from each perspective laying the foundation for the next. We delve into the details for each perspective next and summarize how the outcomes from each phase are coupled to address the higher level research questions.⁷

⁶ <http://www.guardian.co.uk/world/2011/sep/29/saudi-woman-lashing-king-abdullah>, last accessed on 04/29/2012.

⁷ A primitive version of the proposed model has been introduced in the authors' earlier publications (Agarwal et al. 2011a, b).

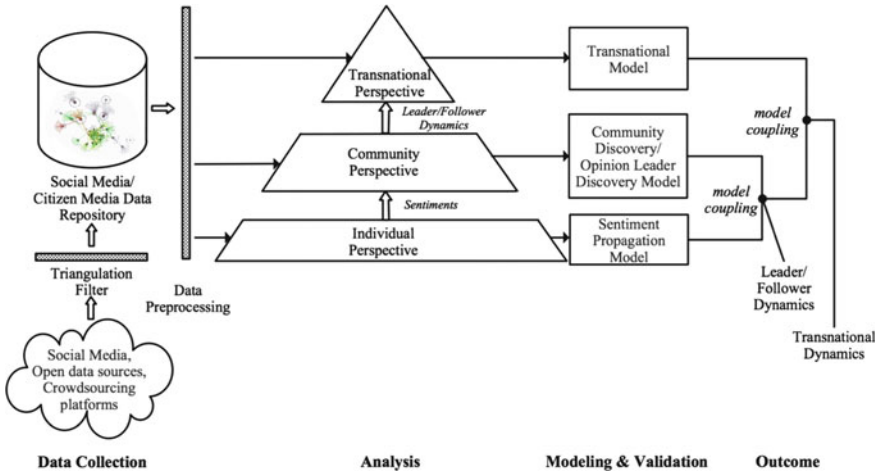


Fig. 7.1 Overall envisioned research design

7.5.1 Individual Perspective

Individual causes/issues can be transformed into collective cause. To understand and model this process, we need to study how personal issues and concerns evolve and propagate in social networks and how they converge and form collective concerns. We begin with preprocessing the blogs, identifying issues and concerns representing individual cause; and then modeling their diffusion in the network, and analyzing their convergence to collective cause.

Preprocessing and extracting cause: For each event, blog reactions are analyzed. Topic modeling techniques (such as Latent Semantic Analysis) assist in identifying, segregating, and teasing out relevant topics. Blog posts containing relevant topics are summarized to reduce off-topic chatter narrowing in on the key information (Coombs et al. 2008). The summarized text is used to extract representative keywords using Wordle that renders words with font sizes proportional to their frequency in the text. Starting from the seed blog, the above process is repeated for all other blogs that are connected to the seed blog. Blogs connected to the seed blogs are termed adjacent blogs. This demonstrates whether the issues and concerns mentioned in the seed blog were diffused to the adjacent blogs.

Modeling the diffusion of cause: We analyze the extracted issues and concerns representing a certain cause and study their propagation. Specifically, we explore how network ties affect an individual’s concerns. The proposed diffusion model extends the existing information diffusion models by considering concerns as the information chunks that propagate over the social network of bloggers. Since the underlying social network remains the same, the structural properties of the concern diffusion are no different than information diffusion characteristics. In other words, leaders of the community responsible for the fastest information

diffusion also tend to be the major influencing factors on the individual's issues and concerns and, hence, it follows the collective concerns of the community.

7.5.2 Community Perspective

Community leaders often exert significant influence over fellow members in transforming individual opinion and shaping into collective sentiment. To model this phenomenon, we analyze the community of bloggers and identify the opinion leaders of the community. This enables us to address the following issues: Do followers consistently follow the same leader(s)? Or, is the influence of opinion leaders time-variant and/or topic-variant? To address these questions, first, we extract and analyze the community of bloggers and then identify the opinion leaders.

Community identification: Often in the blogosphere users do not explicitly specify their community affiliation. The discovery of communities through network-centric approaches has been extensively studied (Lancichinetti and Fortunato 2009); however, as pointed out in Kritikopoulos et al. (2008), blogs are extremely sparsely linked due to a casual environment that does not necessitate users to “cite” sources that inspire them. Moreover, spam links generated by malicious users could connect unrelated and/or irrelevant blogs, affecting community discovery processes. Further, spam may also adversely affect content-oriented community identification approaches. We identify their implicit community affiliations and orientations leveraging the network structures (social ties, participation in other forms of social media) and issue/cause diffusion characteristics identified in the individual perspective phase. The content-induced interactions approach, leveraging issues, and concerns diffusion characteristics extracted from the individual perspective phase, not only guides the network-centric community extraction (while considering the relevant links and ignoring the spam/irrelevant links) but also complements it through revealing new potential links. Leveraging the insights from our prior study (Agarwal et al. 2010), the purpose of which is to identify communities from blog networks by examining the occurrence of shared concerns on particular events/causes, we unveil interactions through the observation of individual concerns. If the concerns of these blogs were similar, we assume the blogs are themselves similar. Mathematically, the similarity between any two blogs can be computed using cosine similarity as follows:

$$\text{Sim}(B_m, B_n) = \frac{P_m \cdot P_n}{\|P_m\| \|P_n\|}$$

where, $\text{Sim}(B_m, B_n)$ is the cosine similarity between blogs B_m and B_n . The concerns of B_m and B_n on an issue is represented by the column vectors P_m and P_n , respectively. The data mining clustering algorithm, k means, is used to extract communities.

Identifying Influentials: After identifying the communities from the social media, we set out to identify the leaders. We examine how social gestures of “influentials” could be approximated by collectable statistics from the social media. We gather

network-based statistics from various indexing services such as Technorati and the Google search engine. These statistics use the linking knowledge gleaned from the graph of who cites whom and leverage prestige-based stochastic models to evaluate influence of each node in the graph. Knowledge from prior work on identifying influential bloggers, iFinder (Agarwal et al. 2008), enables us to model community leaders factoring in socio-cultural traits of the community that bootstraps our understanding of opinion leaders. The model analyzes how issues and concerns travel across the network. Tracking the diffusion of issues across the network helps discounting viral blogs as a form of CA. Longitudinal analysis could be further performed to address questions such as, whether followers consistently follow the same leader(s), or is the influence time-variant, offering deeper understanding of group dynamics. An individual perspective provides an understanding of how issues and concerns propagate along the network. The outcome of the community perspective enlightens us with a deeper understanding of leader–followers dynamics. Together, outcomes from both phases lend insights into the emergence of online CAs in socio-culturally diverse environments.

7.5.3 Transnational Perspective

In this phase, we study and analyze whether collective concerns in communities transcend nation-state barriers and converge into transnational online CA or not. Social networking platforms have undoubtedly intensified the degree of connectivity by building up capacity to circulate ideas and to transfer content very quickly across all barriers. Consequently, these platforms have favored a complex array of coordinated mobilization at the global level. Analyzing the emergence of transnational actors and networks, structures relating to fluidity, and boundless organizational architecture, are key to a deeper understanding of transnational underpinnings of online CAs. The issue can be geographically mapped periodically to detail the development of the issue network. The mapping process can identify each individual and classify her in one or more clusters. The issue networks and mapped clusters can also be studied longitudinally over a chronological sequence of various events, to identify and track how they merge/expand/split and to discern other interesting patterns, regardless of their geographic dispersion and at local or global scales (Fig. 7.2).

7.6 Experiments and Analysis

Next, we present our data collection efforts to analyze our proposed methodology for the Women2Drive case study.

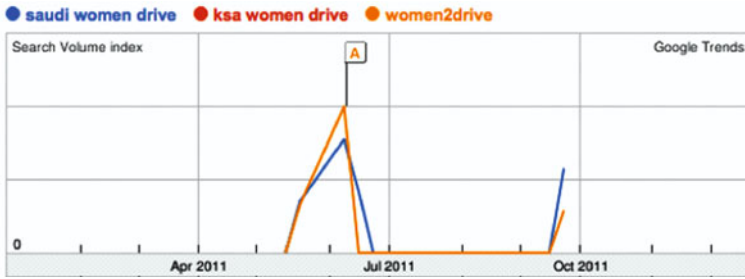


Fig. 7.2 Search keyword volume for the three most popular keywords using Google Trends (Results were obtained using Google Trends at <http://www.google.com/trends/> as of 10/27/2011.)

7.6.1 Data Collection

In this section the authors employed a multi-faceted data collection strategy, due to the role of a multitude as well as variety of social media sites identified and observed in various online CAs. Data from blogs and other social media sites were collected and anonymized in a completely observational and non-obtrusive manner. We started the data collection using the Google search engine and the keywords/tags related to the campaign such as ‘women2drive,’ ‘Manal Bertha Woman2drive,’ ‘17 June Saudi Arabia,’ ‘Saudi Women Drive,’ and ‘KSA women drive.’ The search keywords were enriched by the suggestions provided from the search engine. We performed both a generic search and a focused search. The generic search was conducted on the entire Web and the focused search was limited to specific social media sites using the search engine’s advanced search parameters. The results were analyzed to identify the fan pages, Twitter groups, and YouTube channels. These identified groups were further investigated to find the number of subscribed users. Table 7.1 summarizes these findings. The sheer volume of blog results made it impossible to analyze the links individually. This is indicated by the number of blog hits versus overall web hits for the different search keywords. Table 7.2 summarizes these findings for the top three search keywords. The numbers presented in Table 7.2 could be an overestimation of actual search results due to redundancy. However, the redundancy exists in both the Web search results as well as the blog search results thereby making the comparison between the two fair. Figure 7.3 illustrates the search volume index on Google for the keywords, which indicates spikes on June 18, 2011 indicating the celebration of Women2Drive Day in Saudi Arabia⁸ and another spike on September 25, 2011 indicating the announcement of Women’s Right to Vote in Saudi Arabia.⁹

⁸ <http://www.thelinguist.com/en/en/library/item/131557/>, last accessed on 04/29/2012.

⁹ <http://www.bbc.co.uk/news/world-us-canada-15052030>, last accessed on 04/29/2012.

Note that ‘KSA Women Drive’, although mentioned in the blogs and on Web pages, was not used as a keyword for searches. This is indicated by the no search volume of ‘KSA Women Drive’ as compared to the other two search keywords.

Next we present our analysis and findings on the collected data using the proposed research methodology.

7.6.1.1 Individual Perspective

In analyzing the individual perspective on the Al-Huwaider driving campaigns, we started with the original narrative of Wajeha Al-Huwaider’s cause to lift the ban of driving for Saudi women as a source of issues and concerns. Representative keywords were then extracted using a tag cloud generator. We repeated the extraction for each blog within Al-Huwaider’s network to seek whether Al-Huwaider’s issues and concerns were diffused to these blogs. Our findings (Fig. 7.3) show the occurrence of similar keywords representing similar issues and concerns across these blogs (e.g., Saudi, women, cars, drive/driving, right/rights). Figure 7.3 shows how an individual cause of Al-Huwaider was propagated in social networks (Fig. 7.4).

Next, the same method is applied to the three formal statements delivered by the 2011 Women2Drive campaign management to seek the connection between this later action with the 2008 Al-Huwaider driving campaign. As this campaign is about women’s right to drive, expectedly (as can be seen in Fig. 7.5) dominant keywords of the statements generally mimic those of Al-Huwaider original statement. However, we also see the occurrence of a different set of keywords representing different subissues. In the second statement launched immediately after the arrest of Women2Drive leader Manal al-Sharif, we see ‘Manal,’ ‘al-Sharif,’ ‘Women2Drive,’ ‘campaign,’ and ‘management’ as being more prominent than keywords representing the issue (rights, driving). Indeed, the statement was issued mostly to clarify the existence of the movement despite the withdrawal of Al-Sharif’s participation in the campaign. Closer to the date of the campaign, in the fourth and fifth statements, the keywords central to the issue (women, rights, driving) came back to dominate the narratives (Fig. 7.6).

7.6.1.2 Community Perspective

Al-Huwaider was a major factor in mobilizing individual bloggers with similar concerns (toward various issues) into a community and in leading the movement, i.e., transitioning individual cause to collective cause and ultimately manifesting into a cyber-collective movement. This also correlates with our findings in the individual phase, where the community leader was identified as the most significant influence over the individuals’ concerns. We followed the proposed methodology analyzing our data by extracting communities and opinion leaders and observing leader–follower dynamics.



Fig. 7.3 Issue analysis of Al-Huwaider campaign



Fig. 7.4 Women2Drive second statement



Fig. 7.5 Women2Drive fourth statement

Continuing with the example presented in Fig. 7.3, we identified the occurrence of various Al-Huwaider’s causes in three blogs, “Tara Umm Omar,” “Saudi Woman,” and “Sand Gets in My Eyes.” If the concerns of these blogs were similar we assume the blogs were themselves similar. We illustrate our analysis in



Fig. 7.6 Women2Drive fifth statement

Table 7.3, where we aggregate the concerns from these three blogs (denoted in columns) for each cause/issue (denoted in rows).

Once communities of bloggers are extracted, our next step is to identify the influentials. We analyzed a community of 75 blogs that shared similar concerns for Al-Huwaider’s campaigns and identified top 10 influential blogs, as illustrated in Table 7.4. Due to space limitations we could not present the analysis of other blogs. However, all 75 blogs had an average influence score of 198.306, a maximum influence score of 833, a minimum influence score of 1, and a standard deviation of 269.892. The influence score for each blog is provided by Technorati indexing service, which is directly proportional to the number and authoritative-ness of blogs and other media that cite/link to the blog in question. The distribution indicates the expanse of the blogs in terms of the influence or authoritative-ness. Representative tags extracted using Wordle are specified next to the blog posts to give contextual background and the topical keywords. The analysis demonstrates a feasible approach to identify influential blogs for an event.

7.6.1.3 Transnational Perspective

Analyzing the emergence of transnational actors and networks, structures relating to fluidity and boundless organizational architecture, is key to a deeper understanding of the transnational underpinning of cyber-collective movements. One such actor identified in our analysis was Wajeha Al-Huwaider. Despite the cultural, ethnic, political, social, and geographical diversity of Al-Huwaider’s supporters as illustrated in Fig. 7.7 below, the sense of community superseded differences and nation-state barriers and converged individual concerns into CA. Figure 7.7 illustrates the geographical distribution of the transnational support for Al-Huwaider’s campaigns and Fig. 7.8 shows the actual geographical locations of the links supporting the Women2Drive campaign obtained from analyzing the data.

Transnational communities can also be analyzed by clustering pages from blogs/sites based on issues discussed in those blogs and websites. In Fig. 7.9 we can see that conversations around Al-Huwaider campaigns are diffused in various blogs, websites, news portal, and social media sites. Identified communities here are not always

Table 7.3 Occurrence of shared issues and concerns in each blog for the women's right-to-drive cause

Al-Huwaider's causes	Tara Umm Omar	Saudi woman	Sand gets in my eyes
Women's right to drive	Drive, car, like, wheel, right, behind, alone, needs (+)	Driving, drive(r), want, around, make, men, ban, sense, king, right (+)	Cars, drive, vehicles, right, support, make, issue, allow, campaign, right, changed (+)

Table 7.4 Top-10 influential blog posts discussing Wajeha Al-Huwaider's campaign along with their influence scores and representative tags extracted using Wordle.net

Blog	Representative tags	Influence score
http://hotair.com/archives/2009/07/12/saudi-feminist-blocked-from-leaving-country/	Saudi, Al-Huwaider, Arabia, border, male, passport, permission, activists, rights, guardian	833
http://jezebel.com/5552458/japan-likely-to-reject-ban-on-sexualization-of-minors-playboy-model-jailed-for-boob+grope	Women, minors, drinkers, Japan, Yousef, freedom, infected, prisoners, police, jail, charges, allegations	824
http://volokh.com/posts/1245159018.shtml	Saudi, Arabia, HRW, Human, rights, links, mail, organization, government, Israel, workers	739
http://thelede.blogs.nytimes.com/2009/03/12/saudi-woman-drives-for-youtube-protest/	Saudi, Huwaider, driving, BBC News, Arabia, Arab, women protest, video, Fattah, car, YouTube	702
http://www.memeorandum.com/100418/p4	Saudi, women, driving, Arabia, raped, reform, issues, populace	695
http://www.moonbattery.com/archives/2007/10/the_nobel_joke.html	Afghanistan, Navy, Murphy, bad, gore, Arafat, combat, killed, Marxist	690
http://latimesblogs.latimes.com/babylonbeyond/2010/06/saudi-women-use-fatwa-in-driving-bid.html	Women, Saudi, drive, Islamic, Wajeha, maternal, breastfeed, Obeikan, cars, ban, campaign	665
http://www.hrw.org/english/docs/2006/10/20/saudia14461.htm	Saudi, human, rights, police, detained, government, Mabahith, Arabia, Khobar, freedom	644
http://www.hrw.org/en/news/2006/10/30/saudi-arabia-lift-gag-order-rights-campaigner	Rights, Al-Huwaider, Saudi, Arabia, human, September, Mabahith, Khobar, Abdullah, interrogated, police, officers	644
http://globalvoicesonline.org/2008/08/12/saudi-arabia-bans-women-from-olympics/	Feminist, Burundi, Olympics, Wajeha, Macha, Women, Muharram	627

necessarily linked to each other, but they represent clusters of individuals and/or groups of individuals who share similar conversations. For example, individual blogs such as saudiwomen.wordpress.com and daughterofarabia.blogspot.com share

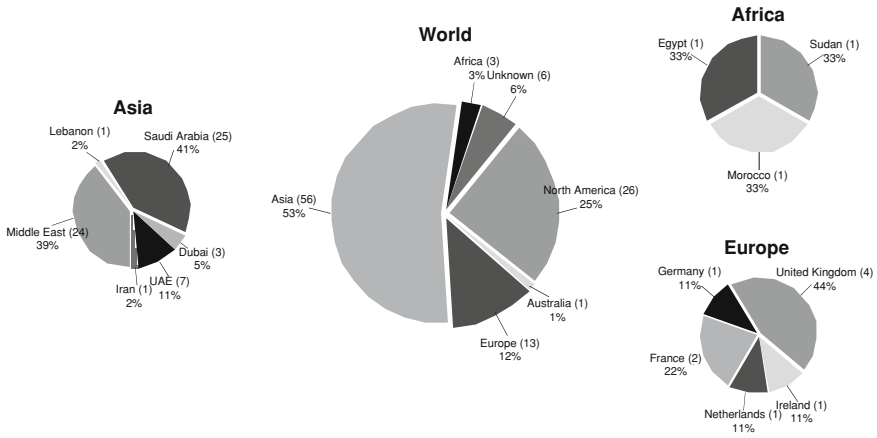


Fig. 7.7 Transnational support for Wajeha Al-Huwaider's campaign

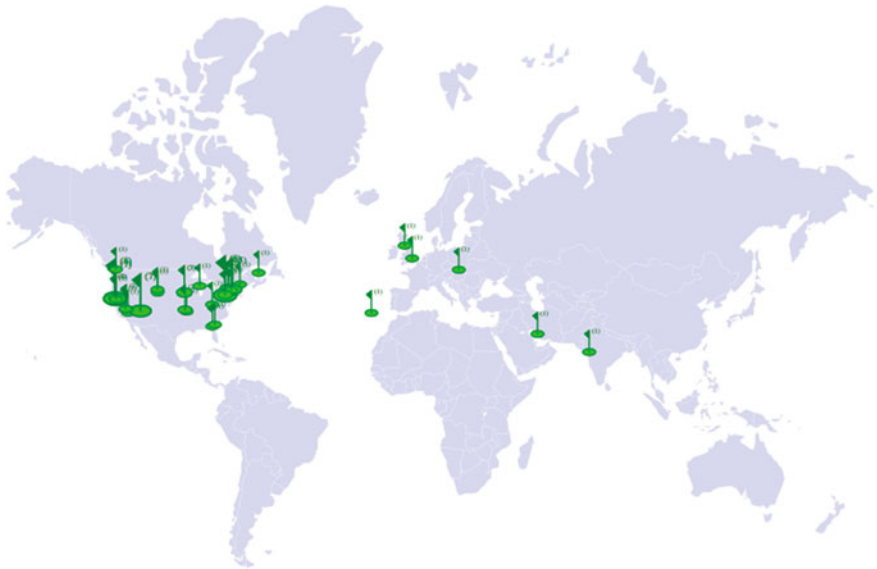


Fig. 7.8 Transnational support for Women2Drive campaign

conversations around the profile of Wajeha Al-Huwaider with transnational organizational blogs such as TheMemriblog.org and cyberdissident.org, as well as with *BoingBoing* and global news portals such as *CNN*, *The Nation*, *Reuters*, and *Washington Post*. Meanwhile, daughterofarabia.blogspot.com and *BoingBoing* also share another community with mypennmypaper.wordpress.com, wikigender.org, *the New York Times*' blogs, and autoguide.com by the narrative on the significance of the

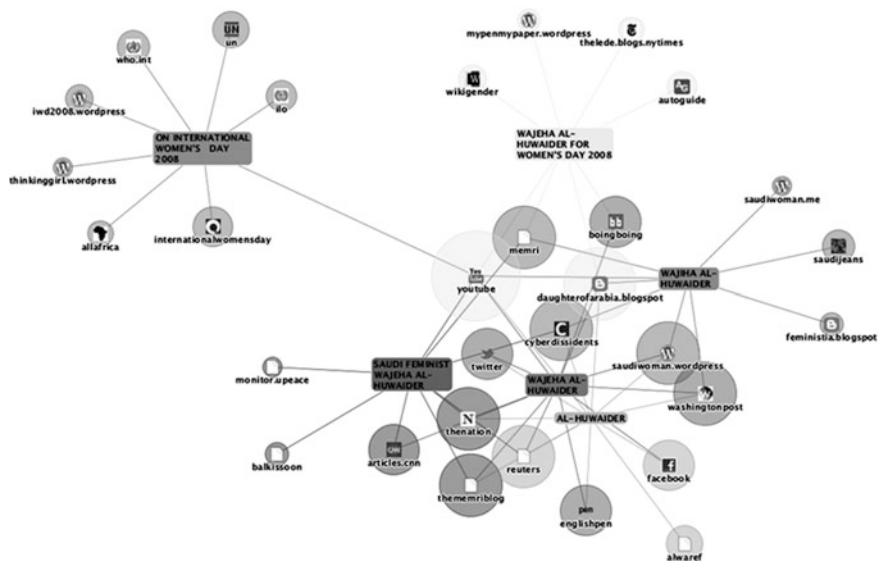


Fig. 7.9 Transnational networks of issue clusters in Al-Huwaider Campaign

driving campaign on the 2008 International Women’s Day. By identifying clusters of conversations/contents, we can map the diffusion networks of issue and discover disparate communities that essentially share the similar issues even without physical links. From the size of its node, we can also see how central YouTube was in the Al-Huwaider campaign. We can see that YouTube is connected to all communities that discuss the campaign from various angles/perspectives. From Fig. 7.9 we also learn that in the 2008 Al-Huwaider campaign, issues are propagated mostly in the blogosphere and international news portals. We can spot that an individual blog of daughterofarabia.blogspot.com is central in such propagation.

We repeated the same method for the 2011 Women2Drive campaign and found a significantly denser network and a larger number of immediate communities/clusters. Interestingly, while YouTube is still prominently central to the network, there are some new dominant actors coming into play. We see that *The Guardian* is the most dominant node in the network. It connects to the majority of clusters. Meanwhile, *Al-Jazeera*, *Huffington Post*, and *CNN* have also become prominent. In addition, we also observe the emergence of Facebook as one of the leading nodes in the network of clusters. As expected, the usage of social networking such as Facebook was not so popular in 2008. The 2011 Women2Drive campaign was carried out after the wave of social media-driven Arab Spring, understandably the movement attempted to make good use of social media in diffusing the issue. As we can see in Table 7.1, with over 13,000 subscribers each, Facebook and Twitter are indeed the two most popularly used media in the campaign.

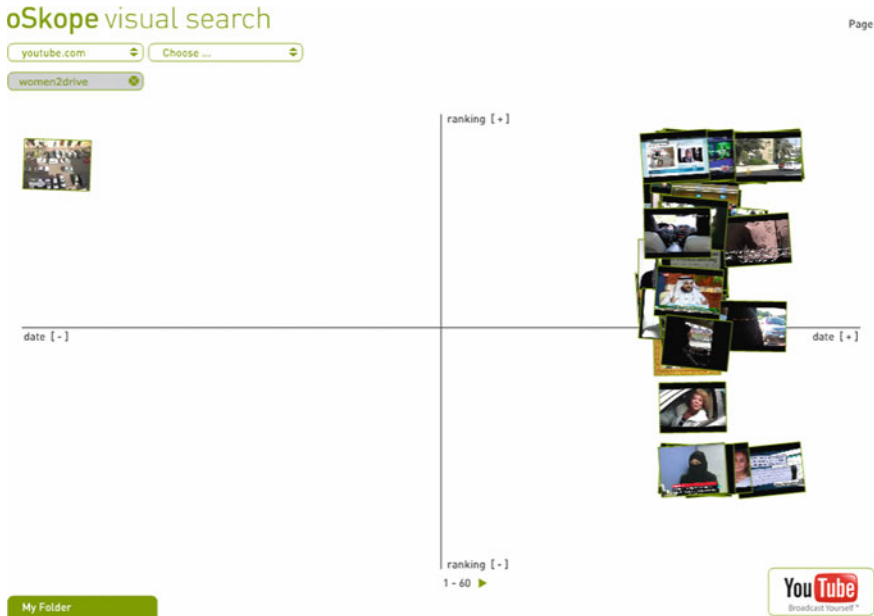


Fig. 7.11 Visualization of top 60 YouTube videos for Women2Drive campaign over time

shifting scale (from local and national to global and transnational) also bring about a change of culture and identity of these movements? With respect to outcomes and goals, can the transnational social movements deliver concrete strategies to overcome the unpredictability of their mobilizations? With respect to their internal dynamics, can the transnational social movements encourage their perpetuation through mitigating the individual convictions of the CAs/movements?

Social media has played a key role and irreversibly transformed organization and mobilization of collective movements. The three-phased approach, individual—community—transnational perspective, offers a great vantage point to analyze the collective movements via ICTs. Specifically, the findings from the individual perspective indicate the affect of social ties on the diffusion of issues in the network. The issue diffusion network is further analyzed in the community perspective to identify the naturally emerging communities and the leaders within. The findings indicated that the leaders of the community tend to be the major influencing factors on the individual's issues and concerns and hence the collective concerns of the community. The transnational perspective helped in analyzing how the communities distributed globally that shared similar concerns helped in the convergence of individual and community concerns into a collective movement.

7.7 Conclusions

In this chapter the authors sought to understand the fundamentals, complexity, and dynamics of online CA. Through this research we highlight the need to revisit the traditional CA theories. Our methodology continues to embrace the conventional CA theories and further helps to reshape the traditional theories to better understand the implication of new forms of communication (facilitated by social media) for CA. As pointed out earlier, the capacity to communicate globally does not automatically translate into successful transnational CAs; the proposed methodology enables a three-phased systematic analysis of how the discussions converge to central themes from individual, community, and transnational perspectives. Specifically, the proposed efforts leverage traditional CA theory and CSNA in order to explain and predict the underlying processes involved in CAs in social media.

7.7.1 Major Findings

As conceptualized, utilized, and illustrated in the case studies of the Al-Huwaider and the Women2Drive campaigns, our novel methodological approaches highlight several key contributions to the fundamental research on online collection actions as well as computational studies on social media in general, as follows:

1. By employing multiple perspectives (individual, community, and transnational), we offer a modus operandi to understand (a) the evolution of online CA networks and (b) the diffusion of issue in multi-scales online environments.
2. By focusing on the formation of issues (such as shared narratives), our approaches offer a powerful explanatory model that goes well beyond a mere descriptive tendency of most computational studies on social media, such as simply mapping the blogosphere.
3. By comparing two different yet related events, our study suggests that in a networked online environment one CA cannot be studied as a mere independent event isolated from other actions. The nature of an online environment presents a high likelihood for CAs to be connected and, further, to mutually influence and shape each other.
4. By utilizing a comparative study encompassing two different periods of time, our study also demonstrates the relationship between online CAs and the rapidly changing online media environment. Our findings (i.e., the importance of YouTube in both campaigns, the importance of blogs in the 2008 Al-Huwaider campaign vis-à-vis the surfacing of Facebook and Twitter, and the importance of mainstream media outlets in the 2011 Women2Drive campaign) display that the centrality and importance of online platforms significantly influence and shape the evolution and expansion of online collection actions.

7.7.2 Further Research

The findings in this chapter also show some future possibilities to develop predictive models of CAs in the blogosphere by combining social network analysis methods as well as focusing methodologically on information flows, issues, sentiments, and communities as well as opinion leadership that, in turn, provide a considerably deeper and more penetrating understanding of CA Theory.

For the future research agenda, we propose to longitudinally analyze the extracted issues, concerns, and sentiment and to identify the factors involved in their propagation. We also propose to utilize existing cognitive and behavioral theories to gain deeper insights into the adaptation of individual behavior stemming from social interaction and cultural ties. These theories will form the basis of our exploration, aided by the development of novel statistical and stochastic diffusion models focusing on the transformation and propagation of sentiments along network ties over time. The model will help in advancing sociological as well as computational understanding of how collective sentiment shapes and will be improved upon in later phases of the analysis by incorporating community and transnational factors.

The longitudinal transnational map of issue networks and clusters can be correlated with intrinsic factors (e.g., demographic, economic, and political statistics) and extrinsic factors (e.g., uprisings in socio-demographically similar regions), which could offer deeper insights into the structural dynamics of certain key factors (viz. primary, secondary, and tertiary relations) that create ‘affordance’ for successful uprisings.

7.7.3 Research Implications on Governance

Looking at the broader picture, our research lends some insights into the relationship between social media and governance. The case studies presented in this chapter—the Al-Huwaider and Women2Drive campaigns in Saudi Arabia—show that the CA to push government to look at certain issues (that are otherwise overlooked) is a form of engagement, especially citizen engagement, that acts a corrective mechanism and it is in itself a part of a governance system. In addition, such actions often also enable new organizational forms as well as refreshingly new forms of citizen and government engagement. We also posit that valuable information and data may be collected and mined from the ever-growing social media that is of considerable potential benefit to citizens and governments. And, as discussed earlier, social media outlets can potentially provide two-way communication channels between citizens and government for effective information dissemination.

Some of the ideas proposed here might be conjecture. Yet, in reflecting on some discussions in this chapter, we can observe that various ongoing citizen participatory efforts through social media (such as in online citizen journalism) can

inform the government in pursuing a better governance, for better decision making and policies toward civic amenities, public safety, and political transparency. Some examples of such efforts include FightBack,¹⁰ HarassMap,¹¹ and Ushahidi,¹² among others.

When viewed from a top strategic level these new forms of communication also offer novel forms of transparency or even accountability for governments. Social media lend themselves to give citizens a new voice to be heard and, conversely, encourage citizens to engage and participate. Social media can potentially be a bridge to connect the government and its citizenry as well as a place where the two parties communicate, have dialogs, and together pursue a democratic form of governance. The authors hope to have made a contribution that advances research in this significant area of interest by offering novel methodological approaches permitting a deeper and more penetrating analysis within a CA Theory framework.

Acknowledgments This research was funded in part by the National Science Foundation's Social-Computational Systems (SoCS) and Human Centered Computing (HCC) programs (Award Numbers: IIS-1110868 and IIS-1110649) and the US Office of Naval Research (Grant number: N000141010091). Their support is gratefully acknowledged. 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 agencies.

References

- Adamic, L., & Glance, N. (2005). The political blogosphere and the 2004 US election. *Proceedings of the Third International Workshop on Link Discovery*, 36–43.
- Agarwal, N., Galan, M., Liu, H., & Subramanya, S. (2010). WisColl: Collective wisdom based blog clustering. *Journal of Information Science*, **180**, 39–61.
- Agarwal, N., Lim, M., & Wigand, R. T. (2011a). Finding her master's voice: The power of collective action among female muslim bloggers. *Proceedings of the 19th European Conference on Information Systems (ECIS)*. Helsinki, Finland, June 9–11, Paper 74. <http://aisel.aisnet.org/ecis2011/74>.
- Agarwal, N., Lim, M., & Wigand, R. T. (2011b). Collective Action Theory meets the blogosphere: A new methodology. In S. Fong (Ed.), *Networked Digital Technologies—Third International Conference, NDT 2011, Proceedings*. Macau, China, July 2011. Berlin—Heidelberg: Springer Verlag, 224–239.
- Agarwal, N., & Liu, H. (2009). *Modeling and data mining in blogosphere*. Bonita Springs, FL: Morgan & Claypool Publishers.
- Agarwal, N., Liu, H., Tang, L., & Yu, P. (2008). Identifying influential bloggers in a community. *Proceedings of the First International Conference on Web Search and Data Mining (WSDM)*, February 10–12, Stanford, CA: Stanford University, 207–218.
- Anderson, C. (2006). *The long tail: Why the future of business is selling less of more*. New York: Hyperion Books.

¹⁰ <http://www.fightbacknews.org/>, last accessed on 04/29/2012.

¹¹ <http://harassmap.org/>, last accessed on 04/29/2012.

¹² <http://ushahidi.com/>, last accessed on 04/29/2012.

- Bimber, B., Flanagin, A. J., & Stohl, C. (2005). Reconceptualizing collective action in the contemporary media environment. *Communication Theory*, **15**, 365–388.
- Bob, C. (2005). *The marketing of rebellion: Insurgents, media, and international activism*. Cambridge, MA: University Press.
- Cleaver, H. (1998). The Zapatistas and the electronic fabric of struggle. In J. Holloway, E. Pelaez and E. Pelaez (Eds.) *Zapatista!: Reinventing Revolution in Mexico*. London: Pluto Press, 81–103.
- Coombs, M., Ulicny, B., Jaenisch, H., Handley, J., & Faucheux, J. (2008). Formal analytic modeling of bridge blogs as personal narrative: A case study in grounding interpretation. *Proceeding of the Workshop on Social Computing, Behavioral Modeling, and Prediction (SBP)*, Phoenix, AZ, 207–217.
- Eiting, B., Kelly, J., Faris, R., & Palfrey, J. (2009). Mapping the Arabic blogosphere: Politics, culture, and dissent. Internet & Democracy Project, Berkman Center for Internet & Society. Cambridge, MA: Harvard University.
- Etzioni, A., & Etzioni, O. (1999). Face-to-face and computer-mediated communities, a comparative analysis. *The Information Society*, **15**, 241–248.
- Faloutsos, M., Faloutsos, P., & Faloutsos, C. (1999). On power-law relationships of the Internet topology. *ACM SIGCOMM Computer Communication Review*, **29**, 251–262.
- Fortunato, S. (2010). Community detection in graphs. *Physics Reports*, **486**(3–5), 75–174.
- Friedland, J., & Rogerson, K. (2009) How political and social movements form in the Internet and how they change over time. IHSS Reports, Institute for Homeland Security Solutions, Research Triangle Park, NC.
- Gill, K. E. (2004). How can we measure the influence of the blogosphere? Paper presented at WWW2004, New York.
- Goldenberg, J., Libai, B., & Muller, E. (2001). Talk of the network: A complex systems look at the underlying process of word-of-mouth. *Marketing Letters*, **12**, 211–223.
- Goyal, A., Bonchi, F., & Lakshmanan, L. V. S. (2010). Learning influence probabilities in social networks. *Proceedings of the Third International Conference on Web Search and Data Mining*, 241–250.
- Gruhl, D., Guha, R., Liben-Nowell, D., & Tomkins, A. (2004). Information diffusion through blogspace. *Proceedings of the 13th International Conference on the World Wide Web*, 491–501.
- In The News. (2012, February 6). Manal al-Sharif. *Arkansas Democrat-Gazette* (Little Rock, AR), 1A.
- Java, A., Joshi, A., & Finin, T. (2008). Detecting communities via simultaneous clustering of graphs and folksonomies. *Proceedings of the Tenth Workshop on Web Mining and Web Usage Analysis (WebKDD)*.
- Java, A., Kolari, P., Finin, T., & Oates, T. (2006). Modeling the spread of influence on the blogosphere. *Proceedings of the 15th International World Wide Web Conference*, May 22–26, Edinburgh, UK.
- Kelly, J., & Eting, B. (2008). Mapping Iran's online public: Politics and culture in the Persian blogosphere (Vol. 1). Berkman Center for Internet & Society. Cambridge, MA: Harvard University.
- Kritikopoulos, A., Sideri, M., & Varlamis, I. (2006). Blogrank: ranking weblogs based on connectivity and similarity features. *Proceedings of the 2nd international Workshop on Advanced Architectures and Algorithms for Internet Delivery and Applications*. Pisa, Italy, October 10–10, AAA-IDEA '06.
- Lancichinetti, A., & Fortunato, S. (2009). Community detection algorithms: A comparative analysis. *Physical Review E*, **80**, 056117.
- Leskovec, J., Krause, A., Guestrin, C., Faloutsos, C., VanBriesen, J., & Glance, N. (2007). Cost-effective outbreak detection in networks. *Proceedings of the 13th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, 420–429.
- Li, B., Xu, S., & Zhang, J. (2007). Enhancing clustering blog documents by utilizing author/reader comments. *Proceedings of the 45th Annual Southeast Regional Conference, New York*, 94–99.

- Lim, M. (2012). Clicks, Cabs, and Coffee Houses: Social Media and Oppositional Movements in Egypt (2004–2011). *Journal of Communication*, **62**(2), 231–248.
- Lim, M. (2009). Global Muslim blogosphere: Mosaics of global-local discourses. In M. McLelland and G. Goggin (Eds.) *Internationalizing Internet Studies: Beyond Anglophone Paradigms*. London: Routledge, 178–195.
- Lim, M. (2006). Cyber-urban activism and the political change in Indonesia. *Eastbound*, **1**, 1–21.
- Lim, M. (2004). Informational terrains of identity and political power: the Internet in Indonesia. *Indonesian Journal of Social and Cultural Anthropology*, **27**, 1–11.
- Lupia, A., & Sin, G. (2003). Which public goods are endangered?: How evolving communication technologies affect the logic of collective action. *Public Choice*, **117**, 315–331.
- Margetts, H., John, P., Escher, T., & Reissfelder, E. (2011). Social information and political participation on the internet: An experiment. *European Political Science Review*, **3**(3), 321–344.
- Margetts, H., John, P., Escher, T., & Reissfelder, S. (2009). Can the internet overcome the logic of collective action? An experiment of the impact of social pressure on political participation. *Political Studies Association Annual Conference*, April 7–9, Manchester, UK: University of Manchester.
- Markus, M.L., Steinfield, C.W., Wigand, R.T. & Minton, G. (2006). Industry-wide IS standardization as collective action: The case of the US residential mortgage industry. *MIS Quarterly*, **30**, 439–465.
- McAdam, D. (1996). The framing function of movement tactics: Strategic dramaturgy in the American civil rights movement. In D. McAdam, J. D. McCarthy & M. N. Zald (Eds.), *Comparative Perspectives on Social Movements: Political Opportunities, Mobilizing Structures, and Cultural Framings*. New York: Cambridge University Press, 338–356.
- Olson, M. (1965). *The logic of collective action*. Cambridge, MA: Harvard University Press.
- Pareto, V. (1935). *The Mind and Society*. London: Jonathan Cape.
- Richardson, M., & Domingos, P. (2002). Mining knowledge-sharing sites for viral marketing. *Proceedings of the Eighth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*. 61–70.
- Sandler, T. (1992). *Collective action: Theory and applications*. Volume 4. Ann Arbor, MI: University of Michigan Press.
- Song, X., Chi, Y., Hino, K., & Tseng, B. (2007). Identifying opinion leaders in the blogosphere. *Proceedings of the Sixteenth ACM Conference on information and Knowledge Management*, 971–974.
- Wigand, R. T., Steinfield, C.W. and Markus, M.L. (2005). Exploring interorganizational systems at the industry level of analysis: Evidence from the US home mortgage industry. *Journal of Information Technology*, **20**, 224–233.
- Wheelan, C. (2011). *Introduction to public policy*. New York: W.W. Norton.