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Anatomy of a Social Media Movement: Diffusion, Sentiment and Network Analysis

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ANATOMY OF A SOCIAL MEDIA MOVEMENT: DIFFUSION, SENTIMENT, AND
NETWORK ANALYSIS

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DEDICATION

To my parents and my wife. I am eternally grateful for love and support you have for me in every moment.

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ABSTRACT

Social media has increased the availability of abundant user interaction data. Technology-mediated social participation tools like Twitter can inform us about collective actions and social movement mobilization. Current focus of social media and social movement research are on usage and impact of technology during historical uprisings. But online social networks are participatory mediums, and filled up with multi-dimensional user interactions, which requires more concrete attentions and need investigations at granular levels. Moreover, limited attention has been paid on how activists develop online social networks. This study stressed on Twitter's ability of helping in making sense of online debates and present meaningful descriptions about social events. It focused on a specific social media movement and investigated on what were protesters' behaviors and opinions on Twitter, the structures of their online networks, leadership roles, and information diffusion patterns. This study took mixed methods approach with combination of sentiment analysis, content analysis, social network analysis, and time series analysis. During the social movement, people's sentiment took a range of emotional levels including anger, anticipation, disgust, fear, joy, sadness, surprise, and trust. Their opinions expressed political biasness. The study revealed that protesters broadcast information worldwide, and during digital activism they formed leaderships even on Twitter's horizontal structural platform. Twitter activists exposed a long-tail information sharing culture. Strong-ties formed small-world network while weak-ties stayed on peripheries.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

In early week of February, 2013 many activists gathered together at Shahbag Square in Dhaka, Bangladesh to protest against a tribunal verdict that announced life-imprisonment for a top Islamic party leader who was convicted for war crimes including beheading a poet, raping a preadolescent girl and killing 344 people during the 1971 Bangladesh liberation war (Tahmima Anam, 2013; The Guardian, 2015; Yuan & Ahmed, 2013). People of all walks of life joined the masses for a peaceful demonstration with a demand of capital punishments for war criminals that had indictments for creating genocide and countrywide havocs in 1971 War of Independence. Ten of these perpetrators were brought to justice in a retroactive war crime tribunal that was set up in 2010 (Anam, 2013; Saad Hammadi, 2013; Zeitlyn, 2013; The Guardian, 2015). The young generation led by a group of bloggers was gathering in the demonstration from all over the country. The activists were spreading news of the movement through social media, which eventually was also covered by the local and international news media; within few days of its foundation the movement news and information were transferred to all of the Bangladeshi community living abroad. Many have compared this mass gathering with the predecessors of its kinds like Egypt's Tahrir Square Movement (Cook, 2011; Kandil, 2012; Tufekci & Wilson, 2012), and Occupy Wall Street Movement (Clark, 2012; DeLuca, Lawson, & Sun, 2012; Gleason, 2013; Thorson et al., 2013).

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However, with contrast to the former movements, the launch of Shahbag Movement was neither for ousting Government nor collapsing larger economic egalitarianism (Yuan & Ahmed, 2013). Supporters of the Islamic political party started to oppose this movement and called the participants as the 'anti-Islamic atheists' (Cohen, 2013; Deutsche Welle, 2013; The Hindu, 2013) . The protestors, both supporting and opposing this movement, were mobilizing resources, information, and news to one another and to the wider community through social media. The information exchanges and interactions made into social networking site particularly in Twitter will be the focus of this study.

1.2 RESEARCH PROBLEM AND AIMS

The exponential growth of online social media platforms such as Facebook, Twitter, YouTube etc. since last decade has increased the availability of abundant user interaction data. On Twitter, for example, more than 500 million tweets are posted daily, most of which are publicly accessible (Mejova, Weber, & Macy, 2015). "Technology-mediated social participation" can inform us about collective actions and social movement mobilization. Mass collaborations and coordination in digital networked media like Twitter can bring major changes in societal and political landscapes (Golbeck, 2013). Existing research in the area social media and social movements generally emphases on the usage of technology during the historical disruptive periods such as Arab Spring, Occupy Wall Street, MENA, and Iran Election (Gledhill, 2012; Barassi, 2013; Krinsky & Crossley, 2014; Tremayne, 2014). Twitter usage during protests is increasing rapidly globally. However, limited attention has been paid on developing necessary tools that can support protesters in successful resource mobilizations, and authoritative agencies to limit contentious political processes. In order to develop these

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applications, we must start by exploring the analytics that can be useful in understanding the information flow, users' sentiments and network structures formed into the digital media.

1.3 RESEARCH QUESTIONS

This study stressed on the ability of Twitter if it can help in making sense of online debates and present meaningful descriptions about the situations. In this regard, it investigated if Twitter can indicate the political stand point of users. For this purpose, this study focused on the case of Shahbag movement and investigates the following question.

- What were the Shahbag protesters' behaviors and opinions throughout 2013 on Twitter, the structures of their online networks, and their power and leadership roles?

The above question is broader in scope and to gather detailed overviews from it this study put attentions on more granular questions. These will be helpful in answering the broader research question with specifications.

1.   What were the sentiments of Shahbag protesters?

2.   What were the political stances of Shahbag protesters?

3.   What were the contentious issues discussed among the Shahbag protesters?

4.   Who were the central activists of Shahbag movement on Twitter?

5.   What are the essential network-attributes of protesters in Twitter?

6.   Who were leading the conversations on Twitter during the movement?

7.   Who had the power and leadership in Shahbag movement?

8.   How was information diffused during Shahbag movement?

9.   How did Shahbag Twitter network continue scale shift processes of

diffusion?

Social movement scholars recognize the importance of social networks in

contentious politics. Passy & Monsch (2013) argues that network importance varies

based on contexts and environments. This inconsistency is also an outcome of conceptual

differentiations among the social movement scholars. Activists interact through

conversations that motivates and changes theirs levels of participation in protest.

This research aimed to explicate the discourses from topical and people-centric

perspectives. The topical context emphesed on the types of information Shahbag

protesters included in their tweets and what were their interpretation and views about the

movement. From a people-centric point-of-view who it delved into the discussion of who

were the influential activists and popularly mentioned in the tweets and how did they

interact with each other on Twitter.

The purpose of this research was to identify how to understand the social

movement conversations on Twitter, and how Twitter usage is supportive to shape our

understanding about social movement participation and information sharing behaviors.

1.4 SIGNIFICANCE OF THIS STUDY

Twitter is used for information dissemination because it's quick information

sharing features (Kwak, Lee, Park, & Moon, 2010; Weller et al., 2014). Informational,

opinionated, and emotional contents can be shared through Twitter with ease

(Papacharissi & de Fatima Olivera, 2012). It is a common practice for political leaders

and individuals to use Twitter for the purpose of information propagation to a diverse

range of population (Small, 2011). Tweets shared by such groups of users provide

options for explorations to understand those political events. Similar attempts to meaningfully conceptualize the activities of protesters on Twitter during social movements have unique scopes for investigations.

The exploration of hashtags usage in tweets during social movement brings new opportunities to explain the events with more granular descriptions (Burns, 2012; Weller et al., 2014). Moreover, it is proven that during contentious political events people share contents from published news media but their agenda-setting priorities are quite different than that of mass media (Burns & Burgess, 2011; Larsson & Moe, 2012). It is, however, unknown if the same can be applied in the area of social movement. This study sheds lights on agenda-setting in a different way as it finds that activists argues on the topics covered by the news media.

Information exchanged through social media can be interrupted. Its flow can be expedited, delayed, even stopped by using interventions. How activists of SM diffused information is, therefore, meaningful to understand the flow of the movement. Identification of the most important actors among the social connections helps us to understand their roles, impacts, attachments and formations of sub groups, how information disseminations can be controlled throughout those networks. Analysis of tweets is also beneficial to understand the behavioral insights of protesters, identify unreliable sources of information in the protests, and detect similar and disparate activists. Mining of social media, Twitter in this case, can represent, analyze, and extract actionable patterns from social media data.

Opinionated posts on Twitter are impactful on social and political lives. In contentious situations like social movements, groups with disparate interests share

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disagreements over various issues. These opinions are useful to discover political ideologies of activists, reveal contentious issues and themes. Moreover, community detection is essential in social media analysis, because it can distinct individuals from groups while group-based user interactions provide an overall knowledge on collective behavior which is sturdy to changes as opposed to individual interactions. For this study, I am choosing Twitter as platform for analysis because of the fact that it offers more publicly available data than any other of its kinds. Moreover, SM tweets are unique and unfolds stories of a culture that is unique and underrepresented in a global scale. And the development of an interactive tool fills up the gap that necessitates designing a Twitter based application that can monitor and track social movement related tweets from all over the world and provide a means to make sense of plethora of user conversations which otherwise would be considered as noisy social media data.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter broadly reviews the literatures in the area of social media, social movements, sentiment analysis, social network analysis, and information diffusion. Its purpose is to discuss and assess the closely related literatures and identify existing gaps and narrow down the scope to the topic of this study. The chapter includes a "literature map" (Creswell, 2013), a visualization of existing works in the area of social media and social movements. Prior to reviewing the literature this chapter starts with definition of terms associated with this study.

2.2 DEFINITION OF TERMS

2.2.1 SOCIAL MEDIA

Social media has many variants such as *social network, Web 2.0, social networking sites* etc. According to the Oxford Reference (2015) social media are the means that allow interactions among users. Social media is an umbrella term that covers broad genre of one-to-one or one/many-to-many communication media regardless of geographical locations. Although network has different meanings and interpretations, this study concentrated on networking from the perspectives of computing and internet technology. For this reason it adopts the definitions from Encyclopedia of Britannica Online (2015) that defines social network as "an online community of individuals who

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exchanges messages, share information, and, in some cases, cooperate on joint activities." Examples of popular social media sites are Facebook, Twitter, Pinterest, Instagram, YouTube, Google+, Reddit, Tumblr etc. These communication mediums allow users, both senders and receivers, to share media contents to each other in virtual spaces.

2.2.2 TWITTER IN BANGLADESH

Social media is increasingly becoming popular in Bangladesh. 67.24 million of people in Bangladesh now use internet. A lion-share of this population, 63.12 million, access through mobile internet (BTRC, 2017). Facebook is currently the mostly used social networking site in Bangladesh. According to the Bangladesh Telecommunication Regulatory Commission (BTRC) nearly 80% of the total internet users in Bangladesh are on Facebook (Daily Star, 2015). However, Twitter use in Bangladesh grew rapidly during several occasions namely Shahbag movement. Moreover, various popular social media like Facebook, WhatsApp, Viber etc. were blocked by the Government of Bangladesh in 2015 due to security reasons. Although many bypassed the blocked sites and accessed through Virtual Private Networks (VPN), Twitter was chosen as an alternative communication medium to Facebook and other blocked sites in Bangladesh to share information and access news through the microblogging site.

2.2.3 SOCIAL MOVEMENT

Social movement is also commonly termed as activism, protests, and demonstrations. Due to the inception of social media tools and internet technologies, it is occasionally referred to as digital activism, and social media revolutions. Social movement is essentially collection of group activities that are developed in order to bring societal changes or prevent those. According to Encyclopedia Britannica (2015) social

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movement may be loosely organized but it refers to "a sustained campaign in support of a social goal, typically either the implementation or the prevention of a change in society's structure or values." Individuals with similar interests like strong beliefs or highly dissatisfied about something form groups regardless of its size and conduct collective actions. The recent developments in internet technologies like Facebook, Twitter, YouTube and mobile phones empowered masses to mobilize resources. For that reason, the mass gatherings in order to bring or resist societal changes becomes are now termed as digital activisms.

2.2.4 SENTIMENT ANALYSIS

Sentiment analysis has many variants, especially most which revolves around opinion mining and affect analysis. It analyzes publics' opinions, sentiments, judgments, attitudes, and emotions "toward entities and their attributes expressed in written text" (Liu, 2015). The entities are largely range from products, services to persons, issues to topics and events. The purpose of sentiment analysis is to computationally identify and classify people's opinions from texts in order to determine content producers' standpoints about a topic in the expressions of positive, negative or neutral. It is a very important technique for businesses, organizations, and governments as they want to understand about public feelings about their services and products in various domains such as health care, tourism, hospitality, financial services and more (Pang & Lee, 2008; Liu, 2012, 2015).

2.2.5 SOCIAL NETWORK ANALYSIS

Social network is a collection of actors or nodes, commonly known as entities, and various kinds of relationships exist among the entities. Overall network goals and

objectives are dependent on the type of relationships continue among the actors or nodes. The applications of social network analysis (SNA) are in use for many decades. For example, anthropologists used it to examine kinship systems, individual perceptions in 1950s (Grosser et al., 2013). Theory of SNA has been utilized to understand the types of ties entities such as persons, groups, organizations, governments, countries etc. build with one another. The relationships can be reciprocal in many occasions. These varieties in social connections are important to pass or restrict resource transmissions such as information and beliefs among the actors or nodes embedded in the networks. SNA techniques help to manage, analyze, and visualize relationship based network data. It is also helpful to examine the pattern of connection among a set of myriad entities (Crossley, 2011).

2.2.6 INFORMATION DIFFUSION

Information diffusion, in this study, is adopted as a derivative of the classical concept of Rogers' (2003) *diffusion of innovation*, which essentially describes how, why and at what rate innovations, new ideas or technology spread in the society. Research based on this theory strives to identify the general attributes and principles of online information diffusion process. There are many means that exist in the modern societies for the purposes of information exchanges and transfers. This study narrows down its importance on the information spreading process in social media particularly Twitter. It defines information diffusion as a process of spreading information or knowledge from one individual to another one or many through interactions (Wu, 2013; Zafarani, Abbasi, & Liu, 2014). Zafarani et al., (2014) identifies that this general information diffusion

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process involves senders, receivers and a medium. For example, on Twitter users may disseminate information about beliefs, political views, rumors, news etc.

2.3 RELATED WORKS

Wu, (2013) studies the dynamics of information diffusion on online social networks by arguing that existing diffusion theories are not capable of finding the dissemination patterns in large scale datasets. By examining the Twitter datasets, the study finds that information diffusion process is dependent on three aspects – influential peoples in the network, content type, and structure of the network. It identifies that "opinion leaders" in social networks work as intermediaries between elite users such as celebrities, news organizations etc. and general users. The author also finds that positive contents, in contrast to negative ones, are shared more on Twitter.

2.3.1 CHARACTERISTICS OF SOCIAL MOVEMENT MOBILIZATION

Myriad attributes contribute to put up a movement in the society. Social movement scholars identify the dynamics of protests from different perspectives ranging from demographics to political compositions. For example, Stekelenburg, Roggeband, & Klandermans (2013) mention that a movement's characteristics can be defined from the perspectives of "collective identities", "share grievances", and "shared emotions". To simply put, they state that a group of people (collective identities) will form a consensus (social movement) when they become angry (shared emotions) on authorities for treating a social problem improperly (shared grievances). For example, protesters of Shahbag Movement were outraged to the tribunal decision of the war criminals and demanded death penalty instead. Supporters with shared emotions or feelings came together and initiated the movement. Stekelenburg et al. (2013) included a framework by integrating

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identities, grievances, and emotions. They displayed into their model that in order to develop shared grievances and shared emotions, collective identities are essential. So, how strongly protesters will take participate in the movements will depend on groups' shared grievances and emotions.

In their essay (2nd chapter of Stekelenburg et al. (2013), Polletta et. al. have identified that internet technologies, specially social networking sites such as Twitter, are creating new sources of accumulating public grievances these digital mediums allow people to be associated with their networks fluidly.

2.3.2 ROLE OF TWITTER IN SOCIAL MOVEMENTS

A historically important use of Twitter in activism is "Arab Spring", the anti-government movements that started during late 2010 and early 2011 in Middle East and North African countries including Tunisia, Egypt, Libya, Bahrain, Syria, and Yemen (Murthy, 2013). However, there are arguments that indicates Twitter usage in movements started during 2009 Iran election (Murthy, 2013). Many unrest news were broadcasted in Twitter first, which made this digital medium an initial source of information collection for many professionals including journalists (Moore, 2011; Murthy, 2013). Based on the observations of Twitter usage during Arab Spring protests Moore (2011), and Murthy (2013) identifies that street led the protesters. While Raley (2009) argues that presence of Twitter is transforming the effectiveness of street-based political protests and resistance. Murthy (2013) also finds similar result in his work as he mentions that Twitter is potential of organizing activism. However, he cautions us on labelling Twitter as the causal factor for creating protests.
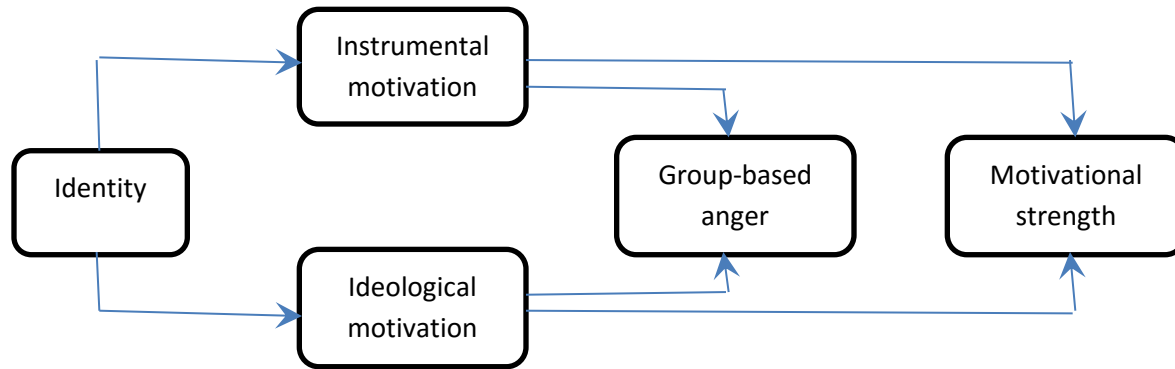
Figure 2.1: An integrated framework of grievances, identities and emotions (Stekelenburg et al., 2013)

Developing nations in many occasions consider social media as a threat to the ruling governments even though these networking media represent a tiny fragment of the total population. For example, during 2011 Egyptian revolution total number of registered Twitter users was 12,000, which represent only 0.00014 percent of the total population (Dunn, 2011; Murthy, 2013). Yet, the Egyptian government considered the social media platforms as perilous, which implies that small population of social media users might have significant impact on organizing protests. However, Twitter never causes the revolutions rather it works as a mode of communication similar to its ancestors like posters, telegraphs, cell phones, email etc. Furthermore, it can quicken the information dissemination process and reduces the time and space barriers (Murthy, 2013). However, Murthy (2013) suggests in his work on Twitter's role in social movements that we need to evaluate its roles critically without taking binary decisions if Twitter can or cannot cause revolutions. Even if geographically dispersed protesters are absent in the movements sites, their tweets have impacts on increasing global awareness about the movements that indirectly may influence diplomatic pressures, and humanitarian aids (Murthy, 2013).

2.3.3 THE STRENGTH OF WEAK TIES

Twitter's roles in social movements are often criticized. Many scholars have disapproved Twitter functionalities as they argue that it cannot overthrow governments or bring societal changes. For example, Morozov (2009), Gladwell (2010) and Rosen (2011) claim that Twitter is "loose networks of followers" and lacks leadership oriented rigid hierarchy which is more important for social movements. However, Granovetter (1973) identified that a collection of weak ties are potential of diffusing strength over strong ties,

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which can be applicable in the case of Twitter to foster digital activisms. Global 2011 Occupy Wall Street movement is a prominent example of weak ties efficacy from the perspectives of information dissemination, resource mobilizations, and participant recruitments. Although the strength of weak ties needs to be measured case by case, coalescence of weak ties and strong ties are important in making successful social movements (Bennett & Toft, 2008).

2.3.4 HOW TWITTER SHAPES POLITICAL DISCOURSE?

Twitter increases both direct one-to-one and one-to-many communications. Centuries ago political leaders used to visit homes and supporters directly and ask for their votes. However, in modern days reaching millions of voters individually is an impossible task. Many new mass media methods like radio, billboards, mails, TV have been in use to continue the communications between leaders and supports. However, these approaches lack the direct communication with the supporters and voters. In this regard, Twitter re-establishes the direct contacts with the supporters and it can be both one-to-one and one-to-many. Candidates can establish meaningful communications with the voters (Faulders, 2014). Results of these interactions are proven not only in politics but also in business.

Twitter is capable of establishing a successful political process and reducing the distance between supporters and leaders. The concept can be metaphorically compared to the framework of popular town square events where people meet to discuss about various societal issues (Faulders, 2014). Supporters can directly communicate with, ask questions, send messages to the leaders. Such straight forward interactions were missing in the other communication mediums like TV, radio and such. The social participations

make Twitter more suitable for bridging gaps between leaders and their supporters. Such impacts are persuading the political leaders on being active on Twitter. For example, in the USA, all of the senators and 97% of the House of Representatives have Twitter accounts (Faulders, 2014).

Open exchange of information is important for bringing a positive impact on global scale and Twitter supports and offers to build such open participatory platform. It is true not only in the cases of developed nations but similar effective results can be traced in developing nations as well. For example, president of Rwanda replies to his followers messages through Twitter (Parker, 2011). Twitter and mainstream US TV news channels like CBS are partnering in order to retrieve and understand millions of users' opinions on presidential candidate debates (Flores, 2015). Viewers' comments and information sharing data can used to formulate proper questions during presidential candidate debates. Many relevant Twitter usage metrics such as how many new followers were generated during the debates is a meaningful way to understand the likability of an individual candidate in the presidential run. With community of users discussion on societal issues online anytime from anywhere, Twitter ensures a participatory democracy in the society.

2.3.5 SENTIMENTS IN SOCIAL MEDIA

Movement tweets are dependent records, which mean these are dependent to each other and have relationships. Activists interacted with one another. Their interactions were related to each other's' tweets. It implies that the Shahbag Movement tweets are full of expressions and contain sentiments and opinions. Protesters' information exchange behaviors make this case richer in context. Their interactions are linked not only with

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each other but also with the tweets they posted on Twitter. Such characteristics are important to conduct sentiment analysis (Liu, 2015). It also allows us to examine what kind of interactions took place among the protesters. For example, grouping protesters into different political parties, identifying contentious issues of the movement, and extracting agreement and disagreement expressions can also be discovered from this investigation. The movement conversations on Twitter are analogous to debates which are essentially forms of exchanges of arguments and opinions among participants (Merriam-Webster, 2015). Therefore, by identifying the discussion topics of the SM protesters, it is possible to group them in different classes to reveal who were supporting or opposing different political parties or ideologies involved in the movement. Dividing the protesters sentiments based on agreements and disagreements to the central issues of the unrest is a pivotal task in this study.

SM tweets include various kinds of information such as viewpoints of the protesters about the movement, questions to the authorities like Government and law enforcing agencies, news media, international interventions like United Nations, Human Rights Watch etc. and leaders. So these tweets can be considered as the collection of debates, opinions, questions and answers.

2.3.6 DISCOVERING THE STANDPOINTS IN DEBATES

Previous studies identified the stances of participants in debates and discussions by grouping participants and posts into two predefined classes (Liu, 2012, 2015). Researchers commonly attempt to solve these problems by designing graphs and developing algorithms for classifying groups. For example, Agrawal et al., (2003) classified the participants of a newsgroup discussion into for and against groups and they

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generated graphs and algorithms to address this challenge. Thomas et al., (2006), on the contrary, classified contents into predefined groups. Their objective is to identify if the statements made during the US Congressional floor debates characterize support or opposition to the proposed laws.

Previous studies discussed Twitter associated social movements mostly from the perspectives of role of Twitter as communication medium and measured its impacts. Twitter has reformed resource mobilizations. Participants involved in various worldwide movements may not be on the streets, yet those digital natives are promoting protest news, globalizing the information, influencing news media and bringing international attentions on the local events which is otherwise impossible. It implies that high-risk takers who actively participates in the street actions during movements cannot diffuse the news by themselves to the international community unless their news are disseminated, which in Twitter's case is tweeted and retweeted by the citizen journalists.

2.3.7 SOCIAL MOVEMENTS AND SOCIAL NETWORKS

Use of social media and its roles are heavily studied in various global social and political movements including the Occupy movements (Jensen & Bang, 2013; Thorson et.al. 2013; Croeser & Highfiled, 2014), Arab Spring (Khondker, 2011; Aday et.al. 2012), Iran Revolution (Burns & Eltham, 2009; Chatfield, et.al., 2012), 2010 & 2011 MENA (Middle East and North Africa) movements (Black, 2011; Moore et.al. 2011; Murthy, 2013), and 2014 Ukraine crisis (Gruzd & Tsyganova, 2014; Szostek, 2014). The results of these literatures commonly claim that Twitter and other online social sites are useful communication tools in order to organize larger collective actions and share updated information with both strong and weak ties.

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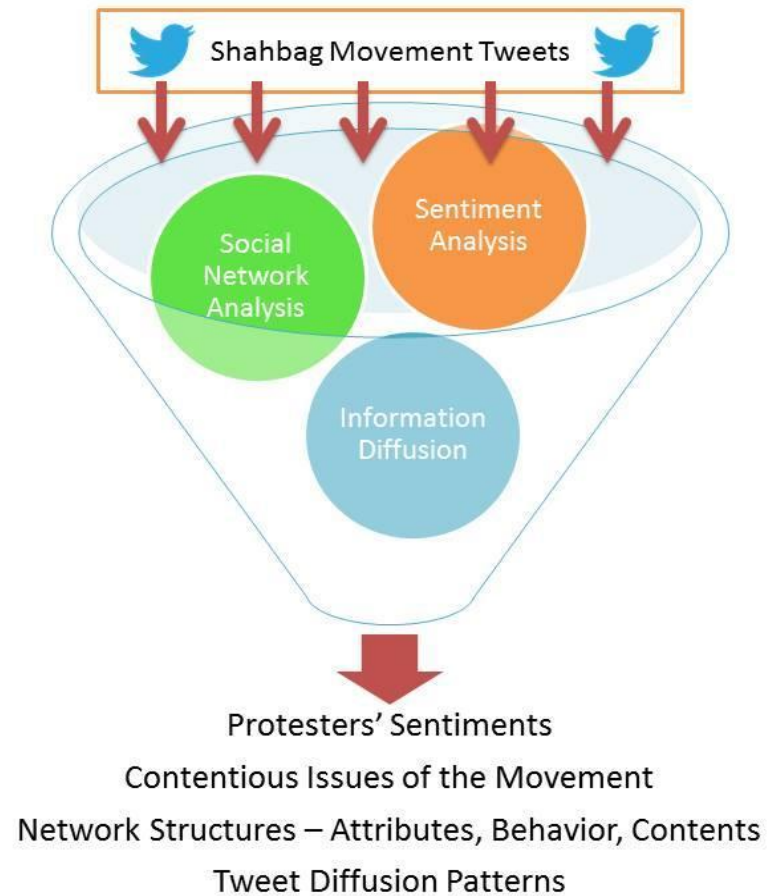
Figure 2.2: A funnel approach

It is not uncommon for social network scholars to study the impacts of social media during various types of unrests. Gruzd & Tsyganova (2014), for example, examined the politically polarized online groups from 2014 Ukraine crisis and identified the similarities and differences of in the network structures. However, the power of social media sites like Twitter needs to be evaluated critically. As Murthy (2013) suggests from technological determinism point of view referring to Warf (2011) that Twitter as a medium should not be considered as the sole cause of driving social and political changes.

However, Twitter's use in digital activism is continuing and answers for many questions related with online social movement group ideologies are still unknown. The case of #Shahbag movement and Twitter has not been examined extensively yet. However, this study skips the common step of describing merely the role of Twitter in #Shahbag movement rather it looked on the investigation of understanding political ideologies of the protesters from their tweets and identify their overall political statements during the movement.

Networks are supportive of information flow through the development of structures (Monge and Contractor, 2003; Wasserman and Faust, 1994). Online network structures are centralized and fragmented (Castells, 2009, 2012). Online networks in social movements do not have decentralized structures and do not always support quick information diffusion (Gonzalez-Bailon and Wang, 2016). Information diffusion depends both on chain reactions and cascading effects (Easley and Kleinberg, 2010; Newman, 2010). Impact of structural holes is crucial for information diffusion as networks are mostly sparse (Gonzalez-Bailon and Wang, 2016). Therefore, for passing information

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through networks bridges between and holes and willingness of nodes are highly important. However, there is limitation in identifying the effect of networks theories on how social media mediate collective actions.

This study specifically examined Twitter networks developed by the Shahbag protesters in 2013. Insights from this study is applicable to similar online network contexts. However, deeper explorations are required in order to generalize the findings of this research to broader areas.

A discontent over the war criminal tribunal verdict prompted a mass protest in Bangladesh. International media and existing research primarily put weight on the role of social media in social movements. Those authentic sources highlight how participatory medium like Twitter facilitate the resource mobilization and progress of the events. However, there is limited attention on how Twitter support debates, discussions, information diffusion, networking in an online protest.

Role of technology in social movements has been studied deeply. The debates of 'twitter revolutions' and Arab Spring are well established. Lack of news coverage in traditional news media during Tunisia movement, for example, led dissidents to use social media tools like Twitter for information dissemination. Twitter's power of over-throwing governments is highly debated as pro-technological views believe in the power of internet-determinism. The critical opinions against these expressions warn for considering social factors and inclusion of impact of social ties among the connections. Twitter is useful in promoting decentralized power network, which brings the question of necessity of structured form of leaderships during social movements. Besides technological determinism, the matter of scale shift that enables a local issue reach the

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global attention is also an important aspect in social movement discussions. This process contains the traits of participants' shared interests and following early adopters during movements. Twitter as an online social networking tool offers opportunities to execute these mechanisms, 'diffusions', 'brokerage', and 'attribution of similarity'. This provides an opportunity to discover the developments of Shahbag movement.

CHAPTER 3

METHODOLOGY

3.1 TIME SERIES ANALYSIS

The rise and fall of public interests in particular event can be examined from the tweets. These publicly available data with temporal information reveal the overall growth pattern of events on Twitter. It provides opportunities to make sense of public opinions over time. With the help of time series analysis shifts of public sentiments can be measured. Classification of Twitter corpus demonstrates the changes of public opinions at different time periods. The graphical representations along with qualitative content analysis explains contexts broadly. Content analysis can describe changes of people's thoughts and interests on a topic over time. It can identify any kind of unusual scenarios in the event on Twitter. Overall trends of a particular event can easily be visualized with time series analysis.

3.2 SENTIMENT ANALYSIS

Large-scale Twitter opinion data can be calculated with automatic sentiment analysis. The classification of public reactions demonstrates their overall reaction to a certain topic. It can identify the sentiment trends and changes into it overtime. Public reactions before and after an event evaluate its impact. In the contexts of social movements how these methods provide insights is limited. This research aims to highlight and explain protest tweets by using sentiment analysis.

3.3 CONTENT ANALYSIS

Texts in the tweets can be classified into different categories that can meaningfully explore themes of Twitter discussions. Constructive conclusions can be made from the frequency distributions and co-occurrence of specific words in the tweets. Due to technological advancements online contents creation is becoming popular. Twitter corpus give an excellent source for understanding human perspectives on multidisciplinary issues. With application of content analysis, Twitter data can be utilized to explore popular trends, topics, actors. It can be combined with number of other established methods including social network analysis (Magnani, Montesi, Nunziante, & Rossi, 2011), information diffusion (Huang, Thornton, & Efthimiadis, 2010; Jensen, Zhang, Sobel, & Chowdhury, 2009), and sentiment analysis (Kumar & Sebastian, 2012; Nielsen, 2011) for that same purpose.

Manual and software assisted content analysis are useful on specific contexts. Small dataset can easily be analyzed with popular spreadsheet programs. For large-scale dataset computer assisted programs are efficient. However, to ensure analysis reliability intercoder or intracoder agreements are vital.

Selection of the right sample dataset appropriate for answering research questions is essential in any kind of content analysis. In the context of Twitter, limited access to its API is a challenge on top of choosing the representative data sample. Tweets with specific hashtags or of certain users are common practice for Twitter data selection. Typical content analysis of tweets produce keyword frequency distribution, list of words, visualization, word tree diagram etc. Significant attention is required during Twitter analysis since tweets are filled with noises such as emoticons, misspellings, bot messages

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etc. For identification of communication practices from Twitter big data combination of computational and qualitative methods are appropriate in order to establish reliability on the findings. Use of computational and software assisted method for tweet analysis increases efficiency with data interpretation.

3.4 NETWORK CENTRALITY

Power is a central attribute to any kind of social structure. Network is an important tool to understand power in social structures. Network centrality identifies which nodes or actors in the social structures are most powerful or central (Hanneman, Riddle, 2005; Scott, 1991). For the analysis of Shahbag Twitter discourses four specific centrality measures are considered including degree centrality, betweenness centrality, and eigenvector centrality, and collective identity. The number of relationships one node has in a social network is indicative of its degree centrality. The degrees can be outward or inward based on the context of the measurements. Connections to other nodes refer to out-degree, while connections receive from other nodes are in-degree relationships. For example, in the case of Twitter mentions in tweets and retweets are considered as in-degree relationships as on particular node receives those connections from other nodes. Betweenness centrality explains the ties between other nodes. Eigenvector centrality describes overall connections of the network with specific attention on the connections with important nodes. Collective identity illustrates the nodes with the shared interests and beliefs, which in the context of Shahbag movement is important to discover like-minded activists.

Network offers better understanding on its organization and interdependence. Individual nodes in a network ties the group of nodes together by controlling

communication and information transfer practices. With the help of digital technological tools communication process certainly has become faster. From the perspectives of Twitter, the communication process has become complex as it can identify the routes of information transfer, and information brokers and their roles.

Nodes who controls information flow, in network theory, are called brokers. The brokers act as bridges and manage the 'global connectivity'. They are connected with measurements of structural constraints and betweenness centrality (Burt, 1992, 2005; Freeman, 1977; Girvan and Newman, 2002). Social media technological affordances provide opportunities for faster information transfer. It means the democratization of information sharing; anyone from anywhere can distribute information through social media. With the connections of network theories this phenomenon can describe how it happens on Twitter and what are the implications of faster information on Twitter. Just like the strength of weak ties, the brokers or bridges play significant role in information travel in networks (Granovetter, 1973). Weak ties connect distant group of nodes together. The nodes who have limited constraints and are connected with multiple groups have the power of promotion and restriction of information flow (Burt 1992, 2005). Opinions of a brokerage can be traced within the nodes of groups in various clusters. It helps to classify group of nodes based on the notions shared by the brokerage. These groups can be identified based on the measurement of community detection process (Girvan and Newman, 2002). Nodes with ideological commonalities tend to group together (Adamic and Glance, 2005; Conover et al., 2011). It means that information may not travel through clusters or communities if there are no common ties among them. Therefore, brokers in networks have power of blocking or passing of information in local

and global structures. In the contexts of Twitter protests, groups will be fragmented if they are not tied with brokers and information diffusion may hamper overall.

It is important to understand the global structure of the online network during social movement. It provides insights on the value of structural holes in the network. Moreover, it demonstrates the local positions of actors in network. Identifying the positions we observe in Twitter network ultimately describe the pattern of information flow. The structural holes with brokerage potential significantly impacts the travel of information in the entire Twitter network. The control of information flow in the networks yields power for the structural holes. This power can shape the opinions of the public. Therefore, it is meaningful to investigate that how such opportunity is operationalized during social movement in Twitter by the cyber activists. There are arguments over the capability of online networks regarding the decentralization of information diffusions. Moreover, networked social movement studies argue that social media make online communication horizontal.

3.5 VISUALIZATION

Graphs have functionality of representing links between data units and revealing structure and patterns of relationships within those. Understanding the relationships of data units is important because it can explain why and how things happen. Graphs are useful for detecting anomalies, patterns, social structures, spatial elements, communities and more from the dataset. A range of tools are used for visualizing graphs in this research. Each application has specific advantages over other and suitable for generating graphs. For the purpose of descriptions, in this research specific graph terms have been used. For example, 'nodes' represents actors and 'links' or 'edges' represent relationships

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exist among those nodes. Use of particular term is important for reducing ambiguity in analysis and discussion.

Gephi: Gephi is an end-user point-and-click application for creating network graph visualization.

Excel: Microsoft Excel offers features that are easy to use and suitable for running basic data analysis and visualization.

NodeXL: NodeXL is a Microsoft Excel plugin useful for social network analysis and graph analysis visualization. This study concentrated on tweets containing both #hashtags and @mentions in order to produce richer network context (Smith, Hansen, & Gleave, 2009). This initiative yielded an asymmetric bimodal network. NodeXL software (Smith et al., 2010) of Social Media Research Foundation was utilized to produce network visualizations. It is an Excel based application and supports macros features to extract every #hashtag and @mention.

R: R programming language offers a variety of packages useful for creating analysis and visualization on multiple methods including sentiment analysis, time series analysis, and social network analysis.

Twitter data collection process has limitations. Due to Twitter data collection limitation it was not possible to harness all of the tweets related to Shahbag movement. The other limitation in relation to dataset of this research is tweets were collected only by using "#shahbag" keyword through Topsy search system. Although the movement initiated by using this hashtag, gradually several other key hashtags emerged. However, #shahbag was the most commonly used terms in the movement, which significantly can illustrate the overall trends of the movement. Moreover, it is challenging to understand

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what is the best representative dataset for this case as Twitter API is the only source for collecting tweets. Therefore, the representation of the total dataset is impossible to cover in most of the Twitter research.

3.6 DATA COLLECTION

Twitter was the obvious choice for data collection for this study. Twitter allows searching and retrieving publicly available tweets through its search Application Program Interface (API). Twitter data collection process is becoming easier due to the advances of programming languages. R and Python are two common platforms for this job. However, due to the growing demand of tweets in many sectors, commercial data vendors are also growing up. For this study, Topsy[1], a Twitter authorized data resellers, search system was utilized. Topsy indexes and ranks results of public sentiments published in social media about particular product, event, policy, issue, and individuals etc. Topsy search API can retrieve both real time data and historical data that are available in Twitter from its inception in 2006. It also can provide geographic information, which means the tweet origin location can be tracked via Topsy service. However, Topsy was acquired by Apple in 2013 (Wakabayashi & MacMillan, 2013). Although now Topsy provides more modified services, its acquisition did not hamper the primary data collection process for this study. Tweets were collected from February, 2013 to December, 2013. Shahbag Movement tweets were posted from the first week of February, 2013. The search yielded a total of 116,314 tweets. "#Shahbag" was used in Topsy search system for data collection. The hashtag (#Shahbag) was widely used by protesters, news media, and international aids during the movement. One of the aims of this study is to longitudinally

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[1] http://about.topsy.com/support/search/

explore the sentiment and topic shifts among during different times of the year. For that purpose it requires more data with hashtag '#Shahbag' from 2014 to 2015. Although Topsy may not be the suitable option for this purpose after the Apple acquisition, some other alternative data resellers, for example, Sysomos[2] and Crimson Hexagon[3], both of which are third party social media monitoring systems and allows users purchasing tweets, can be approached for further data collection. Moreover, open source techniques using R library[4] is also a possible solution for collecting tweets with hashtag "#Shahbag". In any of these cases, Shahbag Movement tweets from January, 2014 to July, 2015 will be collected.

3.7 SAMPLING

For this study tweets including hashtags, usernames, timestamps, mentions, geo-location and platform information was used for analysis. Tweets were saved in Excel spreadsheets and comma-separated values (csv) file format. In R, write.csv() and read.csv() codes were used for importing and exporting .CSV files. The sample of the tweets were chosen for analysis. A simple random sampling procedure without replacement was employed for selecting the sample. Simple random sampling method is popularly used as a probability sampling method because of its ease of use, implementation, and analysis. It allows examination of statistical methods for sample result analysis. This method ensures equal probabilities to select every tweet in the collection. Random numbers were generated by using automatic number generator

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[2] http://sysomos.com/

[3] http://www.crimsonhexagon.com/

[4] https://sites.google.com/site/karamihomepage/tutorials

system without any duplication. It calculates random number by using the minimum number and maximum number of tweets in the dataset.

3.8 PROCESSING

Although data preparation is time consuming, it offers multiple benefits for real world dataset. Data processing is important because of real world datasets are impure, requirement of quality data, and quality patterns in the dataset (Zhang et al., 2003). Streaming datasets contain noises, and often are incomplete and inconsistent. Removal of noises improves the quality of data and it enhances analysis efficiency. Moreover, processed dataset provides opportunities to find quality patterns in the dataset.

Tweets are prone to noises. This study uses multiple methods and applications for cleaning the tweets and removing noises from the tweets for further analysis. Tweets contain stop words, symbols, spelling errors, meaningless words etc. Moreover, this dataset contain a large number of tweets in Bangla language. Only English language tweets from Shahbag movement were used for analysis. Different R packages were used to remove RT, @usernames, special characters, digits, URLs etc. These processes helped with sentiment analysis. The texts and emoticons of the tweets were useful to analyze emotions of Shahbag activists.

Twitter data collection process has limitations. Due to Twitter data collection limitation it was not possible to harness all of the tweets related to Shahbag movement. The other limitation in relation to dataset of this research is tweets were collected only by using "#shahbag" keyword through Topsy search system. Although the movement initiated by using this hashtag, gradually several other key hashtags emerged. However, #shahbag was the most commonly used terms in the movement, which significantly can

illustrate the overall trends of the movement. Moreover, it is challenging to understand what the best representative dataset for this case is as Twitter API is the only source for collecting tweets. Therefore, the representation of the total dataset is impossible to cover in most of the Twitter research.

Microblogging dataset require special attention for processing. For this study emoticons dictionary, and acronym dictionary was used for sentiment analysis of tweets (Agarwal et al., 2011). Five labels - Extremely-positive, Extremely-negative, Positive, Negative, Neutral, were assigned for emoticon analysis. Slang.com online compilation was used for acronym list. The sample selection process followed the process of inter-coder assignments. Two coders scanned the sample dataset for categorizing the themes of Shahbag tweets. To ensure reliability and validity, only English language tweets were used for analysis. At first the codebook was prepared with discussions between the three coders. After scanning the tweets further coder discussion took place. This process was repeated three times, which provided an agreement rate of 75 - 85%.

This study explored the tweets of the Shahbag movement protesters, both supporters and detractors, by using machine learning techniques to gather insights of the movement. it identified their sentiment levels and political stand points, and contentious issues by employing sentiment analysis and content analysis respectively. It investigated how the supporters and antagonists formed their online networks on Twitter. In light of social network analysis, it examined who were influencers, how they formed Twitter communities, and what were the essential network-attributes of the protesters. This study employs open source R packages including *tm*, *igraph*, *SnowballC*, *ggplot2*, *wordcloud*,

cluster, *fpc*, and *syuzhet* for computing Twitter data, and Gephi, NodeXL, Tableau, and Carto DB for analyses and visualizations including networks and geospatial.

Gephi and NodeXL has been used for graph and network analysis apart from R. The primary dataset for this research was collected through Topsy. The dataset had been processed with proper specifications for further network analysis. At first, Shahbag Twitter data was processed in the format of NodeXL. In the second phase, it was converted into a GraphML file and processed with Gephi for visualization. Prior to NodeXL formatting Twitter data was cleaned by removing texts of all language, symbols including # and @ for network analysis. Nodes or vertex information was added in two columns based on the actual dataset. The formation considered retweets and mentions for creating networks.

The network analysis explained the interactions among various hubs and connections. To identify the community identity, this study emphasized on mixed method approach of content analysis in addition of network analysis. Tweets are limited to 140 characters and include noises such as stopwords, emoticons etc. In order to deduct this shortcoming of quantitative research, here further explorations of authentic Shahbag movement sources were observed and examined.

Multiple methods were used in combined to appropriately discover the Twitter practices of Shahbag protesters. Following table lists different types of methods utilized to analyze research data for this study.

Table 3.1: Sample emoticons dictionary

Emoticon	Polarity
:) :-) :3	Positive
:D C:	Extremely-positive
:(:-(:[	Negative
D8 D; DX v.v	Extremely-negative
:|	Neutral

Table 3.2: Methods used for data analyze

Research Questions	Methods
1. What were the sentiments of Shahbag protesters?	Sentiment Analysis
2. What were the political stances of Shahbag protesters? 3. What were the contentious issues discussed among the Shahbag protesters?	Content Analysis
4. Who were the central activists of Shahbag movement on Twitter? 5. What are the essential network-attributes of protesters in Twitter? 6. Who were leading the conversations on Twitter during the movement? 7. Who had the power and leadership in Shahbag movement?	Social Network Analysis
8. How was information diffused during Shahbag movement? 9. How did Shahbag Twitter network continue scale shift processes of diffusion?	Information Diffusion

CHAPTER 4

ANALYSIS AND DISCUSSION

4.1 RQ1: SENTIMENTS OF THE PROTESTERS

Sentient analysis allowed revealing of agreed and disagreed expressions, conflicts, liberal and extreme protesters. Tweets were scrutinized against agreement and disagreement (contentious) expression lists developed by Mukherjee & Liu (2012a, 2012b) and Mukherjee, Venkataraman, Liu, & Meraz (2013). For example, in the tweet data set it was examined if protesters expressed words such as *agree, accept, well put, rightly said, absolutely correct* etc. as notion of agreements and *disagree, oppose, reject, refute, doubt, nonsense, don't accept, false, argument fails* etc. as impressions of disagreements or contentions (Liu, 2015).

Twitter only allows 140 characters in tweets. However, there are 116,314 tweets in this collection, which logically will be time-consuming for any human-coding. Automated sentiment analysis approach was utilized for examining the feelings of Shahbag protesters. Their affective positions was measured by classifying tweets into positive, negative and neutral category. Objective of this study was neither developing independent sentiment analysis systems nor evaluating any existing ones. It aimed to understand the public sentiments of Shahbag Movement tweets by using readily available automatic techniques. For example, Gruzd (2013), in his work of examining the polarity

in the tweets , used SentiStrength[5], an opinion mining software developed by the scholars from University of Wolverhampton in UK. SentiStrength calculates positive and negative scores for short texts such as tweets and to identify the polarity in the texts it only counts scores greater than +2 and lesser than -2. There are other sentiment mining systems available such as Lexalytics[6] and Opinion Observer, but SentiStrength is specifically developed for working with short social media texts such as tweets (Gruzd, 2013).

Shahbag Movements tweets are written in English, Bangla, the native language of Bangladesh, Arabic and Persian. Therefore, Shahbag tweets were cleaned according to different languages. Moreover, Topsy system could not recognize all of the world languages, which ultimately made it retrieving tweets with unknown characters and symbols. It happened for most of the Bangla language tweets.

The Syuzhet package in R revealed the emotions of the protesters by using sentiment analysis and NRC lexicon for Shahbag movement tweets. Instead of detecting sentimental views merely as positive and negative, this package was used to classify emotional levels of protesters into eight categories including anger, anticipation, disgust, fear, joy, sadness, surprise, and trust. NRC Emotion Lexicon includes English words and their connections with these eight emotions. This list has crowdsource based annotations.

The English tweets expressed angry emotions of protesters mostly. They were also sad with the overall outcomes of the situations during the movement. Activists became joyous whenever their demands and protest agenda came to fruition. They were afraid of what consequences would turn out to be. Protesters expressed their disgust on the political turmoil and politicized agenda brought into the movement.

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[5] http://sentistrength.wlv.ac.uk/
[6] https://www.lexalytics.com/
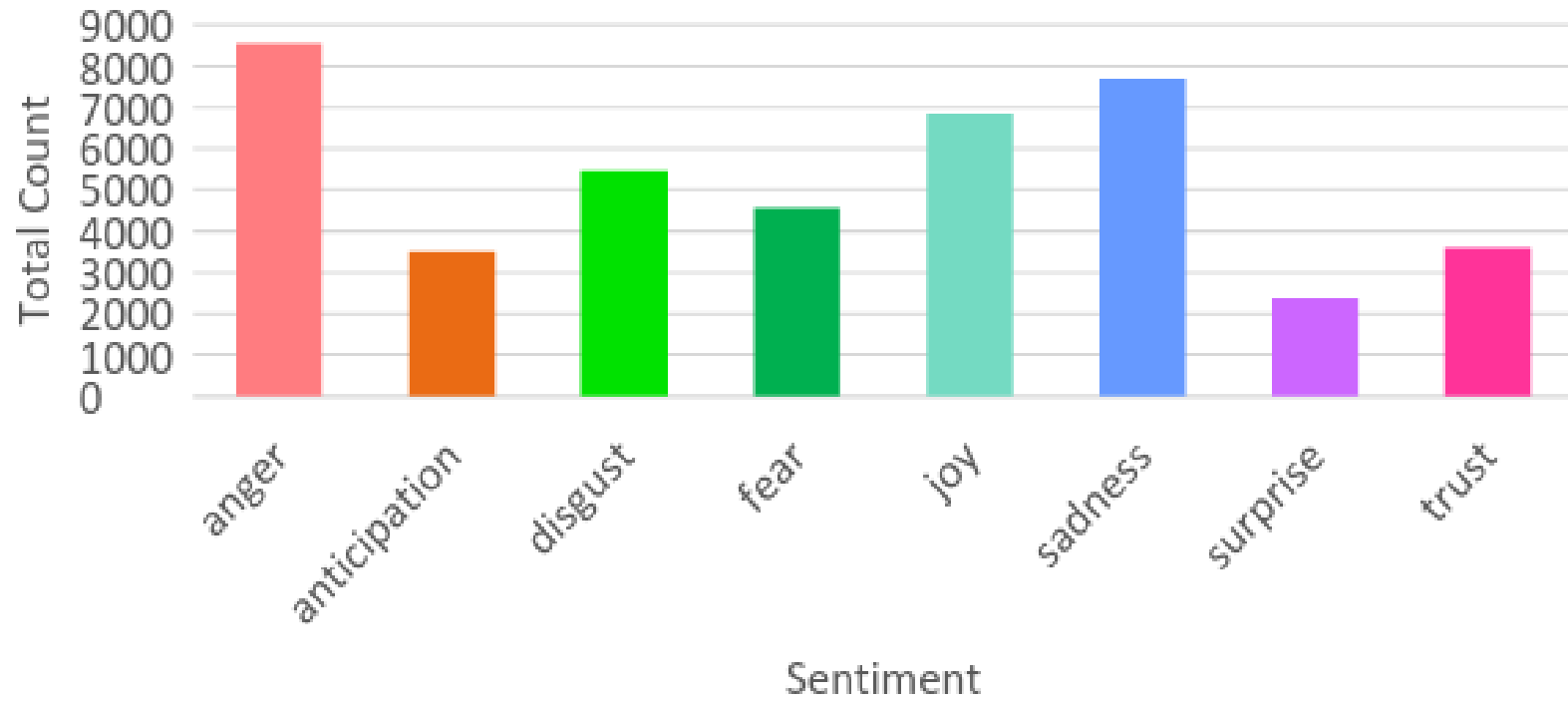
Figure 4.1: Level of sentiments of Shahbag protesters

A relatively minimal portion of tweets uttered emotions of anticipation, trust, and surprise.

4.2 RQ2: POLITICAL STANCES OF SHAHBAG PROTESTERS

Movement discussions are reasonably infused with argumentative and combative issues. Twitter's technological affordance and user-friendly interface makes any kind of communications easier and faster. Shahbag protesters were segmented by ideologies and exchanged many disputes amongst each other. To understand the political stand points (RQ2) and discourse topics (RQ3) of the movement content analysis was applied. It was utilized to identify the contentious issues of the movement.

Shahbag movement started with a demand of death penalty for the war criminals. Protesters were using "#Shahbag" in support of that demand. In contrast, the indicted war criminals are top leaders of an Islamic political party and it is one of the main opposition parties to the ruling Bangladeshi Government. The supporters of this Islamic party also went to the streets and labeled this movement as a political setback from the current government. So, they also started tweeting against the Shahbag Movement protesters by using hashtag "#SaveBangladesh". The tweets were classified on the basis of these two hashtags "#Shahbag" and "#SaveBangladesh" for clustering the tweets into two mainstream political parties. However, this step was insufficient to effectively identify the political polarization of the protester. The Islamic political party is also an ally of the largest current opposition party of Bangladesh. Many cross-ideologically protesters might use any of those two hashtags in reply to the counter party's tweets. To improve these challenges, tweets were manually read after dissecting tweets into two classes. Keywords associated with the slogans of each political party were tracked. It is a common trend for

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Table 4.1: Top ten keywords appeared in tweets by continents

Asia	Europe	North America	South America	Africa	Australia
shahbag	shahbag	shibir	shahbag	shahbag	shahbag
bangladesh	bangladesh	shahbag	savebangladesh	bangladesh	jamaat
jamaat	jamaat	savebangladesh	jamaat	twitter	bangladesh
war	savebangladesh	jamaat	bangladesh	sheikhmujib	hindu
shibir	ajstream	cnn	wsjindia	sayedee	temples
savebangladesh	joybangla	bangladesh	wikileaks	savebangladesh	shibir
protest	shibir	ajstream	struggle	sajeebwazed	savebangladesh
islam	cnn	war	shahbagorg	revolution	amnesty
blogger	justice	protest	projonmo	reorganization	sayeedi
amp	hrw	movement	political	industrial	criminals

Bangladeshi parties to use their ideological catchphrases in every public event. For example, "Joy Bangla" (Victory of Bangladesh) is the trademark shibboleth for the ruling government party. These parties frequently use their founding leaders' names. Therefore, existence of catchwords and party names, and leaders' names in Shahbag Movement tweets was indicative of the political polarizations and philosophical leanings of the protesters.

English language tweets from Shahbag Movement for the year of 2013 were selected and classified to identify top ten keywords by continents. Throughout 2013, the most commonly tweeted words were 'Shahbag', 'Bangladesh', 'Jamaat', and 'SaveBangladesh'. It exhibited that the movement information was mobilized worldwide and there were proponents and opponents of the movement. 'Shahbag' was consistently used by the protesters in their tweets. It is the name of the location where the movement took place in Dhaka, the capital city of Bangladesh. The tweeters commonly chose 'Shahbag' to share information and report about the protest. The Shahbag protagonists used #Shahbag and their antagonists used #SaveBangladesh. Moreover, The third commonly used word was 'Jamaat', the name of an Islamic political party currently in opposition. Usage of this word was stable all through the year with marginal low utilization in November. 'SaveBangladesh' is the fourth frequently used keyword during the movement. The supporters of Jamaat and anti-Shahbag protesters primarily used this hashtag to express their opinions against the movement. "Jamaat", which is the leading Islamic party in Bnagladesh, was the other highest used word in the movement. This word poses a misperception as it should be used mostly by its supporters. However, one of the other demands of Shahbag Movement protesters was banning the Islamic party in
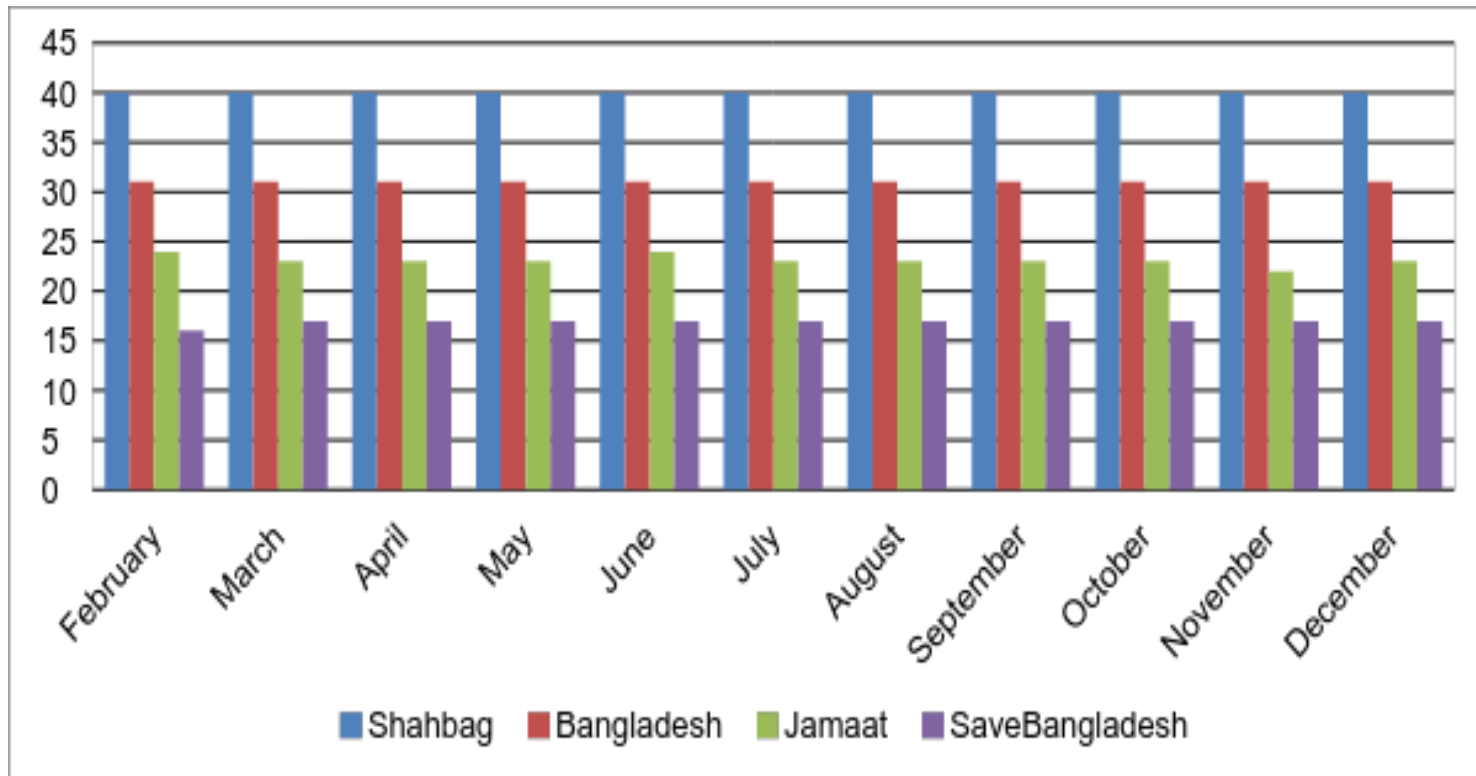
41

Figure 4.2: Most frequently occurred words in 2013 Shahbag tweets

Bangladesh. So, Shahbag agonists used "Ban Jamaat" in their tweets. Therefore, further text mining exploration was necessary as relying on an individual word ("Jamaat, regardless of the fact that it refers to an opposition party) would be insufficient.

The movement witnessed a number of other common keywords such as 'Shibir', 'WarCriminal', 'BanJamaat', 'JoyBangla', 'BanglaSpring', 'AwamiLeague', 'Democracy', 'CNN', 'Illegal', 'BNP', 'Solidarity', 'Hindu', 'Ajstream', 'Hefazat', 'BasherKella', 'Sayeedi', 'AMP', 'Blogger', 'Islam', 'Pakistan', 'ImranHSarker'. The keywords were categorized into five groups according to the relevance of Shahbag movement backgrounds. Three groups of this taxonomy were names of the mainstream political party of Bangladesh including Awami League (AL), Bangladesh Nationalist Party (BNP) and Bangladesh Jamaat-e-Islami (BJI). These three groups had the keywords that were clearly connected with the manifesto and constitutions of those three political parties. For example, 'Joy Bangla' is the initial part of the signature slogan of Awami League. It was mostly used by the tweeters in February, September and December.

Moreover, BJI leaders were under the war crime tribunal. 'Sayeedi', a key BJI leader, was mentioned frequently. 'Shibir', the student wing of BJI, and 'Islam' were also highly tweeted by the SM protesters. 'BNP' was also repeatedly stated in those tweets.

News Media category includes the names of the major international news agencies that were covering SM news and were frequently mentioned in the SM tweets. In this regard, CNN and Al Jazeera were the top two frequently mentioned news media.

The Other category lists all the words that were frequently mentioned in the tweets by the protesters. They were tweeting demanding the death penalty for the 'WarCriminals', the top BJI leaders.

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Table 4.2: Taxonomy of political word

Awami League	BNP	Jamaat	News Media	Others
JoyBangla AwamiLeague	BNP	Islam Sayeedi Shibir	Al Jazeera CNN BBC ABC MSNBC NYTimes Washington Post Time Guardian The Economist	WarCriminal BanJamaat Democracy Illegal Solidarity Hindu Hefazat Blogger ImranHSarker Pakistan

They also tweeted with 'BanJamaat' to prohibit BJI from running political party falsely under Islamic rules rather they want to implement proper 'Democracy' in Bangladesh. The protesters were reporting on increased attacks on 'Hindus' by the BJI supporters. Violence on 'Bloggers' who were actively participating into the SM protest was intensified significantly. Although the movement continued on basis of mass interests and without specific leaderships, it instantly formed an apolitical group called "Gono Jagoron Moncho" (*Mass- Awakening Platform*) and one of its central figure was Imran H Sarker. His name was mentioned in many tweets particularly in the last quarter of 2013.

A distribution of all politically characterized keywords (Figure 4.4) represent that 74% of the SM tweets were about BJI, 25% were related with AL while 1% were about BNP. Both groups of protesters, proponents and opponents of SM, were utilizing #Shahbag to report the cyber-activism updates.

Shahbag movement activities were diffused worldwide. Table 4.1 lists the most frequently used keywords in SM tweets in six continents. The tweets were posted from 40 countries worldwide, 45% of which were European while 35% were Asian, 7% were South American, 5% were both North American and African each, and 3% were Australian. The Shahbag movement supporters were sharing information with demands of capital punishments for war criminals and enforcements of ban on BJI. They also reported on the increased attack on Hindus and temples in Bangladesh by BJI supporters.

On the contrary, the SM opponents, the supporters of BJI, were actively sharing information stating that SM was a political initiative from the ruling party, Awami League, hence calling the portest illegal.
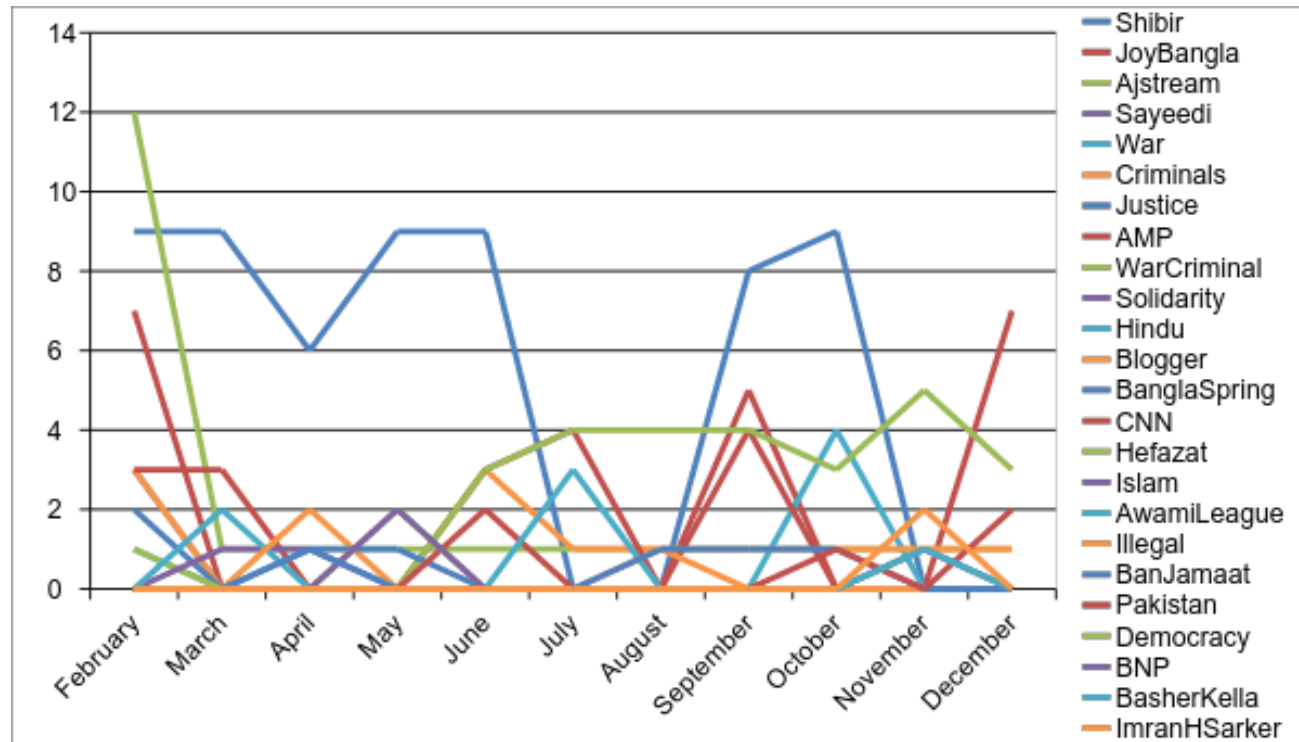
Figure 4.3: Occurrence of frequently used political words in Shahbag tweets

They were demanding the discharge of their leaders from the trial and repeatedly trying to catch attentions of humanitarian organizations such as Human Rights Watch (HRW).

This study investigated if Twitter could possibly identify the political ideologies of online activists and present their statements real-time. To reveal the results this study analyzed tweets of #Shahbag movement. It found that the Shahbag tweets were strongly connected with the three major political parties of Bangladesh, AL, BNP and BJI. With tweet classification and analyses it is identified that Twitter can discover the political ideologies of the activists and their statements. This study lays the foundations for future works in this area particularly identifying more relevant analytics and metrics to make sense of online political debates from Twitter data and visualize and preserve the records for timely usages.

4.3 RQ3: CONTENTIOUS ISSUES OF SHAHBAG MOVEMENT

Relationship between tweets with and without newer hashtags was examined to understand the rate of diffusion of Shahbag movement contents. The tweets were analyzed to extract the key themes of what the activists were discussing on Twitter. Two coders were involved for content analysis including this researcher. The other coder was a graduate student at the University of South Carolina and by profession was statistician. Both of these coders had familiarity with the dataset and the movement as they are both Bangladeshi native by birth. In order to achieve consistency of tweets characteristics evaluation, inter coder reliability was utilized. The contents were counted first and were arranged by months. The tweets were sorted alphabetically. Prior to this process tweets with noises, broken characters were removed.
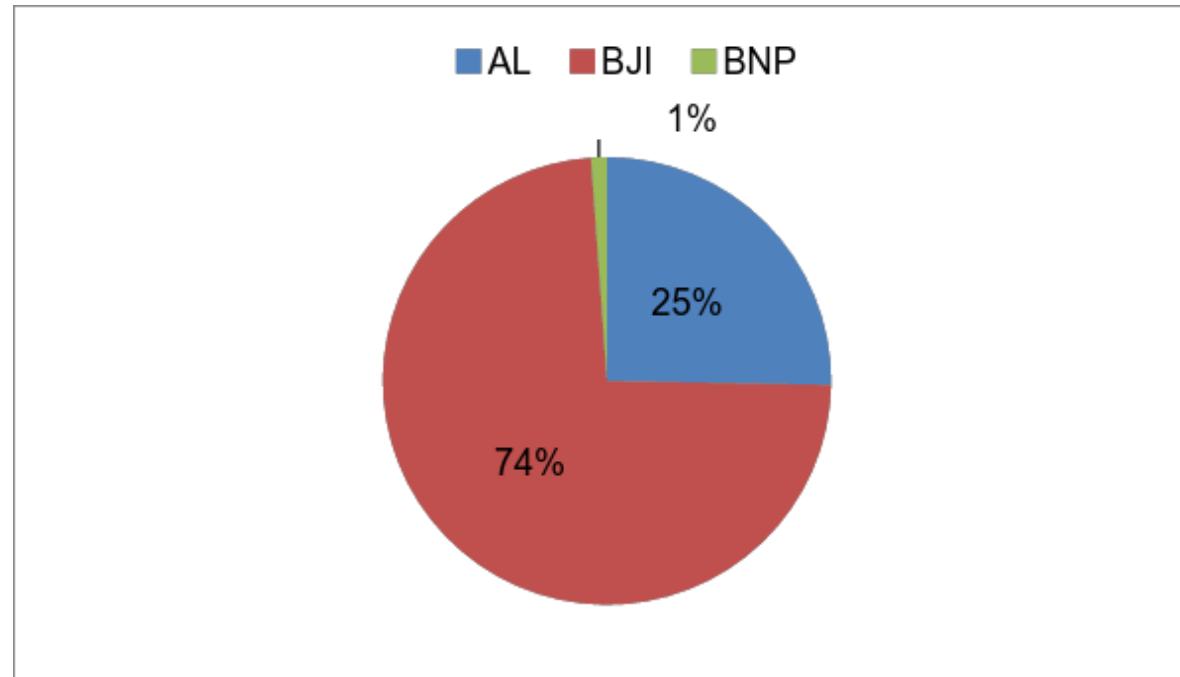
47

Figure 4.4: Political classification of frequently used words in the tweets

Tweets only in English language were used for this step. The coders used Microsoft Excel to read and classify contents of the tweets. There were similar observations among the coders with minimal disagreements over the category selections. English tweets were analyzed for this process and 85% inter-coder reliability score was reported, which was considered as moderate to high level of inter-coder reliability (Kassarjian, 1977).

This process was necessary to ensure reliability and reach accordance in evaluation same contents by raters (Krippendorf, 1989; Neuendorf, 2002). All of the coders were Bangladeshi students studying at the University of South Carolina in graduate programs and had familiarity with the movement. Based on the overlapping classification themes it was found out that the tweets were classified into several groups including *death penalty, hyperlinks, arguments, commentary, mentions, accusations, ban Jamaat, Bangla spring, women participation, Hefajat E Islam, and atheism* (Figure 4.5).

Protesters were divided into two groups. Both the protagonists and antagonists were tweeting using the keyword "Shahbag". The anti-Shahbag group was using "savebangladesh" hashtag to express their views. Pro-Shahbag group, mostly university students, was primarily tweeting on the demands of death penalty of war criminals, banning the Islamic political party of Bangladesh, Jamaat, and its student wing, Shibir, and vandalisms on the Hindu temples. The anti-Shahbag group was referring the pro-Shahbag group as atheists and anti-Islamic. They were mentioning humanitarian agencies and international news media in their tweets to catch international attentions. International news media such as CNN, BBC, and Guardian were covering news on this movement.
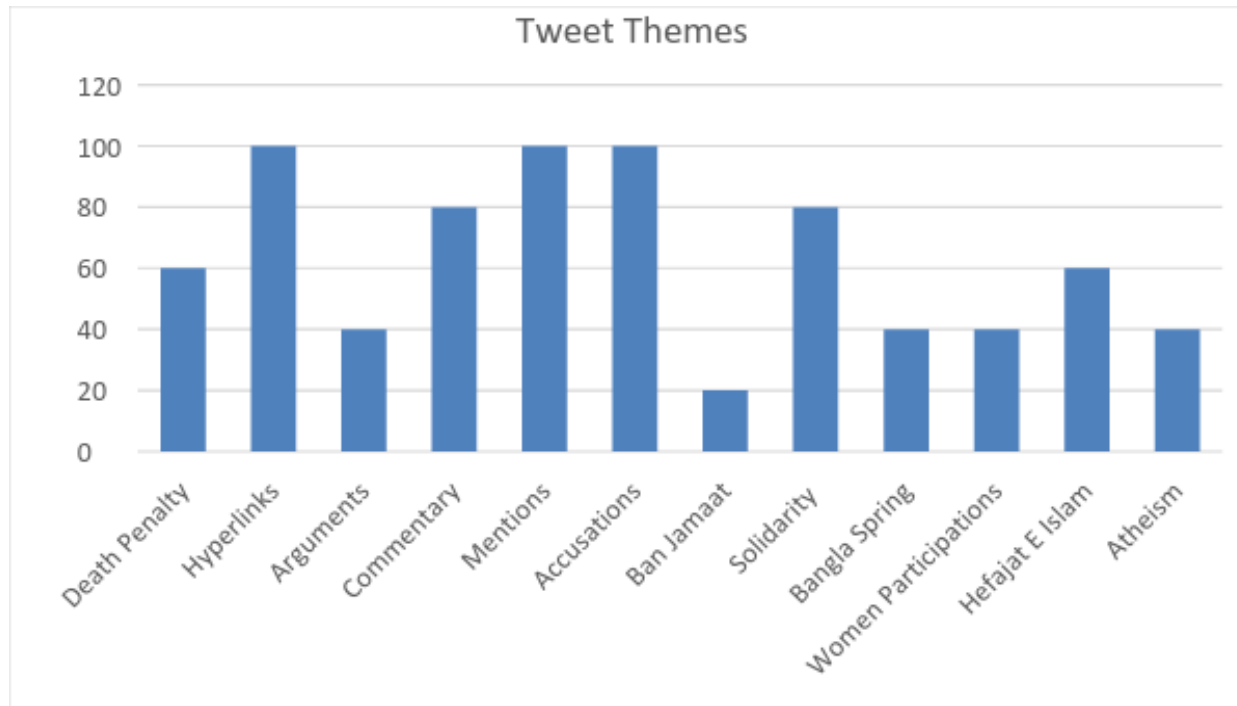
49

Figure 4.5: Tweet themes of Shahbag movement

The cluster dendrogram represents the relationship of how the various words including "Shahbag", "savebangladesh", "Bangladesh", "Jamaat", and "ict", "death", "war", "Dhaka", "Shibir", etc. are from similar groups.

It reveals that the words in the Shahbag-chunk has pair-wise dissimilarity with that of other chunks including savebangladesh, Bangladesh, and Jamaat. The fourth group of words, per the dendrogram, are highly similar to each other. The K Means clustering algorithm summarizes the multivariate dataset of Shahbag Movement tweets into two components that captures the 92.58% of the point variability.

Protesters were expressing contrasting viewpoints against the news published in printed and electronic media. Throughout the history of Bangladesh the roles of general mass and their ownership in political processes have played significant parts in shaping the history of the country. The empowerment of youth through the socio-technical systems and the sense of ownerships of changing the political processes for the greater good has been a key factor for the Shahbag movement.

Although there were critical expressions about the initiation of the movement that it was started by the student wings of the current Bangladesh Government's political party for its own political gains, protesters on Twitter and other social media platforms stated that it was an apolitical event. Typical public demonstrations in Bangladesh are sponsored by political parties and often follow violence. Shahbag movement protesters, mostly of the young generations of the country, claimed that they are free of any political motives rather they are protesting for fair justice of the war tribunals and because of the dissatisfaction they had on the outcomes of the trials. It was quite phenomenal regarding

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the fact it was intergenerational event with significant inclusions of women and the youth.

আবেদ হুসাইন
@AbidDu2

Follow

@AP @CNN @FareedZakaria @hrw Do not publish bogus news, come to #Shahbag watch what the mass people want. Search what the real news.

7:54 AM - 8 Feb 2013

Arnab Saha
@iamarnabsaha

Follow

#CyberWar starts here!!! You can join here #AJStream. Tell ur voice against all False news! #Shahbag... fb.me/Ik0UqFwB

4:08 AM - 19 Feb 2013

Nemesis
@MrTNemesis

Follow

@TheEconomist please do not spread false news regarding #Bangladesh. If you cannot speak the truth then plz keep mum. #Shahbag

RETWEETS   LIKE
9   1

2:02 AM - 23 Mar 2013

9   1
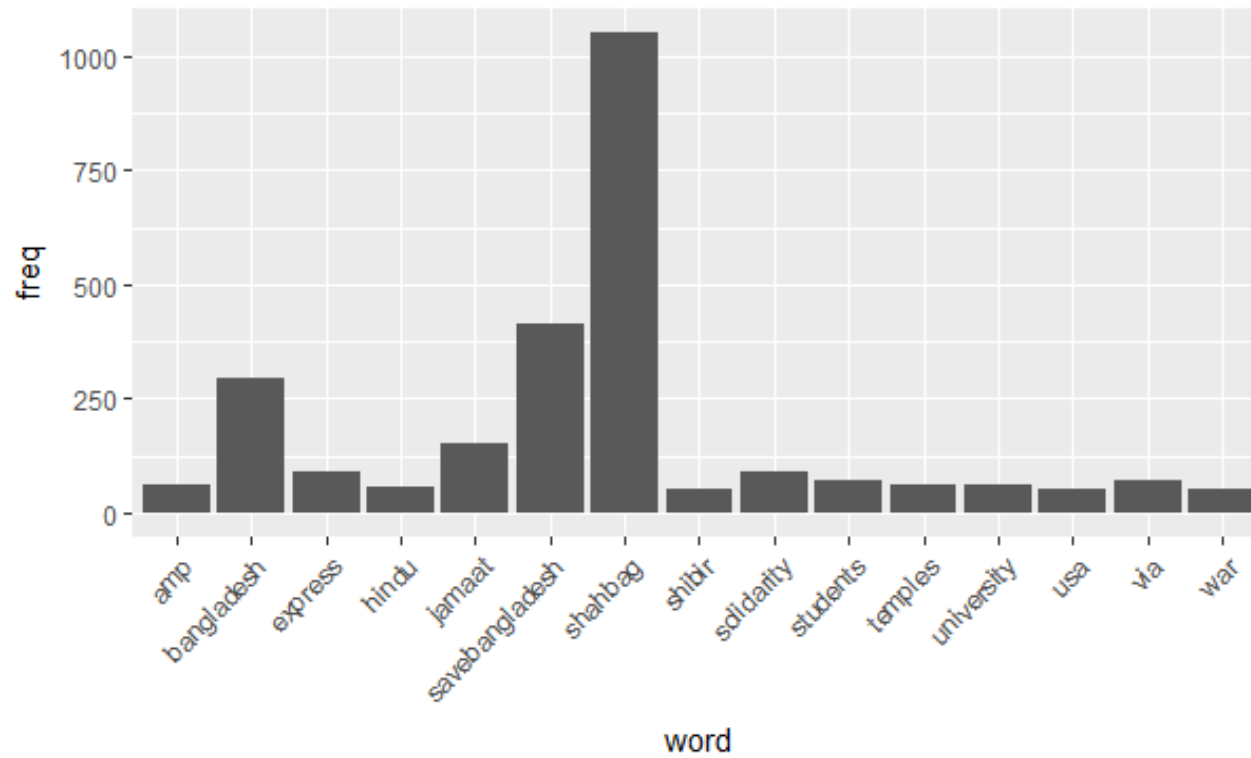
Figure 4.6: Frequently appeared words in Shahbag Twitter dataset

Figure 4.7: Wordmap of Shahbag tweets

Cluster Dendrogram

Height

400

0

shahbag ict death war dhaka people shibir will amp via savebangladesh bangladesh jamaat

d
hclust (*, "ward.D")
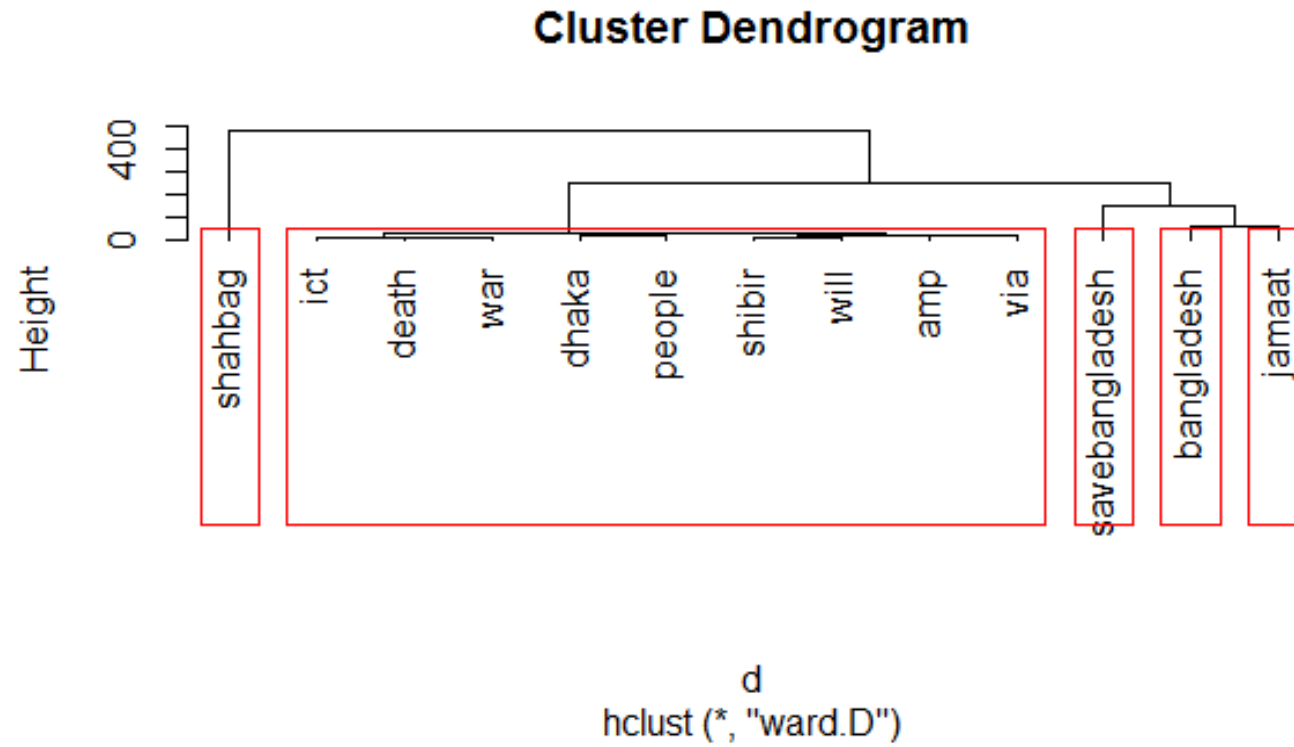
Figure 4.8: Cluster dendrogram of Shahbag movement tweets
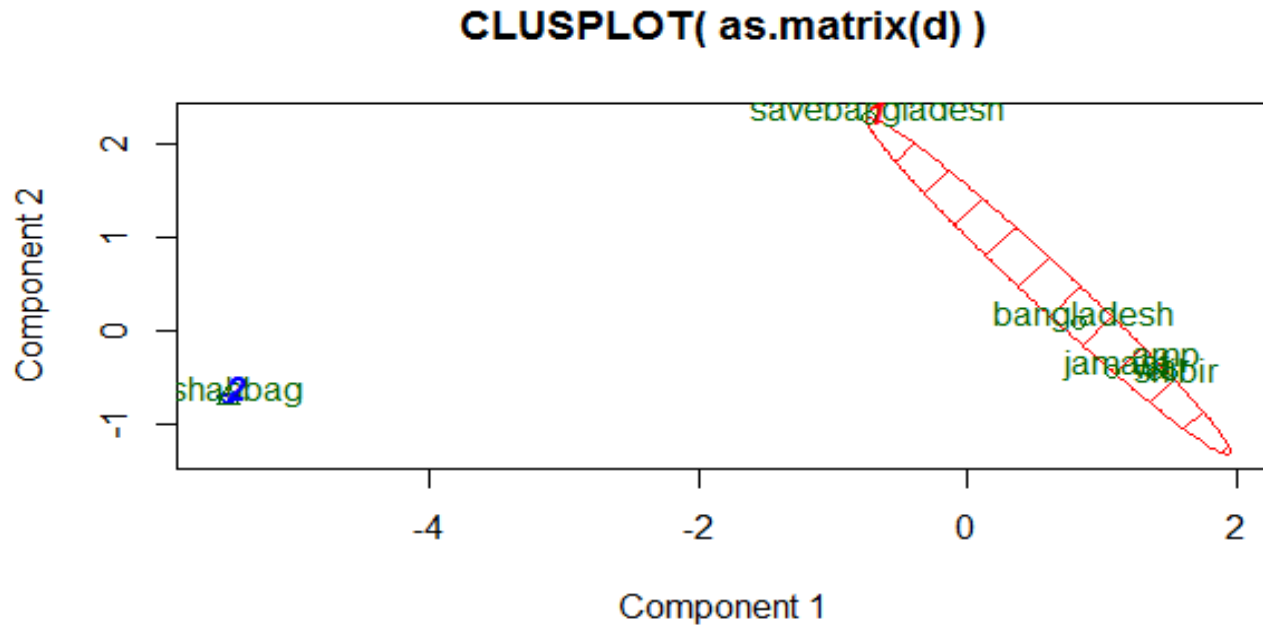
Figure 4.9: Cluster plot of Shahbag tweets

Taief Shahed
@tshahed

Follow

@mmbilal @AJStream Yes. #Shahbag gives Bangladeshi youths a platform who r politically aware, but don't like existing partisan politics.

RETWEET 1   LIKE 1

1:18 PM - 19 Feb 2013

↩ 1   ⟲ 1   ♥ 1

NISHKORMA
@KORMOHIN

Follow

#Shahbag is not against Islam. it's against criminals accused of #warcrimes. #Shahbag is apolitical. @davidbangladesh @AJStream @AJEnglish

RETWEETS 2

5:08 AM - 19 Feb 2013

↩ 1   ⟲ 2   ♥

The supporters and the antagonists were debating over the issue of political connections with the movement. Individuals conveyed different opinions on this matter. The pro-Shahbag groups claimed this protest as apolitical and stated that it came from the spontaneity of the protesters and for the love of the martyrs of the country.

Tanima Dey
@tanimadey

Follow

#shahbag is apolitical, for human rights, and is the voice of all bangladeshis demanding justice for #71genocide, hang the #warcriminals

RETWEET 1

11:44 AM - 27 Feb 2013

↩   ⟲ 1   ♥

57

There were critical views about the motifs from the anti-Shahbag group. They argued that the movement was strongly connected with political interests of the ruling Government's political party.
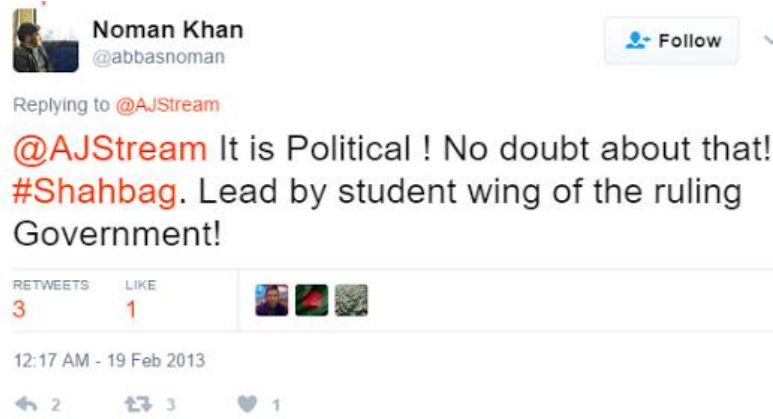
Social media was key part for mobilizing the people to the rallying ground. Bloggers and activists invited individuals to join the protest by creating social media accounts. They used Facebook pages, for example, to disseminate information about the protest and bring in people to the movement site.

Shahbag movement needed to be discussed within the larger socio-political context of Bangladesh. The political landscape of Bangladesh was under turmoil from the very beginning and violence has been a part of it for long. The Shahbag uprising started with the notion of demand of justice for the war crime tribunals. However, security became an issue later. Large popularity for the Shahbag protest was challenged by the antagonists. It grew as dangerous when bloggers were killed and the connections of Shahbag adversaries were revealed.

The collective actions generated large amount of conversation on Twitter. However, the critical views about this movement were labeling this movement as politicized and claimed that there were major flaws in the war crime tribunal.

58
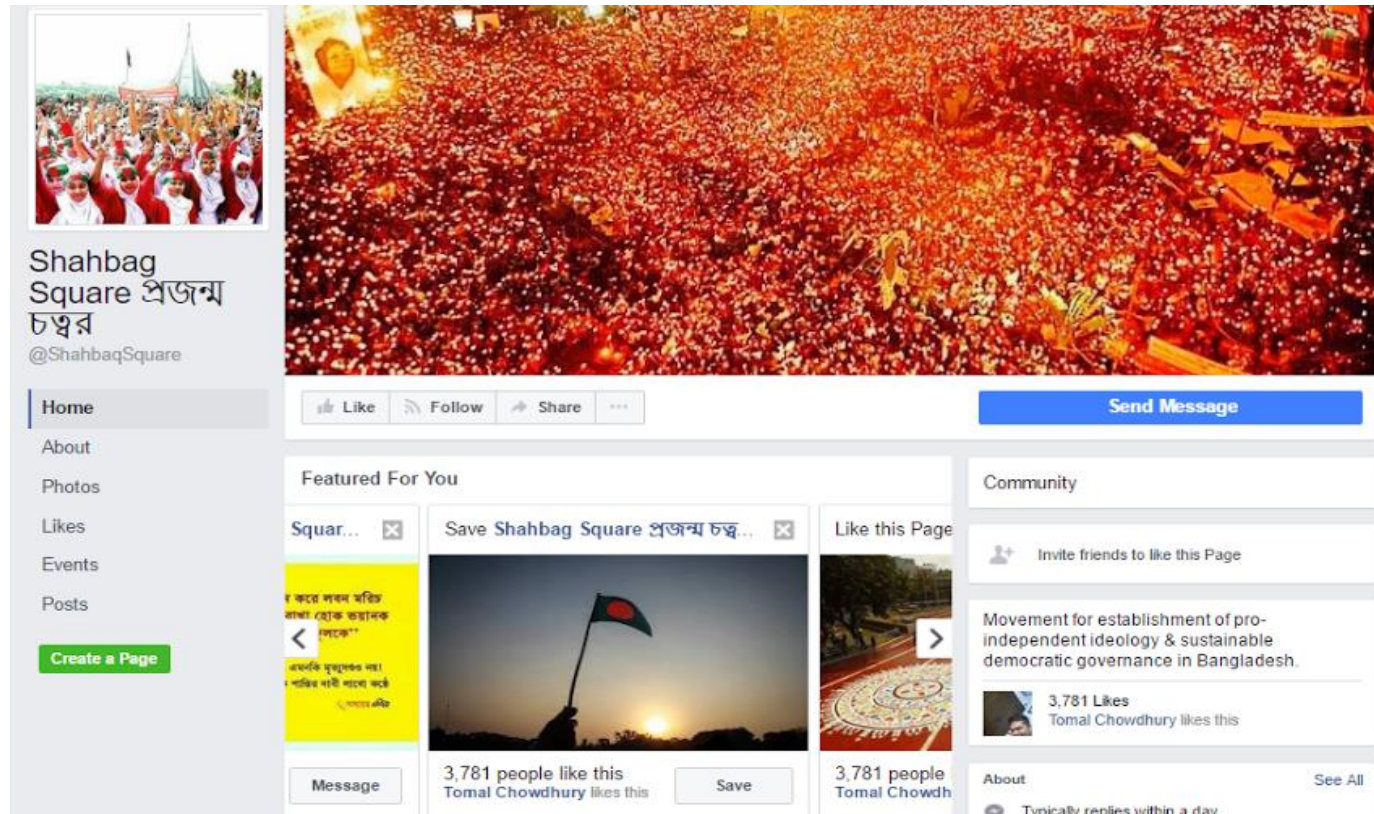
Figure 4.10: Facebook page of Shahbag Square

They were raising issues from the perspectives of human rights and the validity of conducting retrospective trials. The Shahbag movement protesters were explaining that their demand was related to the maximum punishment for the war criminals, which in the case for Bangladesh is death penalty.

Tahmima Anam
@tahmima

Also, that women are out in full force in #shahbag. Bravo #Bangladesh @asifsaleh

RETWEETS 10 LIKES 2

9:37 AM - 8 Feb 2013

Sabrina
@SNeverything

#Bangladesh war criminals led campaign of rape,murder & terror, targeted women, girls & minorities. Can't deny #history & #truth #Shahbag

1:04 AM - 12 Feb 2013

Therefore, the activists were sharing information with arguments against the challenges posed by their rivals. Above all the sense brutality happened during the liberation war in 1971 especially rapes of women, which was introduced as weapon of war, motivated the protestors for taking part in the movement. Women were participating in the movement in large numbers. The tweets related with women were about the liberation war brutality, rapes, conservative views on women, and appraisals for taking parts in the protest.

60

Figure 4.11: Shahbag Square LIVE Twitter profile page

Chowdhury H
@HsMuse

@Rahim7Abdul Where in Quran can u show
me to mass murder and rape women/ supply
women to Pak Army, and claim to be muslim/
Ummah'? #shahbag

RETWEETS 4   LIKE 1

1:01 PM - 14 Feb 2013
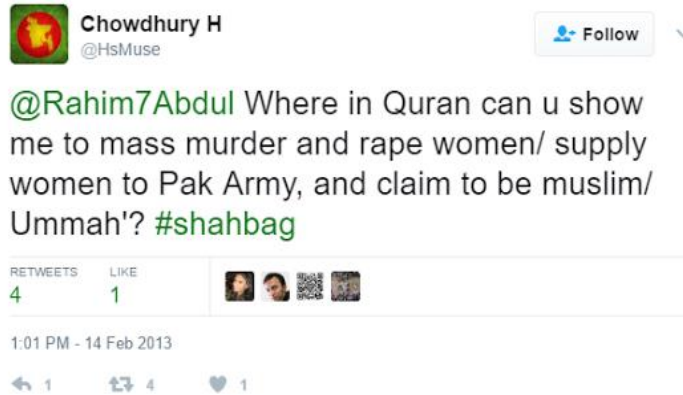
In 1971 rape was consciously used as "weapon of war" (Hossain, 2012). Did

women participate in the movement because of the large-scale violence against women in

the 1971 Liberation War of Bangladesh? The answer to this question is beyond the scope

of this study as activists were not interviewed to understand their real motivation behind

their participation. The tweets merely reported the participations of women at the site.

Enamul Hoque
@enamul1hoque

jamaat shibir activists openly call women
participating in the #Shahbag movement
prostitutes..nothing good can be expected from
jamat shibir

RETWEETS 26

1:45 PM - 20 Feb 2013

Shahbag supporters were expressing opinions related to capital punishments, ban

of Jamaat and its affiliated institutions, while anti-Shahbag groups claimed that the

movement is poeticized and the sought attentions of international media and human rights

agencies by claiming the tribunal as flawed. The goal of Shahbag activists as expressed in

their tweets were to keep pressure on the Government. The evolution of demands in this

movement was changing periodically. It grew over the rejection of tribunal results and demanding death penalty of the war criminals.

Weeks after in this process the activists added to the demand of separating religion form the politics. Which ultimately converted to the demand of banning Jamaat, the leading Islamic opposition political party in the country with inclusions of war criminals in leading roles in it. Unlike other uprisings such Green Revolution and Egypt Revolution, Shahbag was not parallel to those as it was not about overthrowing the government, or, protest against autocratic regimes. The demands and arguments were shifting based on the actions of Government and tribunal results.

4.4 RQ4: TWITTER NETWORKS OF THE PROTESTERS

To examine network structures of protesters social network analysis was employed. Twitter dataset was used to analyze protesters' tweets (contents), attributes, and behaviors. To quantify these interactions among protesters a number of tools that are specifically designed for analyzing social media data were used. A number of social

network analysis instruments are available. For this study a combination of these tools were utilized including NodeXL[7], Gephi[8], Netlytic[9]. These options are mostly open source and freely available. However, the free versions have limitations, for example, with Netlytic only a sample of 1000 tweets can be analyzed. To avoid subscription issues this study focused on its goals and use specific ones for examining specific questions.

4.4.1 NETWORK CENTRALITY

NodeXL was used to compute vertex-specific measures. As mentioned in the method section that Shahbag Twitter mention network was used for discovering the influential activists.

4.4.2 DEGREE CENTRALITY

Degree of a vertex is a count of the number of connections it has. These connections can be received and forwarded to other nodes or vertexes. In the case of Shahbag Twitter network it was calculated how many ties each activist had and how many of those were received (in-degree) and sent (out-degree). Out of the Shahbag network, a total of 2787 unique activists were identified who had sent or received at least connection on Twitter during the movement. The degree of vertex range was 1 to 311. The dataset provided that 11% of the activists had more than 10 connections while 89% of the had less than 10 connections. Table 4.3 denotes the top 20 activists who had more than 57 connections. The highest degree was received by the Twitter handles of two news media, @AJStream, and @BBCWorld. Several other news media and journalist were mentioned highly and were on the top high degree list. However, as identifying

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[7] https://nodexl.codeplex.com/
[8] http://gephi.github.io/
[9] https://netlytic.org/

64

influential activists was in the scope of this study, the news media were not considered in the high degree list. Moreover, none of the news media except @AJStream developed ties with the activists during the movement, although those traditional media reported Shahbag movement in several occasions. Twitter handles of @sm_faysal, @sshatabda, @royesoye, @asifmatin, @raquibulbari, @Sabrina_S71, @nine_L, @AsifKabir1, @CEREBRALTEMPEST,@RABBIFAZLE, @fzrabbi, @DelipDasBisharg, @k05001, @faisal_osu, @zuberino, @IslamAnjuman, @ShahbagInfo, @sajeebwazed, @turing1010 had the highest degree.

4.4.3 IN-DEGREE AND OUT-DEGREE CENTRALITY

There was significant differences between the in-degree and out-degree measurements. The activists with higher degree did not had higher in-degree. Rather, for most of the high-degree activists number of out-degree was higher and number of in-degree was lower. It explained that activists mostly mentioned others in their tweets and had received minimal references during Shahbag discourse. In contrast, there were activists who had received many connections from others, but they sent insignificant ties to their senders. However, there were exceptions in this metrics. For examples, activists like @nine_L, @rezwan, and @ishtiaqrouf had relatively higher in-degrees and out-degrees. They were mostly active in the movement online discussions as they received and sent higher number of ties on Twitter.

4.4.4 BETWEENNESS CENTRALITY

Table ## (a) and (b) report the central hubs of Shahbag Twitter network. Among these nodes on Twitter @nine_L, @sm_faysal, @CEREBRALTEMPEST, @sajeebwazed, @asifmatin, @AsifKabir1, @faisal_osu, @enamul1hoque, @fzrabbi,

65

Table 4.3: Top 20 highest degree activist

Vertex	Degree	In-Degree	Out-Degree	Betweenness Centrality	Eigenvector Centrality
sm_faysal	175	3	172	495481.653	0.008
sshatabda	150	4	146	148760.201	0.009
royesoye	142	3	139	96540.315	0.008
asifmatin	137	3	134	282291.004	0.008
raquibulbari	115	8	107	147200.657	0.009
Sabrina_S71	112	7	105	174647.815	0.008
nine_L	104	70	35	639929.561	0.002
AsifKabir1	97	1	96	275767.744	0.007
CEREBRALTEMPEST	91	2	90	351148.765	0.003
RABBIFAZLE	91	8	83	55044.850	0.008
fzrabbi	89	4	85	232817.359	0.005
DelipDasBisharg	89	1	88	40505.028	0.007
k05001	86	3	83	153214.882	0.005
faisal_osu	80	3	77	255005.896	0.006
zuberino	78	5	73	137606.792	0.004
IslamAnjuman	75	3	72	220540.541	0.003
ShahbagInfo	69	62	7	218420.081	0.001
sajeebwazed	60	60	0	323997.233	0.000
turing1010	57	3	54	188899.473	0.002

@IslamAnjuman, @ShahbagInfo, @turing1010, @Sabrina_S71, @k05001, @sshatabda had higher betweenness centrality (Table 4.4).

There were influential activists in the network, but some are positioned as "bridge" among the rest of the activists. These activists were extremely important in the network for information transfer. Moreover, their absences would be vital in the network as their connections would be lost and information dissemination would be hampered during the movement. 1607 activists, however, in this network had 0 betweenness centrality.

If these 58% activists were detached from the network, the rest of the 1180 activists would still be connected with each other without even altering their closest communication links.

4.4.5 EIGENVECTOR CENTRALITY

@raquibulbari, @sshatabda, @sm_faysal, @royesoye, @Sabrina_S71, @asifmatin, @RABBIFAZLE, @DelipDasBisharg, @AsifKabir1, @faisal_osu, @fzrabbi, @k05001, @zuberino, @Piccheee, @nafees_pial had higher eigenvector centrality (Table 4.5) in the Shahbag Twitter network. Essentially in networks connections to the influential nodes is more important than a connection to an isolated node. Therefore, in Twitter networks number of connections of a particular node is equally important as the number of connections those nodes each have. The activists with higher eigenvector centrality metric had ties with the most influential ones in the network. In contrast, 2314 or 83% of the total activists had 0 eigenvector centrality metric. They were connected with loners or nodes with many isolated ties.

4.5 RQ5: NETWORK ATRRIBUTES OF SHAHBAG TWITTERVERSE

Table 4.4: Shahbag Twitter central activists (in-degree and out-degree)

In-Degree Centrality		Out-Degree Centrality	
nine_L	70	sm_faysal	172
ShahbagInfo	62	sshatabda	146
sajeebwazed	60	royesoye	139
TarekFatah	36	asifmatin	134
basherkella	26	raquibulbari	107
rezwan	25	Sabrina_S71	105
ishtiaqrouf	25	AsifKabir1	96
SCyberjuddho	22	CEREBRALTEMPEST	90
shahbagorg	21	DelipDasBisharg	88
icsforum	17	fzrabbi	85
ShahbagSquare	16	k05001	83
ChittagongGuy	16	RABBIFAZLE	83
tahmima	16	faisal_osu	77
diya880	14	zuberino	73
ttorongo	14	IslamAnjuman	72

68

4.5.1 THE EGO NETWORKS

There were many active actors in the Shahbag protest network who would be posting more tweets than others. Who are these actors in Shahbag Movement network? What are their attributes? What are their primary concerns?

What do they share in the network? All of these questions about various egos in the network or most active users in the protest were scrutinized by investigating on their number of tweets, number of followers, and information about their demographic, background, and locations.

For example, using Netlytic, Figure 4.13 have been generated by taking Shahbag Movement tweets. It displays the top Shahbag Movement tweeters.

Organic tweeters emerged during the movement. They tweeted in higher numbers in comparison with others. Activists such as Shehab, Shahbag Worldwide!, Shahbag Square LIVE, Picchee, Rezwan, Shah Ali Farhad, M Fazle Rabbi, Lenin, swakkhar, Sabrina, nisha, M Nemesis, Kazi Faysal Ranel, Odhikar, faisal_osu participated actively in the Twitter conversations. A calculation excluding the accounts with higher follower counts namely international news media, world authoritative agencies, and journalists provided this list of protesters who belonged to both of the groups of activists.

Netlytic also allowed investigating on the communication network developed in among the protesters by extracting the names from the tweets (Figure 4.13). It automatically calculated the ties in that network by connecting a protester to all names of other protesters found in his/her tweets and by connecting protesters whose names co-occur in the same tweets. Moreover, an investigation on the chain networks ('who replies to whom') was also possible through Netlytic (Figure 4.14). Protesters tweeting behavior

Table 4.5: Shahbag Twitter central activists (betweenness and eigenvector)

| Betweenness Centrality		Eigenvector Centrality	
nine_L	639929.561	raquibulbari	0.009
sm_faysal	495481.653	sshatabda	0.009
CEREBRALTEMPEST	351148.765	sm_faysal	0.008
sajeebwazed	323997.233	royesoye	0.008
asifmatin	282291.004	Sabrina_S71	0.008
AsifKabir1	275767.744	asifmatin	0.008
faisal_osu	255005.896	RABBIFAZLE	0.008
enamul1hoque	245479.696	DelipDasBisharg	0.007
fzrabbi	232817.359	AsifKabir1	0.007
IslamAnjuman	220540.541	faisal_osu	0.006
ShahbagInfo	218420.081	fzrabbi	0.005
turing1010	188899.473	k05001	0.005
Sabrina_S71	174647.815	zuberino	0.004
k05001	153214.882	Piccheee	0.004
sshatabda	148760.201	nafees_pial	0.004
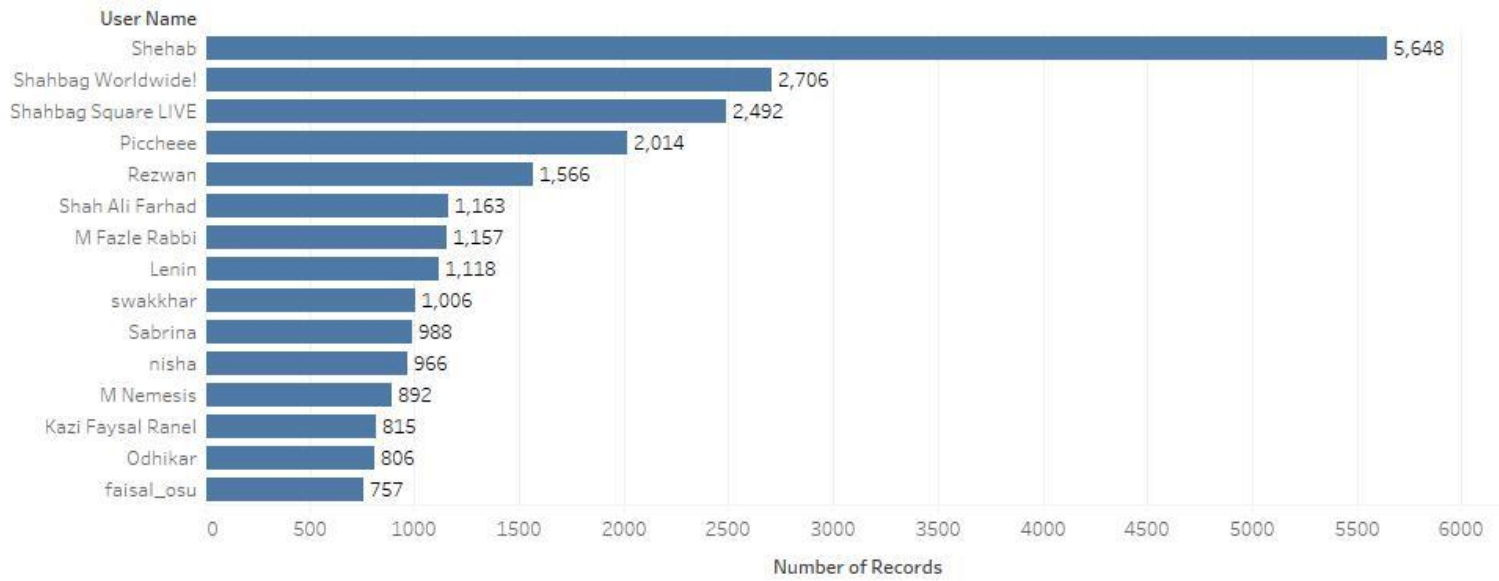
Figure 4.12: Active Twitter movement participants

was useful in this regard. The ties among the protesters were discovered in this process as well.

4.5.2 OVERALL NETWORK ATTRIBUTES: CENTRALITY AND COMMUNITY DETECTION

With network centrality measures explorations were conducted on how central were the activists or, nodes in general, in the whole Shahbag Movement tweet network (Figure 4.15). Networks usually displayed various cliques and clusters which had distinct patterns of attributes. The number of links each egos or influential Shahbag movement activists had was measured. It provided measurements of degree centrality. The measurements also involved how close were those egos to other actors to compute the closeness centrality.

It offered insights on how quickly egos transferred information to others in the network, which was indicative of identifying the betweenness centrality. The process also involved the calculation of how important egos were considering the importance of their neighbors or connections, which yielded the information on eigenvector centrality. Analyses of interaction frequency of protesters was useful for identifying the least active protesters and isolates. The overall network structure indicated clusters and intermediaries relative to the positions. Visual representations of the whole network illustrated how sub groups or networks communicated with each other during Shahbag Movement and what resources particularly mobilized them. By studying the pattern of tweeting and interacting with each other on Twitter, communities or clusters were identified and specific community intermediaries were detected. They played roles of information producers and broadcasters.
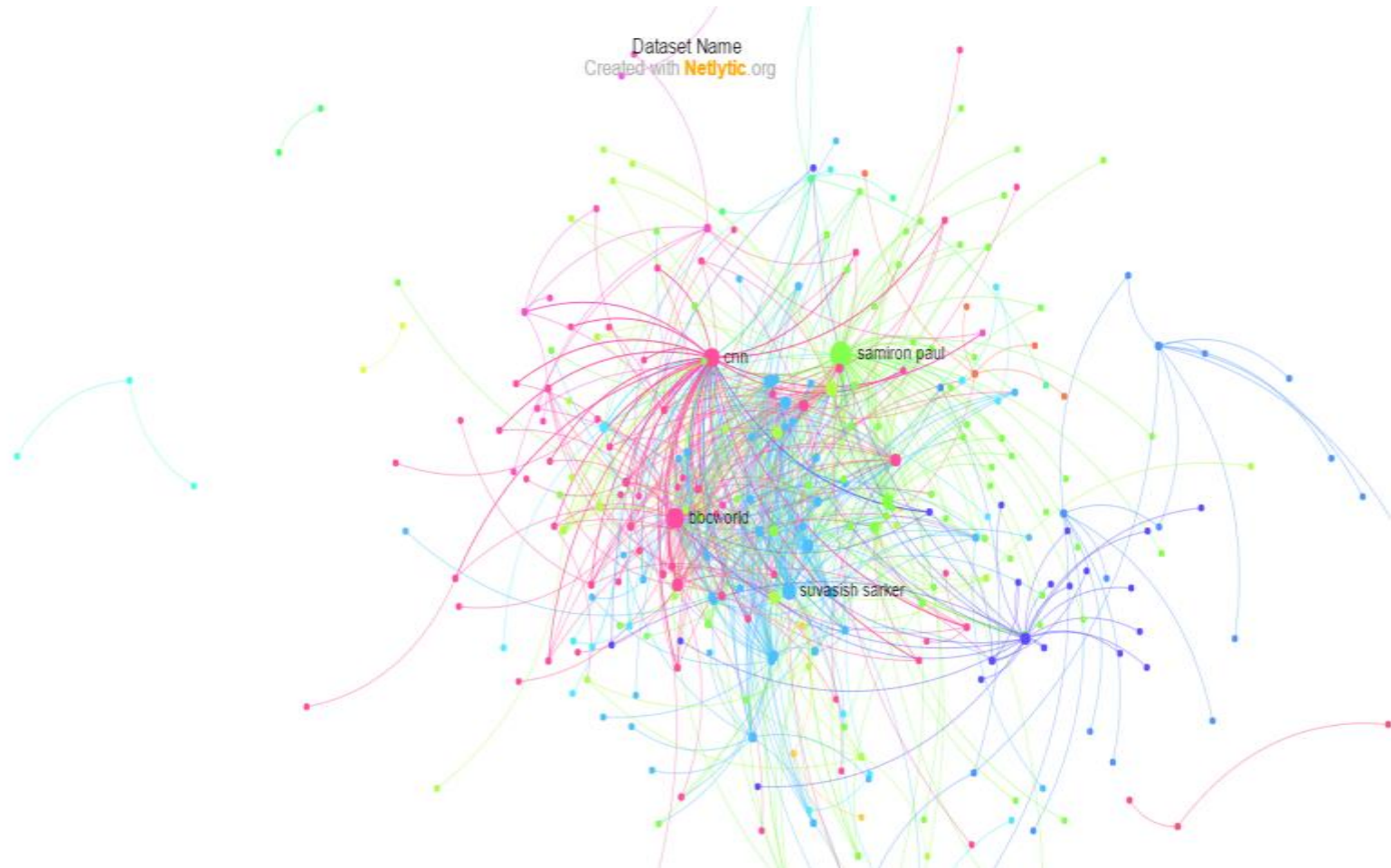
72

Figure 4.13: Name network (calculating names in tweets) of Shahbag movement

Protesters, both proponents and opponents of the movement, were spreading various kinds of news about their activities. For example, one group demanded ban of Islamic party in Bangladesh and their opponents labeled them as atheists. Consequently, they disseminated tweets and information on Twitter against to each other. A strong behavior of retweeting of similar contents were observed among the protesters. The retweeting behavior related with specific contexts such as arguments, newspaper attentions, were commonly practiced. One of the most commonly retweets were related with worldwide solidarity with the movement. University students and residents from various part of the world were expressing their participation through Twitter.

4.5.3 INFORMATION CASCADE

Deeper look at the cluster behaviors yielded information about highly observable networks of protesters. Their reposting patterns over time was examined. These patterns identified the specific topics propagated into the networks. The retweet graph presented information regarding protesters' closest networks and strongest allies. A sample of specific group of retweets over time revealed that tweets from the influential protesters were propagated in the movement. Protesters relied onto their both closest and distant allies for information propagation. Protesters were retweeting the contents posted by the influential nodes in their networks and relied on strong ties for information diffusion. However, the weaker ties were important to propagate the information throughout the network and reach more global landscape.

Activists spreaded messages to one another at Shahbag. Few of them posted that message on social media including Twitter. After a while the messages were distributed to various diaspora around the world.
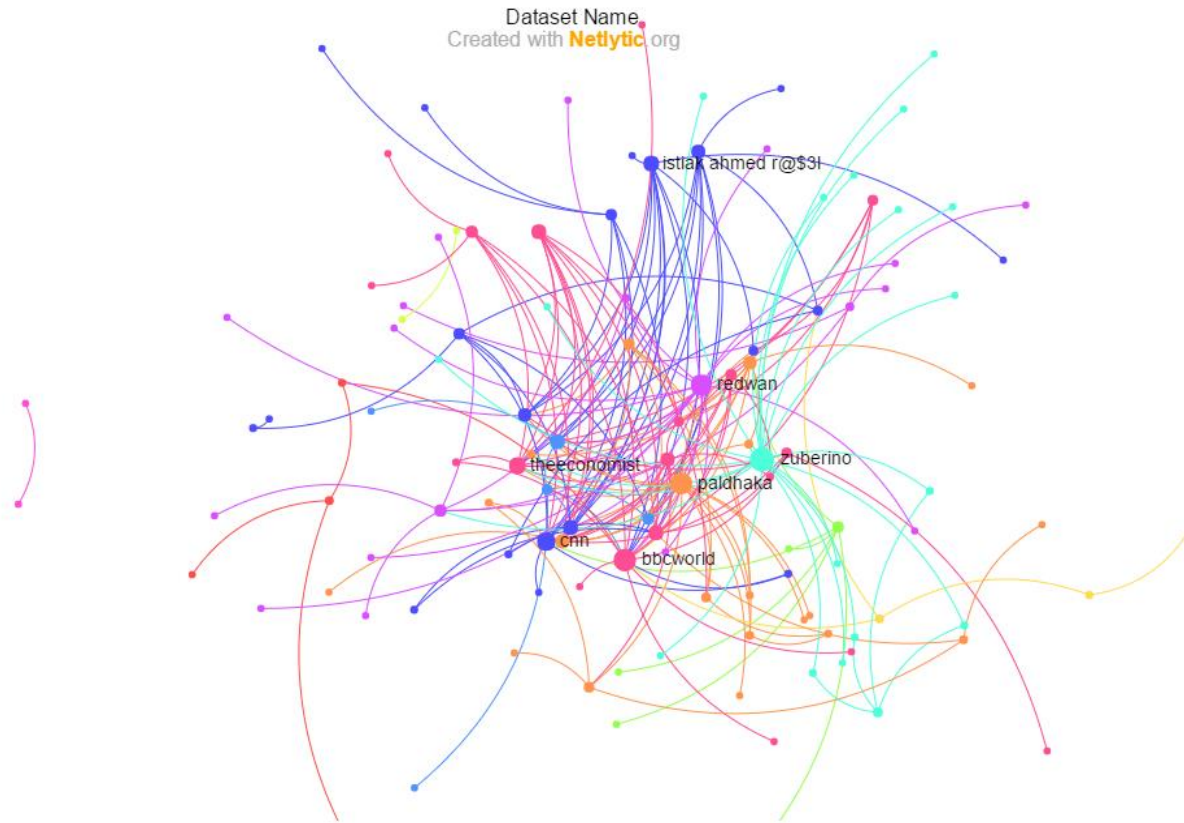
Figure 4.14: Chain network (who replies to whom) in Shahbag movement

The international news media such as Al Jazeera, CNN, BBC etc. reported on the event, which later became more prominent and caught world attentions. This process of information propagation took place in Twitter during Shahbag movement.

Shahbag activists tweeted with somewhat low moderate speed. There were total of five thousand six hundred and seventy-six (5,676) unique tweeters who in total posted 113,164 tweets by including at least hashtag 'shahbag'. Averagely every tweeters posted at least 20 tweets about the movement over the time period of February, 2013 to December, 2013. Tweeters had the range of minimum of one tweet to maximum of five thousand six hundred and forty-eight tweets.

Highly active protesters tweeted sixty-seven percent (67%) tweets, which was 75,844 tweets, in comparison with minimal active activists posted thirty-three percent (33%), which is 37,320 tweets, of all tweets. In this study, tweeters with more than one hundred tweets were considered as the highly active users and minimal tweeters posted less than one hundred tweets. Two hundred and sixty-four (264) activists posted more than one hundred tweets each. These tweeters each posted two hundred and eighty-eight (288) tweets on an average, while a majority of the Shahbag protesters, five thousand four hundred and fourteen tweeters, posted only seven tweets each on an average. Only a few tweeters were actively participating in the online movement. Out of the total of 5,676 tweeters, only five percent of them or two hundred and eighty-eighty activists posted majority of the tweets. A large group of activists, which is ninety-five percent (95%) of the total, had low participation in the movement.

There were only twenty-five (25) activists who tweeted more than five-hundred (500) tweets each. In combination, they tweeted nearly two thousand nine hundred and
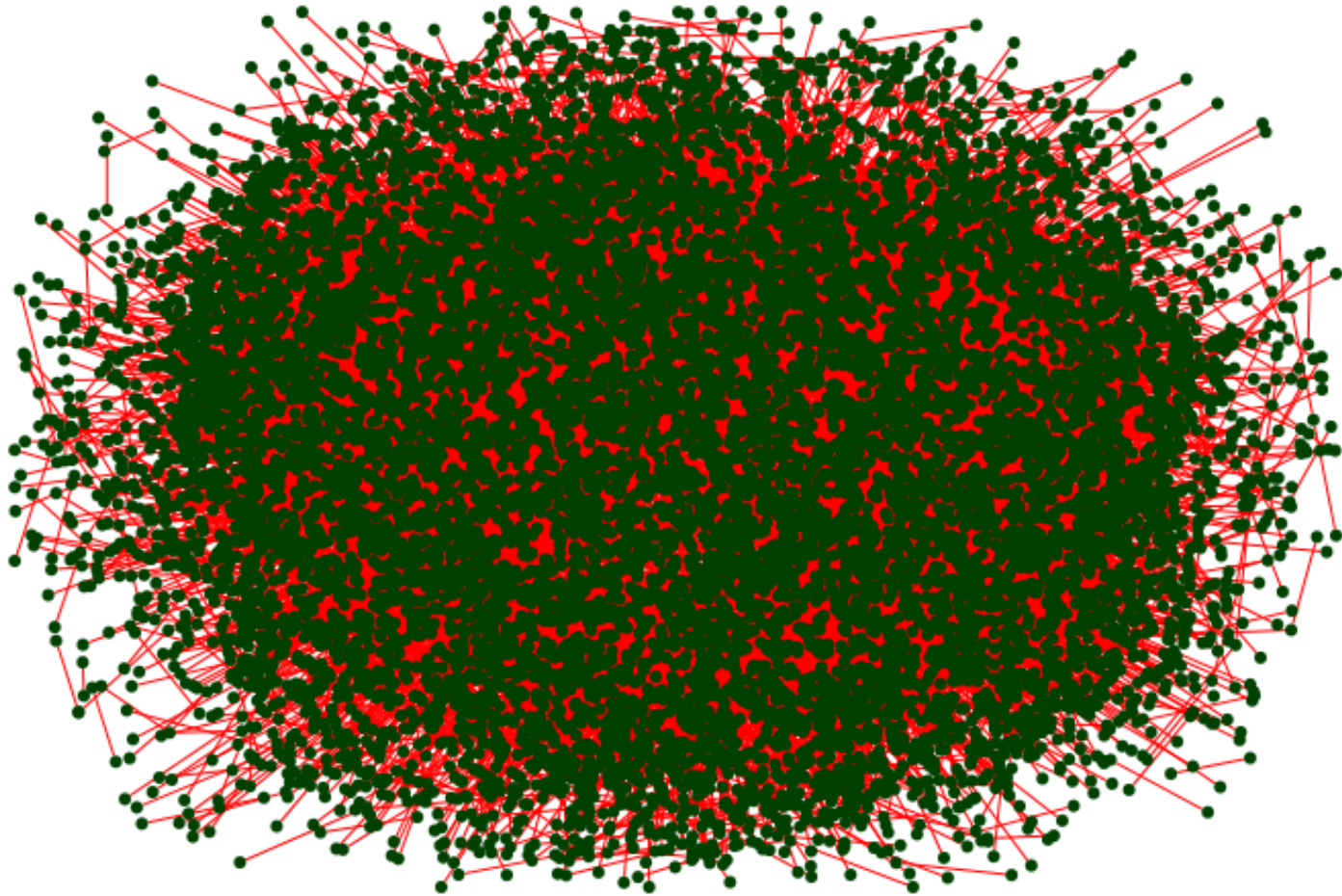
76

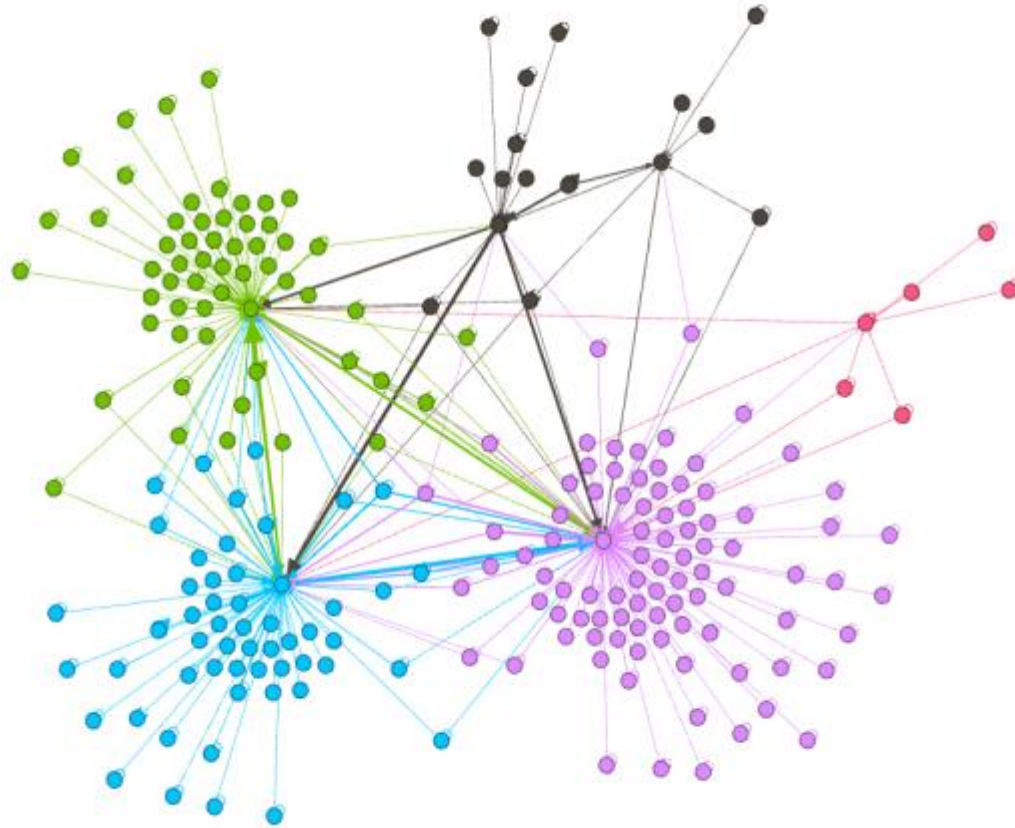Figure 4.15: An overall Shahbag movement tweet network

Figure 4.16: Information cascade behavior of Shahbag Twitter network

ninety-eight tweets during the span of the Shahbag movement.

Network analysis revealed the opposing groups and found the individuals who had capability of interconnections among the differing groups. Community structure identification strategy was used to reveal such groups in social network analysis (Hansen et al., 2011). The Shahbag movement had two groups, one supported it and the other was against it. Their conversations were related with debates over the justifications of the movement and were filled with arguments. These two groups emerged from the unique interactions they had on Twitter. Shahbag tweets were analyzed to discover the groups of activists with similar tweeting patterns In NodeXL.

This network was developed based on retweets of similar contents by different activists. This network was kept as undirected. NodeXL automatically computed network structures based on Wakita and Tusrumi algorithms. The vertexes, activists in this case, did not overlap and were kept within in single cluster based on the retweet patterns. This method yielded two clusters with six individuals in the middle. They had the capability of broadcasting information among their groups faster. These activists led the conversations and shared the contents which were retweeted by the rest of the group members frequently.

However, the groups were not always clustered based on the types of interaction they had on social media. There were conversations when two groups had similar topics. For example, the death of blogger during the movement sparked debates on Twitter among these two groups. The groups were referring to each other in their tweets. A cluster analysis in NodeXL of the tweets of February 2013, when a blogger named Rajib Haider was killed for writing against war criminals, exposed that activists with similar

Table 4.6: Shahbag activists with more than 500 tweets

| Name of the Tweeters	Total Tweets	Name of the Tweeters	Total Tweets
Shehab	5648	Kazi Faysal	815
Shahbag Worldwide!	2706	Odhikar	806
Shahbag Square LIVE	2492	faisal_osu	757
Piccheee	2014	S M Faisal	734
Rezwan	1566	raquibulbari	707
Shah Ali Farhad	1163	Fazle Rabbi	584
M Fazle Rabbi	1157	Projonmo 13	576
Lenin	1118	A Khan	575
swakkhar	1006	Zihad Tarafdar	551
Sabrina	988	Asif	546
nisha	966	Iftekhar Chowdhury	542
M Nemesis	892	Torongo M	538
		MahadibMHB	532
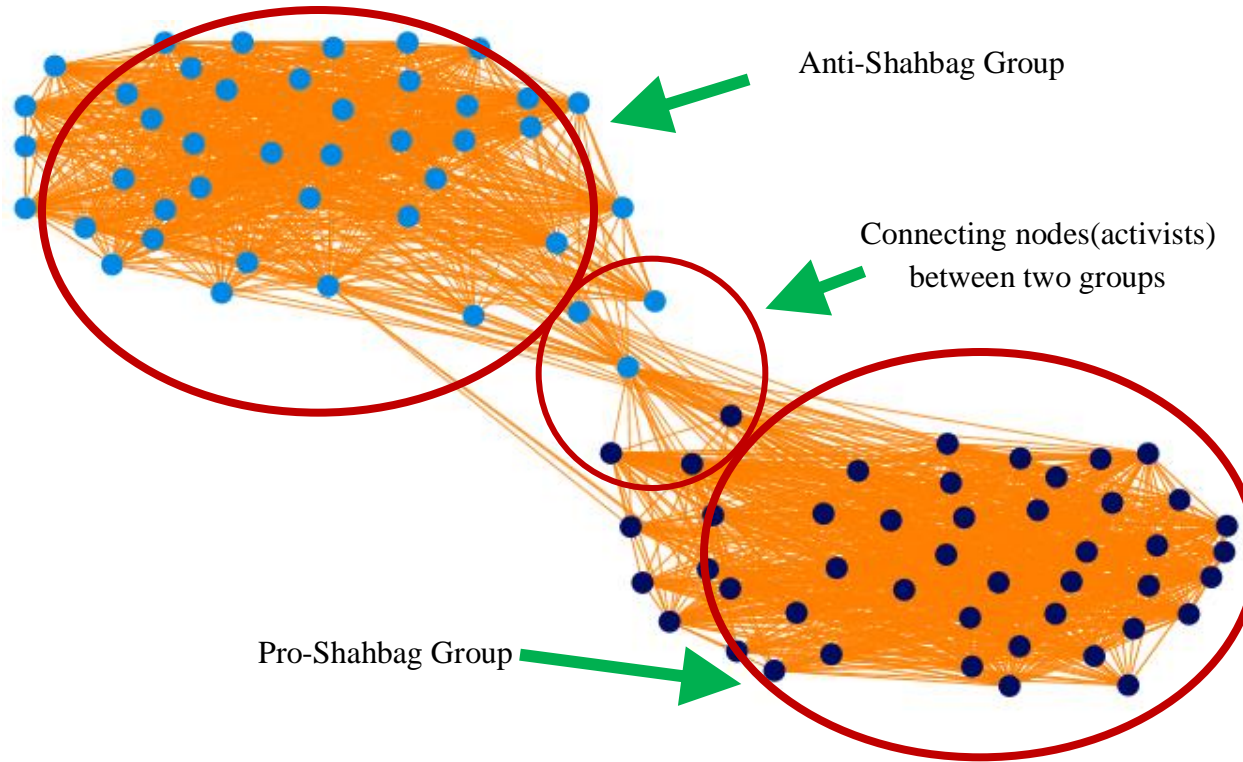
Figure 4.17: Pro and anti-Shahbag Twitter groups

interests were grouped together. Two polar opposite groups coincided in the same cluster as they were disseminating confrontational information by mentioning each other in the tweets.

Small-world networks were common phenomenon for quick information transfer. As nodes among the small-world networks were densely connected with shorter path length and higher clustering coefficient. This study highlighted how two groups of Shahbag movement interacted with each other and developed small-world network on Twitter.

As a popular social media, Twitter is both a communication medium and social network. Users share their opinions and delve into dialogues with each other on Twitter. Moreover, they can follow each other, which means it provides the opportunity to connect with each other through the follower-followee relationships. Such connection feature is not sufficient to understand how users develop interactions on Twitter. More exploration into the activities of users on Twitter is crucial to highlight the emergence of interactions on specific topics. In the context of social movements, deeper investigation on different level of activities of protesters on Twitter can identify the influential.

4.6 RQ 6: CONVERSATIONS NETWORK

Political protests and collective action research strongly highlight on 'networked politics' and 'networked social movements' due to recent technological innovations. Researchers have investigated on impact of online platforms on organizing social movements including Arab Spring, Occupy Wall Street etc.

There is gap between findings of these research and prominent network science
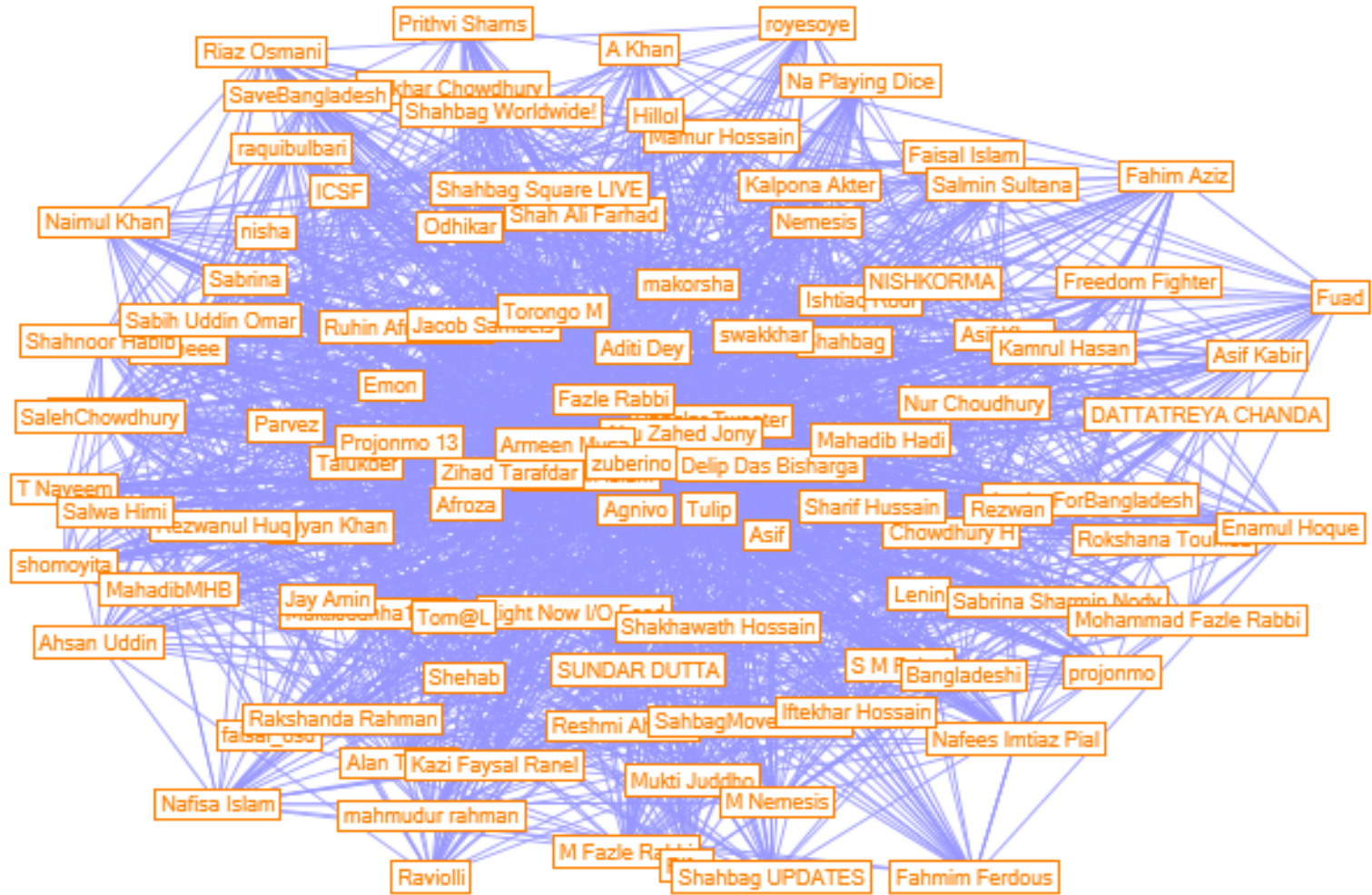
Figure 4.18: Shahbag Twitter network

studies. This study assessed how Twitter facilitated collective action activities with the application of network theories. Shahbag protesters joined conversations with each other on Twitter. It is important to know who were replying to whom to understand the leader of conversations and their opinions. There were Twitter accounts which, however, did not replied to the senders of the tweet even though they were mentioned in it. News media, journalists, for example, were mentioned frequently in tweets, but they did not replied to its original senders.

The dataset did not produce any automatic networks and offer connections among the protesters. Manual approaches were utilized to explore the relationships among the tweeters. The analyses were conducted through various social network and visualization applications to generate networks and identify underlying relationships.

A sample data was used and prepared into Gephi by creating edges and nodes files. For this process, the mention data was used to generate structure of relationships among the group of tweeters. An edge list was produced by listing the sources and targets. It included the mentioned Twitter accounts as source and targets were listed as account holders who referred those accounts. Another document containing all of the accounts by removing the duplicates was created that included user names as labels, and the chronological order as ids. Both of these nodes and edges list were fed into Gephi data laboratory which yielded a network.

It illustrated that Shahbag protesters were sharing information worldwide while referring with each other on Twitter. Their degree centrality in the network put them in influential positions in information transfer, coordination, and arguments. The most popular news media mentioned in the Shahbag tweets were Al Jazeera, CNN, BBC,

84

Figure 4.19: Activists who joined conversations by replying and mentioning others on Twitter

NYTimes, AP, Guardian, Washington Post, ABC, and The Economist. Prominent journalists' Twitter handles were also referred in the tweets namely davidbangladesh, CAmanpour, alexpillus and more Tweeters were broadcasting information by mentioning international politicians like Barack Obama, celebrities such as Joan Baez, Mike Tyson, Katrina Kaif, 50 Cents, Nicki Minaj, and human rights organizations like Amnesty were frequently mentioned. Many also included their renowned soccer team fan club such Liverpool Fan Club in their tweets.

Shahbag tweets provided a large and complex network. The visualization offers limited insights when all of the activists are included in one network with all of their relationship exposed. Large networks are consisting of multiple subgroups (Hansen et al., 2011). In order to observe the key connections within a network, it important to identify the clusters and the connectors that join those with one another.

RQ7: POWER AND LEADERSHIPS

Many Twitter users with reasonably higher follower counts participated in the movement discussions online. These tweeters had larger follower base prior to the movement inception. Celebrities, journalists, bloggers, professionals had greater number of followers and they tweeted infrequently in comparisons with the organic opinion leaders during the movement. Protesters like omarshehab, Projonmo13, Picchee, fzrabbi, faisal_osu had relatively lower follower counts, yet their participations were higher. These activists tweeted fairly large number of contents during the movement. Internet technologies provide benefits of faster communication which is exploited during online collective actions. Many researchers (Weinberger, Beckett; Tufekci, 2011) argue that due
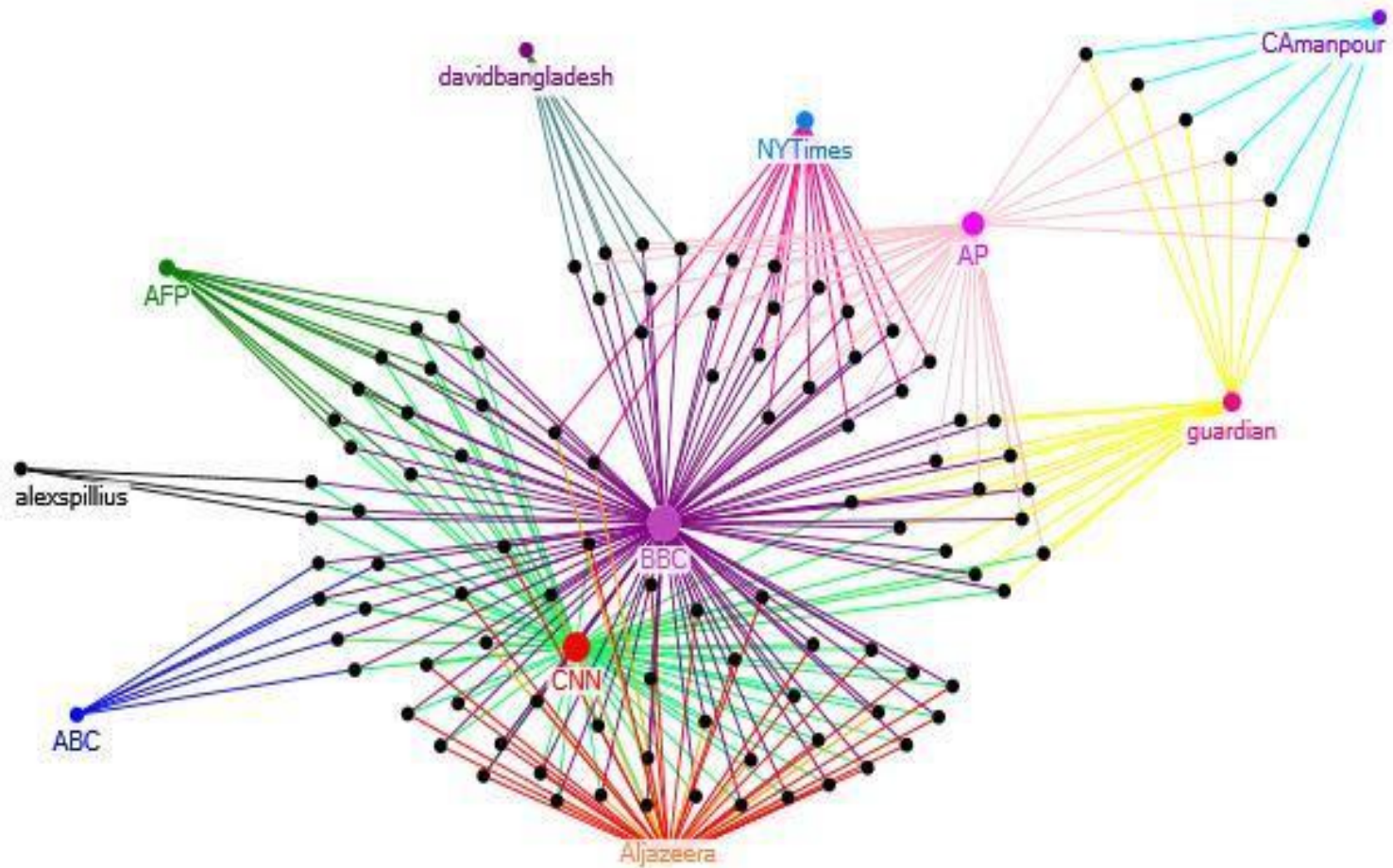
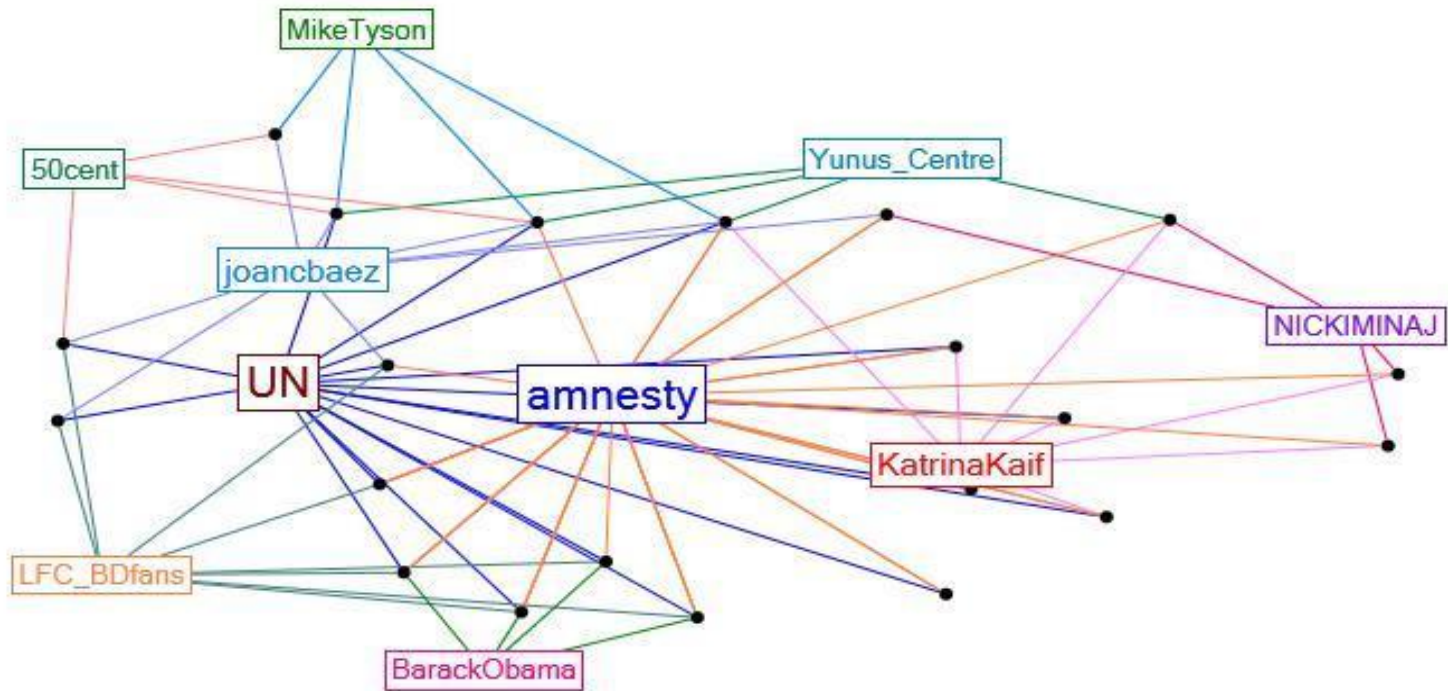Figure 4.20: Popularly mentioned news media and journalists

Figure 4.21: Popularly mentioned non-news media Twitter accounts

to social media platforms protests have become leaderless. Internet has minimized the gaps for communication between different social classes. It enables citizens to hold horizontal or flat networks, which ultimately trigger for leaderless online revolution. However, there are antagonistic theories against this concept. Historically, social movement are prone to include hierarchical networks. This debate of social media allowing a leaderless online network has been investigated in this study. This point makes interesting contribution to the networked protest studies. Shahbag movement did not emerge from the support of established structures or political organizations, which is a likely consideration during a standard social movement. Therefore, understanding how a leaderless movement diffused globally is important. In terms of impacts of leaderless movement, it has both pros and cons (Tufekci, 2011).

Twitter follower count provides a measure to understand the importance of nodes in a network (Tufekci, 2011). This process of follower increase can take place due to multiple reasons including 'random growth', 'meritorious growth', and 'preferential attachment'. 'Preferential-attachment' characteristically exhibit 'scale-free' network attributes, which has strong connections with power-law distributions. In the context of social media, it means fewer users will have large number of followers, and majority users will have little number of followers. In social network theory it aligns with the concept of 'rich gets richer'.

To conduct this process in this study, first Shahbag activists with large number of tweets were selected. For this specific analysis, activists with over 1,000 tweets were chosen. This process yielded a total of 10 tweeters with minimum of 1,000 tweets.
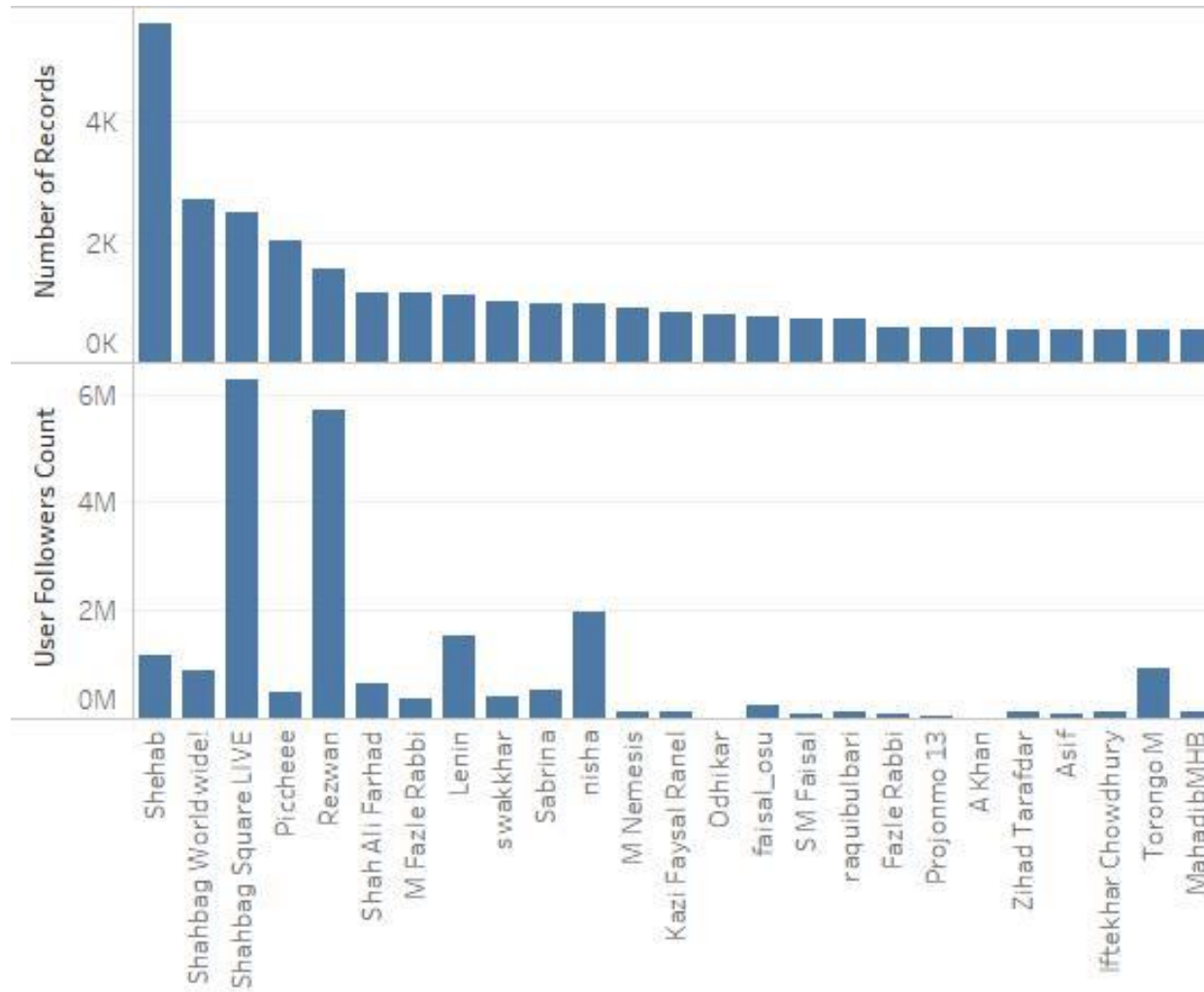
Figure 4.22: Activists with number of follower counts and tweets
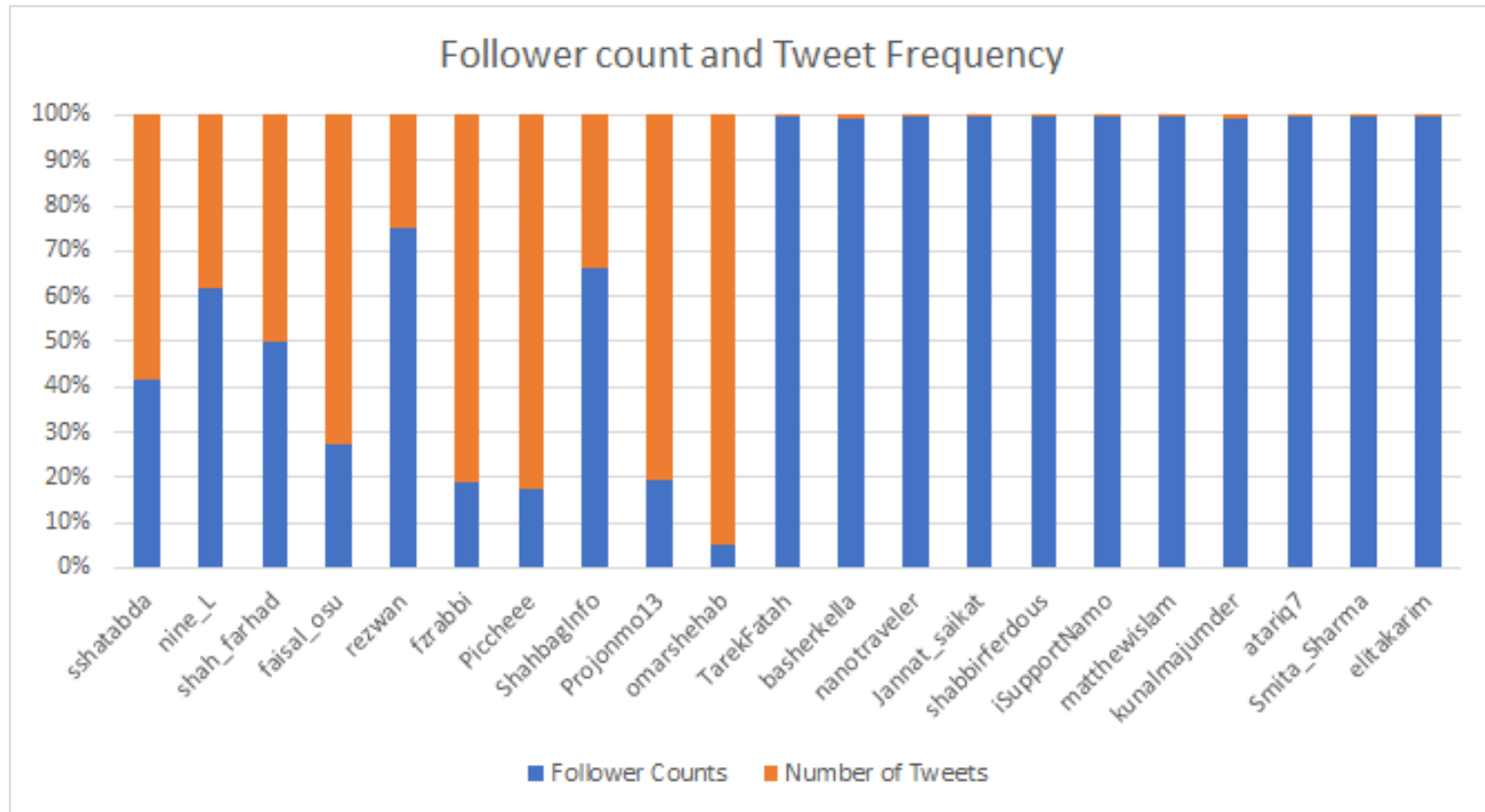
Figure 4.23: Follower count and tweet frequency of Shahbag activists

@sshatabda and @omarshehab were the two activists with minimum and maximum of tweets respectively in this category. In the second step, follower counts from February, 2013 to December, 2013 were counted for each of this top ten activists. Follower counts at the beginning of every month was considered for analysis. This process produced a matrix which was visualized in a chart.

From this highly active Shahbag tweeters, only two had over thousands of followers prior to the movement. A majority of Twitter accounts were created during the movement.

Figure 4.24 displays power-law distribution emerged during the movement. Highly active tweeters gradually attracted higher number of followers within the course of the protest. The movement started in February, 2013. Higher number of Twitter users followed the highly active protesters during the initial months of the movement.

Twitter handles @rezwan, @ShahbagInfo, @shah_farhad received higher number of followers every month. @ShahbagInfo started the movement with 15 followers, which grew up to 2915 in the beginning of March, 2013. This account was used for circulating movement information. 27 to 502 users followed the highly active network of Shahbag protesters averagely. Follower count growth rate was exponential during the initial months, February to May, of the movement and it remained steady during the last half of 2013.

These results explain that a collective action with leaderless or flat structure can take the shape of hierarchical structure. The preferential-attachment dynamics of social movement stands for this case. The more highly influential activists share information on Twitter, the more followers they get in their networks.

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Table 4.7: Activists' follower count growth by month

| Tweeters	February	March	April	May	June	July	August	September	October	November	December
sshatabda	93	344	477	516	560	594	605	672	675	677	717
nine_L	1117	1213	1317	1432	1492	1553	1584	1627	1678	1726	1818
shah_farhad	1	250	438	513	596	667	731	812	952	1046	1172
faisal_osu	40	201	308	346	374	401	401	470	489	489	533
rezwan	2695	3299	3637	3863	4111	4184	4255	4334	4425	4506	4734
fzrabbi	6	115	270	295	318	327	337	339	335	345	368
Piccheee	19	80	159	225	254	278	295	319	336	365	425
ShahbagInfo	15	2915	4490	4967	5029	5029	5029	5029	5029	5029	5029
Projonmo13	8	65	168	278	353	375	395	427	478	540	793
omarshehab	36	121	225	241	241	241	241	241	241	241	299
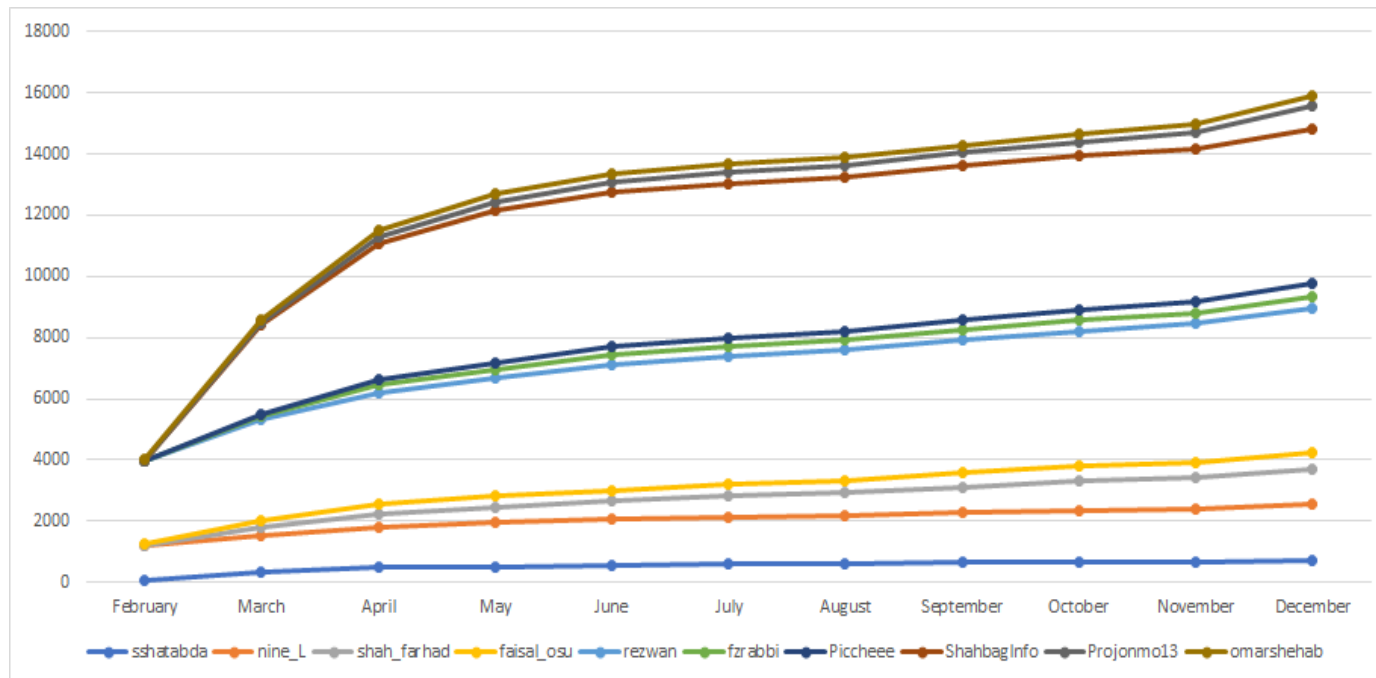
Figure 4.24: Activists with higher number of followers

This study finds that a leaderless horizontal network is capable of promoting a hierarchical network without support from established organizations. Some Shahbag Twitter activists gradually became important in the information diffusion process. Knowingly or unknowingly they became influential and central hubs or nodes for information circulation. The preferential attachment theory in social network supports this concept. Therefore, the Shahbag uprising created leaders of information sharing on Twitter. One limitation of this finding is that, follower increase may also happen for natural causes. To challenge this argument, it needs to be identified that many Twitter accounts were created at the beginning of the movement. The sole purpose of creation of such Twitter accounts were to participate in the movement. Therefore, it is somewhat safe to assume that follower count growth rate was related with the movement.

Shahbag movement was labeled as unique by the protesters because of its participations of young generation who were apolitical and had beliefs in bipartisan solutions. The tweets of the movement exposed that there were no specific group of leadership involved in this movement. The organic nature of youth participation, however, helped to emerge new leaders. Active bloggers were involved in organizing the events. The mobilization was not confined within geographical barriers. It became popular worldwide. Social media such as Twitter played major role in the global spread. Students, academicians, activists, musicians of Bangladeshi diasporas from around the world were tweeting about the event. They participated in this movement from the urge of their own consciousness and were not motivated by the linking of any political structure. The pro-Shahbag groups were describing that it was sense of collective efforts where their voices would be heard and there would be positive outcomes as reflections.

Figure 4.25: Event created for Shahbag movement

4.8 RQ 8: INFORMATION DIFFUSION

Shahbag tweets were shared with worldwide population. However, it is unknown what was the life-span of this movement. It started in February 2013, but it is unclear how long its momentum continued overall. Moreover, it is also not identified that if protesters had shift of opinions throughout the movement. Information diffusion analysis was used to answer these questions. In this regard it delves into discovering activists' Twitter account creation timeline, their language, location, hyperlinks used in the tweets, time zones, sources, and applications used for tweeting during Shahbag movement.

There were 116311 tweets in the dataset. Topsy retrieved tweets with timestamps. It included minute time details for every tweet with a format of Day Month Date XX:XX:XX +0000 Year. For example, the first tweet in the dataset had the time format of "Wed Feb 06 08:45:51 +0000 2013".

85% of the total Shahbag tweets, which is 99541 posts, were created within first three months of the movement. Approximately half of the tweets, 48% or 55739 tweets, were posted during the month of February, 2013. The tweeting frequency decreased in March, 2013 when 27% or 30907 tweets were posted on Twitter. The activists tweeted about event lesser in April, 2013. Only 12895 tweets were created. Gradually lesser number of tweets came in the following months of May, June, July, August, September, October, November, and December, 2013. The lowest participations were reported during the months of August and November, 2013; only 0.8% tweets were created. On an average 54% less tweets were published on Twitter every month after February, 2013 until December, 2013 during Shahbag movement.

97
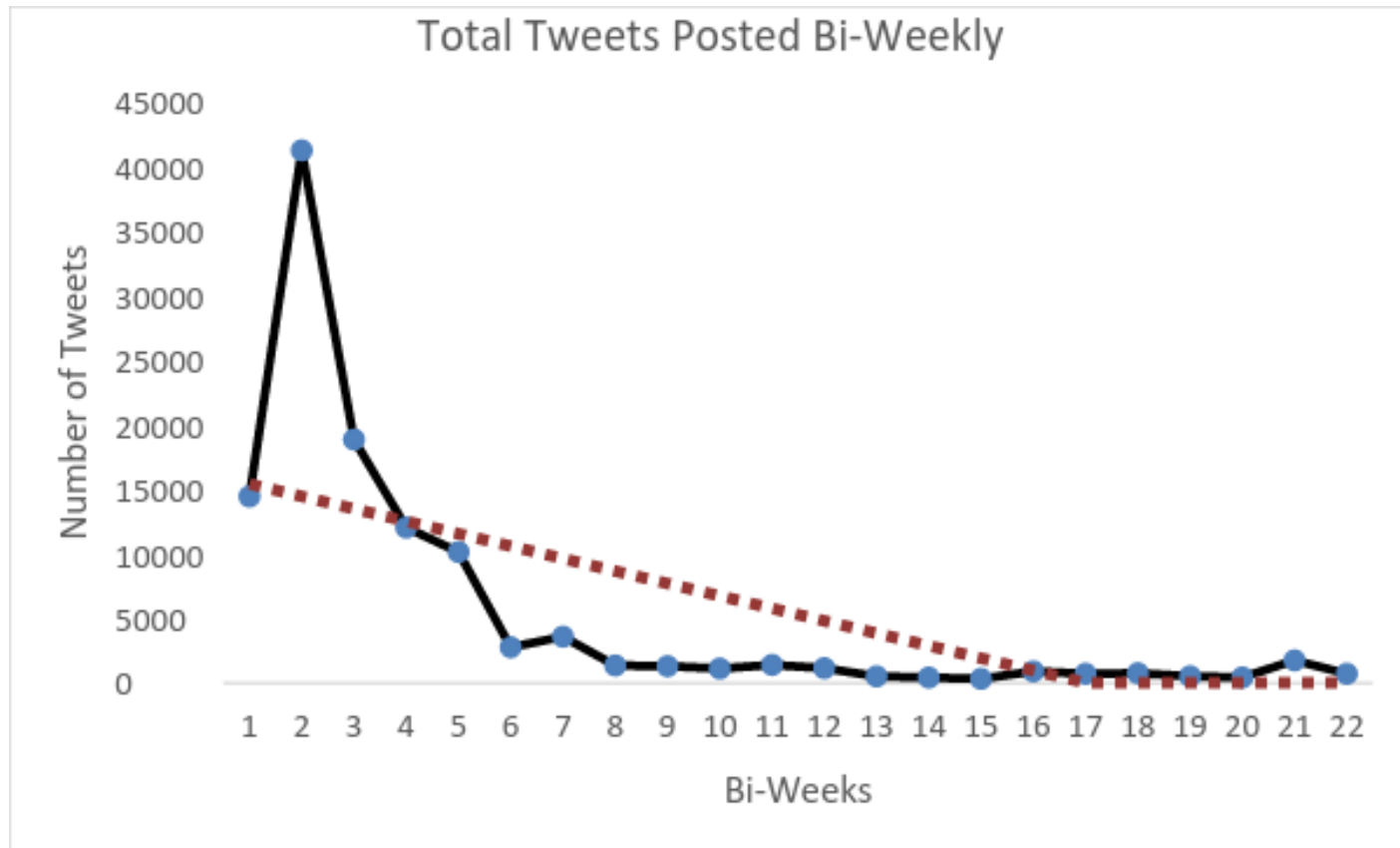
Figure 4.26: Total tweets posted bi-weekly

Figure 4.27: Shahbag Tweets by month
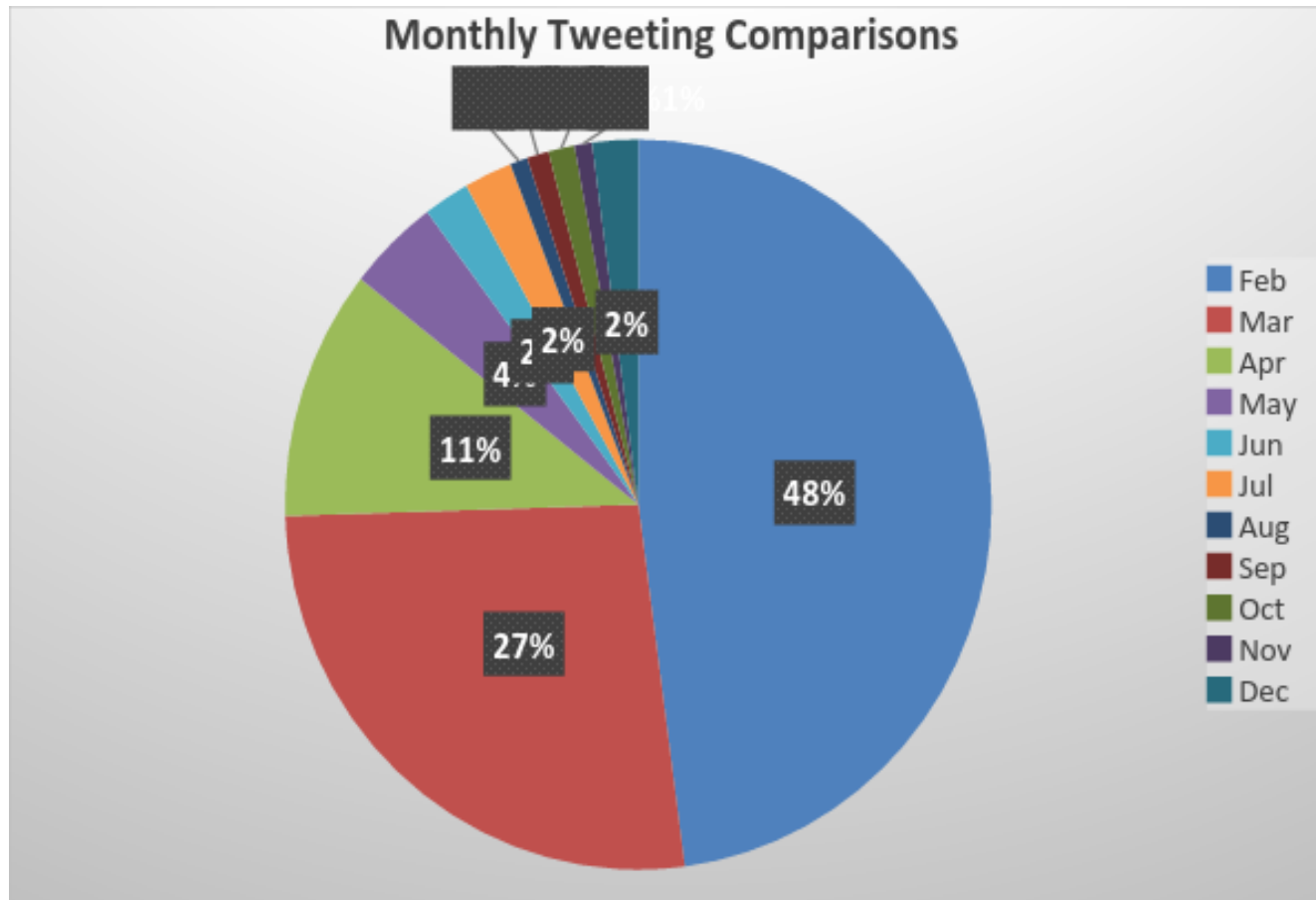
Figure 4.28: Monthly tweeting comparison

Throughout the timeline of the movement it was evidenced that the first month, February 2013, received most number of tweets. Highest peaks were found in this month and in the following months tweet production rate was decreasing abruptly. This case illustrated that a particular event life cycle is limited within a specific time frame. It reached its apex during its origin while losing its attractions from later on.

Information diffusion can be measured by measuring how information or beliefs propagate in the networks based on Rogers' (2003) *Diffusion of Innovation* theory. Shahbag tweets were used to create a map to explore worldwide diffusion of Shahbag movement. For this purpose, CartoDB[10] was used, an open source geospatial dataset and map building application.

The map displayed that the tweets were propagated at global scale. CartoDB used latitudes and longitudes for representing specific geographic locations. Topsy dataset did not extract these geographic coordinates (latitudes and longitudes) about the tweets rather it displayed mere location names. the location names were converted separately into longitudes and latitudes by using http://www.latlong.net/ application.

They shared the links of various news sources with inclusion of their personal opinions about the news. 58% of the total tweets included links of various sources. Out of the total tweets with links only 28% contained arguments where the activists expressed their views about the news published in the traditional media. The debates with news media started after couple of weeks of the launch of Shahbag movement on February 5. Local news media published the event from the day of initiation. However, international

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[10] https://cartodb.com/

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Figure 4.29: Shahbag movement tweet diffusion

news media such as BBC, Guardian, CNN, Al Jazeera etc. reported the event after couple of days when the movement started. Initial issues of these news were related to the reports about the events itself. The thought-provoking pieces ultimately caught the attentions of the activists who expressed mixed views about the news.

4.8.1 CREATION OF TWITTER ACCOUNTS

Twitter users created during Shahbag movement was higher than previous years. There were 116,303 Twitterers were found in the dataset. However, there were accounts of established news media, international agencies, foreign delegations who were mentioned in the tweets. Their Twitter accounts were created mostly in the time periods of 2006 to 2008. There are veteran

Twitterers who have their Twitter accounts from the initial days of the platform. However, it was discovered that out of the total accounts found in the dataset, 36%, or, 41846 accounts were created in 2013. These accounts were created during different months of 2013 when the movement took place. After identifying the account number, it was manually checked through the all of the accounts created in 2013 with keyword "#Shahbag". The numerical sorting and finding feature in Microsoft Excel retrieved 41,846 records, which is the number of accounts created in 2013.

User creation rate on Twitter during the movement was higher in February 2013. The dataset included various types of Twitter accounts that necessarily did not participated in the movement but were mentioned frequently. Such handles were excluded and only Twitter accounts created in 2013 were analysed. The dates exhibited that in various dates of February 2013 such as February 07, 08, 09, 12, 15, 23, and 25, a large number of Twitter accounts were opened, which were used to post contents related

103
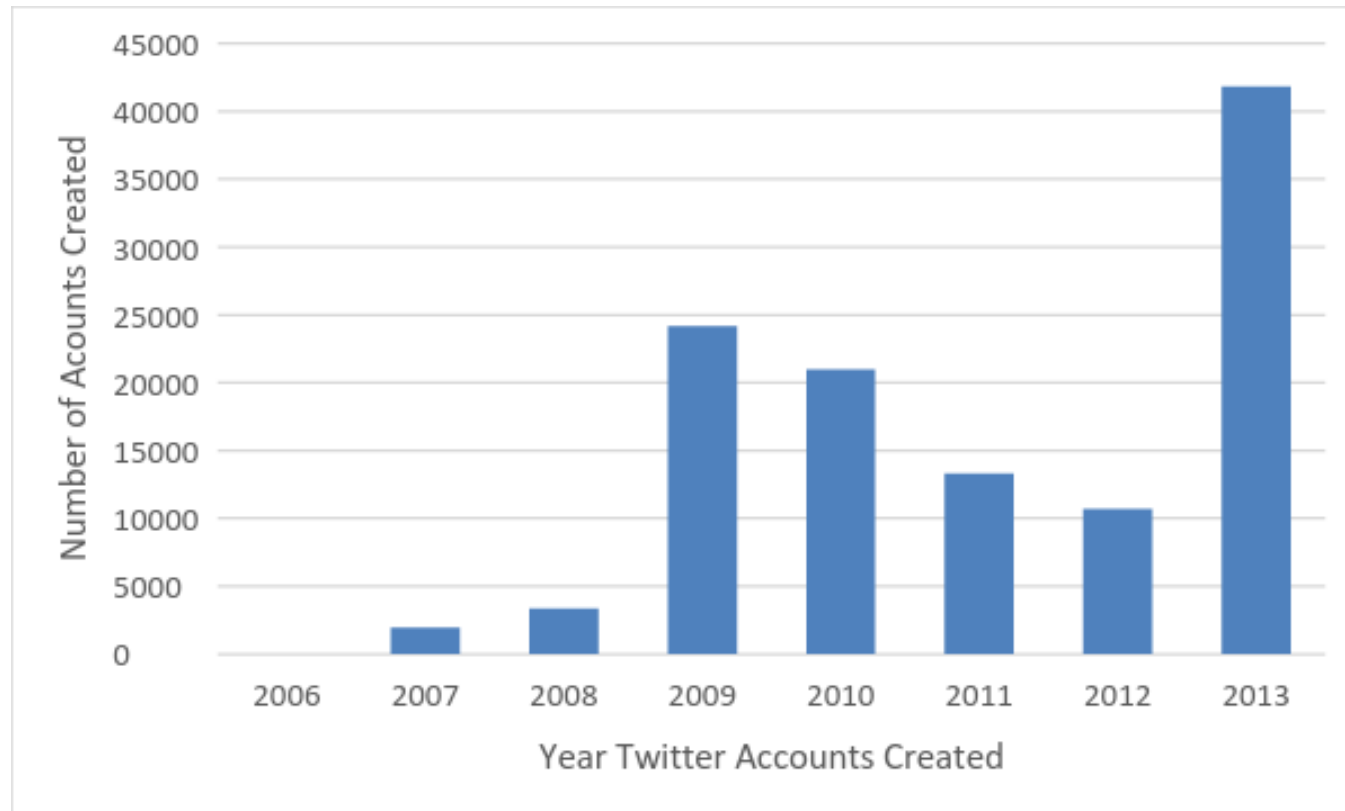
Figure 4.30: Creation of Twitter accounts in Shahbag dataset by year
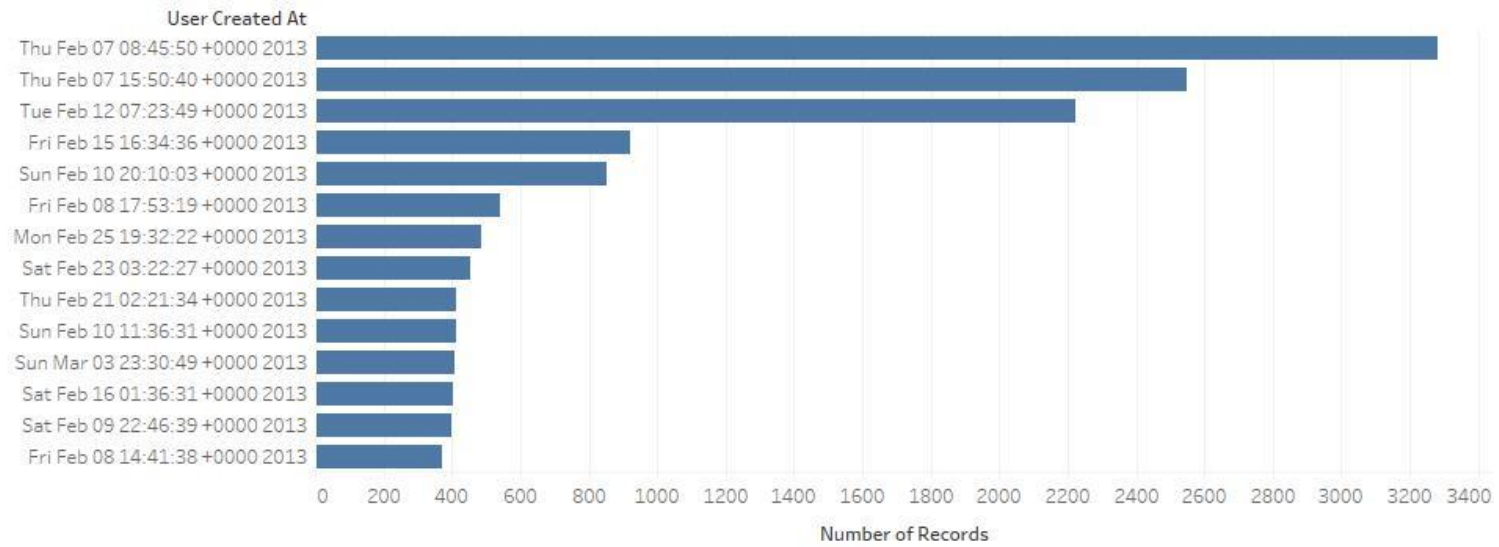
Figure 4.31: Twitter account creation timeline

to the movement. In several dates of March 2013 many new accounts were brought into existence to share movement information.

4.8.2 LANGUAGE

Topsy dataset uncovered various types of languages used to express opinions by the protesters. Worldwide activists broadcasted tweets about the movement in their native languages. A total of 24 languages were identified from the dataset. The list includes Arabic, Bengali, Danish, Dutch, German, English, Spanish, Estonian, Finnish, French, Hindi, Haitian, Indonesian, Italian, Japanese, Polish, Portuguese, Russian, Slovenian, Swedish, Tagalog, Turkish, Urdu, and Vietnam. Although a range of languages were observed in the tweets, English was the dominant language used to create contents and communicate within the Shahbag Twitterverse. The list followed other major languages such as Bengali, Indonesian, German, Danish, Tagalog, Dutch, French, Polish, and Turkish.

4.8.3 LOCATION

Shahbag tweets were broadcasted from different regions of the world. The geo-location information that came with the tweets revealed that tweets were posted from every continent of the world. The highest number of tweets were posted from Bangladesh. The examination of location based tweets exposed Bangladesh as outlier in the results. After excluding Bangladesh from the data analysis it identified that the countries from where the tweeters posted their contents mostly include USA, UK, Canada, Australia, India, Germany, Libya, Pakistan, Malaysia, Russia, South Korea, Singapore, France, Denmark, Iran, Switzerland, and Sweden. Both groups of tweeters, Shahbag supporters and antagonists, were found in these locations.

106
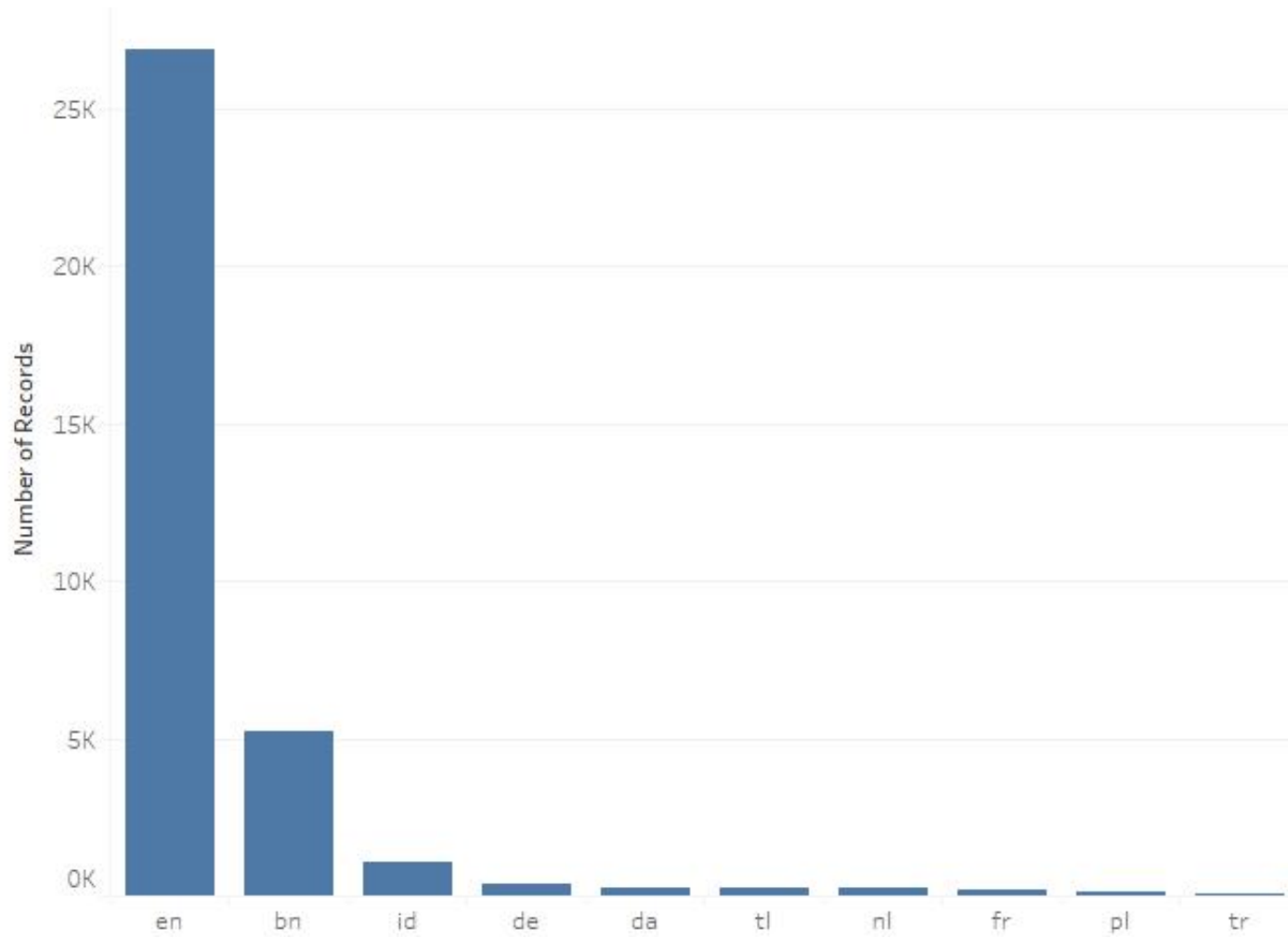
Figure 4.32: Language used for tweeting
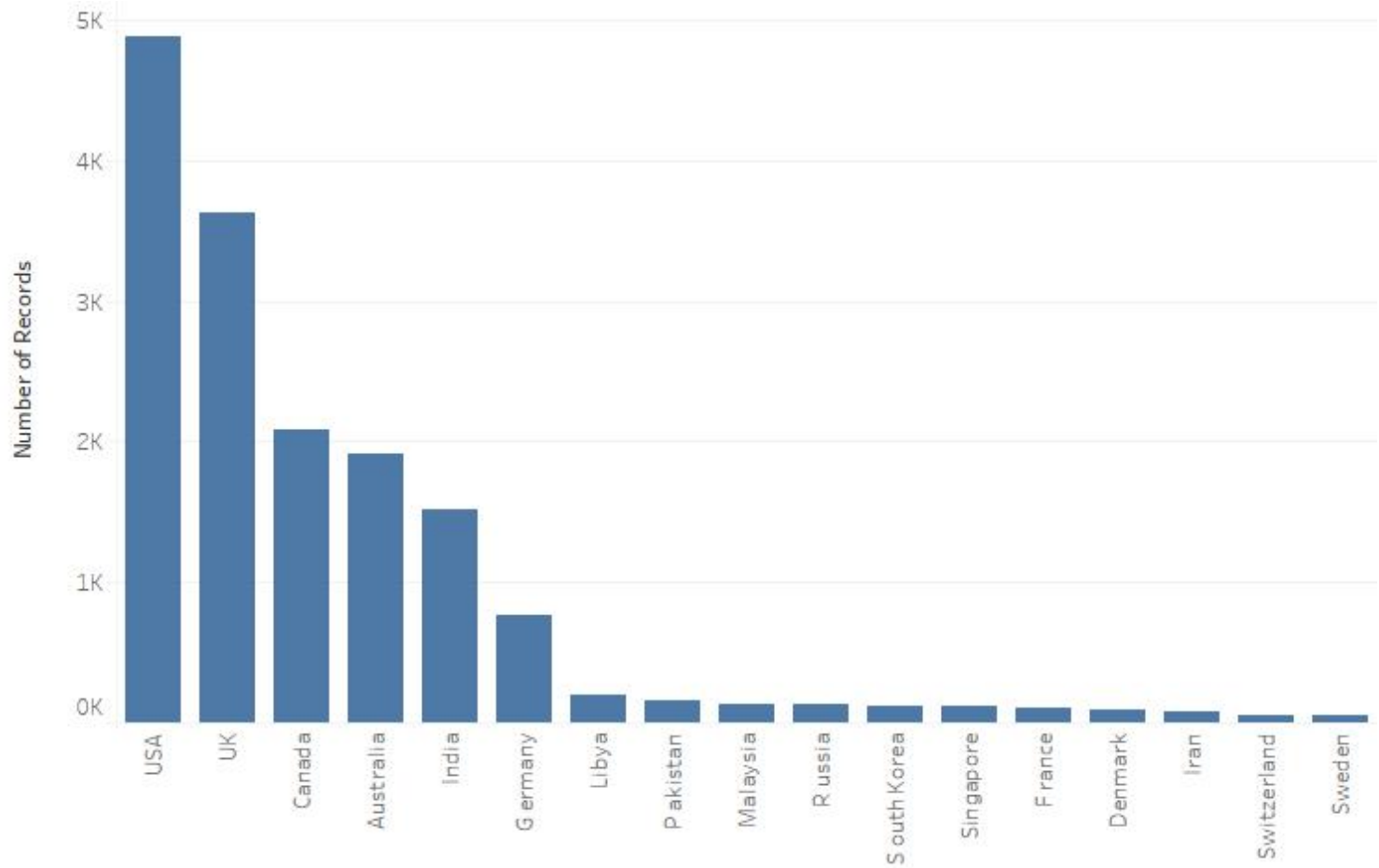
Figure 4.33: Locations from where activists tweeted

4.8.4 HYPERLINKS IN TWEETS

Weller et al. (2014) report three case studies on political discourses and describe the significance of inclusion of hyperlinks in tweets. These case studies take random samples of tweets on political discourses and categorize the links into the important media objects those refer to. By following this method, in this study, tweets with hyperlinks in first week of every month of the total movement period were selected. 3722 hyperlinks were extracted from these tweets by removing the texts of the tweets in Microsoft Excel.

Significant portion of the hyperlinks referred to professional news media and user-generated contents posted in various social media. 32% of the total sample tweets had links of professional news media. 28% of those tweets included Twitter posts, while 20% shared the Flickr posts. 10% tweets had Facebook post links, 6% had YouTube links, and rest of the links 1% each had connections from Instagram, blogs, and other media such as Srcibd.com.

The study found that citizen reporters used Twitter for spreading information. It demonstrated that both opportunities and obstacle were found during information sharing. Cyber activists used Twitter for diffusing information and make online communications with each other. The information spreading hindered due to the circulation of false reports regarding the movement. There were clear arguments in the Shahbag movement tweets. One group supported the movement and the other opposed it. The battle of tweets raised the concerns of information credibility.

109
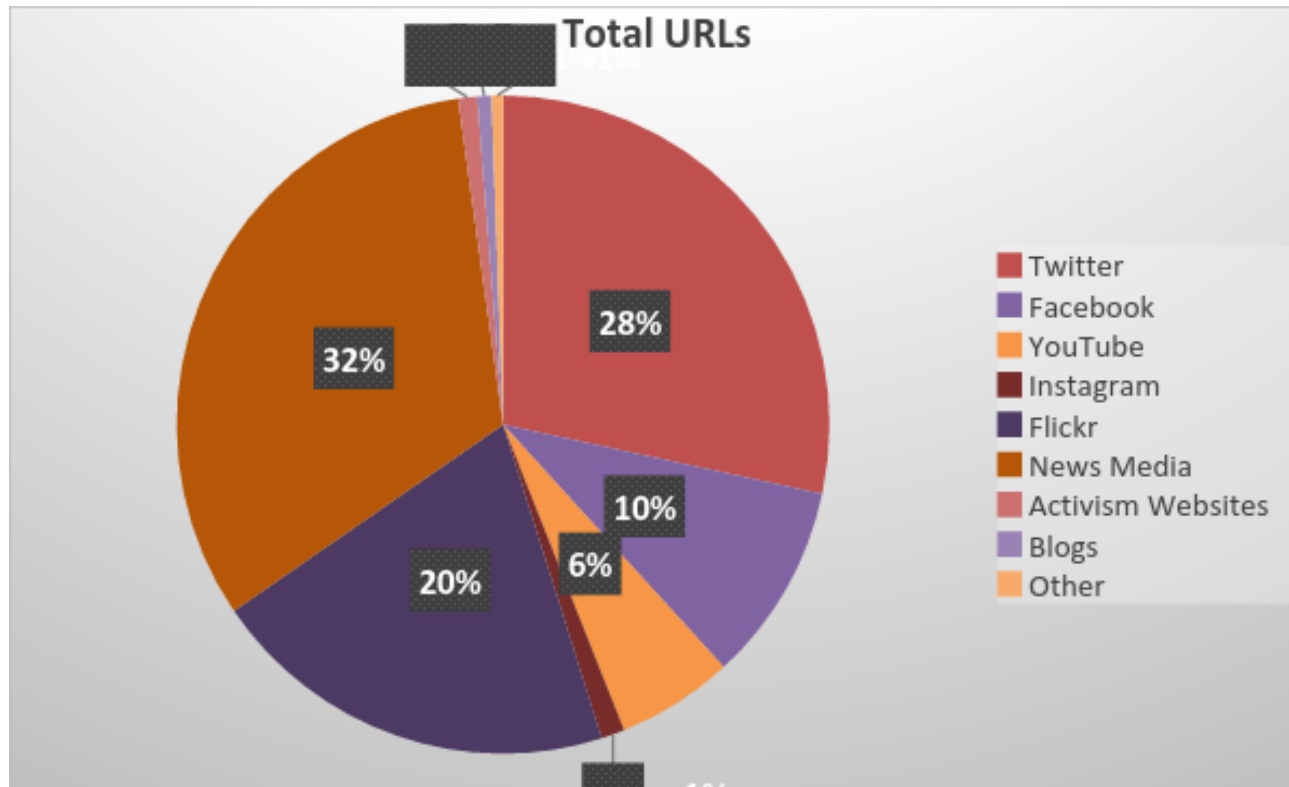
Figure 4.34: Hyperlinks shared in tweets

Activists shared reports, images, videos, and opinions in their tweets. These actors created and re-shared various contents. Easy access to internet and hand-held devices aided activists in reaching global attention and share information in large-scale settings. Historically, countries with conservative policies such as Middle Eastern countries block online communication tools during contentious events. Bangladesh Government did not shut down Twitter during Shahbag movement.

4.8.5 TIME ZONE

The dataset also provided the time zone information. Tweeters were posting contents from varieties of time zones including Dhaka, Almaty, US time zones, London, Amsterdam, Brisbane, Nairobi, Riyadh etc.

Higher follower counts do not guarantee higher number of Twitter interaction during the movement. Organic Shahbag activists had minimal followers on Twitter but they posted more frequently than the tweeters who had larger follower base. Influence and participation level had differences during the movement.

4.8.6 SOURCES AND APPLICATIONS

Shahbag protesters used multiple platforms and sources to tweet the movement. A range of sources were revealed from the Topsy Twitter dataset. Web browsers were highly used to tweet the movement. Twitter mobile application was also used to tweet and the most non-Twitter based application used during the movement was TweetDeck. Among the major sources top ones were 64% web, 26% Twitter, 9% TweetDeck, and 1% Facebook.

Numerous applications were utilized during the protest to produce tweets and share on Twitter. HootSuite, WriteLonger, Twitpic, Rightnow, Twitlonger, iTunes,

111
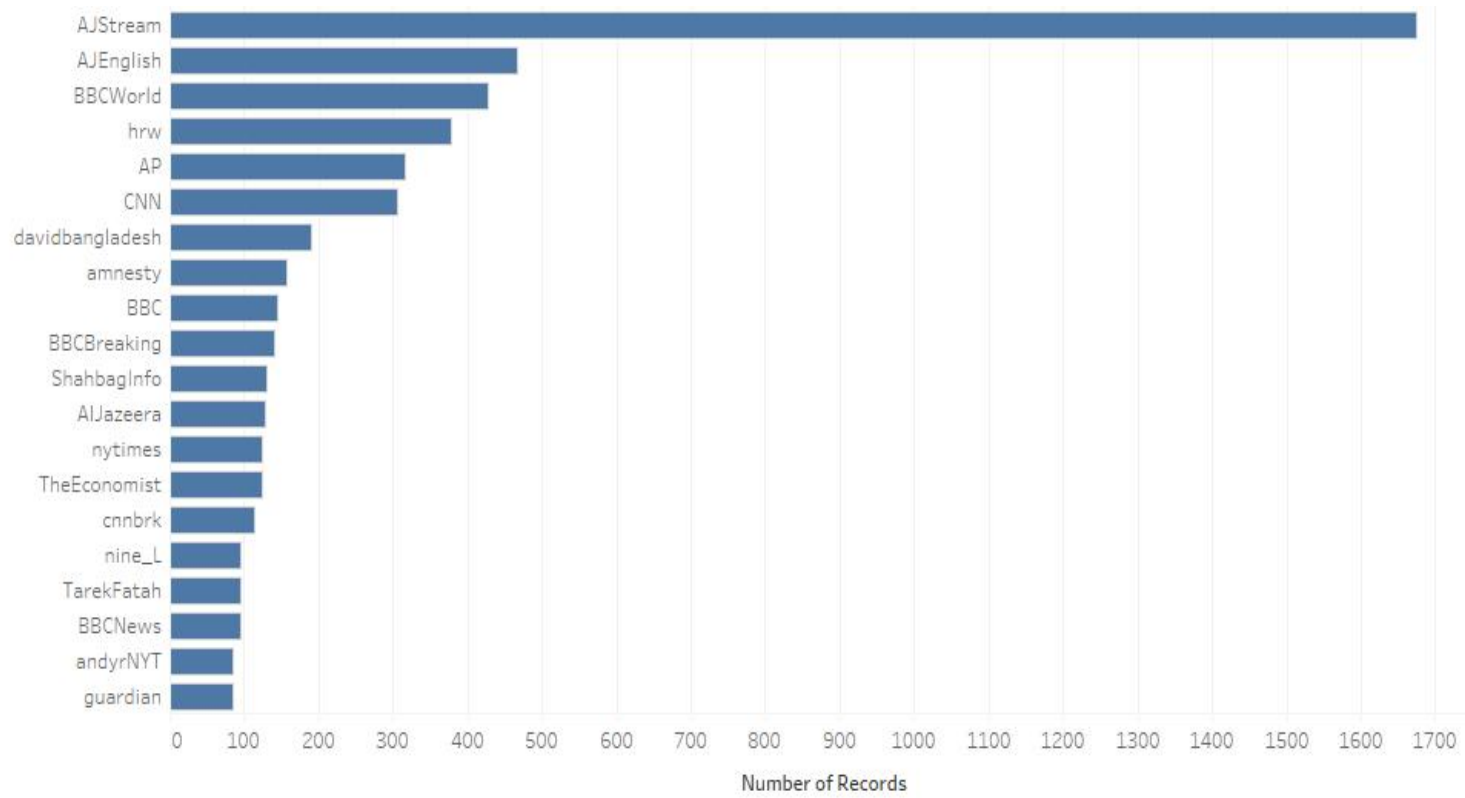
Figure 4.35: Twitter accounts mentioned highly in Shahbag tweets
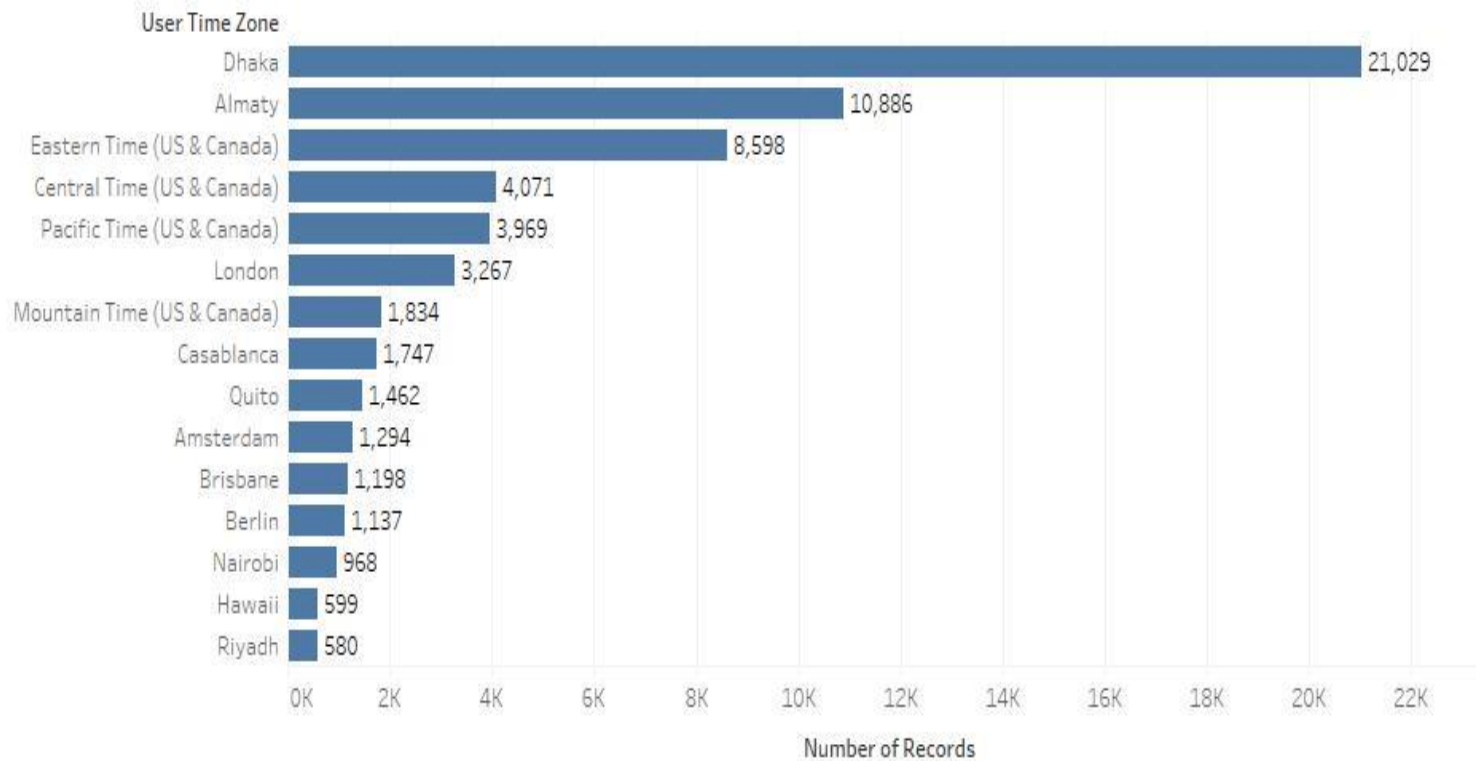
Figure 4.36: Time zones of tweets
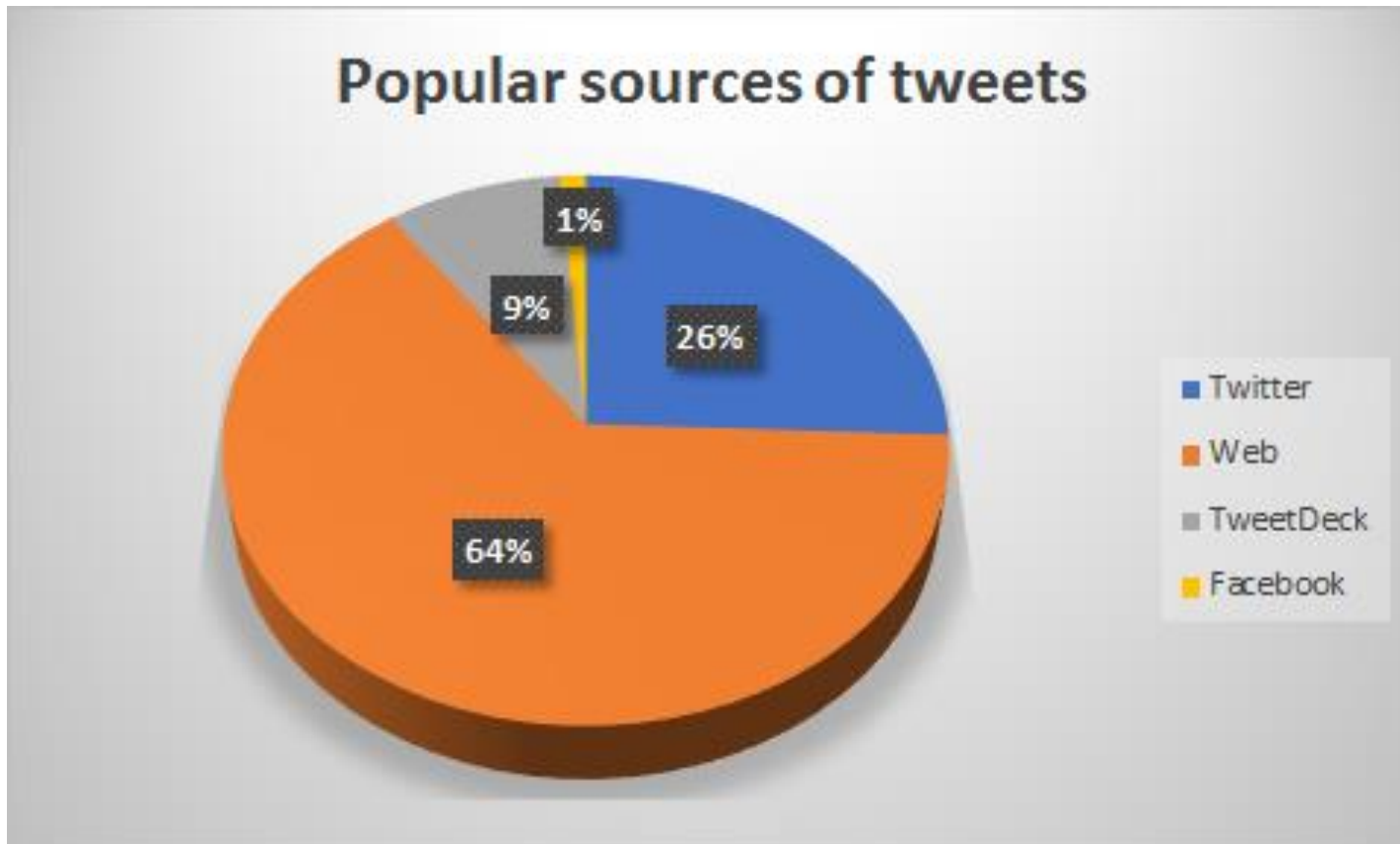
Figure 4.37: Popular sources of tweets

AddMeFast, TweetCaster were utilized frequently by the activists to relay their opinions on Twitter.

Protesters used different types of mobile devices during the movement. Highest number of tweets came from Android devices followed by iPhones. Other notable types of handheld devices were used during the protest were Blackberry, iPad, LG Phone, Nokia, Sony, and Windows Phone. Use of bots and automated methods for tweeting was not uncommon during the uprising. For example, few accounts used social promotion services like Addmefast.com. It allows users to gather followers, send contents on various social media including Facebook, Twitter, Instagram, YouTube, Pinterest, Google+ etc. It offers a range of Twitter features including acquiring free followers, tweets, retweets, and likes.

Few protesters used this service for generating multiple tweets simultaneously. All of these tweets expressed opinions against Shahbag movement. 188 tweets containing the text "Dear world: The #Shahbag movement is an Awami political protest against the Islamic leaders of #Jamaat. #FreeJamaatLeaders #saveBangladesh" were posted by using Addmefast service. Topsy, the data collection application used for this research, retrieved "AddMeFast.com Tw apps" as source for these tweets. These tweeters used null referrer service, which means these tweet links were generated anonymously by hiding the referring site.

The profiles of the tweeters described that they were mostly students within age group of 17-27. These students mentioned frequently in their profiles about their interests namely in soccer, culture, music, politics, literature, and professional wrestling.

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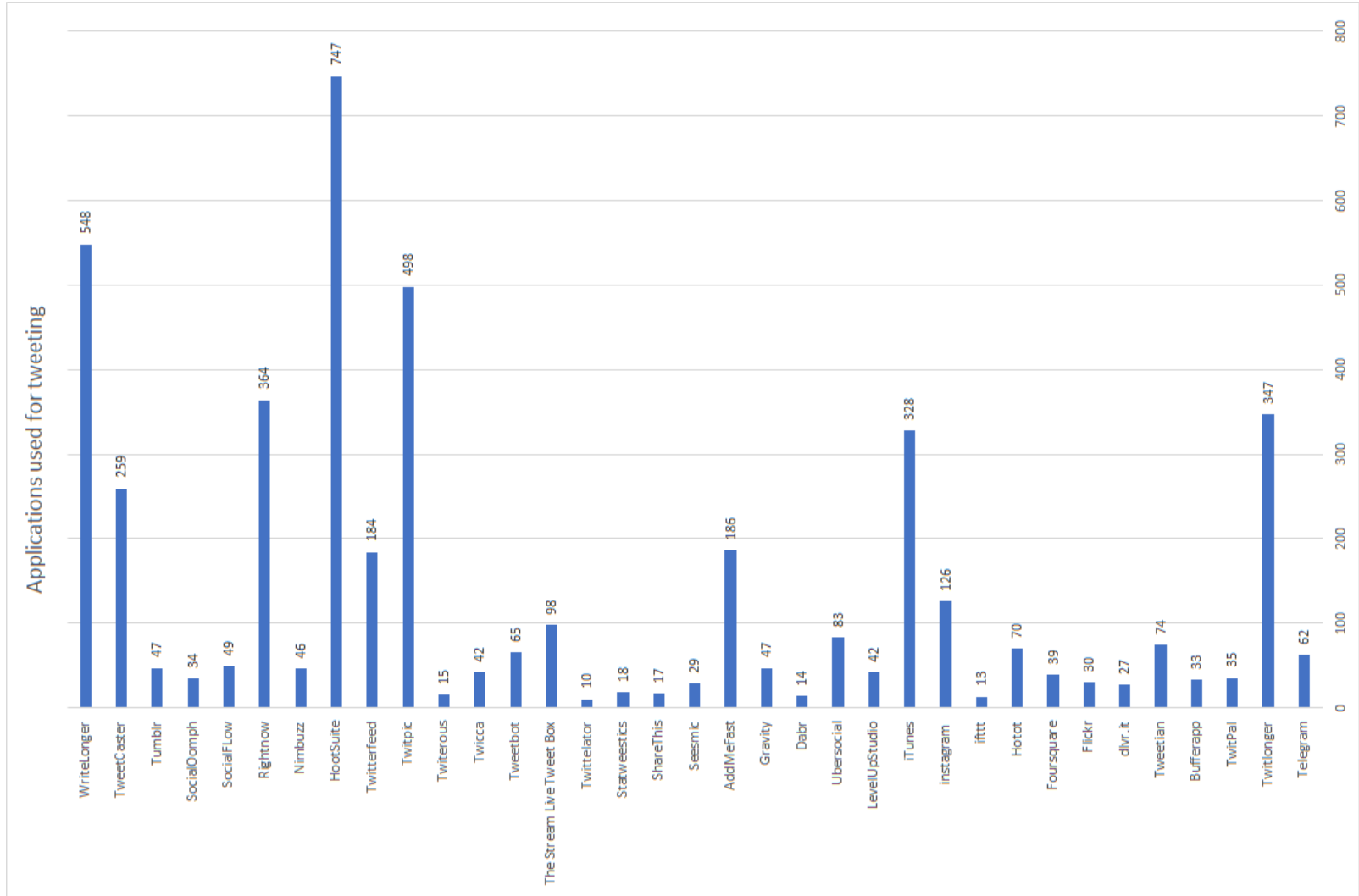
Figure 4.38: Applications used for tweeting
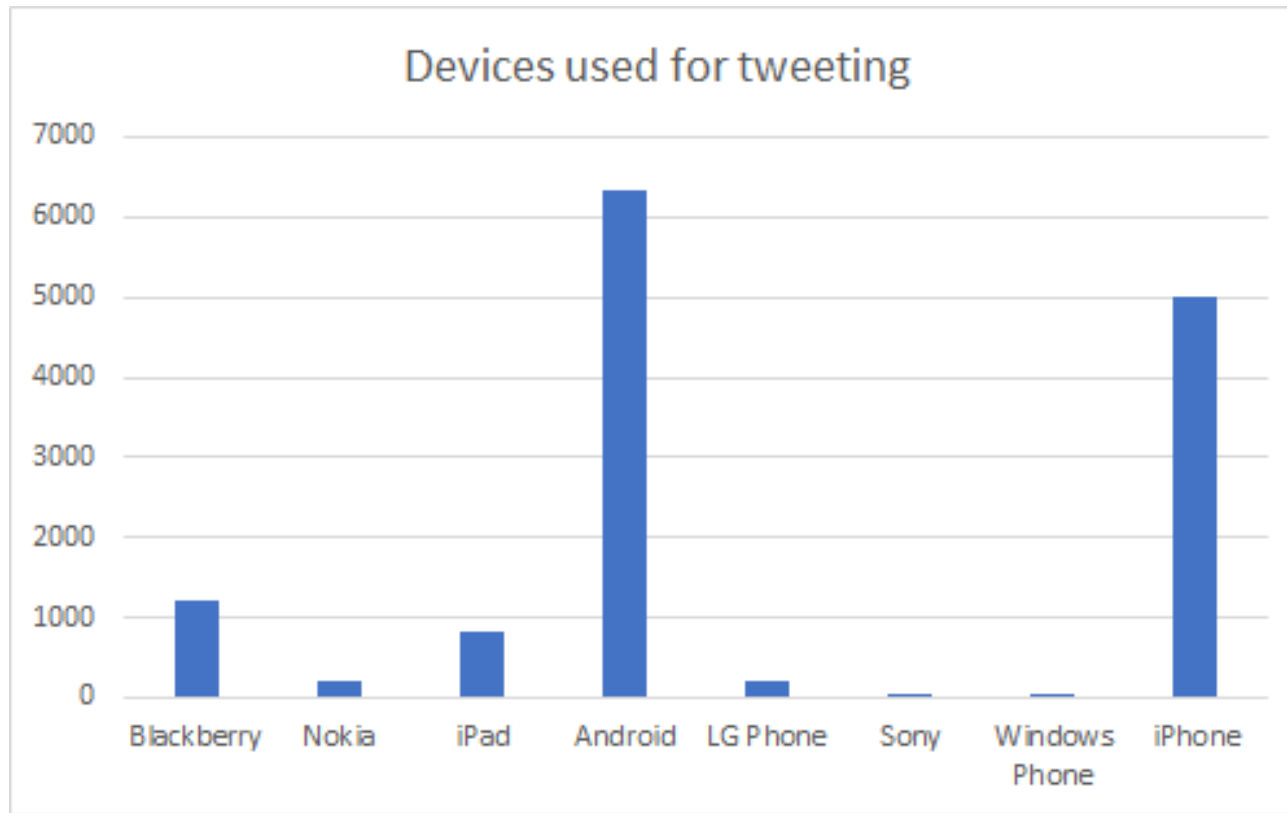
Figure 4.39: Devices used for tweeting

Religion and Islam were notably visible in their profile details. Many had diverse professional backgrounds as they mentioned in their accounts which includes businessman, engineers, lawyers, journalists, economists, doctors, filmmakers, humanitarian workers, teachers etc. Although all tweeters did not mention their background information specifically on Twitter, the available data showed that youths were central in disseminating protest information. These tech-savvy users had access to education. Activists were, by profession, employed.

4.9 RQ9: SCALE SHIFT AND DIFFUSION

Scale shift is a complex process that helps to diffuse discourses and make new connections in the networks (Tarrow, 2010). A collective action infused with contentions can either move "upward", or "downward". While a downward scale shift is limited into local contexts, upward scale shift goes across borders and receive global attentions. Scale shift has the traits of diffusion including "brokerage", "attribution of similarity", and "emulation". In the stage of brokerage activists make new connections, while emulation involves with adaptation of existing culture, and attribution of similarity deals with relevance identification based on common practices.

Shahbag protesters started with combination of diffusion and brokerage process. Diffusion was considered as a process when original tweets were retweeted with no additional contents and brokerage involved the retweeting practice that added newer contents with it (Tremayne, 2014). Diffusion and brokerage characteristics were evident from the initial stage of Shahbag movement. Emulation stage started from March and continued until April of 2013. The significant indication of this trait was visible among the solidarity expressions of the activists worldwide.

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Table 4.8: Automatically generated tweets against the movement

Date	Twitter Link	Text	Twitter Handle
Wed Feb 27 12:55:38 +0000 2013	http://twitter.com/mohamedidrissi3/status/306749434237186048	Dear world: The #Shahbag movement is an Awami political protest against the Islamic leaders of #Jamaat. #FreeJamaatLeaders #saveBangladesh	mohamedidrissi3
Wed Feb 27 12:55:47 +0000 2013	http://twitter.com/GrupoVenus/status/306749469364477952	Dear world: The #Shahbag movement is an Awami political protest against the Islamic leaders of #Jamaat. #FreeJamaatLeaders #saveBangladesh	GrupoVenus
Wed Feb 27 12:56:03 +0000 2013	http://twitter.com/polaris84s/status/306749536217464832	Dear world: The #Shahbag movement is an Awami political protest against the Islamic leaders of #Jamaat. #FreeJamaatLeaders #saveBangladesh	polaris84s
Wed Feb 27 12:57:59 +0000 2013	http://twitter.com/imgboxcc/status/306750024312823809	Dear world: The #Shahbag movement is an Awami political protest against the Islamic leaders of #Jamaat. #FreeJamaatLeaders #saveBangladesh	imgboxcc

Figure 4.40: Automatically generated tweets against the movement

Protesters around the world began to share their bonding to the protest started in February 2013 from March 2013. The attribution of similarity stage existed in Shahbag movement. Activists began to make comparison of this movement with Arab Spring by labeling it as Bangla Spring.

CHAPTER 5

CONCLUSION

Traditionally tweets are used to understand the opinions of users and their feelings about commercial products. Advanced opinion mining techniques can highlight the trends of commercial success of any product. Similar techniques for understanding the binary feelings of Twitter users towards any social issue is not sufficient. More complex processes are required to gather a fuller understanding about the opinions of users in the context of social issues like protest. This study finds that during the movement people's sentiments range from anger, anticipation, disgust, fear, joy, sadness, surprise, and trust.

Without understanding the motivations and personal preferences participants in a social movement, it is hard to label a movement as political. It is important to know the political party choices of the activists to claim that standpoint. However, Shahbag movement tweets portrayed a unique opportunity to discover political leanings of the activists. A content analysis in combination of sentiment analysis discovered the presence of specific keywords and sentiments expressed towards different political parties. The pro-Shahbag group had a pattern of behavior of using slogans of the current ruling political party of Bangladesh. In contrast, the anti-Shahbag group labeled the pro-Shabag group as a political movement and supported the causes of the Islamic opposition political party.

International news agencies, journalists, human rights organizations, shahbag protesters were frequently mentioned in the tweets. Al Jazeera Twitter handles were most commonly used in the tweets. It was observed in the dataset that Al Jazeera reported the event and held discussion sessions on the topic, which led to intense conversations around this news organization. Various accounts of Al Jazeera, for example, AJStream, AJEnglish, and AlJazeera, were found in scores of Shahbag tweets. The other news channels and newspaper Twitter accounts that were most often discovered included BBC, CNN, AP, nytimes, TheEconomist, and guardian. Another frequenter found in many tweets was the international human rights organizations with Twitter handles such as *hrw*, and *amnesty*. The popular Twitter handle mention list also included journalists and columnists like *davidbangladesh*, *TarekFatah*, and *andyrNYT*. Moreover, protesters Twitter accounts such as *ShahbagInfo* and *nine_L* were also commonly brought up in the Shahbag tweets.

The Bangladeshi diaspora all over the world participated in this movement. Expatriates from the USA, UK, Australia, India, and various European, Middle Eastern, and African countries expressed their concerns over the war crime tribunal. Faster internet access through smartphones and desktop computers contributed towards the quicker information diffusion.

Twitter was used for information transfer outside of the country. Local media and global news agencies picked up the event quickly. The activists communicated with their networks outside of Bangladesh and shared information with them. Activists from outside of Bangladesh relayed movement information to the world. This global information

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sharing practice facilitated international attention particularly by the influential news media and policy making institutions.

As activists used Twitter for spreading information about the movement, it was also true that the opposite scenario occurred. Rumors, false information, propaganda were distributed through social media. The contentions regarding the war crime tribunal in two groups of the Shahbag movement were explicit. Both groups provided their arguments in their tweets and content shared in Twitter.

Although the movement started at Shahbag in Bangladesh, it became popular among the Bangladeshi expatriates, foreign delegates, international print and electronic media in various continents including Asia, North America, Europe, Middle East and Australia. A complex mention network of Shahbag movement tweets revealed the clusters of connected tweeters and disconnected peripheries. The connected tweeters created a type of leadership through use of digital media. Influential tweeters were revealed, whose tweets were mostly retweeted and mentioned in replies during movement conversations on Twitter.

Central Twitter accounts in the Shahbag movement dataset did not always respond to the tweets sent by the activists. These accounts were of news media, journalists, and human rights agencies. However, the central hubs of activists in the movement network were both mentioned and responded back in the conversations. A greater number of Twitter mentions in tweets did not ensure replies back to messages. Highly active protesters did not limit themselves to mentioning of influential Twitter accounts. They participated actively in movement conversations with all categories of Twitter users during the movement including members of both pro and anti-Shahbag

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groups, network egos, and peripherals. Some activists not only participated actively in Twitter conversations but also held the positions of connecting the rest of the group members. These activists were influential in transferring information quickly to the rest of the members. In the Shahbag movement, the majority of the group members were in peripherals and participated without interacting with each other densely. Meanwhile, connecting with a large number of followers did not mean that activists can become influential in the movement. Isolates or loners were visible largely in the Shahbag Twitter network. The majority of those protesters did not interact with central tweeters and tweeted about the movement on their own and at their own pace.

Shahbag protesters used Twitter for movement organization and information dissemination. This study explored tweets with '#shahbag' and '#savebangladesh' and examined those with the application of network analysis to identify contentious issues, movement emergence, and central hubs of Shahbag protest. This research contributed in the areas of social movements and social network analysis by explaining how network centrality measures are useful to make sense of Twitter movements.

This study identified two shared motifs of Shahbag protesters: broadcasters, who retweeted frequently and had large out-degree, and receivers, whose tweets were retweeted at a high rate and have large in-degree. However, the high in-degree score did not guarantee who is an influential node in the network. Among all the network centrality measures, eigenvector centrality identified the influential activists from the Shahbag movement tweets by counting the number of times they were mentioned and retweeted. Social networks in protests construct self-engagements and interactions among activists. This approach supports the development of a cognitive perspective about the protest for

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the activists. They modify the level of their actions towards the movement based on their consumption of protest interactions. However, connections between activists increased the degree of participation in the protests. Conversations, discussions, and resource sharing solidified the level of actions taken by the activists.

Shahbag activists discussed specific types of topics on Twitter. They followed each other to varying degrees. Few had a large number of followers, others had a relatively limited number of followers, many had no followers at all. Based on the observation on the time of opening or creation of the Twitter accounts, it was identified that many activists opened their Twitter account during the evolution of Shahbag movement and had no profile pictures. They had the default Twitter profile pictures in their profiles with limited activities. Most of their actions were confined to retweeting and favoriting tweets posted by other protesters. There was a unique relationship among the types of topics shared by these tweeters.

The movement network exposed a long-tail characteristic in the context of participation. A large portion of the population tweeted only a few times, while there were only small number of members who posted the bulk of the Shahbag tweets. Polarized activists disputed similar issues and commented separately on multiple topics. Shahbag protesters formed a small-world network and transferred information quickly through their shortest paths on Twitter. Significant number of tweeters cited like minded protesters to communicate, coordinate, and share information. They were also involved in disputes regarding tweets.

Even though online protests were largely self-organized, there is evidence that indicates that Twitter protests emerged through the leaders during a social movement

(Gerbando, 2012). The Shahbag movement is not exceptional in this case. Activists expressed solidarity and cooperated with a specific group of participants in the movement. While the movement progressed without formal leadership, throughout the entire course of time of the social movement, few tweeters were influential in spreading information in large scale. Through Twitter communication, Shahbag activists organized and mobilized resources. Twitter provided them with a medium for making lucid decisions about the movement's activities. Collective action became "connective action". Information cascaded through the Twitter networks as activists interacted with news agencies, activists, and policy-making institutions. The technological affordances of Twitter provided opportunities for the activists to become empowered and share information rigorously.

Twitter may be wrongly considered as the root cause for the start of any social movement such as Arab Spring, Occupy Wall Street, Iran Green Revolution, etc. It should be taken as a tool for communication that enables the protests and speeds up information dissemination and activism organization. Twitter as an online social networking site enabled protesters to communicate with larger audiences, organize events, and call for participation, share information including multimedia objects such as videos, photos, and voices. The interactive features of this online participatory media made a striking impact in the contexts of communication. In February 2013, people from Bangladesh started tweeting about a retroactive tribunal on its 1971 liberation war criminals. Online activists flocked together at the Shahbag Square in Dhaka of Bangladesh and shared information in social media with hashtag '#Shahbag', named after its location of origin.

The Shahbag movement started seeking justice for the war crimes of Bangladesh. Activists demanded the death penalty for the war criminals. Social media played a significant role in relaying the conversations of online protesters during the movement. Although, in Bangladesh, Twitter is relatively less popular as a social media platform in comparison to its competitors like Facebook, blogs, etc., people from different parts of the world used it as a common medium for information dissemination. They used various common hashtags such as '#shahbag', '#savebangladesh', '#jamaat', etc. to diffuse information related to this protest globally. Thousands of people took to the streets and joined together at the Shahbag Square in Dhaka, the capital city of Bangladesh. Shahbag as a site for mobilization has a rich history of being the starting place for many historical non-violent uprisings including the movement against the British Raj, Language Movement in 1952, movements throughout 1960s and 1970s, and up until the Liberation War of Bangladesh in 1971. People of all walks of life - students, bloggers, teachers, entertainers, sportsmen, professionals, young, old, children, women, men, all participated in the 2013 movement seeking capital punishment for the war criminals. The supporters of the war criminals also rallied at the same time and used Twitter and other online platform to express their critical viewpoints. This movement is one of the largest public demonstrations in the history of Bangladesh. What is unique to this movement is the social media usage for resource mobilization and communication. The technological affordances of socio-technical systems like Twitter enabled protesters of all kinds to broadcast information that they wanted to share with others including individuals, news agencies, international authorities, etc. The war crime tribunal triggered the event and citizens were dissatisfied with the verdict. However, what was unique was the online

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resource mobilization of the dissidents through social media that empowered them to debate about the rulings and portray their views in a non-violent manner.

This study examined the communication practices conducted on Twitter in the trajectories of the Shahbag movement and the citizens of Bangladesh. It placed this analysis within the context of Twitter's technological affordance feature as it is considered as one of the key tools for organizing social movements in the internet era. The primary objective of this research was to provide insights on how networked protesters share information and communicate on social media during online social movement.

The Twitter dataset enabled exploration of youth-led collective action and identification of its patterns as they were exposed online. The social networking site played a significant role in participation, news agenda-setting, information sharing, communication, and shaping public debates during Shahbag movement. Twitter provided communication supports that were essential for sharing movement information on a global scale. It enabled the protesters to set the news agenda for mainstream news media in Bangladesh. It also identified that individualized forms of protest are on the rise in the age of the Internet. The activism showed that an online communication platform like Twitter has a vital role in social and political discussions. This culture of online discussion should not be neglected as a complement to the traditional methods of idea generation. Twitter as a communication medium exhibited that the voice of any kind of activist may be heard through their online messages.

This study had an emphasis on use of Twitter and how it facilitated formation of online community or networks during the Shahbag movement in Bangladesh. With the

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application of social network analysis, this study investigated the relationship structures and influences in the Twitter networks. Moreover, to ensure the validity of the data this study employed qualitative content analysis to provide a context for the analyses.

There is empirical evidence that "revolutions are not tweeted" (Murthy, 2014). The Iran Election case was cited and described that few Twitter accounts were evident and most of the tweets were in the English language instead of Farsi. This fact was implied as the Iranian movement was created by influential western journalists. However, the Shahbag movement tweets illustrate that a large group of users opened Twitter account in 2013, mostly during the early days of the protest. Twitter users with large followers were absent during this perod of the movement. Although many well-established news media covered the stories and had a large follower base, they certainly did not take sides during this uprising; rather they were conducting their journalistic duties according to protocol. Of the tweeters who opened accounts on Twitter during the protest, few of them experienced a growing follower base over the time. Also, their profile backgrounds did not exhibit connections with established political parties. These were youths who participated out of their own conscience as they expressed in their tweets. So, this movement was not any journalistic or diplomatic invention.

There are allegations that Twitter is not supportive of revolutions as such movements require formal leadership to sustain. Although a large group of Twitter users had weak ties with others and shared minimal tweets related to the movement, few emerged as a leader by actively engaging and participating regularly. A large group of users certainly displayed the characteristics of absence of any structured and organized hierarchy in this protest. In contrast leadership by a few, over the course of time, a range

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of users shared thousands of opinions. Their tweets were retweeted in large volume. These few activists were mentioned in the bulk of tweets, indicating that the Shahbag movement had leaders online particularly on Twitter.

Moreover, these small group of tweeters exposed the nature of strong ties. They were connected on moral intensity, shared similar types of content, supported the causes of the protests, and over the time exhibited reciprocal relationships on Twitter. While the weak ties were important to disseminate opinions and sentiments to a larger population, strong ties were promoting the movement with active participations. The distributed weak ties were spreading information real time. Both types of relationship network, irrespective of its thickness, were visible during the Shahbag movement.

The role of weak ties in the Shahbag movement was important. A significant contribution of such a relationship was in large scale information dissemination. The contents of the tweets were largely intended to catch the attention of international media and journalists. In terms of any hierarchical protest, such method could have proved to be cost effective. Twitter was utilized by both groups during the movement including one supporting the demand for the death penalty for war criminals and the other opposing those demands by accusing it as Government-led protest. Both groups were constantly updating about the issue and sharing news to the world in their own contexts. The presence of fake Twitter accounts was found. Automated system-generated tweets were circulated from a range of locations simultaneously. The content of these tweets were similar. These tweets expressed views that supported the group opposed to the movement. As news propagation through Twitter is fairly easier, it can be used for both good and bad purposes. Both real and fake news can be circulated through Twitter.

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However, measuring the merits of tweet content regarding whether those were real, rumors, or, misinformation was beyond the scope of this study. However, polarity among the views expressed by Shahbag protesters existed. Antagonists and protagonists from both groups used Twitter to circulate information regardless of its types.

The Facebook event page created by the Blogger and Online Activist Network was crucial in participation and mobilization of protesters during the movement. The protesters mentioned in their tweets that their consciences lead them to participate in the movement. They also mentioned that their motivations were drawn from their respect for the martyrs of the 1971 Bangladesh Independence War. Tweet counts were higher during the initial days of the emergence of this movement, especially in the month of February 2013.

Many of the Shahbag Twitterverse were youths, students, and city dwellers with access to mobile phones and the internet. This tech-savvy generation created a networked protest, although the total number of Twitter users was very small in comparison to the total population of the country. However, Twitter use during the movement illustrated that information from the protesters can reach to the rest of the world. Their rapid opinions shared through Twitter provided the means of broadcasting real-time movement updates, notifying global media, and connecting the heterogenous protesters to both individuals and groups. The nature of citizen journalism helped the movement to interact with international groups with similar interests.

Although Twitter enables broad participation, there was evidence that many protesters only posted tweets and never interacted with other participants. In the Shahbag movement there were densely interacted networks in addition to the sparse

communication of individuals. The contents of the tweets expressed the views of support and opposition about the Shahbag movement. However, a large volume of the public opinion supported this movement. Thus, Twitter was commonly used for communication and public opinion sharing.

In regard to the theory of homophily that like minded people build social ties together, Shahbag tweeters exposed a similar notion. They formed clusters, retweeted contents, and followed the activists that had similar interests and opinions regarding the movement. Generally, offline activism was characterized by the formation of established leadership. Twitter enabled the activists to share their views freely. This open culture of participation revealed the rise of individual leaders with no association of political or established organizations.

Social movements during the Arab Spring were for political reform and regime change. Information dissemination largely happened through social media during the recent online-based uprisings. Apart from developing network-based communications, Twitter facilitated the information circulation in the Shahbag movement. Information diffusion patterns can be seen as an important factor of measuring the success of the movement. Diffusion elements explained what contributed to information transfer in Twitter during the Shahbag movement. Its evolution, expansion, and engagement was important to understand the movement growth completely. Four primary components of diffusion (Katz, 1968) including transmitters, adopters, innovation, and channel, shed light on the Shahbag movement development. In the context of this movement, Shahbag activists were the transmitters, citizens from across the globe who picked up on the topic

were adopters, topics and ideas related to the war crime tribunal were innovation, and Twitter and other social media played the role of channel.

Twitter facilitated the proximal model of diffusion instead of hierarchical or top-down characteristics. Activists engaged in the information transfer process with spatial and cultural commonalities among themselves. Twitter supported both direct and indirect communication among activists. There were many protesters who tweeted minimally and never interacted with other activists. A large portion of the activists tweeted across the world, which facilitated diffusion across geographical distances and cross-national contexts during the Shahbag movement.

A framing process was evident in the Shahbag movement. Protesters mentioned international governments, news media, and authoritative groups in their tweets. They expressed their motivations, grievances, and demands in their tweets by constantly trying to gain the attention of international bodies. The study identified the rise of a new form of leadership in raising public opinions during the movement. A significant portion of opinion leaders were youth who are college and university students and unemployed. Communities of employed people with similar interests were also involved in this movement. Expatriates and students studying in developed countries for higher studies were also actively engaged in the protest. Reference to international forces and universal ideas such as human rights was a common practice of the protesters of this movement. A large portion of the tweets were written in English, which indicates that support and interference from the global forces was deemed as important by the protesters.

Diffusion of information related toh the war crime tribunal was explicitly evident in the Shahbag movement. Ideas related to seeking the death-penalty for war criminals,

banning the Islamist political party, atheism, and human rights were primarily conveyed through the tweets of Shahbag activists. Whether social media was the primary cause of the movement was out of scope for this research. The study did reveal that people with similar interests expressed their opinions regarding the movement through Twitter and other social media. Their actions using social media ensured the mobilization and sustainability of information transfer during the protest.

This movement exhibited several information diffusion principles. First, Twitter enabled the proximal diffusion through its decentralized and non-hierarchical communication structure. Second, the diffusion of Shahbag tweets was global. The activists continually mentioned the global forces and expatriates in their tweets to bring this movement to their attention. Third, the transmitters and adopters communicated with each other through Twitter's interactive services. Fourth, Twitter enabled the process of framing during the movement. Protesters referred to international media in their tweets to focus the attention of the Western world on the tribunal and gather support for the causes of the activists.

Due to the technological innovations, viewing, sharing, connections, interactions, and social features are becoming universal to all online tools. These affordances provided by a technology, such as Twitter, greatly impacted the socio-political sphere in the Shahbag case. In contexts of social movements such technological advances provide new meanings. Digitally connected publics achieve quicker information sharing. Ordinary citizens can broadcast content to millions of other people through social media. They can converse beyond formal structures of communication and record any activity through these platforms.

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Modern societies filled with advanced digital technologies enjoy a greater capacity to conduct social movements. Any kind of collective action aims to direct public attention towards specific topics. The rapid spread of information is vital during the initial phase of social movements. Social media plays an important role in the formation of these uprisings from their rudimentary stages. Protesters with similar interests find themselves coordinate with each other through social media. The concept of 'homophily' provides strength to dissidents in terms of how they interact. Social media provides support for removing the geographical barriers among these like-minded activists. They share content and information worldwide by using hashtags that help to observe the growth of interaction over time. Young generations with access to digital tools and ubiquitous smartphones organize and share information through social media during the movements. Geolocation barriers erode easily as they connect with people across the globe. The interaction and visibility features of social media provide greater support in making these connections. Twitter offered a vehicle for achieving these supports to the dissidents. However, it is important to find the right persons online whose information and contributions carry more weight than others. Over a specific period of time leadership forms and emerges out of the popular interactions. Protesters may have stronger connections beforehand and may continue that bond during the movement.

People irrespective of political viewpoints participate through social media and are connected with active protesters. Activists use social media for information dissemination as early adopters for these tools. Mobile phones and text services were also the common tool for communication during the political upheavals. Smartphones with

interaction features are important for technology savvy protesters to advance their points of view.

Although many scholars term the online protests as "slacktivism", protesters who participate online and offline may pay significant sacrifices for their participation and engagement during protests. Death threats for these people are commonly observed. Twitter or online activism can be dangerous and high-risk. During the movement a blogger was killed by the group opposing the movement and several others received death threats for their active involvement in the movement. Therefore, the concept of 'slacktivism' did not completely fit with the Twitter Shahbag movement.

Network effects for activists is a blessing for information transfer and coordination. Varying levels of social ties of activists are utilized to disseminate information and communicate with each other. In this process global awareness of any topic or point of view may be impacted by both strong and weak ties. Twitter users typically follow few people intensely and are followed by a large group of people with irregular interactions between themselves. To spread ideas quickly over the network through the help of trusted friends on social media is as important as sharing by the weak ties with some acting as the bridge between strong and weak ties. Twitter users can connect with themselves and the role of weak ties in that communication is strong. In the context of social movements, the dissidents can broadcast their views and opinions through their weak ties on Twitter.

Shahbag movement tweets illustrated the opinions for and against the movement by protesters of many walks of lives. The supporters of this movement demanded the death penalty for the war criminals, while the anti-group of this movement began a

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counter-protest with demands of releasing the accused political leaders. They used a range of hashtags to express their opinions on Twitter. The most popular keyword found in the activists' tweets is #shahbag, although various spellings were used to write this in the tweets. The anti-group, however, used #SaveBangladesh in most of their tweets. While the movement started in Dhaka and emerged worldwide through the help of social media like Twitter.

Of the total population of Bangladesh, 43% use the internet, of which 80% are on Facebook. This implies that total Twitter users in Bangladesh is miniscule. This number was rather smaller during Shahbag movement. However, activists were sharing protest information through Twitter and worldwide news and authoritative agencies were monitoring the situation through it. Twitter enabled this socio-political protest to gain international media attention as news agency beyond the borders of Bangladesh were covering the news of this protest. International journalists were mentioned frequently in the tweets and few commented on the activities of the protest. The inception of the protest was from the streets and later transmitted through digital mediums like Twitter. Just as its predecessors like "Arab Spring" the Shahbag movement also first originated in the streets, particularly the Shahbag Square in the capital city of Bangladesh. The "technological determinism" factor of Twitter was absent in this movement. Twitter did not caused this movement rather it provided the communication supports for activists and citizens to circulate their opinions.

As Twitter was not blocked by the Government during the uprising, its interactive features supported resource mobilization and coordination for the activists. The tool was supportive of spreading information and provided an online place for

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discussing a pressing social issue of the country. Historically, communication media, which arrived before Twitter, like posters, telegraphs, telephones, mobile phones, texts, emails, etc. also play central roles in all kinds protests. Thus, Twitter was not exceptional in the context of the Shahbag movement.

Weak-ties played important roles at the transnational levels for information transfer and mobilizing resources worldwide. For future investigation a temporal behavior of communities, i.e., when and how protesters shared information, formed or left groups would give insights about the community evolution through social media.

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