

Disruption of a Movement: A Network Analysis of the Assassination of Benazir Bhutto

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DEDICATION

This is dedicated to my wife Vickie, my children Mitchie and Carly, and my parents who instilled in me the importance of a lifetime of learning.

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I would like to thank the many friends, relatives, and supporters who have made this possible. My wonderful wife, Vickie, was so supportive of my studies and was an endless source of encouragement. Dr. Nan and other members of my committee were of invaluable help and I would like to thank them for their endless patience.

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ABSTRACT

DISRUPTION OF A MOVEMENT: A NETWORK ANALYSIS OF THE ASSASSINATION OF BENAZIR BHUTTO

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To more accurately understand the impact of the assassination of former Prime Minister Benazir Bhutto on the democratization movement in Pakistan, this thesis study provides a network-oriented analysis of those individuals associated with her either personally, as participants in the movement, or in some other non-obvious way. By using publicly available news sources and data visualization software, this thesis shows the shape of the social network and identifies change agents, opinion leaders, and other actors and groups who might play key roles in the network.

The analysis reveals what effect her assassination has had on the shape of the democratization network and on the network's ability to recover, grow, and develop in order to advance the cause of democracy in Pakistan. While many individuals and small groups became detached from the network when the former Prime Minister was assassinated, based solely on topology, the surviving network showed no signs of imminent collapse or weakness.

The subject of this study is intentionally narrow, but the implications and applications of this type of network-oriented analysis in the field of conflict analysis and resolution are numerous. By making use of well-known and widely accepted network theories, together with software tools and algorithms to visualize relationships between individuals and groups, researchers and practitioners can better understand what happens when key individuals and groups are added to or removed from a network. Will the network collapse? Can it repair itself? Will it grow at an increased or decreased rate? Answers to these types of questions form a basis of understanding that can help researchers and practitioners decide what tactical or strategic adjustments might be needed to continue or expand conflict resolution efforts and interventions, or perhaps to even anticipate conflict escalation.

CHAPTER 1 – Introduction

The research conducted for this thesis study was part of an effort to determine if publicly available news articles would reveal relationships between individuals, which in turn might elicit insights into the inner workings of groups, movements, and communities. The hope was to discover and leverage such findings to provide conflict resolution researchers and practitioners with valuable information for improving or altering intervention tactics and strategies, for predicting conflict escalations and de-escalations, and for simply gaining a better understanding of conflicts under study.

Thesis Problem

A network-oriented analysis of Benazir Bhutto's social network as drawn from publicly available news articles will reveal non-obvious relationships and ways in which her assassination has reshaped the democratization movement in Pakistan.

Thesis Outline

The body of the thesis is divided into six chapters including this brief introduction. Chapter 2 provides an overview of network theory. This chapter is intended to broaden the reader's understanding of background information related to the thesis problem described above. This brief but important chapter reviews key theories and ideas about the nature of social networks, small world phenomenon (Watts and

Strogatz), “the strength of weak ties” (Granovetter), preferential attachment (Granovetter), and “tipping” points (Gladwell), all of which make this study possible.

A synopsis of the technical approach for this thesis study is provided in Chapter 3. The approach included processes for locating news articles, extracting items of interest from them, and visualizing the social network drawn from those items to facilitate analysis.

Chapter 4 elaborates on the technical approach by describing the process used to identify, acquire, and condition the data for analysis. Strategies for increasing the size and improving the quality of the data set for future studies are presented at the end of this chapter.

Chapter 5 describes the key findings of the network-oriented analysis. An in-depth analysis of the social network as drawn from the publicly available news articles is presented here. Potential key players in the surviving democratization movement are identified. The chapter reveals who they are, how they are related to one another, and their impact on the topology of the surviving network. The shape of the post-assassination network is brought to light in this chapter.

Conclusions and suggestions for future studies are made in the final chapter. This closing chapter highlights the key findings of Chapter 5 and also describes numerous variations of this study that might be conducted in the future in order to confirm, refute, or otherwise improve the quality of this study’s findings that suggest that the network representing the surviving democratization movement showed no signs of imminent collapse or weakness. Variations include using different data sources, examining

relationships temporally, studying groups instead of elite individuals, and analyzing the relationships between the authors of the selected news articles and the sources they reference.

CHAPTER 2 – Social Network Theory

The study of network theory over the past several decades has revealed interesting, troubling, and surprising information across many different contexts about the structure, resilience, formation, collapse, and power of networks. Researchers have discovered unexpected commonalities between social, biological, and computer networks, to name but a few (Buchanan 49). Armed with these fresh ideas and theories, researchers and practitioners in all fields of study are gaining new insights from large and previously opaque data sets.

Social network analysis is a field of study within broader network theory that focuses on analyzing social structures or networks created from individuals or organizations and their relationships with each other, with events, with movements, etc. The ways in which individuals and organizations are linked together are often quite surprising and non-obvious. For example, although there are close to six billion people alive in the world today, there is a sense that the world seems much, much “smaller”.

In 1967, Stanley Milgram, a psychologist and scholar from New York, performed an experiment to study how closely connected people are to one another (Milgram 60). He mailed one hundred sixty letters to a random selection of individuals living in Kansas and Nebraska, asking each of them to forward the letter to a stockbroker in Boston who was a friend of Milgram. Milgram did not, however, give them the stockbroker’s

address. Instead he asked each of the recipients to forward the letter and the same forwarding instructions to someone they knew personally who they thought might be "socially closer" in some way to the stockbroker in Boston.

Interestingly, and perhaps surprisingly, most of the letters were actually delivered to the stockbroker. Moreover, each letter arrived having been forwarded *only about six times*. Given that there were nearly two hundred million people in the United States at the time, this result seemed astonishing. Milgram's findings became the basis of the now famous phrase "six degrees of separation", whereby everyone seems to be separated from everyone else by about six relationships.

Small World

What can explain this mystery of such a seemingly "small world"? Watts and Strogatz (440) discovered a mathematical explanation for the phenomenon of small worlds. In the figure below, the left side depicts a network of twenty people, each of who is connected directly to four others. It requires several "jumps" to get from a person on one "side" of the network to a person on the other "side". By introducing two or three random connections to the network as shown on the right, the number of jumps (degrees of separation) is reduced by *half*.

This becomes particularly interesting at scale when the subject numbers are large. For example, given a conceptual circle that included everyone in the world with each person directly connected to fifty other people, it would take some *sixty million* jumps to get halfway around the circle. If two random connections were introduced for every ten

thousand people, the number of jumps drops from sixty million to about *eight*. This is precisely why the world seems small to us.

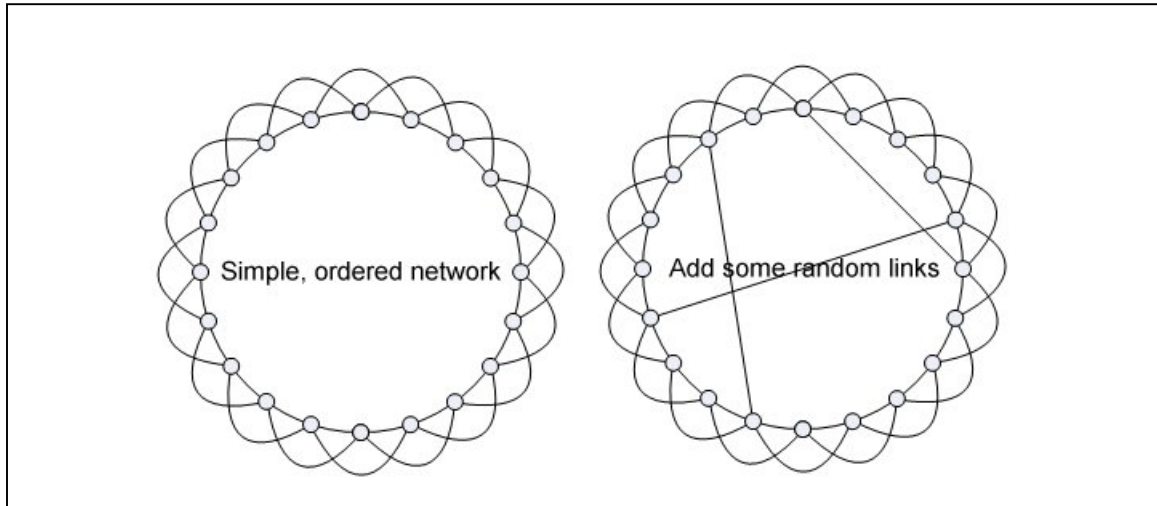


Figure 1: Simple Network with Random Links

While the mere connectedness of the people represented by these figures is interesting, it is also the *strength* of each of these connections (as by measured by a combination of time spent together, emotional intensity, mutual confiding, and reciprocal caring) that is particularly revealing about relationships. These random connections (perhaps it is better to call them *long distance* connections) are the keys to the notion of a small world and these types of connections are what Granovetter (“The Strength”, 1361) calls *weak ties*. Weak ties are the network *interconnections* -- the connections that join disparate networks together in order to make the world seem more connected.

Surprisingly, this explanation for the mystery of the small world extends to other types of networks as well. Researchers have applied this theory to other types of networks and have discovered that all these networks have nearly the same exact

structure as the social network discussed above. In other words, whether it is a network of power lines, a network of neurons in a simple worm, a network of airports, the network of the brain, the World Wide Web, etc., each of these types of networks has a relatively small network diameter (Buchanan 119). That is, there are a small number of degrees of separation between *any* two nodes in the network.

Social Network Analysis (SNA)

There are certain social network analysis metrics that can be computed to determine or verify important elements of subject networks (Hanneman, Ch.10).

- **Degree centrality** – measures the number of direct connections a given node in a network has. In other words, how many people know a given person or are directly known by that person?
- **Betweenness centrality** – measures the influence of a node in a network over the distribution of information throughout the network. A node with high betweenness is very influential; removal of that node would disrupt the flow of information throughout the network. In other words, how influential is a person in a social network over the distribution of information to others? How many people would be isolated from certain types of information if a given person were removed from the network?
- **Closeness centrality** – measures the lengths of the paths between nodes in a network. Nodes with high closeness have shorter paths to other nodes than those that do not. People with high closeness centrality have the shortest paths to others.
- **Eigenvector centrality** – measures the importance of a node in a network and is often used to analyze vulnerability in the network.
- **Centralization** – shows whether most of the nodes in a network are connected to only a few main nodes or connected to many nodes. A few main nodes or hubs indicate a high degree of centralization.

- **Clustering coefficient** – indicates the likelihood that if A and B are connected to C, they are also connected to each other. It is a measure of cliquishness.
- **Structural cohesion and equivalence** – cohesion measures how many nodes would have to be removed in order to disconnect a group from the rest of the network. Equivalence measures the extent to which nodes have connections to the same other nodes.

Knowing these measurements can help researchers and practitioners in the field of conflict analysis and resolution better understand how people and groups are related to one another within a given social network. Whether the goal is to identify ways to disrupt conflict situations or to find non-obvious ways to build and grow peace by joining individuals and groups together, understanding social network analysis measures is very important.

It is essential to note, however, that these particular measures focus on only the *topology* of social networks. While understanding network shape is crucial for determining and studying the smallness of social networks, no study of them would be complete without considering myriad other elements related to the inner workings of social networks.

Crowds Attract Crowds ... Or Do They?

Beyond the study of network topology and small worlds, of particular interest to network-oriented analysis is the notion of *preferential attachment*. What causes people to mobilize? What accounts for an outbreak of a riot? Granovetter (“Threshold Models”, 1420) suggests that all individuals have a threshold for joining a collective action and for associating with (attaching to) others.

For example, one might not choose to be part of a protest action until and unless three close friends join the effort. Another person might join the effort only after a *dozen* friends choose to join. When it seems that virtually everyone else is “going crazy” over the latest gadget or smart phone, another individual might not get caught up in the frenzy until five friends or co-workers begin talking about how great the device and experience with it is. Since everyone's threshold for involvement is different, it is impossible to predict, for example, how and when riots might erupt or when democratization movements might gain momentum.

When large numbers of people frequent a popular restaurant, visit a particular website, wear a certain brand of clothes, listen to a certain kind of music on a new music playing gadget, associate with "important" people, etc., these things (and people) become increasingly popular and tend to attract others. In essence, this reflects the "the rich get richer" (Barabasi 86) phenomenon – people attach themselves to popular things because they believe it is valuable to do so; the popular things become increasingly popular thereby attracting even more people.

In the context of conflict resolution for example, a large non-governmental organization (NGO) with a proven track record of delivering goods and services successfully will likely attract more donors than a smaller, less proven NGO. As it accumulates even more successes, the large NGO attracts even more donor support.

Interestingly however, this growth continues only while people believe they receive enough value from the relationship. When they no longer feel they receive enough value (however one defines that) from the relationship, the relationship ends. As

people, things, destinations, etc. become less popular over time (or even abruptly), an increasing number of people abandon the relationship -- restaurants go out of business, websites shutdown, brands of clothes go out of style, gadgets become obsolete, people fall out of favor, donors walk away from NGOs, major airports yield business to regional ones, movements fade, etc. After some threshold is crossed, there is no longer a large enough crowd to keep attracting a larger crowd.

There are, however, arguments that suggest that crowds do not always attract larger crowds but instead can discourage participation. For example, if you arrived at a restaurant that was so crowded that you would have to wait three hours for a table, given normal circumstances it would not be entirely rational for you or anyone else to wait.

Tipping Points

While network topology and ideas like preferential attachment are intrinsically important, there remains the question, "How do ideas, rumors, advertising, etc. actually spread through a network of people?" Malcolm Gladwell's The Tipping Point addresses this by suggesting that small, seemingly insignificant changes can often lead to hugely disproportionate changes. Why do some ideas spread "like wildfire" while others do not travel beyond just a small handful of people? Do ideas really traverse a network like viruses, "infecting" people along the way? The truth lies in the contact process -- how many people are newly "infected" with an idea, how many people were already infected with the idea and stand ready to reject or promote it, and how well are people able to differentiate between ideas.

No one knows definitively the rules by which ideas spread through a network or what causes a movement to succeed or how ideas jump from mind to mind. Why do some ideas stick and spread, while others quickly die? Despite the fact that these rules are not known (as one cannot predict the outbreak of a riot, the successful mobilization of tens of thousands of citizens in the street, etc.), there does exist a tipping point beyond which ideas (like viruses) will spread far, wide, and fast.

The key to a viral outbreak returns us once again to Granovetter (“The Strength”, 1973) and the importance of weak ties – those long distance connections also known as interconnections between different worlds -- the very foundation of small world theory. If one wants to spread ideas or practices that will “save the world” for example, one must leverage these long distance connections; otherwise, ideas will simply circulate among those who are already familiar with them. Conversely, if it is critical to *stop* the spread of an idea (or a disease or ideas that foment violence, etc.), one must somehow *sever* as many long distance links as possible to reduce the means of escape for those things. A mere handful of long distance links can tip the balance between a well-contained outbreak and one that accelerates into a pandemic.

While no one knows definitively how or why ideas travel, there exists a large literature on the subject of “memes” or actively contagious ideas. These self-propagating ideas, or *thought contagions* (Lynch 2), are believed to travel from mind to mind like viruses by programming themselves for retransmission. With roots in evolutionary biology, the idea of thought contagions is based upon the notion that an idea or belief can

influence its own popularity in the human population by somehow motivating its human hosts to engage in activity that spreads the idea.

Lynch examines beliefs that influence humans to have lots of children. By motivating humans to have lots of children, a belief increases its likelihood of survival and propagation by first being passed on to those children. He also suggests that beliefs spread through proselytizing. Creating converts increases the number of people who will likely reproduce and pass on these beliefs to their children.

Social Movements

A social movement is a network. The democratization movement in Pakistan is no exception. To better understand the development of this kind of network, one must first understand what determines whether or not a rational individual will participate in such a public-spirited collective action.

Chong suggests that one reason a rational individual might participate in a collective action is for the psychological benefits, namely “feelings of efficacy, self-esteem, righteousness, and competence that are part and parcel of playing an active role in the affairs of society” (Chong 233). He calls out the notion of historic importance as a key factor for these individuals. While the historical importance of many movements is perhaps obvious enough to know in advance, the historical importance of many movements can only be assigned in retrospect.

The psychological and social benefits of belonging to a social movement seemingly override a rational individual's tendency to "free ride" - to reap the benefits of the movement without actually contributing to its creation, development, or maintenance.

Rather than free ride, rational individuals involved in a public-spirited collective action tend to act in conformity to others because of conscience, morality, reputation, righteousness, etc. The importance of this conformance is that it makes individuals eager to participate and instills a sense of obligation for them to participate, resulting in group solidarity and the accumulation of social capital within the movement.

Social movements like the democratization movement in Pakistan require a significant amount of reassurance and nurturing in order to be successful. In an uphill battle like the fight for democracy in Pakistan, intermediate and even temporary gains can serve to encourage and motivate participants. Movements often face a circular problem – they must organize and mobilize in order to affect change but must first demonstrate their ability to affect change before they can organize and mobilize. Chong and others suggest that successful examples of movements and successful mobilizations from the past can provide just enough support to inspire the desired political activism.

The leadership of a movement must reframe the issues at hand in order to pull individuals out of complacency and must also communicate other successes to the community in order to encourage members to “keep up the good fight”. These publicized successes serve to facilitate the contagiousness of the movement. It is the leaders' responsibility to seek out the quick victories and the “low hanging fruit” in order to bolster the perception of group success and to encourage continued activism and evangelism.

In order for a successful movement to continue, it must develop a new generation of goals to sustain it and must continue to win concessions (real or symbolic) if it is to move forward. After all, no one wants to support a lost cause.

Implications for Conflict, Conflict Analysis, and Conflict Resolution

Conflict researchers and practitioners should learn about and pay close attention to network theory and its application to conflict and conflict resolution scenarios. At the very least, this understanding can help to explain what, why, and how something happens to escalate or sustain a conflict situation, de-escalate or reduce violence, or mobilize citizens to take action -- as in the case of the democratization movement in Pakistan. Better yet, this understanding can help to inform decisions that can alter the course of a conflict intervention and perhaps the ultimate outcome of a conflict resolution intervention.

Social network analysis can help researchers and practitioners better understand conflict situations by identifying key players and groups involved in a conflict and non-obvious relationships between them. Studying networks can reveal dangerous weaknesses that might threaten the flow of information, goods, and services between certain key individuals and groups. Action might be taken based on these findings to protect certain key individuals, introduce leaders to other leaders to form alliances, and other such relationship-building activities.

For example, a network-oriented analysis of a conflict situation might help a conflict intervener to identify and carefully select key representatives from all parties in conflict to participate in a problem-solving workshop to analyze the sources of the

conflict and discuss mutually beneficial ways forward. Such an analysis could give the intervener more visibility into the relationships or potential relationships within the network and also identify key influencers and points of weakness in the network to help inform the selection process.

Ahead of such conflict resolution efforts, conflict researchers and interveners might also be interested in finding ways to disrupt conflict-sustaining activities. Network-oriented analysis beyond just an examination of topology can be used to reveal the reach and influence of individuals and groups who might be working against conflict resolution efforts and bring to light other individuals and groups in the network who could rise up to contain or weaken those individuals and groups.

In his address at Rice University on the Nation's Space Effort, John F. Kennedy addressed the double-edged sword of technology:

“We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people. For space science, like nuclear science and all technology, has no conscience of its own. Whether it will become a force for good or ill depends on man ...”

In order to understand whether a network is one that sustains or exacerbates conflict versus one that supports conflict resolution efforts, conflict researchers must first understand the nature of *participation* within the network. Knowing the nature of

participation within the network is key to determining the degree to which the network is inclusive (open membership, fuzzy boundaries) or exclusive (closed membership, sharp boundaries). Only after that is determined can conflict researchers better understand the governance of the network – the decision-making processes and culture within the network (Nan 122). Without this knowledge of network governance, conflict interveners are likely to make tactical and strategic errors in their conflict resolution efforts.

CHAPTER 3 – Overview of Approach

The research supporting this thesis study involved the open-ended investigation of a data set using interactive data visualization software and the well-known social network analysis metrics described earlier, where possible. Interactive data visualization facilitates deep exploration of data, allowing a researcher to freely explore the subject data using different data visualizations such as tables, charts, relationship diagrams, timelines, and geospatial mapping.

The data to be analyzed for this study were derived from publicly available news articles. News articles that mention Benazir Bhutto are plentiful so it is not difficult to obtain more data for analysis at any time. That is a key strength of the approach for this study; there is no shortage of source data and the size of the data set to be analyzed can be increased or decreased very easily. The volume and velocity of new news continues to increase at an almost overwhelming pace, providing studies such as this with an endless supply of data.

There are also considerable weaknesses in this approach, however. In an ideal world, every news article written about the former Prime Minister would be written in a factual, unbiased way with all the proper identification and framing of relationships. Moreover, technology would be sufficiently advanced enough to parse and understand the nature of the relationships described or implied in each news article. The world is

less than ideal; news reporting is very uneven in both substance and truthfulness, and available technology falls short, unable to accurately disambiguate unstructured news content with high precision.

Given these limitations, it is challenging but not impossible to approximate relationships between individuals simply based upon the fact that they are mentioned together in news articles. In this study, names extracted from targeted news articles represent the nodes of a derived social network around the former Prime Minister.

While there is no obvious way to determine if someone mentioned with Benazir Bhutto in a selected news article is a true supporter of the democratization movement in Pakistan, absent any definitive information to the contrary, it is assumed that they are. The goal of the thesis study was to discover non-obvious relationships in the social network drawn from these news articles in hopes that the network-oriented analysis might elicit some insights about the democratization movement in Pakistan before and after the assassination.

The goal was achieved and key findings provided valuable information regarding other influential players in the democratization movement in Pakistan, the social distances between them, vulnerabilities in the movement, and emerging players, etc. Combined with the calculation of the social network analysis metrics when possible, the data visualizations uncovered valuable insights about the network supporting the democratization movement much more quickly than traditional methods of analysis.

Interactive data visualization and the social network analysis metrics described above brought forth observations and measurements to help answer in part some of the

following questions. What effect did the assassination of Benazir Bhutto have on the prospects for democracy, stability, and prosperity in Pakistan? Are there other individuals who can step in to fill the void? Is the network supporting the democratization movement resilient enough to recover, grow, and strengthen despite not having her to play a continuing role? What will happen to the democratization movement in Pakistan going forward? Where is the movement particularly vulnerable?

The approach for the study included the following steps, which are described in detail in subsequent chapters.

- Identify, acquire, and condition data from publicly available news sources
- Extract entities from data using named entity recognition software
- Filter extraction results based upon relevance metrics
- Explore entity relationships using data visualization software
- Reach conclusions

CHAPTER 4 – Data Acquisition and Conditioning Methodology

The data set used for this study was derived from publicly available news articles using a multi-step process to identify the news sources, acquire the Web-based news articles, isolate and condition the unstructured text from the news articles, and extract named entities from the text. Modern software tools do a good but not perfect job of transforming unstructured data such as this into structured data more suitable for analysis. As these tools improve, the quality of new data sets may help to reveal additional insights about a subject or reinforce existing ones.

Identify News Sources

Given the capabilities of modern Internet search facilities and the availability of massive amounts of publicly available data from diverse news sources, access to data germane to this study and follow-on studies was and continues to be readily available. The data to be analyzed could have been obtained in many different ways. One approach would have been to search the online archives of a single news organization to locate Web-based news articles related in some way to Benazir Bhutto. Every major news source has an online Web presence to facilitate such an approach. While such an approach was proven to be technically feasible, the result was a data set comprised of news articles written and influenced by a *single* news organization. To obtain a more

diversified data set, a better approach would be to repeat the search using multiple news organizations and then combine the results.

After considering this approach, the decision was made instead to use Google News to locate and obtain as varied of a sample as possible. Google News implements essentially the approach described above, aggregating headlines from literally *thousands* of English-language news sources worldwide. In addition to aggregating current headlines, Google News offers an archival news search facility enabling researchers to search for news articles dating back nearly three decades. For this thesis study, the data to be analyzed was obtained from a collection of news articles published between 1989 and 2009. Some of the articles were not originally published online but were made available later as the widespread use of Internet technologies became more commonplace and the demand for archival news increased.

A simple search for “Benazir Bhutto” using Google News archive search produces well over 100,000 results on any given day. A proprietary Google News algorithm groups related news articles together and highlights the seemingly most relevant news articles. While Google News aggregates from thousands of well-known news sources such as the Associated Press, Reuters, New York Times, Voice of America, and Al-Jazeera, there is no way to guarantee the quality or accuracy of all the available target news sources and by no means can a news search such as this guarantee that a result set is complete or balanced in any way. Moreover, Google News search results are a product of proprietary search algorithms over which there is no external control or visibility.

The typical way to use the Google News search is for a user to manually enter a keyword or phrase into a search field using a Web browser such as Firefox or Internet Explorer. The result of a successful search is a Web page comprising a collection of more or less relevant links that can be clicked by the user to navigate to the news articles the links reference. This is much the same way in which the popular Google search is used. The process works well when researching a handful of news articles but does not scale well when there are hundreds, thousands, or even tens of thousands of news articles to analyze.

For this study, Google News search was driven programmatically (not manually) and was limited to searching for news articles published between 1989 and 2009 that mention “Benazir Bhutto”. To constrain the size of the data set further, only the news articles given prominence in the Google News search results were used as the basis for the data set to be analyzed. Figure 2 below is an example of a search result entry with three news articles given prominence and 67 related articles accessible via a secondary link.



Figure 2: Example Google News Search Result Entry

Acquire News Articles

Once Google News was selected as the primary news source, the next step in the data acquisition process was to use the Web links returned in the Google News search results to retrieve the actual news articles for additional processing. The identified news articles were downloaded programmatically, stored temporarily and then conditioned for entity extraction by isolating the news content as much as possible. Entity extraction in the context of this study is the term used to describe the process of examining the textual content of each news article to identify and extract names, organizations, places, events, etc.

To improve the quality of entity extraction, each news article was pre-processed to remove as much as possible everything except the textual content of the news article itself. For example, formatting information used to render a news article as a Web page was removed in order to provide the entity extraction software with the simplest text possible from which to extract meaningful information for analysis.

Extract Entities From News Articles

After the news articles were cleansed of extraneous information, they were submitted to an entity extraction software system where the content was analyzed and deconstructed into named entities. This process produced structured data from the unstructured news articles, which are more easily analyzed by available software tools. The entity extraction software captured from each of the news articles information such as:

- People's names
- Organizations
- Places
- Positions/Roles
- Dates
- Events

Because the text of the news articles is unstructured, this is perhaps the most challenging aspect of the research approach. For example, handling alternate spellings for proper names is an obvious issue, as are date formats. There are several reasonably good entity extraction software packages and systems available to handle data disambiguation, some of which are freely available.

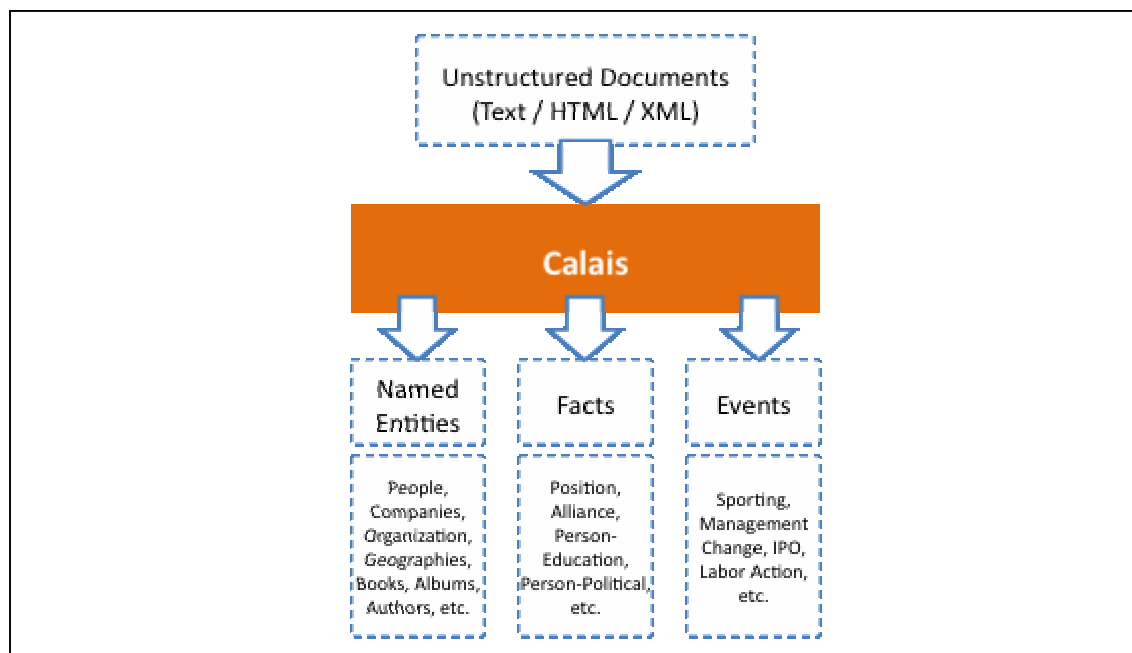


Figure 3: Calais Entity Extraction Process

For this thesis study, the freely available OpenCalais Web service was used to extract information from the identified and retrieved news articles. The text of each news article was sent to the OpenCalais Web service using a published and documented Web-based application programming interface (API). The Web service examined the text of each submitted news article and returned for each a structured document identifying the discovered entities. While not perfect, the extraction results provided enough accuracy and richness from which quality input data, complete with relationship support, could be derived for analysis. The Appendix provides an example of entity extraction results.

Size and Quality of Data Set

The multi-step data acquisition and conditioning process described above provides several opportunities for altering both the size and the quality of the data set used in future studies. It is, however, beyond the scope of this study to determine whether changes to size and quality (independently or together) will produce data sets that reveal different insights or not. For example, a larger data set may reveal relationships not discovered in a smaller data set, but there is no guarantee of that; the larger data set may simply reinforce previous findings of studies based upon the smaller data set.

As explained previously, to constrain the size of the data set, only the news articles given prominence in the Google News search results were used as the basis for the data set to be analyzed. While over 75,000 results were returned for the time period search, fewer than a thousand (936) news articles were given prominence in the search results. The search approach described does not prescribe any particular method for

controlling the distribution of news articles within the time period selected. Examining the resulting data set to be analyzed revealed that the 936 news articles were published on 310 distinct dates between 1989 and 2009, with about twenty-five percent published between 2005 and 2009. For future studies, it would be relatively simple to alter the data collection approach to adjust or at least give consideration to the distribution of news articles within the time period selected.

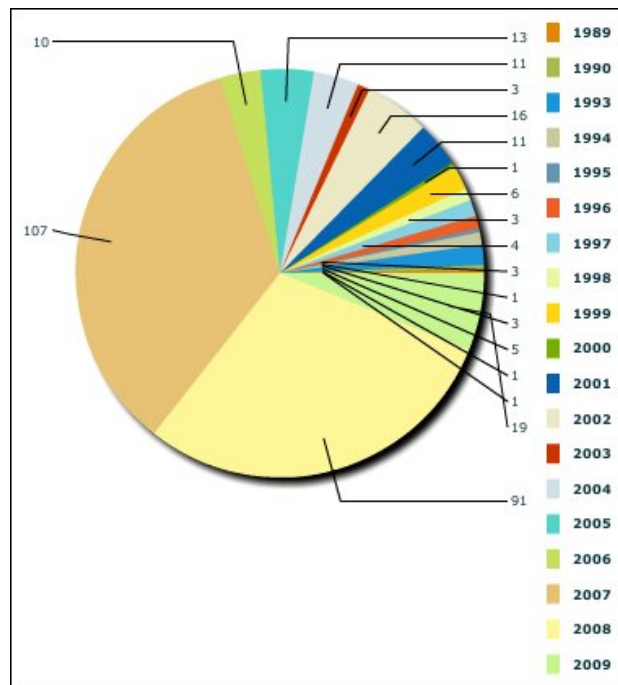


Figure 4: Distribution of News Articles By Year

To increase the size of the data set to be analyzed at any given time, researchers need only to consume more of the Web links returned by Google News search. For example, a simple search for “Benazir Bhutto” using Google News archive search produces well over 100,000 results on any given day, so it would be quite simple to

increase the size of the data set to be analyzed. The same steps described above would be used to acquire and condition the data in preparation for extracting the named entities from the news articles.

Since most entity extraction software packages can operate using plain text as input, researchers can experiment with other entity extraction packages to improve the quality of the entities extracted from the selected news articles. One of the biggest challenges for entity extraction software packages is to discern meaningful information from “noise”. To borrow a term from electrical engineering, it is desirable to have a high signal-to-noise ratio in the data – the ratio of signal power (meaningful information) to noise (unimportant information) that corrupts the signal.

For example, if the body of an online news article were not adequately stripped of extraneous information necessary to render it for consumption on the Web prior to being submitted for entity extraction, the returned result may contain some unimportant or totally irrelevant information. To be more specific, Web-based news articles typically contain links to other documents that may or may not be related to the selected news article itself. That link information is likely to contain names of people, places, events, etc. and if not disassociated from the selected news article prior to entity extraction, those irrelevant items might be captured and end up in the data set to be analyzed. Fortunately, many entity extraction software packages, including the one used in this study, calculate a relevance metric to help researchers discern such noise.

As already mentioned, another challenge for entity extraction and data cleansing software packages is the disambiguation of proper names. Alternate spellings of proper

names is commonplace particularly for Arabic and Asian names. In the data set for this study, for example, it was common to see Benazir Bhutto's father's name spelled *Zulfiqar* Ali Bhutto as well as *Zulfikar* Ali Bhutto. Moreover, sometimes Ali was omitted, making correct identification and association even more challenging. There were also cases in which the full proper name of a person was not used in favor of a name by which they are most commonly known.

When attempting to do this kind of network analysis, it is also important to determine whether or not an extracted name represents a person who is deceased. While an identified relationship with any person is likely to be important and meaningful, in at least the context of conflict intervention, the fact that a person of interest is deceased is obviously important.

CHAPTER 5 – Data Exploration

A challenge for researchers and analysts in virtually any field of study is to make sense of large volumes of data. With advancements in modern technology, the volume and velocity of data continues to increase while the ability to analyze that data lags behind. Modern technology must also be a part of the solution for enriching analysis capabilities; analyzing data using traditional means is woefully inadequate.

An alternative way to analyze large volumes of data is to visualize the data using sophisticated software. Visualizing data can reveal items of interest in the data that might otherwise be overlooked using traditional means of analysis. For example, the same data may reveal something different when examined using a chart instead of a relationship diagram or a typical spreadsheet. As the saying goes, a picture is worth a thousand words and the analyst's eyes are drawn to anomalies, shapes, relationships, etc. that often only surface when data is visualized a certain way.

There are a few software packages available to visualize large volumes of complex data. One such package from Centrifuge Systems, Inc.¹ provides several built-in and integrated visualizations to facilitate the deep exploration of data. This software package empowers analysts by providing them with *interactive* visualization capabilities to uncover hidden insights in data that represent threats and opportunities critical to understanding conflict situations, movements, campaigns, etc. This is a commercial

¹ The author is Vice President of Engineering at Centrifuge Systems, Inc.

software package but there are non-commercial software packages available that provide more or less similar functionality.

This thesis study was not a tutorial on how to analyze data. There are countless methodologies for analyzing data, some of which are very well-documented while others are the concerns of intelligence-gathering organizations not interested in sharing their techniques and processes for data exploration with the broader research community. Organizations often protect their analysis methodologies in order to safeguard competitive advantages or for reasons of national security.

Key Findings

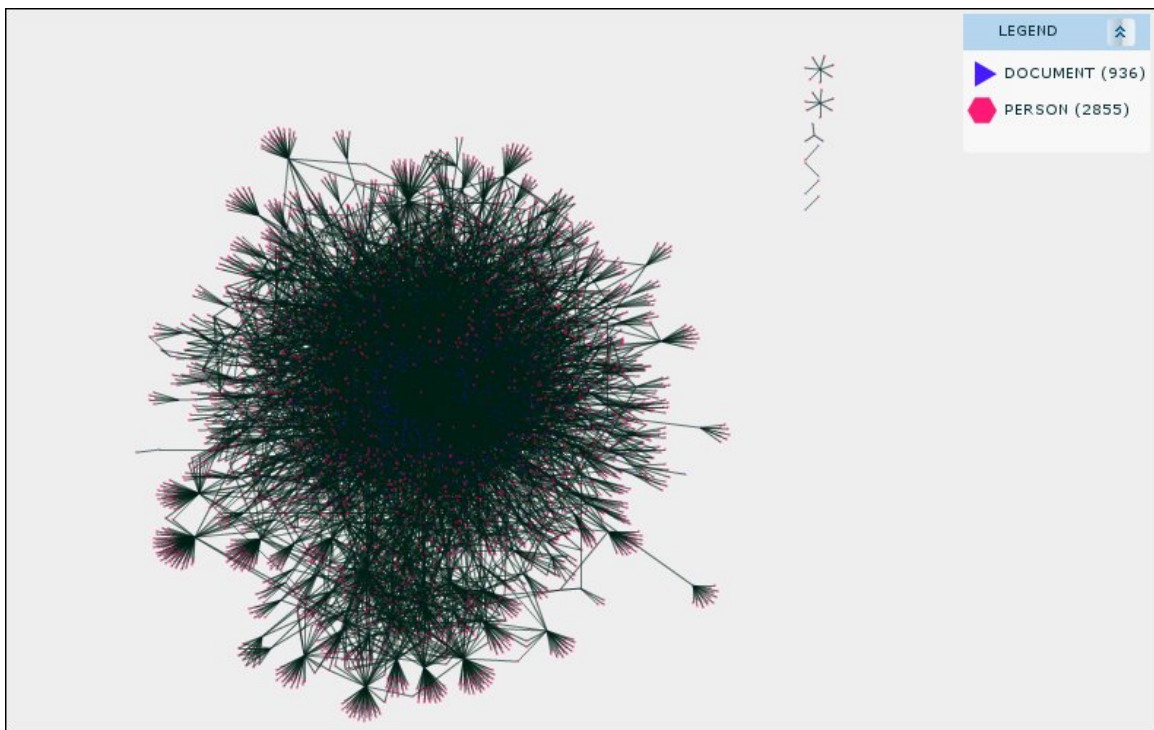


Figure 5: Relationship Diagram of All People and News Articles in Data Set

At the highest level with all nodes and links visible, it is extremely difficult to discern any meaningful patterns in the relationship diagram, which represents all the connections between people mentioned in the selected news articles. Entity extraction initially discovered over *three thousand* people in the 936 news articles referenced in the data set. Because of limitations in the entity extraction software to handle alternate spellings for proper names, the number of people discovered is somewhat inflated. Adjusting the data to account for some common alternate spellings resulted in a 10 percent reduction in the number of names.

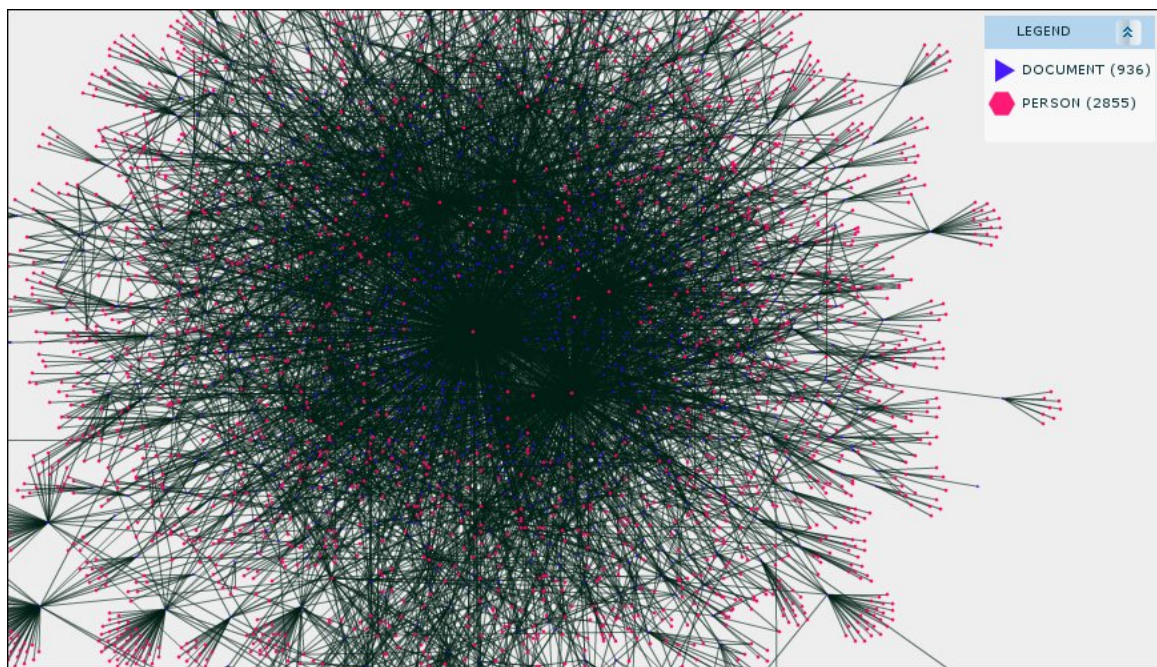






















Figure 6: Relationship Diagram of All People and News Articles in Data Set Magnified

Degree centrality – the number of direct connections a given node in a network has – can usually be observed in relationship diagrams such as this. In this particular diagram, patterns reveal how people are related to one another by way of a particular

news article. These patterns typically draw the analyst's attention to nodes that appear to have large numbers of connections within the network and are related in some way to another node, in this case a node representing Benazir Bhutto. This narrowing of focus helps the analyst identify candidates for further analysis in order to determine the nature and depth of their relationships with Benazir Bhutto. In the relationship diagram in Figure 5 however, there are simply too many densely clustered nodes to identify any nodes besides the one representing Benazir Bhutto in the center.

A different view of the data reveals what is not immediately discernable in the initial relationship diagrams, but also reveals some "noise" in the data. The data set contains names that might not otherwise have been discovered during entity extraction if the source news articles had been thoroughly screened and cleaned of extraneous information. For example, a few names from American pop culture were discovered only because they were mentioned in content unrelated to the selected article mentioning Benazir Bhutto. This unrelated content was not detected and stripped away in the data cleaning process.

Table 1: Names Appearing Most Frequently in Data Set

	Benazir Bhutto	1039
	Pervez Musharraf	462
	Nawaz Sharif	285
	Asif Ali Zardari	268
	Zulfiqar Ali Bhutto	214
	Bilawal Bhutto-Zardari	76
	Mohammed Zia ul-Haq	60
	Syed Yousaf Raza Gilani	58
	Osama bin Laden	48
	Makhdoom Ameen Faheem	44
	Sherry Rehman	40
	Bush	39
	Baitullah Mehsud	37
	Murtaza Bhutto	37
	Barack Obama	34
	Donald Soffritti	34
	Farooq Ahmed Leghari	33
	Lucy Cavendish	33
	Nusrat Bhutto	33
	Ghulam Ishaq Khan	31

Because context determination is very difficult to achieve with natural language processing software, several names were discovered only because they happened to appear alongside Benazir Bhutto's name in a selected news article and are actually less relevant to the analyst. For example, Senator Benjamin Cardin of Maryland was identified from a particular news article in the data set because of a statement he made about Benazir Bhutto's assassination and not because he has or had in the past any direct or indirect ties to the democratization movement in Pakistan.

There are also many other names and relationships that one would naturally expect to appear in a network analysis of relationships. For example, one would expect to see familial ties in any such analysis. These relationships are deemed to be obvious and already known and as such do not *always* reveal anything of particular interest to the analyst. One argument for excluding family members from analysis is that they are likely

to be connected to the same people. Another argument for excluding family linkages from a network analysis is so that the analysis can examine the strength and stability of a network beyond those family ties. Such an analysis can help to reveal key players well outside a family's inner circle of trust who hold influential places in the network.

That being said, not all families, movements, and conflict contexts are equal. For example, the Bhutto family is unusual because of its past and present involvement in the political landscape of Pakistan. Given this deep involvement in Pakistani politics and intra-family dynamics, an analysis inclusive of family members in this case could be important and meaningful. Such an analysis is beyond the scope of this thesis study.

As expected, Benazir Bhutto's family members were mentioned many times throughout the data set.

Table 2: *Familial Ties*

Family Member	Number of Mentions
Zulfikar Ali Bhutto (Father)	178
Nusrat Bhutto (Mother)	36
Shahnawaz Bhutto (Brother)	20
Mir Ghulam Murtaza Bhutto (Brother)	53
Sanam Bhutto (Sister)	13
Asif Ali Zardari (Spouse) (Current President of Pakistan)	314
Bilawal Bhutto Zardari (Son)	80
Bakhtawar Bhutto Zardari (Daughter)	14
Asifa Bhutto Zardari (Daughter)	5

Not surprisingly, the data set also contained the names of several world leaders. This information is also obvious, well-known, and not particularly revealing. One would expect that a former Prime Minister of Pakistan might often be mentioned together with the names of many world leaders.

Beyond the expected familial ties and associations with various world leaders, the data set starts to reveal people closer to the democratization movement in Pakistan as well as political insiders and outsiders involved with the government of Pakistan. The first few dozen people who appear to have high degree centrality and relevance in the data set were divided into two categories in an attempt to reduce complexity; there were people who seemed to be (or have been) *detractors* of Benazir Bhutto and those who

seemed to be *supporters*. That delineation was made based upon light research on those oft-mentioned individuals, which revealed their obvious leanings. No effort was made to locate and identify people who seem to be neutral.

As a conflict researcher, analyst, or intervener, understanding the membership of these loose categories can be critical to identifying candidates for additional analysis, to determine strengths and weaknesses in movements, and to forge new strategies and tactics for conflict intervention.

Interestingly, about half of the individuals categorized as detractors of the former Prime Minister were mentioned in a historical context, as they were deceased at the time the containing articles were published. In some cases, they are deceased now but were alive when the containing article was published. Although they are deceased, the identified detractors undoubtedly had important relationships with and influenced many individuals who continue to play important roles in the political landscape of Pakistan. Isolating these individuals for additional study may uncover hidden information that may explain the shape and strength of the remaining network relationships disrupted by the assassination of Benazir Bhutto.

Detractors

Name	Position/Relationship	Status
Muhammed Zia ul-Haq	President of Pakistan 1977-1988, overthrew Zulfikar Ali Bhutto	Deceased
Pervez Musharraf	President of Pakistan 2000-2008	Living
Baitullah Mehsud	Taliban militant, behind numerous attacks in Pakistan including Bhutto assassination	Deceased
Ghulam Ishaq Khan	President of Pakistan 1988-1993, dismissed Benazir Bhutto's government	Deceased
Farooq Leghari	President of Pakistan 1993-1997, dismissed Benazir Bhutto's government	Living
Imran Khan	Political adversary, alleged to have had an affair with Benazir Bhutto	Living

Figure 7: Detractors

One of the purposes for this study was to see if the network analysis could identify individuals who might be candidates for additional analysis in order to determine their role, position, and influence within the democratization movement in Pakistan. Identifying candidates for additional analysis can aid the conflict researcher, analyst, and intervener by drawing attention to a few key individuals out of hundreds or thousands of people somehow involved in the movement.

To facilitate this, familial ties, world leaders, and obvious detractors were filtered out of the original data set to reduce complexity in the network and to focus on only the supporters (or at least not detractors) of the former Prime Minister. Family members were excluded from this particular study to see if the analysis could help to reveal key players well outside the Bhutto family's inner circle of trust who might hold influential places in the network.

Filtering out familial ties, world leaders, and obvious detractors actually did not reduce the complexity of the network enough to improve the ability to discern any meaningful patterns in the relationship diagram at the highest level, but a magnification of it begins to reveal more.

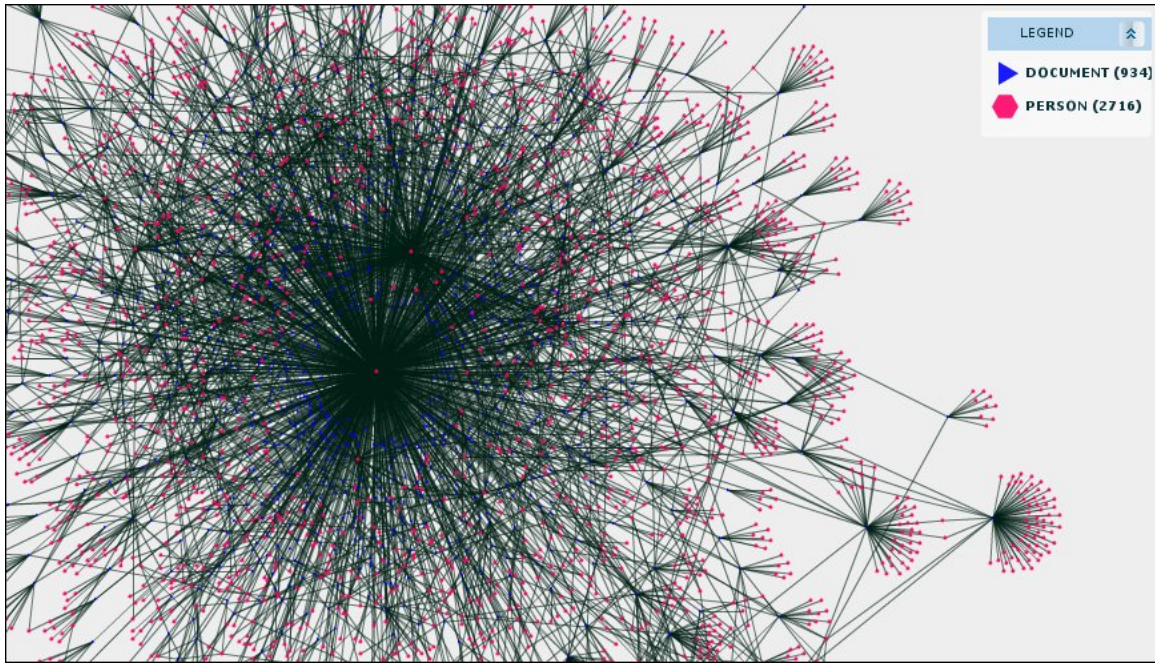

















Figure 8: Relationship Diagram with Family, World Leaders, and Detractors Removed

Again, a different view of the reduced data set reveals what is not immediately discernable in even the new relationship diagram.

Table 3: Names Appearing Most Frequently in Reduced Data Set

	Benazir Bhutto	1039
	Nawaz Sharif	285
	Syed Yousaf Raza Gilani	58
	Makhdoom Ameen Faheem	44
	Sherry Rehman	40
	Iftikhar Muhammad Chaudhry	33
	Farhatullah Babar	28
	Javed Iqbal Cheema	22
	Rehman Malik	21
	David Miliband	20
	Javed Rahman	20
	Shaukat Aziz	20
	Babar Awan	16
	Indira Gandhi	15
	Fatima Bhutto	14

Supporters of the former Prime Minister in the data set were plentiful and diverse, bringing to light several individuals who might make key contributions to the stability and growth of the post-assassination democratization movement in Pakistan. The figure below highlights some key individuals considered to be advocates of Bhutto at the time of her assassination. Not surprisingly, some of the political figures in the list might at one time or another have appeared in the list of *detractors*. It is certainly not uncommon in political circles to switch allegiances over time.

An individual such as Nawaz Sharif whose allegiance has been somewhat inconsistent over the years was categorized according to his public allegiance at the time of the assassination. If he were squarely in the detractor camp at the time of the assassination, he would have been excluded from the analysis along with the other individuals loosely categorized as detractors. Because of the inconsistency and uncertainty of his long-term support, he was not deemed a candidate for further analysis.

Supporters

Name	Position/Relationship	Status
Nawaz Sharif	Prime Minister of Pakistan 1990-1993, 1997-1999, vowed to avenge Benazir Bhutto's death	Living
Sherry Rehman	Pakistani politician and journalist, referred to as "Democracy's Hero" by International Republican Institute	Living
Makhdoom Muhammed Ameen Faheem	Pakistani politician and member of the Pakistan Peoples Party (PPP)	Living
Farhatullah Babar	Pakistani politician and Parliamentarian, member of PPP	Living
Rehman Malik	Pakistani politician and government official, member of PPP, chief security officer of Benazir Bhutto	Living
David Miliband	British Labour politician and Member of Parliament	Living
Shaukat Aziz	Prime Minister of Pakistan 2004-2007	Living
Zaheer-ud-din Babar Awan	Pakistani politician, member of PPP, former speechwriter for Benazir Bhutto	Living
Javed Iqbal Cheema	Former Interior Ministry spokesman	Living
Naheed Khan	Former political secretary for Benazir Bhutto	Living
Makhdoom Syed Yousaf Raza Gilani	Current Prime Minister of Pakistan, Vice Chairman of PPP	Living
Hasan Askari Rizvi	Academic	Living
Iftikhar Muhammed Chaudhry	Current Chief Justice of Pakistan	Living

Figure 9: Supporters

The initial analysis brought to light several individuals who might play key roles in the post-assassination democratization movement in Pakistan. Light research confirmed that the network analysis was right on the mark with these individuals. That being said, there could be other individuals equally or even more connected and influential in the new network that were not included in the sample data set due to the limitations of the data acquisition and conditioning methodology described in Chapter 4.

Candidates For Further Analysis

The data visualization highlighted several individuals who should be among the first to be considered for further study in order to determine their roles and span of influence in the post-assassination democratization movement in Pakistan. Each is listed below along with brief background information.

Shehrbano “Sherry” Rehman. A former Federal Minister of Information and Broadcasting in Pakistan, Rehman is a noted journalist and a member of the Pakistan Peoples Party (PPP), which was led by Benazir Bhutto until her assassination. The International Republican Institute (IRI), an American organization whose mission is to help countries build infrastructures for democracy, recognized her in 2009 as “Democracy’s Hero” in part because of her close association with former Prime Minister Bhutto’s push for democratic rule in Pakistan. Interestingly, Senator John McCain chairs the IRI.

Makhdoom Muhammed Ameen Faheem. Faheem is chairman of the Pakistan Peoples Party Parliamentarians in the National Assembly of Pakistan and parliamentary leader of his party. Once considered as a possible candidate for chairman of the Pakistan Peoples Party after Benazir Bhutto's assassination, Faheem was also considered a candidate for Prime Minister of Pakistan. He served as Federal Minister during Benazir Bhutto's administration and currently serves as Commerce Minister of Pakistan.

Makhdoom Syed Yousaf Raza Gilani. Gilani is the vice chairman of the Pakistan Peoples Party and the current Prime Minister of Pakistan. He served in both Benazir Bhutto administrations, first as Minister of Tourism and then as Speaker of the National Assembly and is widely recognized as a Bhutto loyalist.

Farhatullah Babar. Babar is the current spokesperson for President Asif Ali Zardari of Pakistan, a member of the Pakistan Peoples Party, and a former senator. He was an outspoken critic of former President General Pervez Musharraf's administration.

Zaheer-ud-din Babar Awan. Babar Awan is Pakistan's current Federal Minister for Parliamentary Affairs, a practicing lawyer, and a member of the Pakistan Peoples Party Central Executive Committee. He served as Benazir Bhutto's speechwriter and chief negotiator while she was in exile in Dubai. He is an Islamic scholar and enjoys a wide and diverse base of support within Pakistan.

Hasan Askari Rizvi. Dr. Rizvi is one of the leading political science scholars in Pakistan, a visiting professor at The Johns Hopkins University's Paul H. Nitze School of Advanced International Studies (SAIS), a prolific author, and recognized expert in Pakistani security.

Iftikhar Muhammed Chaudhry. Chaudhry became Chief Justice of Pakistan's Supreme Court in 2005 but was removed in 2007 by then President Pervez Musharraf for questionable reasons. Considered by many to be the symbol of justice, rule of law, and democracy in Pakistan, Chaudhry was restored to the position of Chief Justice of Pakistan in March 2009.

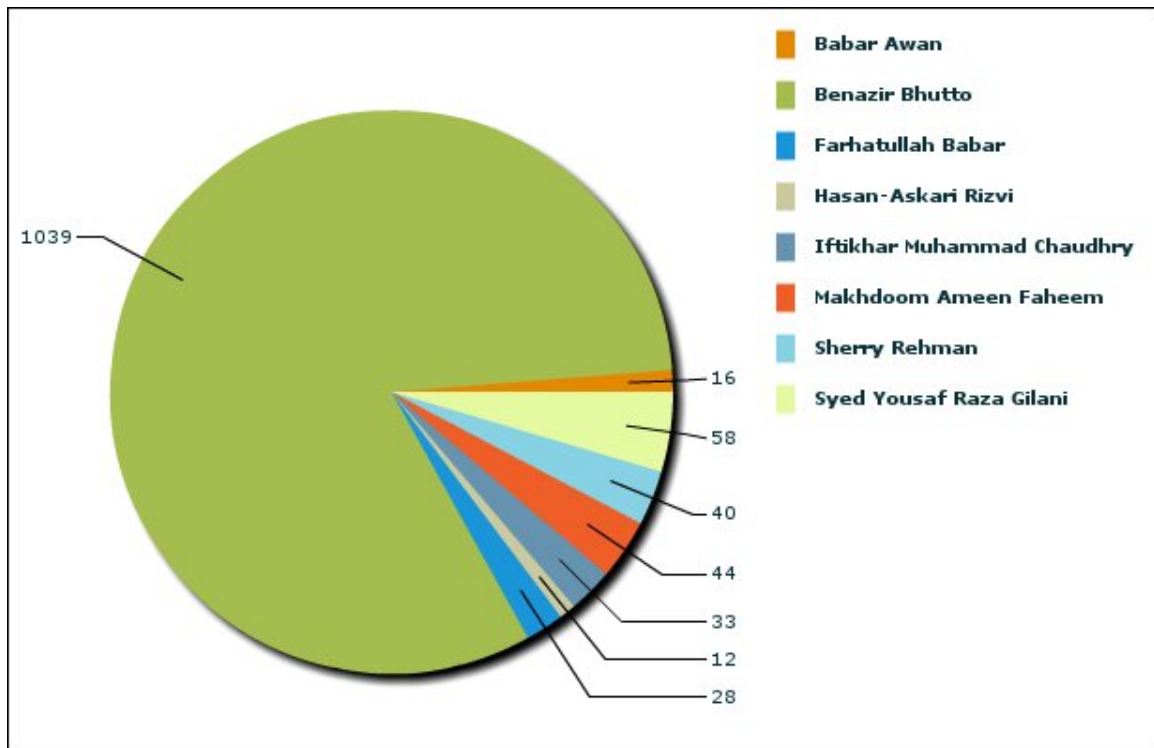


Figure 10: Distribution of News Articles References for Key Players

Focusing the network analysis on this shortened list allowed for easier exploration of the data and less complex data visualization. Among the first questions to answer is whether or not these individuals are connected to each other in some way besides through Benazir Bhutto. Examining the relationship diagram below shows that they are moderately connected. The evidence of this is the small collection of lines connecting them to each other around the perimeter of the diagram.

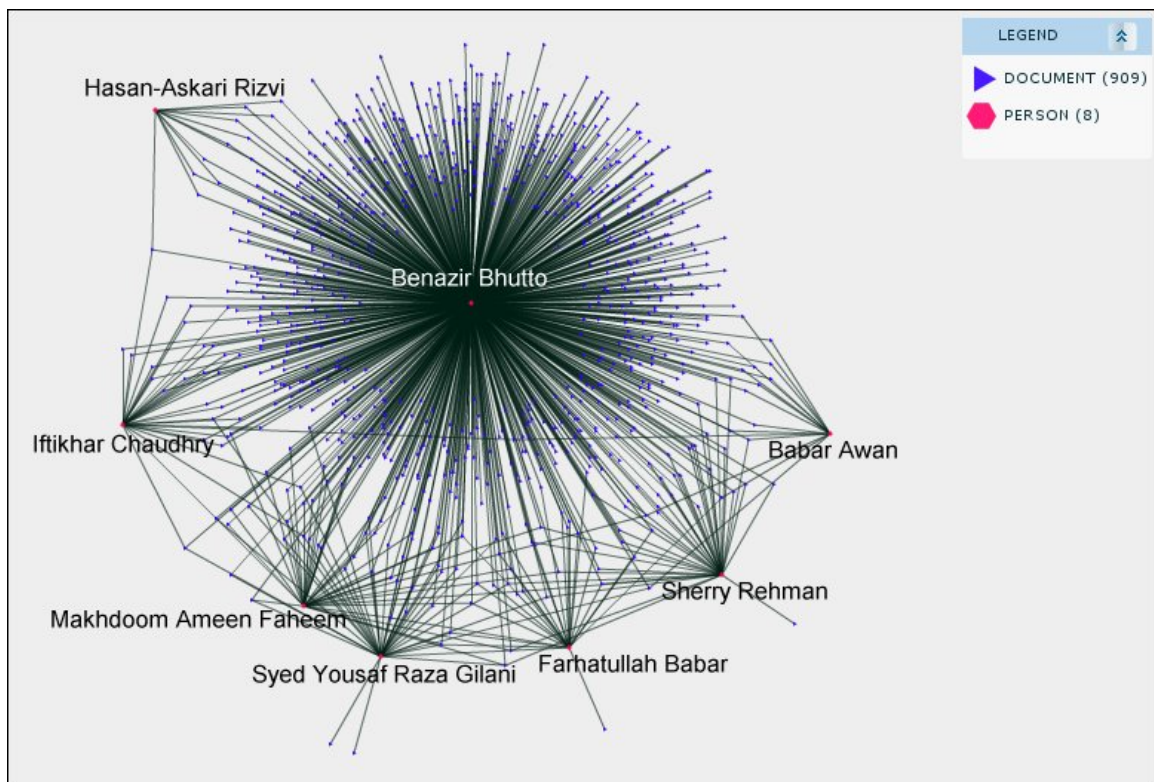


Figure 11: Relationship Diagram of Benazir Bhutto and Potential Key Players

Removing Bhutto from the relationship diagram reveals those connections in a more obvious way. After removing Bhutto from the analysis data, the visualization software must recalculate the surviving relationships and re-render the relationship

diagram. The new relationship diagram brings clarity about the surviving relationships. One can see from the new relationship diagram the surviving connections between these potential key players. It appears that all but one of the potential key players (Hasan-Askari Rizvi) is connected to at least one other.

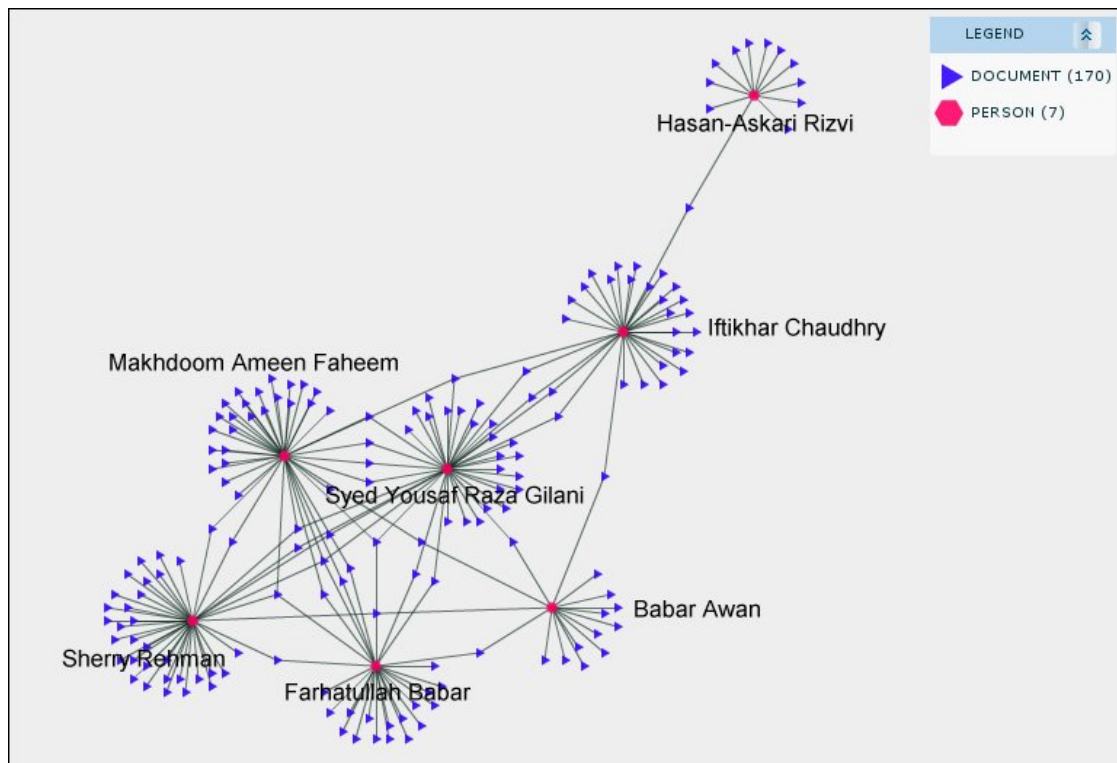


Figure 12: Relationship Diagram of Potential Key Players, Post-Assassination

It is sometimes helpful to render the underlying relationships in different ways to make the nature of the connections even more obvious. Here are two alternate layouts.

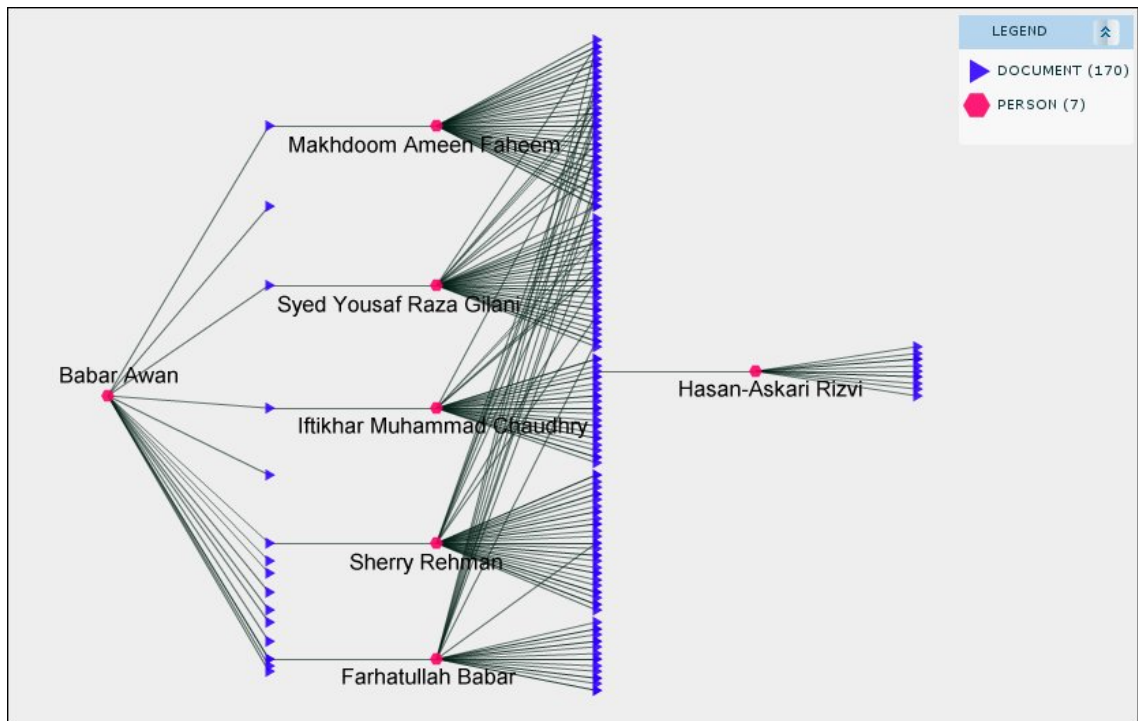


Figure 13: Relationship Diagram of Potential Key Players, Post-Assassination (Linear)

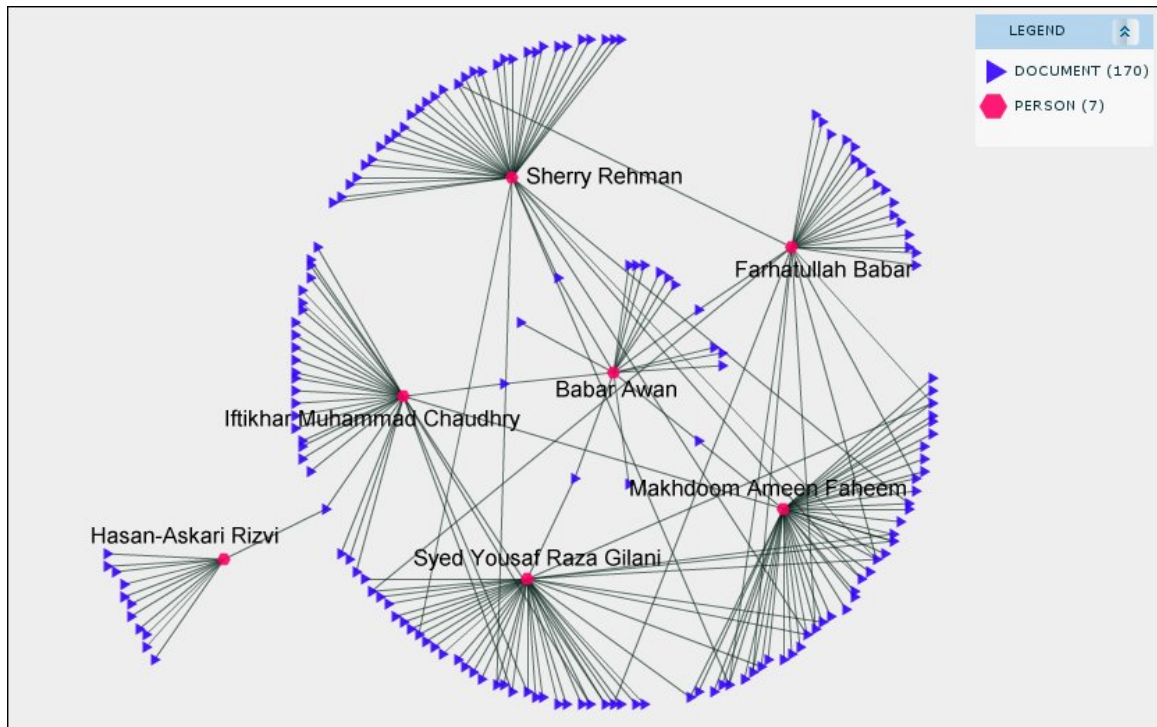


Figure 14: Relationship Diagram of Potential Key Players, Post-Assassination (Radial)

There is a single underlying graph structure that supports these three different data visualizations. Changing the layout of the relationship diagrams is done simply to view the underlying relationship structure in different ways. A skilled analyst will be drawn to different aspects of the visualized relationships based upon the different layouts. The three different relationship diagram layouts show in decidedly different ways, the surviving connections between these potential key players.

For example, it is not immediately obvious from the first of the three relationship diagrams who is most central to this group of potential key players. By changing the layout of the relationship diagram, that information becomes more obvious. Both the linear hierarchy and radial layout diagrams reveal in an obvious way that **Zaheer-ud-din Babar Awan** is the common link between all the potential key players. It is clear from this that finding out more about Babar Awan would be meaningful to begin to discover more about the true nature of all these relationships. That being said, all the potential key players are candidates for additional analysis.

While these diagrams reveal the effects of Benazir Bhutto's assassination on the small network of potential key members of the surviving democratization movement in Pakistan, what effect did her assassination have on the shape of the remaining network of supporters? Is the movement in danger of imminent collapse? While that type of conclusion cannot be reached based solely on network shape, it is useful to know the shape of the network after her assassination.

Using the original data set with familial ties, world leaders, and known detractors filtered out, removing Benazir Bhutto from the network results in a relationship diagram

that reveals a network that is much less dense. While a substantial number of individuals and small groups became detached from the network when the former Prime Minister was assassinated (see the nodes and links on the right no longer connected to the network on the left), visually at this magnification, based solely on the apparent topology of the network, the surviving network shows no signs of imminent collapse or weakness.

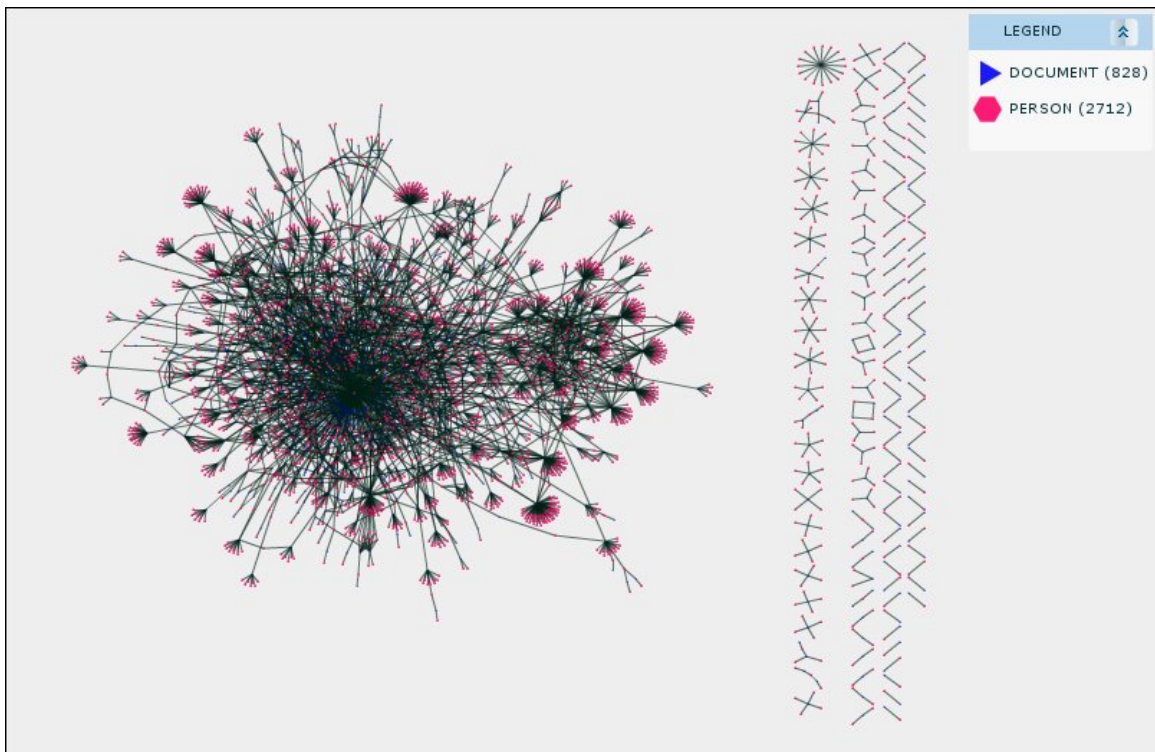


Figure 15: Relationship Diagram of Supporter Network, Post-Assassination (Familial Ties, World Leaders, and Detractors Removed)

A relationship diagram depicting many, many detached individuals and groups would be more worrisome. The number of duplicate interconnections between individuals and groups in the surviving network pictured above suggests a robust network held together by a fabric of connections instead of a weak network held together only by

a few isolated and vulnerable threads. A deeper exploration of the surviving network would be needed to truly get a sense of its strengths and weaknesses.

Beyond Visualization: Social Network Analysis Metrics

Beyond data visualization and the insights gained from actually “seeing” the data, there are certain social network analysis metrics that can be computed to determine or verify important elements of subject networks (Hanneman, Ch. 10). To review the most important measures again:

- **Degree centrality** – measures the number of direct connections a given node in a network has. In other words, how many people know a given person or are directly known by that person?
- **Betweenness centrality** – measures the influence of a node in a network over the distribution of information throughout the network. A node with high betweenness is very influential. That is, removal of a node with high betweenness can cause significant disruption in the flow of information throughout the network. How many people would be cut off from certain types of information if a given person were removed from the network?
- **Closeness centrality** – measures the lengths of the paths between nodes in a network. Nodes with high closeness have shorter paths to other nodes than those that do not. If people are the subjects, people with high closeness have the shortest paths to other people.
- **Eigenvector centrality** – measures the importance of a node in a network and is often used to analyze vulnerability in the network.
- **Centralization** – shows whether most of the nodes in a network are connected to only a few main nodes or connected to many nodes. A few main nodes or hubs indicate a high degree of centralization.
- **Clustering coefficient** – indicates the likelihood that if A and B are connected to C, they are also connected to each other. It is a measure of cliquishness.

- **Structural cohesion and equivalence** – cohesion measures how many nodes would have to be removed in order to disconnect a group from the rest of the network. Equivalence measures the extent to which nodes have connections to the same other nodes.

Several software implementations exist to compute these key measures but each requires a setup effort beyond the scope of this thesis study. While very important, these calculations focus on network topology; they do not consider the *strength* of the connections between the subject nodes but instead reveal only that the nodes are connected and their importance to the overall topology of the network. These measures must be consumed with the understanding that while they contribute to a network-oriented analysis, they cannot credibly be the totality of the analysis.

CHAPTER 6 – Conclusions and Suggestions for Future Studies

Entity extraction and link identification are difficult to perform against unstructured textual data such as news articles. The quality of this network-oriented analysis is understandably affected by this fact. Modern software tools currently do a good but not perfect job of this work; software vendors and researchers continue to make rapid improvements in this area.

The challenge for this kind of technology is to identify relationships within data but also to determine the *strength* of the ties that bind these relationships. Without advances in this latter area, network-oriented analyses such as this one are important but are of limited value because they are based only upon the shape or topology of a social network. They lack enough consideration of the richness of the identified relationships as measured by a combination of time spent together, emotional intensity, mutual confiding, and reciprocal caring – social capital, if you will.

Even if it were possible, this thesis study was not exhaustive. Instead, the study was limited to a basic link analysis and review of Benazir Bhutto's social network as drawn from publicly available news articles in order to identify what happened to the subject network as a result of her assassination.

Because of the narrowness of this thesis study, it simply does not consider all facets of network theory nor does it consider all the implications for the field of conflict

analysis and resolution. The implications and potential applications of this type of network-oriented analysis approach in this field are numerous. For example, this study does not address specifically how to use a network-oriented analysis to build stronger peace processes or organizations, nor does it address how one might use such an analysis to disrupt a conflict-sustaining network.

Recognizing that the data set used for this thesis study may not be based on high quality news sources because of the proprietary nature of Google News search, the accuracy of news reporting, and the quality of entity extraction, etc., conclusions can still be drawn from the study. Additional research should be conducted to reinforce or refute these findings.

What did Bhutto's assassination do to the shape of the network representing the democratization movement in Pakistan?

As explained in Chapter 5, while many individuals and small groups became detached from the network when the former Prime Minister was assassinated, based solely on the apparent topology of the network, the surviving network shows no signs of imminent collapse or weakness. That being said, the shape of the surviving network is only one measure of the network's stability and reach. Missing from this thesis study is a deep analysis of the remaining social capital woven throughout the fabric of the new network and the amount of social cohesion remaining within the post-assassination democratization movement.

Are there other obvious or perhaps emerging actors within the democratization movement?

The network-oriented analysis identified several individuals as potential key players within the post-assassination democratization movement in Pakistan. For reasons described in the previous chapter, the following individuals were brought to light as candidates for further analysis:

- Shehribano “Sherry” Rehman
- Makhdoom Muhammed Ameen Faheem.
- Makhdoom Syed Yousaf Raza Gilani
- Farhatullah Babar.
- Zaheer-ud-din Babar Awan
- Hasan Askari Rizvi
- Iftikhar Muhammed Chaudhry

How are they placed within the network?

Some but not all of these individuals are currently deeply involved in different aspects of the government of Pakistan while others, like Sherry Rehman and Dr. Hasan Askari Rizvi, are not in any official capacity. These potential key players are known to each other. Based solely upon the number of connections they have between them by way of common mentions in selected news articles, it does not appear that they know each other extremely well. Perhaps more importantly, the depth of their relationships is opaque to this study.

While its primary goal was not to determine how best to shore up the surviving network in order to build a stronger democratization movement in Pakistan, the study certainly reveals interesting possibilities. The fact that the potential key players are not

part of a close-knit group within a narrow slice of the political landscape of Pakistan bodes well for the surviving democratization movement.

There is tremendous potential in the weak connections of any network. The weak ties are the network interconnections – the connections that join disparate networks together in order to make the world, in this case the democratization movement in Pakistan, seem more connected (Granovetter, “The Strength”, 1361). If their connections to one another are indeed weak, their individual networks are not likely to overlap much. Therefore, *growth* in their individual networks within the movement is also not likely to overlap much. It would be reasonable to conclude then that their weak ties actually help to broaden the reach of the democratization movement and contribute to its robustness.

Suggestions For Future Studies

There are several follow-on studies that might be helpful in refining the findings of this study. One such study would involve performing the same analysis described here on a different set of source data to see if the new data set reveals additional or different relationships or if the data set simply confirms this study’s findings. For example, a different data set might simply be a larger one or perhaps one obtained by using different but related search criteria. Another variation would be to target different news sources or to repeat the study by targeting news sources from a certain country or region of the world to see how the findings change.

Family members were excluded from this particular study to see if the analysis could help to reveal key players well outside the Bhutto family’s inner circle of trust who

might hold influential places in the post-assassination network. However, the Bhutto family is unusual because of its past and present involvement in the political landscape of Pakistan. Given this deep involvement in Pakistani politics and intra-family dynamics, it would be valuable to vary the study in the future to include family members in the analysis to determine the impact of those family ties on network cohesion.

Examining relationships in the data set within the context of time is likely to yield interesting results. For example, a temporal study could reveal the length and progression of relationships as well as relationships born out of events. Such information would help analysts and researchers to better understand the strength of the ties that bind these relationships – that is, their origin, durability, and likely direction in the future. A time series analysis could reveal the nature of stabilization or growth within the surviving democratization network.

Related to this would be a follow-on study focused on a temporal exploration of the “social capital grid” (Patulny) in the network representing the post-assassination democratization movement in Pakistan, beginning with the sub-network of the potential key players called out in this study. Patulny and others have focused much attention on the two subcomponents of social capital when examining networks – *bonding capital* (strong ties between like-minded people) and *bridging capital* (weak ties between socially heterogeneous people). While they do not appear to be part of a close knit, homogeneous group based solely on the shape of the sub-network, some of the potential key players highlighted in this study will likely have a significant amount of bonding capital built up between them just from their association with the Pakistan Peoples Party.

This thesis study, however, concluded that significant bridging capital exists within the sub-network and network as a whole and that at least some of the identified potential key players are (or can be) important gateways that link seemingly heterogeneous groups. The follow-on study could help to quantify the blend of bonding/bridging capital in the network representing the post-assassination democratization movement and confirm or refute this thesis study's conclusions. Such a new study would identify the nature of participation in the surviving network and reveal the governance of the network – the key decision-making processes and culture within the network (Nan 122).

Moreover, such a new study could help to explore and explain if increases in bridging capital (diversity in the network) over time are a result of more democratization making society more inclusive in Pakistan or a result of plentiful citizen engagement improving the quality of relationships between heterogeneous groups (Varshney 383). Conversely, a new study could also help to determine if decreases in bridging capital over time are a result of less democratization or a result of a slowdown or breakdown in citizen engagement in Pakistan.

To improve the quality of the conclusions reached in this narrow study, a follow-on study involving a more detailed examination of the candidates for additional analysis is warranted. A close analysis of those individuals brought to light by this thesis study is likely to yield additional non-obvious relationships which might help to bring more clarity to the inner workings of the post-assassination democratization movement.

This thesis study did not focus on organizations, regions, or countries mentioned in the subject news articles although those items were captured during the entity extraction process used to convert unstructured news content into structured data more suitable for analysis. A follow-on study to analyze more deeply the relationships uncovered between individuals, organizations, and geography could prove to be useful for determining organizational, cultural, and ethnic influences within the social network. Such a follow-on study could help to determine if there are isolated groups that could be brought together to expand the reach of the movement.

Finally, examining the relationships between the authors of the selected news articles and the sources they reference might provide an additional perspective on the data for researchers and analysts. For conflict situations especially, this angle for analysis might be used to illuminate important sources of information and to identify additional change agents by revealing the sources of truth as well as the sources of misinformation.

Since this thesis study was wholly dependent upon the public media, the journalistic, generational, gender, and political leanings of the authors and their governing publishers played a large and complex role in the study. Those leanings could have significant influence over who was mentioned most often, who was most often quoted, what other sources of information were referenced, etc. A close examination of authorship would be useful to determine the quality of the underlying data for this and future studies.

APPENDIX – Example Entity Extraction

Example Entity Extraction Results

```
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http://www.opencalais.com. By using this service or the results of the service you agree
to these terms of service.-->
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Khan,Oxford,Karachi,LOS ANGELES,Washington,London,MUMBAI,
Company: British Raj,
Continent: America,Africa,
Country: Bangladesh,France,Pakistan,United States,Afghanistan,India,
Currency: USD,
EntertainmentAwardEvent: the BET Awards,the reign,
Event: Person Travel,
Facility: Magazine Road,Watson's Hotel,
MedicalTreatment: rejuvenation,
Organization: University of Chittagong,Awami Party,Harvard,US
      administration,Benazir,Muttahida Majilis-e-Amal,King's Party,Pakistan People's
Party,ISI,army,Pakistan's military,Pakistan Muslim League,Central Intelligence
Agency,Taliban,
Person: Iftikhar Chaudhury,Murtaza,Ghulam Ishaq Khan,Rafi Ahmed Kidwai,Michael
Jackson,Ziaul Haq,Mowlana Abul
      Kalam Azad,Benazir Bhutto,Pervez Mushrraf,Yahya Khan,Nawaz Sharif,Shah Newaz,Ali
Khan,Zulifikar Ali Bhutto,Asif Ali
      Zardari,ABDUL MANNAN,Joe Jackson,Nusrat
      Bhutto,Zulfikar Ali Bhutto,Ayub Khan,Liaquat Ali,Nawaz,
Position: Prime Minister,flamboyant and populist political
leader,President,politician,General,Chairman,writer,Vice-Chancellor,Chief,
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PublishedMedium: The Daily Star,
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News Article Upon Which Example Extraction Was Based

Is PPP Buried With Benazir Bhutto?

2007-12-31 13:15

By ABDUL MANNAN/ The Daily Star/ ANN

Keeping the bloody and conspiratorial legacy of Pakistan's politics alive, the latest in the line of such tragic killings is the assassination of the Chairman of Pakistan People's Party Benazir Bhutto in the same Liaquat Bagh on the evening of 27 Dec, fifty-six years after Liaquat Ali's murder.

Benazir was shot in the back of her head and neck by the assassin before he blew himself up, killing at least thirty others attending an election rally. An earlier report said that the international terror outfit Al-Queda had claimed responsibility for the killing of 27 Dec. However, Al-Queda later denied any connection with Benazir's assassination.

The People's Party and family members of Benazir accused Pervez Musharraf for the killing. Pakistan's much-awaited general election is scheduled for Jan 8, and it was expected that Benazir and her party would do well in the election provided that the government did not rig it. With the killing of Benazir, the reign of the powerful Bhutto family of Larkana in Pakistan's politics has come to a tragic end, at least for the time being.

Benazir Bhutto was the eldest of the four children of Pakistan's flamboyant and populist political leader Zulfikar Ali Bhutto and Nusrat Bhutto. Zulfikar Bhutto was hanged in 1979 by Pakistan's military dictator General Ziaul Haq, when Benazir was just 26.

One son, Shah Newaz, was poisoned in France in 1985, while the other son Murtaza was killed in police firing in 1996 in Pakistan when Benazir was the prime minister of Pakistan.

When Benazir died she was 54. Bhutto, himself educated in Berkeley, made sure that his children got good education. Benazir went to Harvard and Oxford, was a good orator, a manipulator of politics like her father, and loved power. She was glamorous, a pleasing personality, and could play to the gallery like her father.

She became the first female Muslim prime minister in the world in 1988, at the age of 35, amidst tremendous opposition of the religious bigots of her country. President Ghulam Ishaq Khan, a bureaucratic turned politician, who was known to be a master in conspiracies and intrigues, sacked her twenty months later.

The president alleged that Benazir was up to her neck in corruption, and had misused power. She made a comeback in 1993, to be removed again in 1996 amidst the same allegations; this time her husband Asif Ali Zardari's name added to the list of corrupt.

The charges of corruption were never proved conclusively, and they were dropped by Pervez Musharraf before the return of Benazir to Pakistan last October.

Pakistan, a country created in 1947 by the leadership of a band of politicians, most of whom had no roots in what came to be known as Pakistan (Jinnah was from Gujarat, with his political and professional base in Bombay, and Liaquat Ali Khan came from UP), was the result of a strange political philosophy—"the two nation theory", the two nations being the Muslims and the Hindus of undivided India.

When India was partitioned into India and Pakistan in 1947, India had a bigger Muslim population than the newly created Muslim Pakistan. Visionary political pundits of the sub-continent, like Mowlana Abul Kalam Azad and Rafi Ahmed Kidwai, in the pre and post partition eras never really saw a politically viable Pakistan. Sixty years after Pakistan's creation, their observation still holds good.

In sixty years of Pakistan's existence, the country, except for brief spells under Zulifkar Ali Bhutto, Benazir Bhutto and Nawaz Sharif, was ruled by military dictators like Ayub Khan, Yahya Khan, Ziaul Haq and Pervez Musharraf.

The common way of these military dictators coming to power was either by blocking the exercise of democracy through holding of general election, or by overthrowing of democratically elected governments in the name of restoring law and order, protecting Islam and putting the country on the road to development.

Every military dictator was profusely supported and backed by the United States, and every military dictator took the country a few steps closer to the brink of disaster; and now it faces the stark reality of becoming the first failed state outside Africa. During the rule of General Yahya Khan, Pakistan disintegrated and Bangladesh was born.

Before Benazir's assassination, she spent eight years in self-imposed exile in Dubai and London. With the growing public resentment in Pakistan against America's blue-eyed General Pervez Musharraf, the US administration in Washington tried to create a Pervez-Benazir powersharing formula of "democracy", and persuaded Pervez Musharraf to let Benazir and Nawaz Sharif, another exiled former prime minister of Pakistan, to return to Pakistan and participate in a process of return to civilian rule in Pakistan.

Benazir, announcing that her life would be in danger in Pakistan, returned to her country on Oct 18. On her return, she announced that she would fight for the restoration of democracy in Pakistan and, if elected to power, would uproot religious and political militancy and extremism from Pakistan. The Talibans will have to go, she thundered.

These forces have grown unabated during the long rule of Pervez Musharraf. She promised that Pakistan would again join the community of modern nations. At least in public she was no friend of the militants, and more so of Pervez supporters, as she was the only visible threat to his dictatorial rule. Pakistan's military never had any liking for civilian rulers, and they seldom had any qualms about it.

Pakistan's infamous military intelligence, the ISI, had always worked overtime to overthrow democratically elected governments in Pakistan.

Pakistan has been under Pervez Musharraf's military rule for the last eight years. Like his predecessors, Musharraf, in the name of giving a civilian face to the military rule, had a

King's Party of his own, the Pakistan Muslim League (Quaid), and used it to form a loyal pseudo-civilian government that would rubber-stamp all his decrees.

When Pakistan's civil society under the leadership of the lawyers took to the streets last September to protest the sacking of Chief Justice Iftikhar Chaudhury, Musharraf found himself in a vulnerable position.

As in the past, the US administration came to his rescue by persuading him to allow Benazir and Nawaz to return to Pakistan from exile, hold an election and share power with the PPP. Musharraf did not have much of an option but to agree to the US power sharing formula.

When Benazir returned to Karachi on 18 Oct, her entourage was attacked with grenades and bombs. Obviously, the target was Benazir Bhutto. Both ISI and Al-Qaeda were blamed for the attack.

To them, Benazir was seen as someone who could make their operation in Pakistan difficult, as she spoke for the end of military dominance in Pakistan's politics, and for restoration of democracy.

ISI, democracy, terrorism, and militancy do not go together. Military rule and dictatorial regimes provide the perfect breeding conditions for terrorism and militancy.

Though Benazir escaped the carnage of 18 Oct, 140 of her supporters lost their lives. On Dec 27, Benazir was not that lucky. Though the government is keen to blame the Al-Qaeda for both the incidents, fingers still are pointed towards the ISI and Pervez Musharraf for the mayhem on both the occasions.

Such pointing of fingers is not without reason, as Benazir Bhutto and her People's Party were the only challenge to Pervez Musharraf's reign, and to the ISI playing the role of an invisible government.

Pakistan, under international pressure, was heading towards a general election. Though both Benazir and Nawaz Sharif doubted the fairness of the scheduled election, they still agreed to participate so that Pervez Musharraf's King's Party, the PML (Q), would not get the walk-over which he would very much like to have.

With the killing of Benazir, Nawaz Sharif has announced that he will boycott the election. US and some western allies strangely wants the election should be held as scheduled, and Pervez Musharraf to get his party elected and form the next "civilian" government.

However, the million dollar question is, what will happen to Pakistan after the assassination of Benazir Bhutto? Benazir was the People's Party, and it is believed that the People's Party will unfortunately die a premature death in her absence. PPP, from its very beginning in 1967, was run autocratically by its chairmen, Zulifikar Ali Bhutto, Nusrat Bhutto and Benazir Bhutto.

The party never had a working executive committee, or held any regular council sessions, and there was no competent second line of leadership. Benazir's children are too young for the complicated politics of Pakistan. Her husband Asif Ali Zardari does not enjoy much support of the rank and file in the party.

Some would like to say that PPP was buried on 28 Dec along with its chairman Benazir Bhutto in Ghari Khuda Buksh in Larkana. For the time being, PPP will enjoy some public sympathy. However, public sympathy will not take the party very far.

Nawaz Sharif never had a working political party. His Muslim League had only 19 seats in the last Assembly. He just managed to put together some rag-tag part-time politicians to contest in the forthcoming general election. Jamaat, MQM, Awami Party, Muttahida Majilis-e-Amal, and the like, are all regional parties.

Historically, the military is the strongest and the largest political party in Pakistan, as it wields a tremendous amount of power in Pakistan's politics. A large section of Pakistan's military, especially the ISI, has a strong liking for religious fundamentalists and extremists.

During the Soviet occupation of Afghanistan, it was the ISI that was responsible for formation of the Taliban with the support and funding of the CIA.

Pakistan's military, Taliban sympathiser ISI, and the Islamic militants combined may decide the immediate future course of Pakistan. Under different military rulers, the religious extremists have grown very powerful in Pakistan.

If the army and the ISI really join hands with them, which is not impossible, the world would perhaps witness emergence of another Ziaul Haq. Going by the past track record, the US and other Western allies will, perhaps, initially show a lukewarm reaction to such a possible political development in Pakistan, but settle down later to accept the new reality and continue supporting such a regime for the next decade or so.

Can such a scenario continue for a decade? The answer, perhaps, is no. It will just take Pakistan to a point of no return, and enable the world to witness the further disintegration of what once was called Pakistan—the land of the pure.

One must not forget that Pakistan is a nuclear power. Under all circumstances, the nuclear arsenal must be in safe hands. The world, especially the US, must play a more pragmatic role in handling the crisis in Pakistan.

In Pakistan, democracy was never given a real chance. Military dictators sold the idea to the general people that the military was the only saviour of Pakistan. The average people of Pakistan believed in the military and its generals. The generals, in turn, took control of everything that was known as Pakistan, and pushed their country to the brink of disaster.

Let us pray for democracy and all the fallen in Pakistan on 27 Dec, and Benazir Bhutto, the last possible hope of democracy in Pakistan. Benazir Bhutto could have made a difference in Pakistan's politics.

(By ABDUL MANNAN/ The Daily Star/ ANN)

Abdul Mannan is a former Vice-Chancellor, University of Chittagong.
(The opinions expressed by the writer do not necessarily reflect those of MySinchew)
MySinchew 2007.12.31

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CURRICULUM VITAE

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