

# Role of Social Media in Disaster Response in the Context of Savar Tragedy

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## ABSTRACT

In recent years, social media is regularly being used to ask for help or report injuries during disasters. Such role of social media as a medium of disasters response is crucial in developing countries, where often government organizations are not well equipped for quick rescue operation and relief donation. Hence, help by the people becomes a significant source of disaster response. General people collects information regarding the disaster, victims and their needs from social media posts by volunteers working in the disaster affected area and respond by participating in rescue operation, sending reliefs etc. Such participation of general people has been observed during Savar tragedy in Bangladesh, where social media was used to propagate information regarding the crisis, victims and their needs. In this paper, we explore the role of social media in leveraging disaster in the context of Savar Tragedy.

## Categories and Subject Descriptors

H.3.5 [Information Storage and Retrieval]: Online Information Services—*Web-based services*; J.4 [Computer Applications]: Social and Behavioral Sciences—*Sociology*

## General Terms

Human Factors, Measurement

## Keywords

Social media, Disaster response

## 1. INTRODUCTION

Social media has become an indispensable part of Internet world dominating the Web 2.0 era. Sites like Facebook, Twitter, YouTube etc., have revolutionized the way people interact with each other and exchange information. Billions of people are using these social media applications to create, share and exchange information and ideas. Participation of

such huge mass has made social media a great medium for exploring issues that matter most to a broad audience.

The extensive use of social media has established it as a prominent source of mammoth real-time data. Facebook, Twitter etc. can potentially serve as valuable information resource for numerous applications and services. For example, Aramaki et al. [4] analyzed Twitter data to detect influenza epidemics, Sakaki et al. [9] addressed the detection of earthquakes. A recent research trend is to explore social media's expanding role in responding to natural disasters. There have been a number of research works addressing this issue. Qu et al. [8] conducted a sequence of studies on how Chinese citizens used online social spaces in response to major disasters. Gao et al. [5] introduced an approach aimed at facilitating efficient collaborations amongst disparate organizations responding to a crisis.

Due to its real time nature, social media is being increasingly used for communication purpose during disaster related crises. Although printed news media typically update the news once every day, online social network users can update information several times in a single day. The large number of updates results in numerous reports related to events which are passed to all the people connected with the information provider. Again, nowadays a group of online news media update on hourly basis. But to view any news of these media, user needs to visit the corresponding sites. Hence, news updates can be propagated to a relatively small community (the visitor of the news sites). On the other hand, social media allows users to distribute news among their followers instantly. Such real-time notification system helps greatly during a disaster by propagating live information updates about the victims and required relief. The role of social media in propagating disaster related information and thus facilitating the emergency response during Savar tragedy in Bangladesh can be considered in this regard.

In time critical events like disaster, the rescue operation and relief distribution needs to be done as quickly as possible to avoid deadly consequences. But in developing countries like Bangladesh often governments are not well equipped to run a quick rescue operation and relief circulation. In such cases the volunteers working there can become the connecting hub to spread the news of these unreachable places / persons to the outside world. The associated volunteers, usually using mobile devices, seek help from the general people through their posts in the social networking sites. These help seeking posts encourage the participation of general people in rescue operation and relief donation.

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In this work we conducted a case study on Facebook, the most popular social networking site in Bangladesh, to investigate how social network can leverage the disaster during rescue operation and relief distribution in the context of Savar tragedy. On 24 April 2013, an eight storied building collapsed at Savar with almost 3,000 people inside [1]. Thousands of impounded people were rescued over a 20 days long rescue operation while more than 1,000 were dead. Here, we conducted content analysis on data collected from Facebook regarding the Savar tragedy. We extracted posts asking for help (relief) and studied these posts to explore the spread among people, required reliefs over time, response time (relief donation in response to posts), influence of virtual celebrities in propagating relief information etc.

## 2. PREVIOUS WORK

There is a growing body of literature denoting the utility of Social media to collect disaster related information and using them to issue disaster alerts and leverage rescue operations. Torrey et al. [11] showed how an online forum was used to facilitate and coordinate the distribution of donated goods during Hurricane Katrina in the year 2005. Qu et al. [8] analyzed people's response to the 2008 Sichuan earthquake on a Chinese online forum. They identified the three main functions of a online forum after a disaster- to provide a communication and information sharing platform for people to seek, share, synthesize information, to enable the expression of emotions and opinions and to support relief coordination. Vieweg et al. analyzed tweets posted by people who were "on the ground" and examined the potential of using Twitter as a source for disaster related situation update [12]. Starbird and Palen [10] analyzed what types of information are more likely to be retweeted after disaster events. To utilize the the crowdsourcing power of social media in disasters, crisis maps can be deployed. Gao et.al. [5] discussed some existing systems using examples from crisis maps deployed for real disasters. One such platform is Ushahidi[2] which can collect, organize, and visualize SMS reports on a map.Challenges in using this system include a manual verification and preprocessing step necessary to ensure that the received information is accurate and actionable. At NSCWDD[3], the Quicknets team has built a plugin for the Ushahidi system which facilitates identification of actionable information by trained volunteers from organizations, such as Humanity Road Inc. It is also capable of replying back to a user via SMS to request additional information or to send an update on the response. Quicknets focuses on SMS but can be potentially used with other social media for disaster relief. In [6], the author outlines some of the problems with existing crisis map platforms and suggests guidelines that will help in the future development of such systems. In [7] Kumar et. al. proposed a Twitter based disaster monitoring and analysis system - "Tweet-Tracker", which can be easily customized for tracking and retrieving disaster-related information to assist first responders to make critical decision and effective response. The systems concentrate on using the information from social media to respond to a disaster.

All of these research works were conducted on the disaster response in the developed country like North America, China and Japan where both the victims and the rescuers had the opportunity to post about their current condition through social network. But in a developing coun-

try like Bangladesh, where the disaster victims hardly have the opportunity to contact through mobile phone, cannot even think of executing a disaster response system which depends on such information-sharing among rescuer and victims. Though utilizing the news propagation nature of social media, such developing countries can also conduct an organized rescue operation.

## 3. ROLE OF SOCIAL MEDIA IN DISASTERS

Social media offers users the ability to connect to each other and exchange information with a previously unknown level of ease. This easy to use nature of social media has led to its extensive use during disasters. The earthquake in Haiti and the tsunami in Japan can be considered in this regard, where people used social media to ask for help or report injuries.

### 3.1 Traditional Media vs Social Media

Social media posts during disasters include a pool of timely reports about the disaster, injuries, and help requests. Apart from traditional news media, this offers an alternative opportunity for first responders and disaster relief organizations to collect information about the disaster, victims, and their needs. Social media has two primary advantages over the traditional news media.

- **Large Scale:** Many information providers in the form of users and numerous posts by these users providing varieties of information.
- **Real Time:** Social media serves news faster compared to news media. This is crucial regarding time critical events like disasters.

The large scale property of social media allows people to get information from varieties of sources during disasters. These sources include people from disaster affected area. Again, the real time property is also crucial during disasters considering the fact that relief (help) needs to be sent at the earliest to avoid deadly consequences.

### 3.2 Developed vs Developing Country Aspect

Developed countries equipped with proper tools and trained forces can handle disasters without much involvement of the mass. In these countries, emergency response is typically performed by trained professionals such as police officers and fire fighters. The coordination of their task is done by federal authorities' equipped with latest communication technologies. Hence social media has limited scope to exploit its utility in response to disasters in the context of developed countries.

The disaster response scenario in developing countries is quite different from the one in developed countries. The involvement of general people is much higher. As federal authorities are not well-equipped, often general people become the prime source of help during disasters. The Savar incident is a prominent example in this regard. The first five days (24 April-28 April) of rescue in Savar involved mass participation of general people. The coordination of the mass was done using social media (Facebook).

### 3.3 Influential vs Non-influential People

The popularity of social media has led to the concept of virtual celebrity, someone who has become famous by means

of the Internet. The role of such people can be crucial at events like disaster. As these celebrities are followed by many people, they can propagate any news faster compared to regular people. Their high vertex degree contributes in this regard.

## 4. ANALYSIS OF SAVAR TRAGEDY

We conducted an analysis over the posts of Facebook regarding Savar incident, to investigate the impact of social network in accelerating the rescue operation and relief distribution after a sudden catastrophe.

### 4.1 Savar Tragedy

On 24 April 2013, at about 9 am, an eight-story commercial building, Rana Plaza, collapsed in Savar, leaving only the ground floor intact [1]. According to BGMEA 3,122 workers were working there at the time of collapse. The search for the dead and injured started immediately and ended on 13 May, with the death toll of 1,127. The rescue team rescued approximately 2,500 injured people from the building alive. The rescue work was divided in two phases. In first phase, rescue started immediately where the general people along with Bangladesh armed force worked together without any heavy equipments and it continued till 28 April 2013. From then the area were restricted from general people and the second phase rescue began, which was conducted only by Bangladesh army with heavy equipments. In the first phase of rescue operation, there was a major contribution from the general volunteers. As in Bangladesh, the government organizations needs a lot for permissions to issue any equipment, the required rescue equipments were mainly donated by the general people. So information passing among the donors at several position of Dhaka and rescue volunteers at Savar was very important at that time. And we found that this information passing was mainly done through facebook status.



Figure 1: Collapsed Rana Plaza at Savar

### 4.2 Why Facebook?

Facebook is the most popular social networking site in Bangladesh. According to socialbakers.com (as on 29/6/2012), there were 27,32,620 Facebook users in the Bangladesh, which made it #52 in the ranking of all Facebook statistics by Country. Unlike many other countries, other social networking sites like Twitter, Google+ etc. did not receive much popularity among Bangladeshis.

While analyzing Savar incident, we tried to collect data from both Twitter and Facebook. In spite of numerous tweets on Savar, there were merely any information for gathering relief and coordinating rescue operation. Hence, we

focused on Facebook posts to analyze the impact of social media, to gather the help of general people in leveraging the crisis.

## 4.3 Analysis

We collected over 200 Facebook posts from day 1 to day 6. These posts belong to a group of people who actively participated in relief donation process. From there we extracted the help seeking posts and studied the spread of the posts, the real time response, the influence of the virtual celebrities etc.

### 4.3.1 Large Scale Spread

The average number of shares of the posts we have collected is over 200. Again, the average vertex degree of the persons involved is over 500. The average number of mutual friend is around 20. Hence, the approximate coverage of each post is around 96,000. The post with highest number of shares has been shared 700 times. Hence it approximately covered 1,36,000 people.

### 4.3.2 Real Time Response

We have found that there were requirements for blood, medicine, oxygen, wheel chairs, crutch, dry foods, water, saline, torch light, fuels for generator, drilling machine and other type of cutting equipments in Savar. In Table 1 we show the required relief goods according to the time line.

Relief	24/4	25/4	26/4	27/4	28/4
Blood	✓	×	✓	×	×
Medicine	×	✓	✓	×	×
Cutting Equipment	×	✓	✓	×	×
Oxygen	×	✓	✓	✓	×
Torchlight	✓	✓	×	×	×
Food & Water	✓	✓	×	×	×
Air Freshner & Mask	×	✓	✓	×	×
Fuel	×	×	×	✓	×
Wheel Chair & Cruch	×	×	×	×	✓

Table 1: Relief Chart

This analysis on Facebook posts shows that in the first day there was an urgent requirement for blood and within only two hours there were abundant amount of positive bloods. On that day volunteers also seek donation of dry food and water for the stuck up victims and torchlight for continuing the rescue operation even in the night.

On day two they asked for oxygen, medicines, dry food and water for the victims and they requested to send more torchlight, cutting equipments, air freshener and masks for the rescuers. These requirements were fulfilled within twelve hours.

On day three, there was again a need for blood, this time they asked for more negative bloods and the donation requesting post for oxygen, medicine, cutting equipments and air freshener continues. Medicines were needed, not only for the injured victims but also for preserving dead bodies. On third night there was a post saying that there were enough amount of foods, water and medicine and so no more donation of these goods were required.

On day four, there were help seeking posts for oxygen. In this day suddenly there was a fuel crisis for the generators, and enough fuel for the generators were received within three

hours.

On day five the volunteers asked for wheel chairs and crutches and enough amounts of crutches and wheel chairs were collected within two hours.

This analysis clearly reflects the power of social media gathering emergency help in massive disaster. However for the lacking of coordination among the volunteers and the donors in this tragedy there were a profusion of some relief goods.

In Table 2 we show the response time for various reliefs.

Day	Relief	Response Time
24/4	Blood	2h
25/4	Cutting Equipment, Food, Medicine, Oxygen	12h
26/4	Blood, Cutting Equipment, Medicine, Oxygen	8h
28/4	Wheel Chairs, Cruch	2h

Table 2: Response Time

### 4.3.3 Influence of Virtual Celebrities

Another analysis reveals an interesting aspect of celebrity influence over the news spread in social media. We found that Savar related helps seeking posts spread more easily and quickly through the virtual celebrities than the normal people. Figure 2 and Figure 3 shows a comparative picture of the average sharing rate of a celebrity post and regular post corresponding to Savar. Where a celebrity’s status is shared by more than 120 people within 5 hours, a regular people’s status is shared by only 20 people.

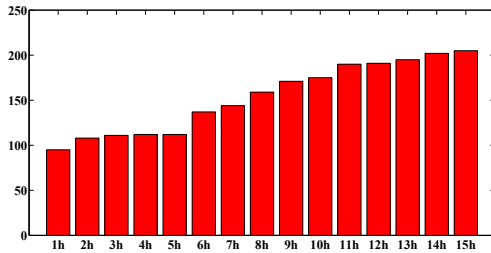


Figure 2: Number of Shares (Cumulative) with Time for a Celebrity User

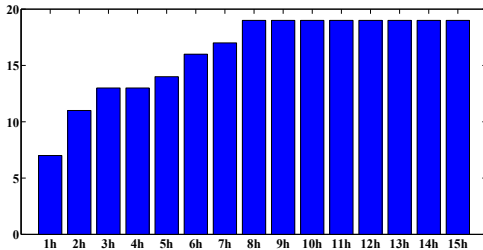


Figure 3: Number of Shares (Cumulative) with Time for a Regular User

## 5. FUTURE WORK

While analyzing Savar incident, we have found certain problems associated with synchronization among volunteers asking for help. These problems include delayed duplicates, replication of posts corresponding to reliefs that have already been sent. There have been many posts asking for reliefs which were already sent to Savar.

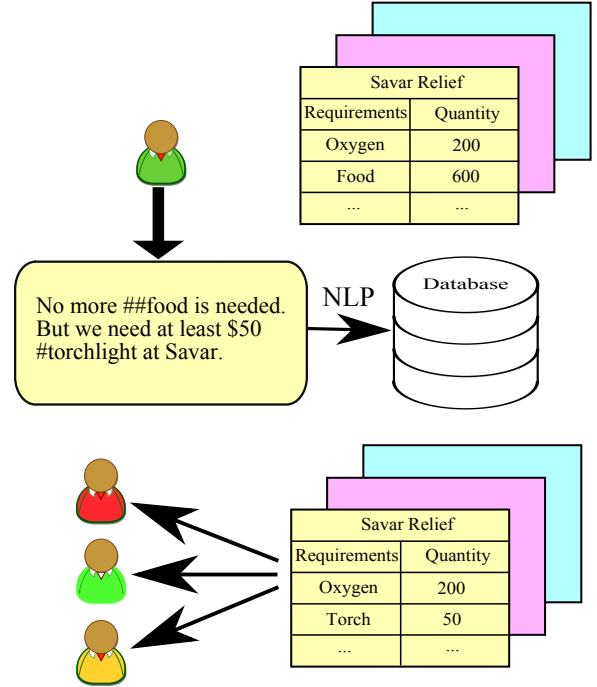


Figure 4: Proposed Application Architecture

To solve this problem, we propose to build an application based on social media that will synchronize among volunteers to keep track of required elements. The application will act as a common channel among volunteers and donors to serve synchronization purpose. The proposed architecture of the application is given at Figure 4. The application will analyze the social media posts by its users and extract help related information from it. It will use NLP techniques to extract information from semi-structured posts. This information will be added to the relief database that will later be used to notify people regarding the current relief requirements. This notification will be done by updating a Facebook note.

Here, semi-structured post refers to the use of markers to identify the required elements and their amount (like a key-value pair). For example, # may indicate the start of an element and \$ may indicate the corresponding amount. Again, ## may indicate that, the element is no longer required. Consider Figure 4, where the entry corresponding to food has been eliminated after a post where ##food appeared. Similarly an entry indicating the requirement of 50 torchlight appeared as the post contains #torchlight with \$50.

## 6. CONCLUSION

Social media has shown great potential in solving disaster related crisis regarding Savar context. General people

collected information using social media and stood by the victims to serve humanity. This is an outstanding example of using social media in public interest. By creating a common channel of communication during disasters, more of social medias benefits can be exploited.

## 7. REFERENCES

- [1] [http://en.wikipedia.org/wiki/2013\\_Savar\\_building\\_collapse](http://en.wikipedia.org/wiki/2013_Savar_building_collapse).
- [2] <http://www.ushahidi.com/>.
- [3] <http://www.navsea.navy.mil/nswc/dahlgren/default.aspx>.
- [4] E. Aramaki, S. Maskawa, and M. Morita. Twitter catches the flu: Detecting influenza epidemics using twitter. In *EMNLP*, pages 1568–1576, 2011.
- [5] H. Gao, G. Barbier, and R. Goolsby. Harnessing the crowdsourcing power of social media for disaster relief. *IEEE Intelligent Systems*, 26(3):10–14, May 2011.
- [6] R. Goolsby. Social media as crisis platform: The future of community maps/crisis maps. *ACM Trans. Intell. Syst. Technol.*, 1(1):7:1–7:11, Oct. 2010.
- [7] S. Kumar, G. Barbier, M. A. Abbasi, and H. Liu. Tweettracker: An analysis tool for humanitarian and disaster relief. In *ICWSM*, 2011.
- [8] Y. Qu, P. F. Wu, and X. Wang. Online community response to major disaster: A study of tianya forum in the 2008 sichuan earthquake. In *Proceedings of HICCS*, 2009.
- [9] T. Sakaki, M. Okazaki, and Y. Matsuo. Earthquake shakes twitter users: real-time event detection by social sensors. In *Proceedings of the 19th international conference on World wide web, WWW '10*, pages 851–860, New York, NY, USA, 2010. ACM.
- [10] K. Starbird and L. Palen. Pass it on?: Retweeting in mass emergency. In *Proceedings of ISCRAM*, 2010.
- [11] C. Torrey, M. Burke, M. Lee, A. Dey, S. Fussell, and S. Kiesler. Connected giving: Ordinary people coordinating disaster relief on the internet. In *Proceedings of HICCS*, 2007.
- [12] S. Vieweg, A. L. Hughes, K. Starbird, and L. Palen. Microblogging during two natural hazards events: what twitter may contribute to situational awareness. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '10*, pages 1079–1088, New York, NY, USA, 2010. ACM.