Social Media In Disaster Management System

Project Report submitted in partial fulfillment of the requirement for the degree of

Bachelor of Technology

in

Computer Science Engineering

under the Supervision of **M*s.Ruchi Verma***

by

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to

Jaypee University of Information Technology

Waknaghat, Solan – 173234, Himachal Pradesh

Certificate

This is to certify that project report entitled **"Social Media In Disaster Management System"** submitted by **Rohit Verma** in partial fulfillment for the award of degree of Bachelor of Technology in Computer Science & Engineering to Jaypee University of Information Technology, Waknaghat, Solan has been carried out under my supervision.

This work has not been submitted partially or fully to any other University or Institute for the award of this or any other degree or diploma.

Date:

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Date: **Rohit Verma (111268)**

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Abstract

The growing popularity of mobile computing and social media has created new opportunities to incorporate social media data into disaster response. In crisis situations such as natural disasters and mass emergencies, social media data could become a valuable source of real-time, first- hand information from affected individuals and could be used to help emergency managers and first responders efficiently assess and respond to needs. However, responders and affected people alike are unable to fully leverage this information due in part to the massive volume of noisy data, and the lack of tools and processes to help them filter and analyze these new information streams.

This report highlights the changing landscape of risk and disaster communications and in particular how social media can be a beneficial tool, but also create challenges for crisis managers. It explores different practices of risk and crisis communications experts related to the use of social media and proposes a framework for monitoring the development of practices among countries in the use of social media for risk and crisis communications. The three step process spans passive to dynamic use of social media, and provides governments a self-assessment tool to monitor and track progress in the uptake of effective use of social media by emergency services or crisis managers.

Chapter 1 Introduction

1.1. Overview

Disaster managers today are increasingly confronted with more complex, hardly predictable crises involving large numbers of people, in which efficient emergency management is more challenging than ever and private companies as well as public organizations are facing almost identical problems. Whereas the procedures, as well as the coordination of internal resources in the case of crises, can be considered efficient already, the potential of improving the external communication is still significant. It is important to note that in this respect, the term "communication" does not solely imply the supply of the public with relevant information, but also the supply of emergency-managers with information from other involved stakeholders, for instance the disaster-stricken population. Communication is a two-way street. Considering the concept of "dialogical emergency management" it can be stated that eliciting information from the public is a substantial part of successful emergency communication, a component that has too long been neglected. Only if the crisis management has "strategic awareness" of what the affected stakeholders know, real communication and collaboration can exist. One central challenge of emergency communication is that it needs to deal with rapidly changing factors such as different needs, abilities and characteristics of the involved actors, thus making it difficult to receive reliable and real time data.

At this point the analysis of social media content constitutes a new way to consider the affected population's information in an efficient way. In recent years the world has witnessed the remarkable popularity of Web 2.0 concepts and social media, in which millions of users communicate, participate, and collaborate. Driven by these new concepts, technologies and features, the web has become more social and interconnected. Global participation platforms and social networks like Facebook, Twitter or YouTube and a mass of local blogs and web communities are an important source for next generation emergency management. According to a study of the American Red Cross (2011) nearly half of the entire population is active in one or more social networks. Also the importance of social media in disasters is increasing, thus it has become the third most popular information channel under these circumstances, right after television and radio Almost 70 per cent of

the population expect the emergency managers to monitor and to react to social media content generated by the public in one way or another. But meanwhile the emergency managers are reacting very slowly, their use of this new communication technology often being limited to manual reading of individual posts or to the unselective posting of information over the organization's profile. Yet there are examples of the successful and systematic social media usage in the crisis management by public, as well as private actors. The earthquake in Haiti 2010 was the prime example of successful social media usage in the case of emergency.

But today's societies are also witnessing the use of social media in stirring and prolonging crises. Among the most prominent examples are the UK riots 2011 and the Occupy-Wall street-movement, both of which were aided by platforms such as Facebook or Twitter and eventually resulted in actions of serious crime. In the case of the latter there were more than 400 Facebook pages and over 170.000 active users. During the UK riots hundreds of Twitter messages were created every minute. This development underlines the need for governments using the very same methods for the prevention and management of such situations.

1.2.Background

Micro-blogging is a form of lightweight, mediated communication where users can broadcast short messages to their networks and direct these messages to specific people within networks. Users of Twitter send short (up to 140 characters) messages or "tweet" to their networks of "followers" people who chose to be updated when the person they "follow" adds a new message to the stream. Twitter users send "tweets" to their followers, and users can also "retweet" or pass along messages originating from others. Twitter includes search functions so users can search the site for prevalence of keywords, phrases, topics, trends, or individuals. Other features of Twitter include options to add website links and geo-location information to tweets. When Twitter first launched, the tweets were often personal and seemingly inconsequential updates on the goings-on of the everyday life which gained Twitter a reputation in the media for being an inane, narcissistic, whimsical medium with little value outside of mere entertainment (Cohen, 2009). Such opinions overlooked that early adopters in the Twitter community were building worldwide social networks accustomed to sending and receiving short messages in real time. Twitter gave

individuals the unprecedented ability to rapidly broadcast and exchange small amounts of information with large audiences regardless of distance. Although Twitter is Internet based, functioning over the World Wide Web, its primary focus is on integration with mobile/ cellular devices, which creates the potential of an alternative communications system apart from traditional telephony, radio and television. In retrospect such affordances of Twitter seem obviously useful during times of emergency and needs to be disseminated to the public rapidly. Today Twitter has clearly captured the public imagination, particularly in light of Twitter usage to mobilize and inform political opposition in countries with regimes that have curtailed public communications infrastructure.

During the Iranian student protests of 2009, the US Department of State reportedly asked Twitter management to delay a scheduled maintenance so users of Twitter in Iran could continue their mobilizing of protests via the site. According to Gilad Lotan, "Twitter served as an incredibly engaging mechanism to disseminate information on the riots and protests that were taking place around the world. Its real-time qualities enables information to rapidly spread between users, while its personal style drives a sense of emotional involvement to the events."

During the revolutionary protests in Egypt in spring of 2011, users reportedly employed Twitter (and Google) as an ad hoc distributed communication system, until the government shut down Internet access country wide. Despite an increasing number of high profile uses of Twitter, what is rarely discussed is the use of Twitter by official organizations during crisis events. Thus the question remains – to what extent can Twitter be repurpose successfully to meet the needs of crisis response organizations? We are also interested in the extent to which Twitter is used by organizations not only for broadcasting information, but also for information gathering during crisis situations. There is a small but growing research literature focused on how the public uses Twitter in times of emergency. Palen have been conducting extensive studies of Twitter use during mass convergence or emergency events such as the Southern California Wildfires, the Democratic and the Republican National Conventions, and the recent flooding of the Red River Valley.

Members of the public sending and receiving messages are only one part of Twitter's communicative dynamic. Based on the literature briefly reviewed above, we propose that

Twitter communication during times of emergency and crisis falls into four broad categories:

1. Twitter users posting self-generated messages about the crisis to their social networks.

2. Twitter users retweeting messages received from members of their social networks, traditional media, unofficial, and official sources.

3. Emergency management professionals using Twitter in either official or unofficial capacities to send messages to the public in affected communities or the public at large.

4. Emergency management professionals monitoring Twitter feeds from the public to gather information during times of emergency.

1.3 Motivation

The importance of adequate emergency management is acknowledged by most countries in the world. Disasters have always happened and they will continue to. What changes though, is global awareness of these disasters as well as the number of people affected. The terror attacks in New York, Spain and London as well as the Katrina hurricane, to name a few, are some recent examples of large scale emergencies. The cause of such emergencies could be natural disasters like flooding, earthquakes, volcanoes etc. Man-made disasters like terrorist attacks, industrial disasters, radiation contamination, etc. have increased dramatically in recent times. Computer systems could facilitate all phases of Disaster Management. This work presents some of the current developments in that field. The aim is not to describe the functionality of every Disaster Management system available, but to investigate the way Human-Computer Interaction takes place in such systems. Real-life applications as well as prototypes of Disaster Management Systems exhibiting User Interfaces.

1.4 Scope

Disasters are unforeseen and highly dynamic situations, defined by high levels of information requirement, low levels of reliable information availability, a great need for quick information, and also information chaos. Government organizations can never be fully prepared for a disaster. They can only do their best to prevent them prepare for them or respond and act appropriately when they do strike, including adequate risk and crisis communication. This is why a pre-established management strategy and crisis communications plan are vital. The uniqueness of each disaster challenges the procedures of those working on the ground, the organization's communication strategy, its standard operational procedures, its policies and the organization itself. A crisis communication plan ranks as a key strategic factor for effective action. They must also use the time before a crisis to prepare the public for any emergency scenario that may occur. When an emergency does strike, they must provide information quickly, accurately, and consistently. Poor internal communication is a prelude to a bad external coordination and communication. In brief, a good emergency management strategy must include a thorough communication plan. Since the year 2000, information technology has changed radically particularly impacting the way people communicate, initially on personal computers but more recently on smartphones and tablets. A considerable number of "social media" companies have developed with names such as Facebook, Twitter, and Youtube. These companies offer technology of various types which greatly facilitate the communication of messages, images and videos, above all allowing for the sharing of these multimedia items with a wide range of "friends" or "followers". As the technologies have grown in ubiquity so have they developed an ever greater role in emergencies. The advances in communication and information technologies have challenged organizations dealing with emergencies to develop new communication strategies for disasters and emergency situations. Social media tools have given people more ways to seek and share information. This can help people cope with disaster situations and support subsequent recovery. But it has added another layer of complexity to the already complex situation of a disaster. Now, anybody with a mobile phone can broadcast information to friends, family and acquaintances. Anybody in a disaster situation can share the details instantly, and sources of information have multiplied dramatically, to such an extent that it can be difficult to make sense of the overwhelming amount of information. Mainstream media were quick to appreciate the power of social media tools. Now, victims are browsing their mobile phones, checking what

friends and neighbours are sharing about the event. In a very short time, a huge amount of information is amassed from various sources, often containing contradictory

Chapter 2 Literature Review

2.1 KEY CONCEPTS

A disaster is "a serious disruption of the functioning of a community or a society involving wide spread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own re-sources. Disasters are often described as a result of the combination of: the exposure to a hazard; the conditions of vulnerability that are present; and insufficient capacity or measures to reduce or cope with the potential negative consequences. Disaster impacts may include loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation."

The terms "disaster" and "emergency" are often used interchangeably. However, disasters are distinguished from emergencies—events which re- quire urgent action and which might involve destruction or injury and extra resources or operational procedures— by their scale.

Disasters may be classified by the types of hazards that cause them, where a *hazard* is simply an event or phenomenon that has the potential to cause harm.

CLASS OF HAZARD	EXAMPLES
Natural (Geophysical)	
Geological	Earthquake, volcanic eruption, landslide, accelerated erosion, subsidence
Meteorological	Hurricane, tornado, ice-storm, blizzard, lightning, rainstorm, hailstorm, fog, drought, snow avalanche,
Oceanographic	Tsunami (geological cause), sea storms (meteorological cause)
Hydrological	Flood, flash flood
Biological	Wild fire (forest or range fire. It can be man-made), disease outbreaks, insects infestation, crop blight, epizootic.
Technological	
Hazardous materials and processes	Carcinogens, mutagens, heavy metals and other toxins
Dangerous processes	Structural failures, radiation emissions, manipulating and transporting hazardous materials
Devices and machines	Explosives, unexploded ordnance, vehicles, trains, aircrafts
Installations and plans or critical infrastructure	Bridges, mines, refineries, other industries, power plans, storage plans, power lines, pipelines, communication networks, high-rise buildings
Social	
Terrorist incidents	Bombings, shooting, hostage taking, hijacking
Crowd incidents	Riots, demonstrations, crowd crushes and stampedes

Social Media

The prior paragraph laid out the ground of crises and how they can be responded to. This thesis seeks to determine if social media has had an effect on the theory and eventually how organizations manage to navigate crises under these new circumstances. Therefore the following paragraph will seek to define social media and how it can be used as a tool and form of two-way communication.

According to Wigley and Zhang, "social media are changing the way everyone, including journalists and public relations practitioners, communicate". In the same instance they go on to state that the definition of social media still is under development. Despite its prevalence in society it is still a relatively new phenomenon, which needs to be explored further. Some scholars have offered an attempt at a definition, among these Kaplan and Haenlein, who define social media as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content". Coombs claims that "one key component found in

these newer media is the capacity to facilitate bi-directional communication, or dialogue". What can be drawn from these quotes is that a number of technological conquests have made social media possible, and that the various mediums have indeed facilitated communication.

It can be argued that traditional media such as the telephone or newspaper also facilitate communication. What is unique about social media though is that they have enabled near immediate communication. And this is one of the most dominant factors affecting, along with the ability to reach large masses without the limitation of geography. Through these two traits social media makes for one powerful game changer. Gerald Baron, an experienced crisis communication practitioner and blogger, even argues that social media are more than this, that they have in fact changed everything we do and how we do them. Crisis blogger also raises the question of whether social media still exists as a separate concept. In other words, social media have started to overlap, and no longer serve one sole purpose.

In order to put social media into a PR context, it is important to study how they can be used as a tool i.e. how organizations monitor, communicate and experience crises through them. Furthermore, it is crucial to understand the effect social media have had on stakeholders seeing as they, in the final instance, define and assess the crisis. Studying the facilitation of communication and hereunder two-way communication can provide a picture of how social media are affecting crisis communication.

"A key to successfully handling crises is controlling the flow of information to the media and one's publics.". If this statement is true the aforementioned traits of social media, immediacy and the dissolving of geographical boundaries, must have had a substantial effect on crisis handling. Social media have allowed for news to break almost instantly and once it hits a conduit such as Twitter or Facebook it is only a matter of minutes before the story is spread virally to thousands or even millions of people. This means that the old mantra of crisis communication regarding control of information flow has become almost impossible for companies to perform. Public relations professionals no longer have time to plan before crises reach social media and the public. Thus, crisis communicators have been

given the reactive role and with that they are forced to begin reputational damage control once the public has already discovered and evaluated the crisis.

So what does this mean for the way crisis communication is designed today? Naturally, there are both advantages and drawbacks by this development. However, there is no doubt that social media can be used as a tool by organizations, and, if used correctly, a very beneficial one. One of the advantages could be a higher degree of transparency and interactivity between company and consumer. Another advantage is the reduced significance of the so-called "middle-men", who until now have served as a form of filter that messages passed through before reaching the public. An example of this could be censors or editors interfering with communication. When using social media the message instead goes directly from sender to receiver without delay or modifications, this has speeded up communication time substantially. This development may also include drawbacks; some argue that social media in terms of credibility fall short. This is specifically due to the immediate nature, which allows a minimum of proof reading and accuracy compared to other media tools. This factor can be important for organizations when trying to convince stakeholders. If credibility of a message does drop when using social media, this means organizations must take extra care in tailoring communication when using these conduits.

Another important feature of social media are their ability to enable two-way communication between organization and stakeholder. They provide the opportunity to invite consumers to respond to a crisis after which the organization can then deal with it in a personal manner. This being said, these opportunities also foster greater expectations on behalf of the stakeholders. They now expect near immediate communication that is well planned and answers to their concerns. These expectations could be a potential drawback, seeing as research at the moment suggests that companies have yet to embrace social media fully, some still focus on the threats connected with the concept rather than the potentials. This can be a positive development, seeing as it can give a nuanced discussion of a crisis. It can also become a negative trait if a collective of stakeholders decide to portray a company as "the villain" and spread this perception. Ultimately, what can be said about entering such an electronic community is that it is a place where user opinions and values are shared, a place that can "spawn commentary, sway views, and spur action". In this way, social media become a vital arena for organizations to navigate in and spread crisis communication through.

Monitoring:

In the literature, social media monitoring is described as a research approach covering both data collection and analysis. It is an observational, passive and quantitative approach which shares commonalities with ethnography and quantitative surveys. Historically, social media monitoring originates from the tradition of media content analysis. The idea of analyzing the social environment through news media monitoring can be traced back to the sociologist Alvan Tenney and his proposal to measure the "social weather" in 1912. In the pre-computer era, these early content analytical approaches required considerable resources in terms of time, labour and money.

The benefits that social media monitoring is much praised for, and that are expected from it, include access to authentic and honest data by providing an account of social life "as it happens. Moreover, it enables the continuous, minute-by-minute, real-time data collection much needed by emergency managers, and tracking of fast changing perspectives over time. It may also provide access to novel information and reveal hidden insights or even topics of controversy. This could also pave the way for two-way communication and partnering with citizens, e.g. in emergency situations. Monitoring is also said to be cost-effective. In contrast, other sources cite the uncertainty related to possible costs of monitoring and responding to potentially voluminous incoming messages in the case of a crisis.

Social media monitoring methods can be described as "listening solutions" that provide technology; services and know-how to help researchers and organizations listen, interpret and respond to what people are saying online. When compared to the traditional research approaches, the similarities that social media monitoring shares with quantitative research include large samples, numeric data and difficulty in assessing meanings, while among those it shares with qualitative approaches are the gathering of spontaneous views and opinions, and a need for rigorous semantic analyses. Monitoring can also be seen as "a 24x7 focus group", which provides community insights and intelligence for e.g. communication planners. In turn, the differences between monitoring and the traditional quantitative approaches include more imprecise sampling and lack of control and standardization in conducting research, while the differences with the traditional qualitative approaches include larger samples, no direct contact with the targets of the research, and lack of non-verbal cues, feedback and contextual information.

In addition to the function of monitoring as environment analysis and listening monitoring may also serve the purpose of evaluation, e.g. tracking the success of a message or a campaign. Moreover, methods for social media monitoring can be divided into active methods that aim at engaging, e.g. citizens, in social media interaction and consequently gathering data from them, as in the case of health practitioners tracking the progress of their patients through an e-health website, and passive methods that include passive and automatized data gathering and analysis. This paper focuses on the latter, i.e. methods for monitoring naturally occurring interaction online.

Purpose of Monitoring

According to the literature, the purposes for conducting social media monitoring are manifold. First and foremost, monitoring is conducted for analyzing the environment. The goal is to make sense of a vast amount of information and to see the big picture of the phenomena monitor. Monitoring provides a window on societal debate and sheds light on stakeholder perceptions, needs and attitudes of various kind. The objective may be identification of issues of concern related to e.g. public safety, trends in e.g. drug use, or political opinions or reactions to public policies. Moreover, social media monitoring may be conducted to identify radical opinions, misinformation e.g. on vaccinations, profile criticism or negative information.

The results of monitoring can be further used for specific action purposes. For example, monitoring may serve as a support in policy-making e.g. to make more informed decisions and for different planning purposes, e.g. organization's social media communication. The aim of monitoring may include e.g. responding to rumours, mediating reactions, correcting inaccuracies and responding to protests. In the context of disasters and emergencies, monitoring can serve to establish situational awareness and to enhance communication with citizens, and to provide an early warning system to identify potential problems and para crises.

Groups of users that may benefit from social media monitoring in the business sector include marketing specialists, advertisers and brand managers , and in the governmental sector decision and policy makers and officials from various areas, such as health and the environment. Monitoring is often specifically the task of public information officers and closely related to the work of crisis and emergency officials and managers. Moreover, other

users of monitoring found in the literature include health professionals and organizations, higher education institutions and researchers from different fields. Finally, monitoring tools may also be used by citizen groups. In this study, however, the focus is confined to monitoring by organizations and, professionals.

Object and Focus of Monitoring

Monitoring can be targeted according to e.g. stakeholder group (who interacts), type of information (what is talked about), type of message (what kind of interaction is going on), or type of social media (where the interaction takes place). Objects of monitoring in Twitter include electronic word-of-mouth communication between consumers and businesses and community-related information. The object of monitoring may be to learn about connections in social networks. With regard to health-related information, for example, it may be useful to know what relationships subsist between people in order to contain the spread of an infectious disease. Other kinds of targets monitored have included Facebook posts and comments, community- related videos in YouTube, crisis-related news content in blogs and radical opinions in extremist forums.

The focus of monitoring, on the other hand, defines the more specific emphasis of monitoring activities. For example, it could be information prevalence, information incidence, or concept co-occurrence. Other focuses may be topics, subtopics, associated sentiments, communication patterns, changes in discursive patterns over time, trajectory of retweets or biographical information about those interacting, including influential users. Other examples of this are given throughout this report.

Monitoring Process

In the literature, the process of monitoring is described as consisting of certain steps or phases. Three phases for analyzing tweets: preparation, data collection, data analysis and reporting.

Preparation

The engagement of an organization in social media interaction, including monitoring activities, should, as suggested in the literature, be guided by commonly agreed upon guidelines. Moreover, the choices made throughout the monitoring process depend on the organization's objectives and can be explained by reference to specific social media monitoring strategies.

The preparation phase includes the definition of the problem and identification of the issue to be monitored. Other considerations are identification of the resources needed for monitoring, including the budget and the personnel to be responsible for implementing the monitoring activities. This phase also includes identification of timing, including dates and timetable; geographic focus, i.e. where (e.g. country) and on what level; and key stakeholder groups who have a stake in the issue and whose perspectives on the issue of interest it may be relevant to know.

The preparation phase also involves a choice among the available listening tools and solutions. Moreover, the message type, e.g. tweets, Facebook or blog posts, to be monitored and the focus of interest in the monitored messages. The choice of data sources, i.e. the key media to be monitored, will depend on the problem or issue monitored, time and budget resources. The identification of relevant social media platforms may also help in limiting an otherwise overwhelming amount of information.

Data Collection

Once the relevant choices in the preparation phase have been made, data in the relevant social media are collected. This can be done via programme interfaces or running search queries which vary from simple keyword searches to more sophisticated searches. The collection of data is preceded by setting the search terms, taking into account possible synonyms, in describing the criteria for an advanced, custom-made system for analysing tweets, propose parameters which the end-user needs to fill in the system to initiate the data collection: keywords, or search terms; language; results type, recent or mixed; and frequency of data collection.

In the case of a manual, researcher-driven monitoring process, the search is followed by downloading and/or saving the search results. A central step in the data collection process

is the archiving of the data collected. This allows not only historical archiving and more analytical flexibility, but also enhances methodological quality, which is especially important when monitoring is conducted for research purposes.

Data Analysis

Following the data collection is the analysis phase. While the use of open-source tools may provide a means to capture the data, the analysis often has to rely on other, either computer-assisted or manual, tools and methods. Specific areas of analysis include general statistical analysis and activity metrics, network analysis, and textual analysis. The process will, of course, depend on the data and method chosen. An analysis of textual data may focus, for example, on the flow, volume, overall tone and temporal evolution of the discussion. The analysis of tweet datasets could focus on frequency over time of tweets, users, keywords, replies and retweets, or changes over time of keywords and phrases.

Monitoring Methods

The monitoring methods described in the literature cover textual analysis and network analysis.

Textual Analysis

In this technique text keywords are searched and matched. If match is found the tweet related to that keyword is returned. For Example if user search #Nepal so all keywords matching this will be returned to the user.

API:

API, an abbreviation of application program interface, is a set of routines, protocols, and tools for building software applications. The API specifies how software components should interact and APIs are used when programming graphical user interface (GUI) components.

In this project we use Twitter API and Google Map API to do extraction and mapping of the location.

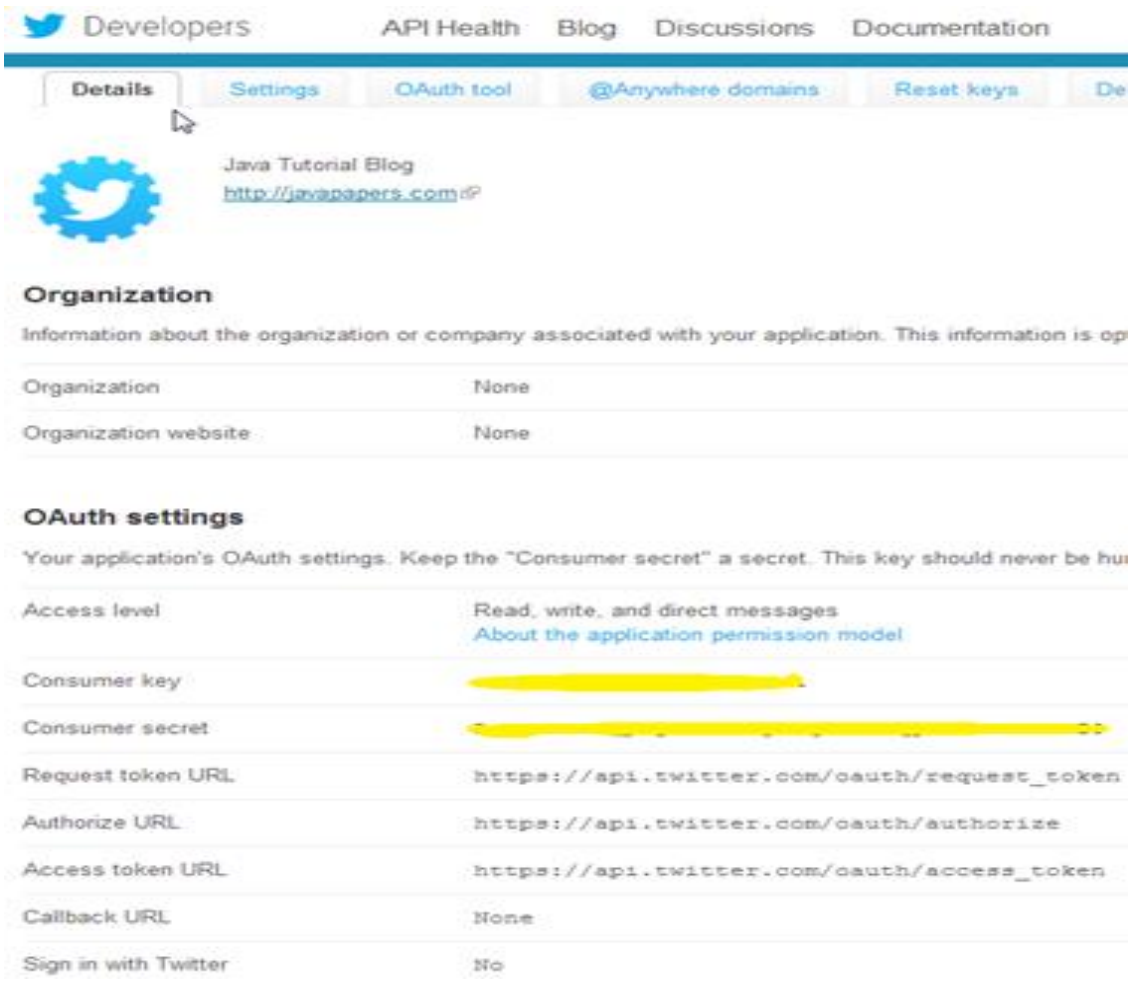
Twitter API:

Twitter4J is an unofficial Java library for the Twitter API. With Twitter4J, you can easily integrate your Java application with the Twitter service. Just add twitter4j-core-4.0.3.jar to your application class path. If you are familiar with Java language, looking into the Java Doc should be the shortest way for you to get started. twitter4j. Twitter interface is the one you may want to look at first.

Before going to the code, we should generate Twitter API keys which enables us to access the APIs. We need to get “Consumer Key” and “Consumer Secret” from Twitter. Using these two, we should generate, “Access Token” and “Access Token Secret”.

Twitter Consumer Key and Consumer Secret:

Go to the URL https://dev.twitter.com/apps and create a new application. Give access level in ‘Settings’ as ‘Read, Write and Access direct messages’. You will get both consumer key and secret.



Twitter Access Token

We can generate access tokens using the consumer keys. It can be done using the API or through the interface as well. I am going with generating using the Twitter website itself as shown below. Ensure that the access level comes the same as in consumer keys or regenerate it.

Twitter4J is one of the most popular APIs for handling Twitter in Java. If we don't want to handle the Twitter REST API calls directly as we have shown above and we want go simple then Twitter4J is the way. All we need to do is add only one jar file from Twitter4J twitter4j-core-3.0.5.jar to the dependency and use the respective classes to make the calls.

Google API :

Requests to the Google Maps Engine API are HTTP requests with a base URI.

API Keys:

Each Google Maps Web Service requires an API key or Client ID. API keys are freely available with a Google Account from the Google Developers Console. To generate a server key for your project:

Visit the Google Developers Console and log in with a Google Account.

Select an existing project, or create a new project.

Click Enable an API.

Browse for the API, and set its status to "On". The Java Client for Google Maps Services accesses the following APIs:

Directions API

Distance Matrix API

Elevation API

Geocoding API

Time Zone API

Once you've enabled the APIs, click Credentials from the left navigation of the Developer Console.

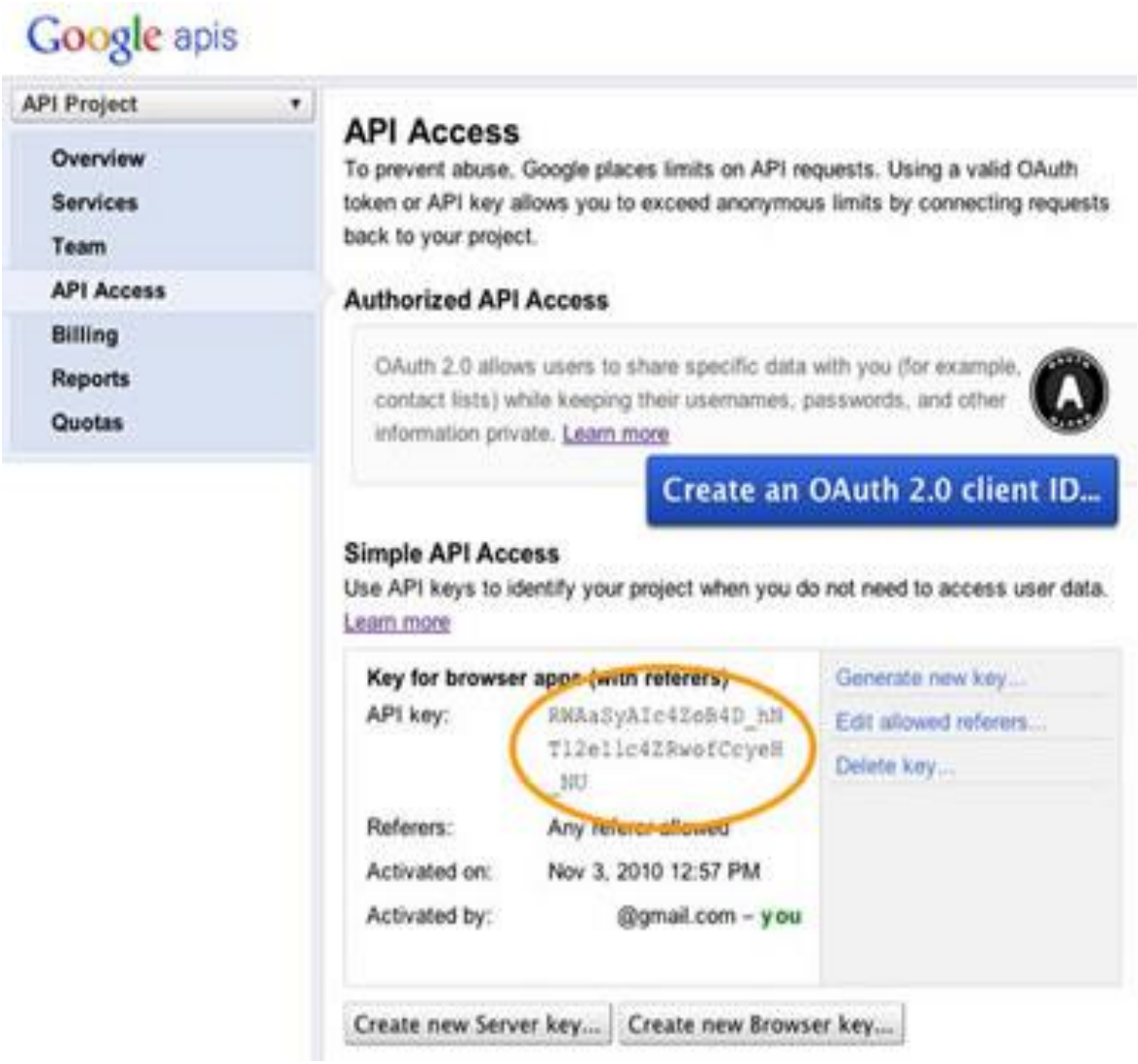
In the "Public API access", click Create new Key.

Choose Server Key.

If you'd like to restrict requests to a specific IP address, do so now.

Click Create.

Your API key should be 40 characters long, and begin with AIza.



There are a few choices when developing against the Google Maps Engine API with Java. You can choose to use pure Java and simply make the HTTP calls yourself. However, we recommend using the Google Maps Engine API client library for Java, along with the wrapper library.

For sending notifications we will use Twitter API to post Tweets and make people aware of the decisions and warning given by the government and decision makers.

2.2 Disaster Management Tool

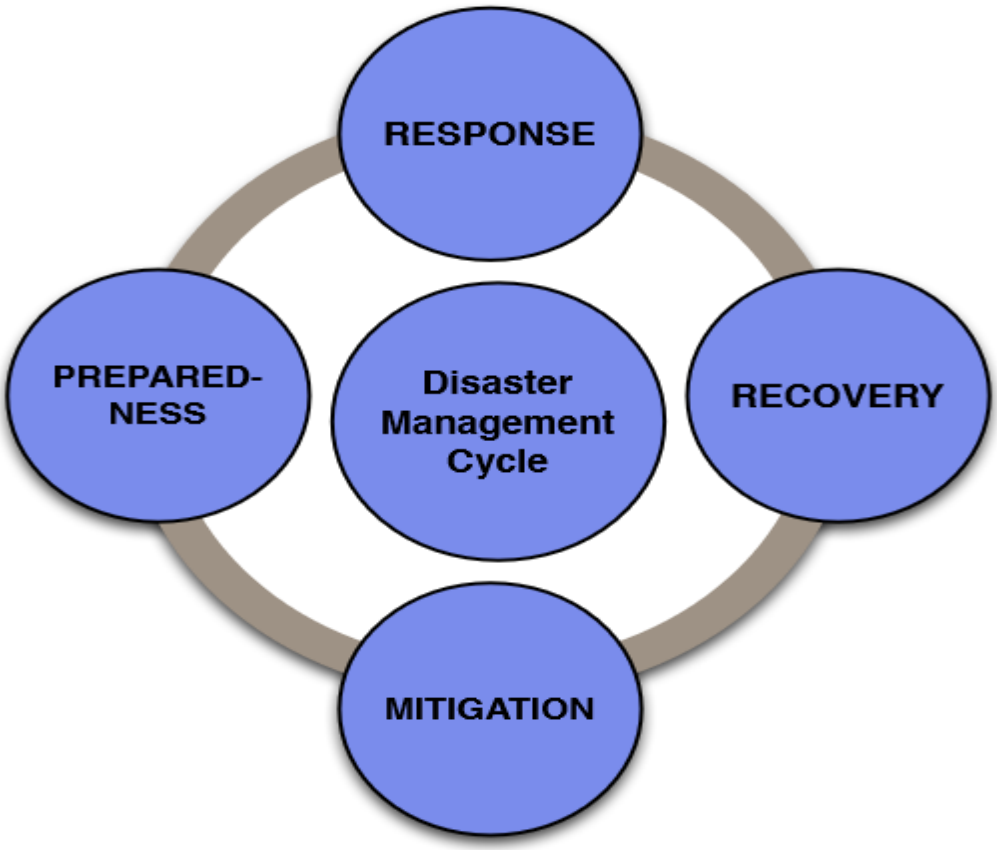
The belief is that, while disasters are disruptive and chaotic in nature, the management process for each one can be viewed as having a common life cycle. A 1979 report by the National Governor's Association seems to have been very influential in describing the management process cycle in four stages. The stages are as follow:

1. Mitigation: Mitigation activities are those under taken to either eliminate the possibility of a disaster, reduce the probability of one, or else reduce its harmful effects. Examples of mitigation activities include: building dams; creating building codes for earthquake or tornado resistant buildings; passing zoning laws.

2. Preparedness: Preparedness activities are those designed to maximize the effectiveness of the response to a disaster when one occurs. Examples include the drafting of disaster plans and evacuation routes; the development of hazard monitors and early warning systems; stock- piling resources; setting up interagency mutual aid agreements; en- gaging in training exercises. While both mitigation and preparation take place before a disaster ever occurs, the two are distinct. Mitigation activities are geared toward the prevention of a disaster, while preparation activities are geared toward effective response. In a literal sense, preparation activities assume mitigation will fail.

3. Response: Response activities immediately follow a disaster and are "devoted to reducing life-threatening conditions, providing life-sustaining aid, and stopping additional damage to property". Securing affected areas, assessing damage, performing search-and-rescue missions and providing immediate medical aid are all examples of response. This phase of disaster management requires urgent action by emergency management agencies and other organizations.

4. Recovery: Recovery activities are those intended to help return society to normality after a disaster. These can be divided into short-term efforts, e.g., providing temporary shelter to those displaced, and long- term efforts, e.g., providing financial assistance to local governments and private individuals to rebuild.



2.3 Disaster communication and the mass-media

It is generally acknowledged that the media play a key role in many aspects of crisis and disasters. When thinking about the role of the media, it is assumed that they are crucial disaster management tools just because of their ability to efficiently and quickly transmit official information about the hazard, preparedness, and recovery stages to a wide and heterogeneous population. Passing on warnings is “without doubt, the clearest and most consistent role in a disaster”. An- other important media role is keeping people informed after the disaster strikes. Further importance lies in the media’s capacity to participate in preparedness and to facilitate recovery by changing people’s attitudes to natural hazards. According to the approach considering the capacity of media to participate in each stage of the disaster management cycle, the public receives, processes, interprets, and personalizes the information and then acts accordingly in each stage of the management cycle. The

assumption is that this informing function of the media varies only in content but not in form across the various disaster phases. In the "preparedness" stage, the media provide factual information about the approaching hazard and tips to help the populace prepare for its impact. During the "response" and "recovery" phases, the media focus their attention on the areas most affected, providing estimates of the damages and losses, helping the recovery of the community. During the long-term "mitigation" phase, the media are considered a disaster information provider through coverage of non-local disasters, which are viewed as helping the community to raise disaster awareness and prepare for future events. Therefore, even when the content of the transmission changes, the media are still perceived to serve an informing function because it is assumed that people keep watching, reading, and listening to obtain information on hazard preparedness, response, and recovery. The media role has traditionally been to function as a link between the public and EMAs. The controversy surrounding the media role is whether the media are effective in increasing preparedness and response to natural hazards, or if they present a distorted and sensationalist picture of the disaster situation. Nevertheless, nobody questions that the fundamental role of the media in natural disaster situations is as transmitters of official information and every EM is aware of the necessity of taking journalists into account in the disaster management process. Rather the project aims to illustrate how social media can be part of the communication toolbox used by EM for emergency and disaster management.

2.4 RISKS AND BENEFITS FROM THE USE OF SOCIAL MEDIA

Of total population affected 76% used social media to contact friends and family; 37% used social media to help find shelter and supplies; and 24% used social media to let loved ones know that they are safe, while 18% retrieved information through Facebook. Although the cited timeframe covers a period of time before the popular use of the Internet and social media, the numbers above still show the expansion of social media use amongst the public. It is therefore important when talking about social media and disasters to distinguish between providing information and receiving information, and between private users and organizations as the different types of disasters require different approaches in each case when using social media tools. Furthermore, the experience from the use of social media thus far has shown both positive and negative results.

Positive results

A good example of how authorities can disseminate information using social media comes from the 2013 floods in Calgary. A few days after the evacuation, city officials wanted to gather volunteers in order to brief them for the upcoming neighborhood re-entry support, and the request to gather at McMahon Stadium was spread immediately through multiple social media sites. As a result, although the city was originally seeking approximately 600 volunteers, nearly 7000 people arrived to offer their help. During the floods themselves, Calgarians used social media to help find answers about their family, friends, and properties.

Another good example is New York Governor Cuomo's Twitter account activity during Hurricane Sandy. The Governor's Twitter account was sending about 400 messages a day, updating citizens about the situation, providing photos and information about the power situation, storm, and damages. This resulted in the Governor's Twitter account going from 20,000 followers before Sandy to reach more than 55,000 after the storm.

Negative results

As the successful examples described above clearly show, using social media as disaster warning and response tools can be very powerful and effective, allowing public authorities and civil protection officers to reach out in real-time to a vast part of the population. However, in order to fully reap the benefit of this new kind of communication and concretely save human lives, social network users need to guarantee the accuracy and credibility of these early-warnings, to avoid causing unwarranted panic.

This happened recently in Italy, in the aftermath of the 4.8-magnitude earthquake that hit Tuscany on 25 January 2013. The small municipality of Castelnuovo Garfagnana, in the center of the area affected by the seismic activity, announced via its official Twitter account, the night of 31 January that new quakes may be expected in the coming hours and suggested citizens to leave their houses. As a result, almost 6000 citizens still dealing with the stress of the recent earthquake poured immediately out onto the streets and spent the night outside, sleeping in their cars or in temporary shelters.

"Unfortunately", the early warning launched by the municipality via Twitter proved to be a false alarm, launched by the authority responsible for civil protection on the side of caution - too much caution in this case that caused unnecessary mass confusion.

During Hurricane Sandy, social media were primary sources of information for many people. The authorities realized its importance and decided to verify the information and attempted to prevent the spread of misinformation brought about by several false alarms. In one for instance, a fake photo of the New York Stock Exchange under three feet of water started to be distributed along with false tweets and other intentionally misleading reports and images. The New York City Fire Department posted messages on Twitter and other social media sites to correct such misinformation.

2.5 CHALLENGES OF SOCIAL MEDIA USE IN EMERGENCY SITUATIONS

It is now clear that social media is here to stay but there are challenges that should be taken into consideration in disaster situations. These challenges can broadly be divided into technological and infrastructure, regulatory and reliability perspectives.

Technological and infrastructure

Social media use is inextricably linked to technology. Users of social media access the various platforms and services through their computers, smart phones, and other mobile devices. These days smart phones contain GPS receivers and applications, which provide the exact location of the person who uses the phone. In a disaster, the information of the exact location of victims who need aid is vital, however not all users provide that data. Thus far, less that 5% of users have provided location information with their tweets due to privacy concerns and lack of awareness.

Moreover, we should not underestimate the part of the population, which does not know how to use social media prior to disasters and this means that they will not be able to use social media at all when the disaster happens. Research following the 2011 earthquake in Japan showed that there is important forward work to be done to help the elderly and others in the population who may not regularly use computers and social media so as not to marginalize them during disaster recovery efforts.

Another challenge to the use of social media in disaster management is the resiliency of a region's power and communications infrastructures. Disasters often result in the loss of electric power and the ability to communicate by phone or via the Internet. This results in difficulties in reaching family and friends and posting information on the Web and via social media. The problem is exacerbated when access to infrastructure is limited even

before the disaster occurs. In cases where individuals have no previous access to Internet and technology because of their low-socio economic situation, it automatically means that there is a part of the society that will have to struggle without access to information in real-time during a crisis.

Regulatory and reliability

The use of social media in disaster management is still in its early stages, and as a result there is still some uneasiness on how to use it, both on the side of the authorities and amongst the public. It follows as well that there are very few, if any, laws or policies in place to direct the handling of information and social media strategies in a crisis situation. In the case of the 2007 Southern California fires, local citizens depended on the information they shared amongst themselves in order to decide their course of action since the authorities had not been prepared to handle the large amount of data and communications exchange simultaneously occurring over several media. This can be interpreted as evidence of a lack of clear regulations and planning on the part of the authorities on how to deal with social media communications in a disaster scenario.

In a broader sense, the increased use of social media in disaster management raises questions with regards to privacy, liability, and security, along with all the associated legal considerations, which may help to explain the relatively slow development of appropriate regulatory frameworks. Social media users may or may not understand the fine-print details of privacy and data sharing policies of the platforms they use, and it is perhaps still unclear how crisis response organizations can use the data shared on these platforms. With regards to liability, important debates arise on whether a person in the public or within a disaster management team uses or withholds information that could cause or prevent damage or loss of life. It becomes rather difficult to understand who is liable if someone unintentionally uses or disseminates information that turns out to be incorrect; in the case of someone that intentionally spreads misinformation, as noted earlier in the case of the false rumors regarding the New York Stock Exchange during Hurricane Sandy, some may argue that legal action should be taken against the person spreading the false news. The design of social media platforms are at the heart of the security discussion, since the quality and reliability of the data being shared depend on the robustness of the platforms themselves and the networks they operate on.

Emergency managers must react quickly based on the most current information of a situation and past experiences in similar circumstances. Large volumes of data coming from social media can be very useful but their use is often hampered by concerns over the reliability of the data and its trustworthiness.

Chapter 3 Design and Modelling

To utilize the large amount of valuable information from social media to assist disaster management, we should collect information from a number of freely available social data sources on the web, such as news feeds, personal blogs, tagged images, and mini feeds. Data from social media are heterogeneous in representation and semantics; therefore, we integrate the collected social data, and provide a unified query interface to users. The social media websites that would be searched. Although there are many social media websites, the most popular ones such as Facebook, Twitter. The appropriate keywords that would be used for search. This is critical as many users may not have detailed expertise or knowledge, and their resultant query formulations may be deficient and lead to incorrect responses.

The way the search engine represented social media websites across different search result. Integration of location based information through a map interface will further enhance people's awareness in their geographic area of crisis, which is especially important in an emergency environment. The appropriate keywords that would be used for search. This is critical as many users may not have detailed expertise or knowledge, and their resultant query formulations may be deficient and lead to incorrect responses.

Over the last few decades, the importance of effective management of information is being increasingly recognized in disaster management. A number of countries have set up disaster management information systems according to their own specific needs. The applications of these systems range from emergency response planning to short-range early warning to long-range mitigation and prevention planning. A variety of information and communication technologies (ICT) have been proposed for managing national, regional, or local natural disasters and man-made crises. ICT can be applied during different stages of a disaster, including disaster prevention, mitigation, preparedness, disaster response, and disaster recovery. Basically, IT technologies can be used for:

(a) Effective warning of disasters using different communication channels,

(b) Integrating information on necessary supplies and other sources;

(c) Coordinating disaster relief work;

(d) Encouraging social, institutional, and public responses;

(e) Evaluating the damages caused by a disaster and the need for disaster relief.

3.1 Requirements for Disaster Management Systems

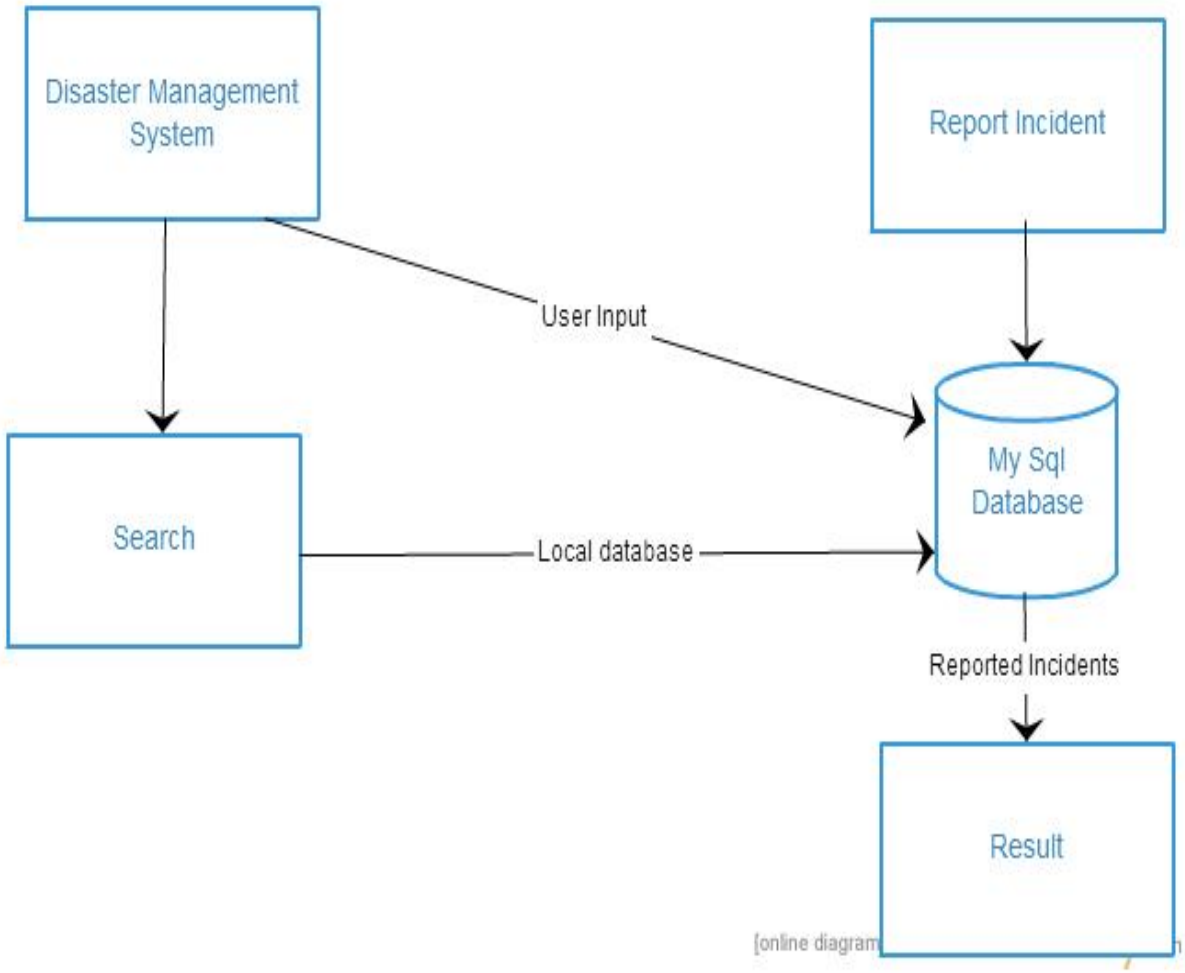
Some general functional and non-functional requirements for Disaster Management Systems.

Functional Requirements only dependability is considered here, because of its primary importance in Emergency management. Dependability is the extent to which a system performs the task it is supposed to. Specific criterions are used to determine how dependably a system works such as confidentiality, data integrity and availability. Disaster management systems work with patient's data, relief unit's data as well as general situation data. Data of such nature should be kept safe and unavailable to unauthorized access. Specific confidentiality criterions have to be determined and fulfilled for every system. High availability in life critical applications such as Disaster Management Systems is a must.

3.2. Design Overview

There are two major features that the system offers: The first is search feature. This feature searches the queried information against the real-time information from social websites and the local database of reported incidents. In our current implementation, we have initially considered incorporating the Twitter social media platform as the source of user generated content. These messages are commonly referred to as the ―tweets‖ and forwarding these messages are referred to as ―retweets‖ according to the Twitter jargon. System fetches the tweet updates based on the keyword search and selected geographic location. These updates are topographically depicted on the Google maps based on the latitudinal and longitudinal information of the source of tweets.

The second feature is report Feature. This feature allows the user to record an incident in geographic vicinity that they have witnessed. This further pops up in the search query results if another user searches for information in the particular geographic location where the incident was reported. Then the engine fetches the results that match the query, from both social sites and local database and displays it to the use**r.**


Disaster Management System
Report Incident
User Input
My Sql Database
Search
Local database
Reported Incidents
Result

3.2.1. Specific Requirements

3.2.1. External Interfaces

User Interfaces

i. Name: NetBeans

ii. Description of Purpose:

To provide a platform for taking the input from user and displaying the output to the user.

iii. Source of input or destination of output:

a. Input source: Query (by the end user)

b. Output Destination: NetBeans.

3.2.2. Functions

i. The system shall take the query from the user.

ii. Store information reported by the user in MySQL database.

iii. Display the relevant answers to the user.

MODULE 1

Input query

Input Question posted by the user

Functionality To take input from the user interface and provide to the system as user query.

MODULE 2

Input: The query posted by the user.

Output: Keywords for search

Functionality: To search local database and web for the requested query.

MODULE 3

Extract data from Twitter using Twitter API

Input Search Keywords

Functionality: Search twitter for the keywords given by user.

MODULE 4

Map the local

Output answer to the user's query

Functionality: To map the location of the tweet on the Google Map

Using Google API.

MODULE 5

Notifications to the users.

Functionality: Send Notifications to the users.

3.2.3. Performance Requirements

Performance requirements deals with both the static and the dynamic numerical requirements placed on the software or on human interaction with the software as a whole.

3.2.4. Logical database Requirements

This specifies the logical requirements for any information that is to be placed into a database.

3.2.4.2. Accessing capabilities:

Only the system shall access the logical database and all the results of various tests and the user can only put entries into database but can't make changes to the existing one.

3.2.4.4. Integrity constraints:

Integrating the information of separate entities in a particular scenario shall be taken care of. A consistent hit count for a particular should be maintained throughout the database.

3.2.4.5. Data retention requirements:

Data retention of all the necessary information in the database for further processing.

3.2.4. Software Attributes

3.2.4.1. Reliability:

A reliable Java and MYSQL platform, embedded in MySQL is been used for the development of the web application.

3.2.4.2. Availability:

Software should be available to use at all times and should work properly at all times.

3.2.4.3. Security

Only Developer can access database fully so as to keep the database secure. Users can only enter and read data in database but can't make any changes to it.

3.2.4.4. Maintainability:

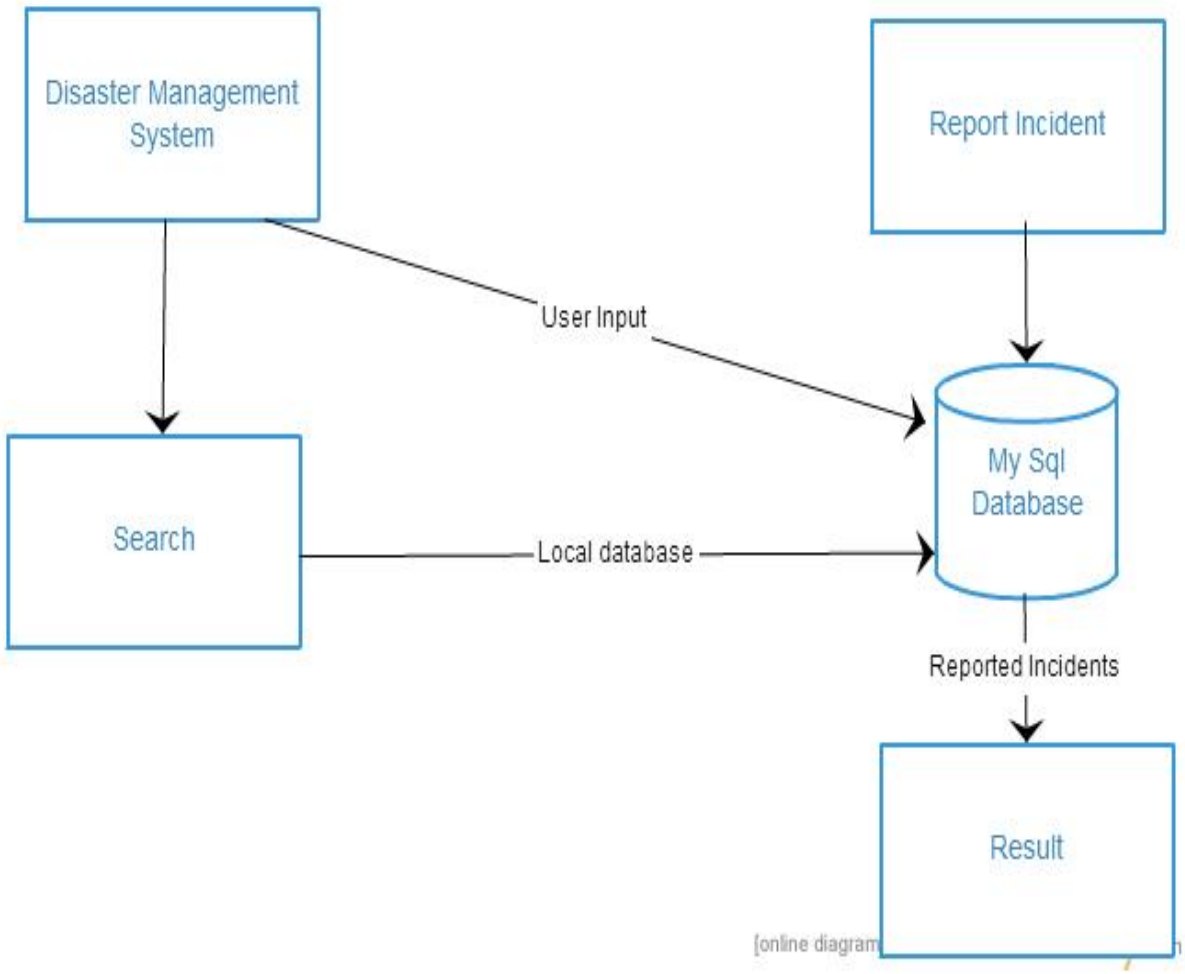
This specifies to the attributes of the software that relate to the ease of maintenance of the software. In the project, modularity is taken into consideration and separate modules like search key, report and extract shall be implemented.

3.2.4.5. Portability:

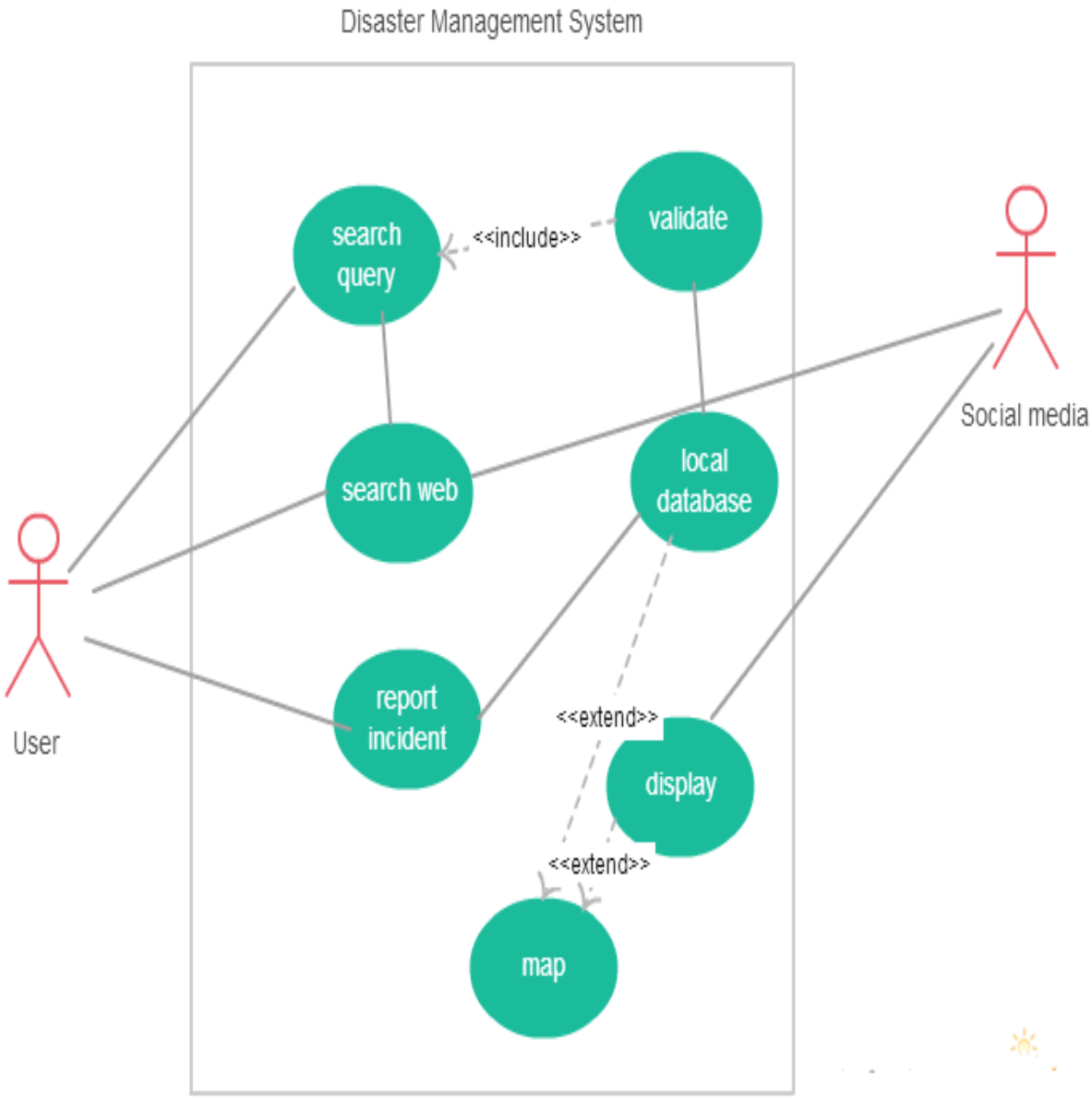
As the system is an online web application, thus there would be no issues of portability as it would be available on the internet. Thus, making it OS independent and host independent.

3.3. Design Diagrams

Flow Chart:



Use Case Diagram:



Chapter 4 Implementation

4.1 Implementation

Search

The first and foremost step is to accept the users input through a web user interface. The user input may include the following parameters: Search Keyword and Location. User search by using the keyword. The search is further narrowed down using city entered by the user. With this the user is providing the ystem with location of interest.

Report

Report incident is an important feature of the system, which enables the user to submit emergency related information. Once an incident is reported, it is stored in the local database and can be retrieved by searching.

Search Web:

Extract tweets from Twitter using Twitter API by finding match to the keywords entered by the user and then store the relevant information like place, user details etc. We can only access those tweets which are public and private tweets can't be accessed because of privacy issues. There are more limitation like number of tweets extracted is limited and is also limited to the time frame also. So, number of tweets accessed is limited.

Map location:

By getting the location of the tweets we can map those tweets by using Google Map API. Here we get location of user and map it on the Google map. This shows us the intensity of problem in the every area and also shows the areas that are hit the most and we can distribute our resources accordingly to the need of the area. This will save time and efforts and will make rescue operations fast and efficient.

Limitations:

By using Twitter API we can extract tweets but there is limitation as we can't exceed the limit for the number of tweets. There is limitation of time as we can only get limited tweets in limited time.

4.2 Source Code

The JAVA implementation of system is divided into three classes: the Main class,Search class and the report class. The search class contains method to retrieve information and the report class to report any incident by user. The main class calls the search class.

Main Class:

```
public class fproject {

public static void main(String[] args) {

 fproject f=new fproject();

 NewJFrame hm=new NewJFrame();

 hm.setVisible(true);


    }

}
```

Search Classs:

In this class User enter his query to search in local database or search query on the web. User can search local database where queries reported by other users is stored and user can access those queries to get information.

User can also search for information directly on the web. User enters query and it will be searched on the Twitter by using Keyword and result matching those keywords will be returned to the user and displayed along with the visual description on the map.

```
Class.forName("com.mysql.jdbc.Driver");
  Connection con=DriverManager.getConnection("jdbc:mysql:///incident","","");
  PreparedStatement ps=con.prepareStatement("select * from rep_incident where
        title=? and city=?"); //To retrieve data from database
  ps.setString(1,ts);
  ps.setString(2,ct);



  ResultSet rs=ps.executeQuery();
    System.out.println(i);
  i=0;


    i=1;
   jLabel6.setText(" ");
  desc=rs.getString("descp");
  date=rs.getString("city");
  title=rs.getString("title");
  System.out.println(title+" "+desc+" "+date);
```

```
System.out.println(i);
```

Report Class:

In this class user can report the incidents along with title, description, location which is stored in local database and can be accessed any time by users.

DataBase Connectivity code:

To report data by users and store in local database.

```
Class.forName("com.mysql.jdbc.Driver");
  Connection con=DriverManager.getConnection("jdbc:mysql:///incident","","");
  int id=0;
  PreparedStatement ps1=con.prepareStatement("select id from rep_incident");
  ResultSet rs1=ps1.executeQuery();
 while(rs1.next())
   id=rs1.getInt("id")
  PreparedStatement ps=con.prepareStatement("insert into rep_incident values(?,?,?,?,?)");
  ps.setInt(1,id+1);
  ps.setString(2,title);
  ps.setString(3,desc);
  ps.setString(4,city);
  ps.setString(5,date);
```

```
int i=ps.executeUpdate();
```

Extract Class:

When user search for query online Twitter API used in this class will search Twitter and return the output to the user along with the source, location, id etc. This information can be stored in database and can be used by the developer.

```
import twitter4j.*;
import twitter4j.conf.*;            /* Include twitter API */
ConfigurationBuilder cb = new ConfigurationBuilder();   /* Authorization */
   cb.setDebugEnabled(true)
        .setOAuthConsumerKey("Key")
    .setOAuthConsumerSecret("Key")
        .setOAuthAccessToken("Token")
        .setOAuthAccessTokenSecret("Token");
   TwitterFactory tf = new TwitterFactory(cb.build());
   Twitter twitter = tf.getInstance();
         query = new Query(“Keyword");/*Searching Keyword*/
         QueryResult result;
         result = twitter.search(query);/*Returns Result*/
         List<Status> tweets = result.getTweets();/*store rexult*/
```

Map Class:

In this the location given by the Extract class will be used and mapped on the map. This will tell managers where they need to put more efforts and resources and will tell the extent of problem in that area.

```
static final String SAMPLE_TABLE_ID = "12421761926155747447-
06672618218968397709";

 static final String PUBLIC_API_KEY = "YOUR_API_KEY_GOES_HERE";


MapsEngineRequestInitializer apiKeyInitializer = new
MapsEngineRequestInitializer(PUBLIC_API_KEY);


   MapsEngine engine = new MapsEngine.Builder(transport, jsonFactory, null)

    .setMapsEngineRequestInitializer(apiKeyInitializer)

      .setApplicationName("Google-MapsEngineSample/1.0")

      .build();
```

4.3 Databases

We have maintained a local database where user can report the incidents happened along with the city. Other users can access the information by searching in the database by using keywords and location. Database to store social media information with location, date, and type of disaster.

After searching for keyword on web data will be directly displayed on output along with other information and map showing location on the Google map.

Chapter 5 Conclusion And Future Work

5.1 Conclusion

With increasingly more individuals using their mobile phones to go online worldwide, surpassing time spent on traditional media such as television, radio and print, it would be essential to carefully consider how social media applications can be incorporated into an integrated crisis management platform for effective crisis management. Leveraging social media technologies for crisis management provide citizens with a greater role in preparing for and managing crises which will help build resilient communities. Embracing resilience as a civic value and a social norm should ultimately be the way forward to encourage citizens to take the actions necessary to help themselves and others during times of crisis.

Social media appear to be making inroads into emergency management for a variety of reasons. For one, accurate, reliable, and timely information is vital for public safety before, during, and after an incident. As people continue to embrace new technologies, use of social media will likely increase. Moreover, as its popularity grows, a significant number of people will likely choose social media as their main source of information. They may also increasingly expect that agencies will also use social media to meet their informational needs. Many emergency managers and agencies have already adopted the use of social media to meet this expectation. However, they also started using social media because they believe it provides another tool to disseminate important public safety information.

In addition, beyond informational purposes, the use of social media not only allows people to interact and communicate in ways that are not possible through other media, but in some cases it has allowed response organizations and victims to interact and communicate with each other when traditional media were unavailable. Some would say that social media can be used to improve emergency management capabilities and that the promise of such positive results merit further use of social media for emergencies and disasters.

It could be argued that the positive results of social media witnessed thus far have been largely anecdotal and that the use of social media is insufficiently developed to draw reliable conclusions on the matter. By this measure, it should therefore be further examined and researched before being adopted and used for emergencies and disasters.

5.2 Future Work

This tool will assist people to collect, visualize, and propagate real-time information. The user interface is extremely user friendly and can be easily understood and operable by a layman. This tool will enable the community to respond to emergency or event in a fast and effective manner, by provision of information concerning the ground-zero‖ situation. The current tool has limitations and lot of enhancements can be made to the existing tool. Apart from twitter, a number of other social networking sites can be integrated into the tool to press for a larger informational database. Ranking the results based on the trusted sources of information and by tracking the ―current most trending‖ words related to the emergency in a particular geographic location. Additionally the types of emergencies and disasters can be further classified at a micro level. Validate the user reported emergency information to check the format before storing it in the local database tables.

It cannot be emphasized enough that social media allows for wide-scale interaction that can be collectively resourceful, self-policing, and generative of information that is otherwise hard to obtain in a disaster area. In this paper, we introduce monitoring system for disaster management. This system crawls social big data, especially Twitter, analyses the disaster-related tweets, and displays disaster situations and trends in a map.

By using this system to manage disasters, we could expect the changes of disaster management: not predicting a simple hazard based on the structured data but sensing and analyzing signs using social data as well as the structured disaster data. We have a long way yet to put this system to practical use. For intelligence disaster management, we plan to research and develop the big data technique for disaster sign detection and response from

2013 by two step planning. First, for sensing disaster using unstructured data, we will develop the analysis and monitoring technology of unstructured data, mainly text, and then build the disaster sign sensing system. In the future, by developing the integrated analysis between structured data and unstructured data, namely big data, an intelligence disaster response system will come true.

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APPENDIX:

Search UI:

Report UI:


Home
Disaster Management System
Report Incident
Title
jTextField1
Discription
jTextField2
City
jTextField3