Natural Disaster Management using Cloud Computing

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Abstract - In recent years, world has been hit by so many natural disasters which has adverse events of the Earth; they consist of floods, volcanic eruptions, earthquakes, tsunamis, hurricanes, tornado, landslides and other geologic processes. Some of the examples of recent natural disasters are devastating floods and landslides in Uttarakhand on June 2013, a volcanic eruption in Japan in 2014, tsunami in Japan on March 2011. These disasters remind us that we are far away from the prepared emergencies.

In this paper I have examined the real-time interaction of incidents of Natural Disasters, in Twitter, and designed an algorithm to examine tweets and to discover goal events. To detect goal events I have work out on collecting Twitter data, looking at free APIs provided by Twitter and also categorization of tweets on basis of aspects such as the keywords in a tweet. I have also worked out in storing Twitter data in a tangible way for use in real-time application and constituted a secular model to calculate time of happening of the event. Finally, I have used MATLAB to show the analysis as a result where common measures and algorithms are used to analyze the data.

Keywords - Twitter; Disaster Management; Hashtags; Tweeter4j; Matlab.

I. INTRODUCTION

The usage of social media for emergencies and disasters on an organizational degree may be formed of as two broad categories. First, social media can be used slightly passively to circulate information and receive user activity via incoming messages, wall posts, and polls. A second conception involves the tabular use of social media as an emergency management tool.

There is a diminutive but increasing study going on how the community uses Twitter in period of emergency. Many authors have reported a huge amount of conversations and considerable information substitute on Twitter during disaster and mass union events. Information interchanging relied on extensive self-organizing and information selection with on the emergence of personality that became information area to the quickly mounting legions of their group. Moreover, Starbird et al. [1] without a doubt demonstrated that people search for out and even freedom for official information, augmenting, to a certain extent than discounting statements issued by disaster services and mass medium outlet. This time after time experimental privilege of information superficially gleaned from administrator sources on Twitter suggests that conventional transmitting media are not only retaining their significance for disseminating disaster information, but also that this information now can be given additional influence

and legitimization from side to side the rumor scenery of Twitter communication [12]. So far Twitter-based communication comes with affordances of interactivity and viewer's option in conduct that conventional danger communication channels by no means did.

Members of the community sending and receiving messages are barely solitary part of Twitter's forthcoming self-motivated. Based on the journalism in brief reviewed that Twitter communication for the duration of times of disaster and catastrophe cataract into four broad categories:

- Twitter users redistributing self-generated post concerning the disaster to their social networks.
- Twitter users re-tweeting post acknowledged from members of their social networks, conventional media, unconstitutional, and administrator sources.
- Disaster management professionals using Twitter in whichever administrator or unauthorized capacities to send post to the community in exaggerated communities or the public at huge.
- Disaster management professionals monitoring twitter feeds as of the community to collect information throughout period of disaster.

II. SOCIAL MEDIA IN DISASTER MANAGEMENT

The function of social media in arouse of natural disasters at a halt is indistinguishable, but sites like Facebook, Twitter and YouTube can be of immense assessment when tsunamis, earthquakes, floods and other natural disasters hits. Social media [2, 10]:

- Provides valuable information to persons in a disaster region before and after disaster (via Internet, if available, or SMS updates).
- Drives consciousness to persons exterior the exaggerated areas, generating volunteers as well donors.
- Connects misplaced family & friends.
- Provides information in relation to available possessions, and in most horrible case scenarios, bodies.
- Offers information regarding relieve, centers and additional resources accessible to persons exaggerated.

III. PRIOR WORK

The purpose of the study was to appreciate the association between the real-time data of a disaster and its fundamental characteristics. While the scale of disaster information has worked nearly related to our concept of event considered the

more common phenomenon of sequential difference of content on Twitter [3]. That work focused on the transmission of various hashtags in the Twitter context as a time series data, without custody in context the precise events these individual hashtags connect with. A connected study measured the dynamics of hashtag in terms of expansion and determination on an increasing scale [4]. They, though, based their studies on numerous hashtags from the same event—the 2012 U.S Presidential elections.

Crisis informatics studies on Twitter lean to moreover sincerely analyze a particular event or realize a consistent mining framework on a little curate datasets. Those focused on a exacting event rarely for overall structure of the Twitter feed. One study designs the Twitter signature for the Australian Black Saturday bushfire, but just to point out the augmented event traffic [5]. Likewise, Sakaki et al. used the signature to for sub events in the case of numerous earthquakes and use exponential allocation to explain the signature in itself [6].

Doan et al. deliberate the 2011 Tohuku earthquake and study public awareness and concern [7]. Terpstra et al. studied Twitter movement due to a storm that hit a music festival in Belgium [8]. Finally Haji et al. study the three different events and explained in terms of numerous characteristics of disaster: foreknowledge, period, harshness and news media engagement [9].

IV. Datasets

The study goes on two logically different natural disasters, serving us to recognize the dynamics of public reactions toward the disaster in every critical situation. For every, our objective was to take out and distinguish key features in the events. We used the Twitter4j approach to accumulate data streams, across the time period during which the event occurred, with a focal point on the reaction on Twitter users toward the natural disaster hazards (e.g., Flood, tornados, and high waters) were present in that area.

A. Flood

By using the "#Flood" hashtags; analyzed the dataset which was collected through streaming API to give proper attention to the post event tweet data. Particularly, this was straight away documented as an act of disaster and, as such, it established instantaneous and all over the country concentration from news organizations. During the collection of data I have collected 743 tweets with the user id, user name and the tweet information. The data collected was unfiltered tweets which was stored and used in the study.

B. Tornado

By using the "#tornado" hashtags; investigated the dataset which was composed through streaming API to give appropriate concentration to the post event tweet data. Particularly, this was directly recognized as and be active of disaster and it conventional immediate and all over the country attentiveness from news organizations. During the collection of data I have collected 1541 tweets with the user id, user

name and the tweet information. The data collected was unfiltered tweets which was stored and used in the study.

C. 2013 Uttarakhand Flood

By using the "#uttarakhandflood" hashtags; investigated the dataset which was composed through streaming API to give appropriate concentration to the post event tweet data. Particularly, this was directly recognized as and be active of disaster and it conventional immediate and all over the country attentiveness from news organizations. During the collection of data I have collected 667 tweets with the user id, user name and the tweet information. The data collected was unfiltered tweets which was stored and used in the study.

V. Methods

A. Event Definition

The objective in this thesis was to approximate and analysis the Twitter events of dissimilar natural disasters. Earlier I have distinct the event of Twitter straight or circuitously associated to that event.

Twitter users are predisposed to congregate on the use of a miniature number of hashtags when discussing a scrupulous topic or event, with hashtags attractiveness reliant on appropriate features and length and privileged connection being associated with acceptance. Therefore, subsequent previous work, we use a set of recognized hashtags to tweets concerning a specified natural disaster. In array to attain complete and relational quantity procedures for a specified time period, we calculate the number of tweets in the time period. We have used 3 hashtags #flood, #tornado and #uttarakhandflood to designate event-related contented. These hashtags were then used to compute topic frequencies for each event, with the presence of whichever of these hashtags in a tweet being tagged as event-related.

Finally these hashtags are the part of the analysis of every event, we reflected on the event-specific.
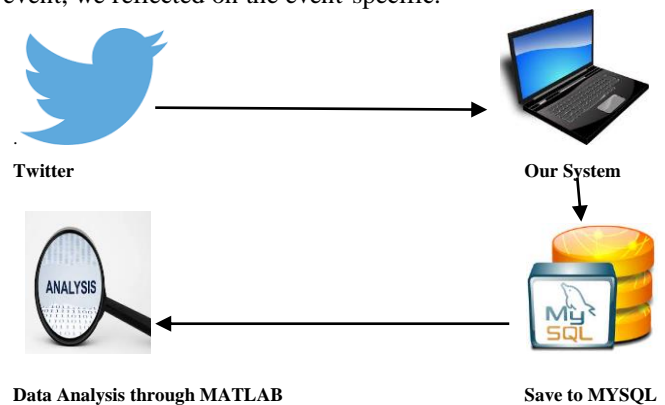

Fig.1: System Architecture

B. Collecting the Data

Penetrating on Twitter is assisted through the use of parameters. Adequate parameter principles for investigate include keywords, hashtags, phrases, geographic regions, and usernames or user ids. With the help of keyword we have

stored data in MYSQL. I have collected the tweets with User ID, User Name, User Text and Time for the post in the database.

Accessing twitter data is completed by gathering tweets that includes definite keywords or are written by specific users.

There are three major stages regarding data collections are:

- Gathering the data
- Filtering the data and
- Preparing the data

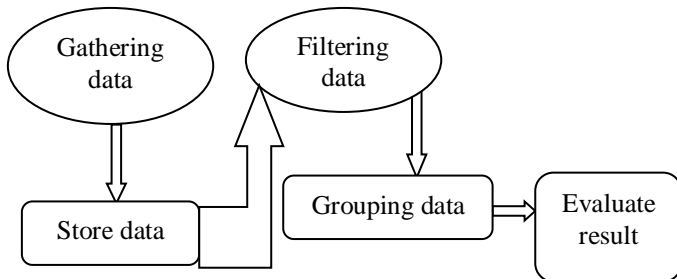The general idea of the procedure is revealed in Figure 2

Fig.2: Process of Data Collection

To make our research more accessible, I have taken out some tweets from key features of twitter. The data base is created which contains the collection of tweets based on the keyword #flood, #tornado and #uttarakhandflood. It contains the columns named as ID, USER, TEXT and TIME which illustrate the User id in twitter, user name as given in the profile of user, the text or the message posted by the user and the time the post was send. All these information is stored accordingly by using streaming API in MYSQL. I have considered the three day event in the analysis which resulted in a dataset of approximately of 2497 tweets for #flood, 1714 tweets for #tornado and 667 tweets for #uttarakhandflood.
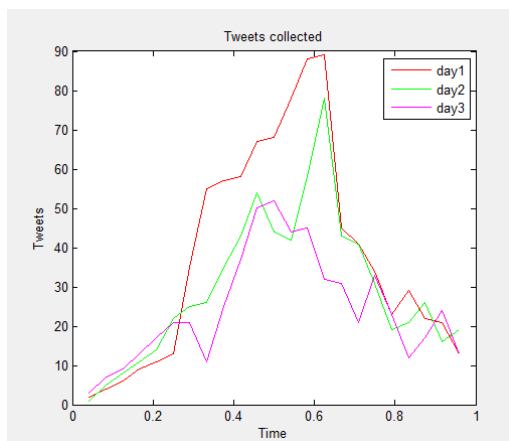

Fig.3: Volume of Tweets received during three randomly chosen days.

To estimate and study the twitter volume for tweets for the disaster it is deliberate the time-compressed frequency to diminish the effect of different user activity at different times of the day. The plots for the Figure 2 were engendered to

analyze the dissimilarity in our determined and standard frequency. For there to be prominent effect, we need an event that distance over longer duration, to be in fact impacted by time of day. As we can see in the case of the graph, the calculation boots the curve during day one when there is a gigantic user activity. The compute is passive in short duration events, since they are less likely to be precious by the enormous variation in twitter volume frequency.

VI. RESULTS

A. Filtering the Re-tweets

A re-tweet is when someone re-publishes the post of a different Twitter user has posted, to broadcast the post between their own Twitter followers. The matter one may want to re-tweet comprise sweepstakes announcements, links to accommodating articles, or breaking news - in precise, whatever one believe to broadcast from Twitter readers might to attend about. Re-tweeting causes an undulation consequence, helping other people know regarding an interesting Tweet [11].

The Figure 4 shows three bars according to the tweets distributed. The black bar indicates the total tweets, the yellow bar denotes the re-tweets and the blue bar denotes the filtered tweets for different hashtags.
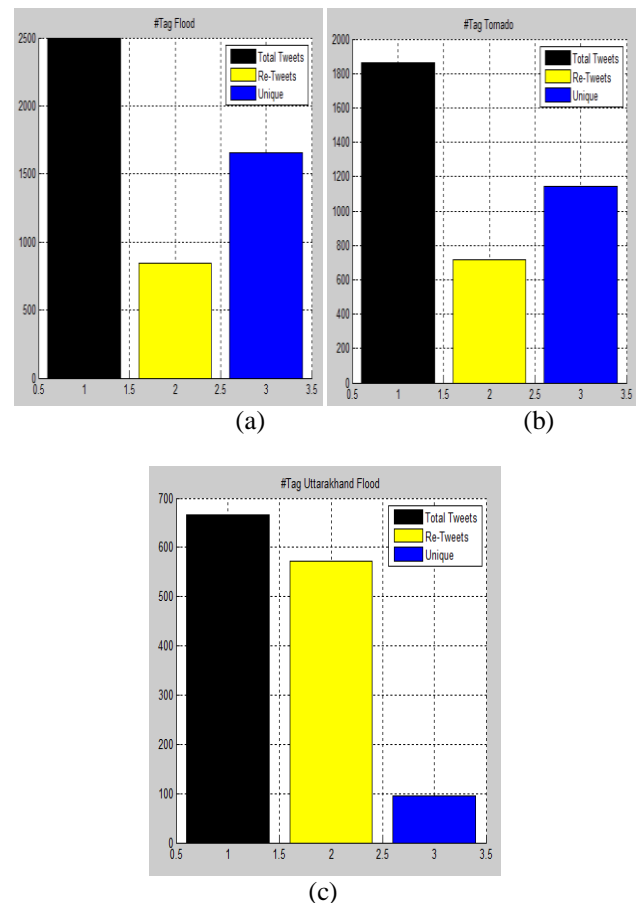

(a)   (b)

(c)

Fig.4: Distribution of tweets on basis of (a) #flood (b) #tornado and (c) #uttarakhandflood.

B. Filtering the Authenticate Data

After the filtration of re-tweets and the authenticate data it is the main aim to show the total number of data that is filtered. On the basis of filtration and analysis of the tweets it the most important query that how much data is precise from the given database. As I have collected 2497 tweets of #flood, 1864 tweets for #tornado and 667 tweets for #uttarakhandflood from the streaming API of twitter (real-time data), after not including the re-tweets and then the inappropriate post from comparing the warning that have created to valid tweets. The Figure 5 shows the total amount of data which was relevant to the disaster flood was 254 for #flood, 556 for #tornado and 0 for #uttarakhandflood. This demonstrates that from an enormous amount of stream of post we are able to retrieve the accurate data which contains the information about the flood disaster and that be used further and also the result for Uttarakhand demonstrate that the irrelevant data that does not indicate the real based information about disaster is filtered.
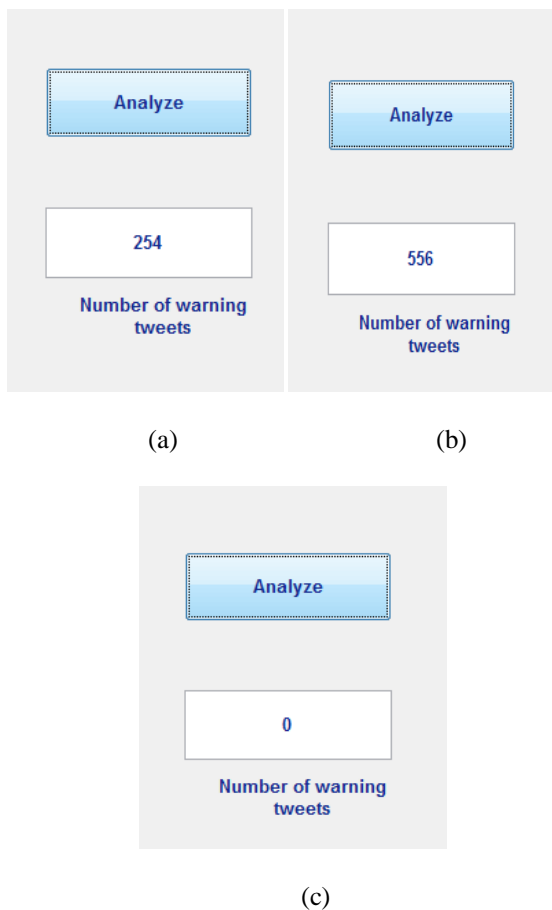

(a)   (b)

(c)

Fig.5: Number of authenticate tweets for the (a) #flood 254 out of 2497 (b) #tornado 556 out of 1864 and (c) #utatrakhandflood 0 out of 667.

VII. CONCLUSION AND FUTURE WORK

Accordingly, this study projected a framework for natural disaster management. The definitive purpose of natural disaster management is to make possible enhanced and knowledgeable disaster decision-making and therefore to trim down the impact of disasters on human lives and belongings. These theses smooth the progress of information assembling and distributing in the course of information achievement and liberation; stores huge amounts of natural disaster correlated data from miscellaneous sources by taking benefit of Twitter.

The #flood, #tornado and #uttarakhandflood hashtags exhibits technique of how Twitter can be used by public welfare and other responders. NGOs and Rescue organization can use and many more hashtags (example #earthquake, #hurricane, #landslide and more) to find and share information concerning about natural disaster which allow citizens and more volunteers to take part in the crises and provide help to the people in need [13].

This thesis expresses that constructive situational consciousness is enthusiastically being posted and shared using Twitter. Social media has specified intensification to the influence of everyday citizens, which permits them to attach with emergency responders easily. Now a day's people are more and more using these social media platforms to be in touch, not just with each other, but as well as with organizations that supply help to the public. Appropriate to the growing significance of communication medium, it would appear irresponsive, perchance even irresponsible, for government institutions to disregard the social media.

Admittedly, the enormous amount of information obtainable on Twitter and other social media platforms can be unapproachable; but, dealing with disputes is possibly one of the small numbers of constants in the world of organization composite disaster management. Tools and strategy revealed throughout this research and by other researchers can lend a hand to growing organization connect their constituents. The time for emergency responders to fasten together the social media has already passed, but the chances continue obtainable for any organization enthusiastic to devote the time and force.

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