The Genesis of Crisis Communication in Twitter: from Witnesses to Gatewatchers

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Abstract

During crisis events individuals look for information and try to share useful content or testify their own experience through social media. The research for valuable information is, relies largely on information provided by news agencies and official actors. This collective behavior leads, on a given amount of time, toward the emergence of gatewatching activities where digital media are used to reshare and to control information. This paper will investigate how this phenomenon emerge looking at the Twitter conversations produced during the first five hours after the earthquake that struck Emilia Romagna region in Italy on May 20th 2012. We have been able to detect, in the early user-led phase of the phenomenon, what kind of messages were produced and how user-produced communication results in different network structures.

Keywords

Crisis communication, twitter, social media analysis, social network analysis

Introduction

Aim of this work is to investigate dynamics of information spreading in Twitter during the first 5 hours of the earthquake in Emilia Romagna – Italy (20th May 2012). Focusing on the very beginning user-led phase of the phenomenon, we investigate which type of users and which type of messages filled the information gap and, by then, what happened when traditional media came on stage.

Existing Research

Previous Twitter research on crisis communication shows how there are many different communication strategies played by different type of users and how those users interact in many different ways in times of crisis (Huges and Palen 2009, Bruns and Burges 2012). Other research shows how geo-coded tweets can provide useful insight in order to understand both users' behaviors and the event itself (Earle et al. 2010, Guy et al. 2010, Sakaki et al. 2010, Longueville et al. 2009)

Research on news spreading activities (Mendoza and Poblete 2010) showed how users make a "quality check" recognizing true claims or false rumors and how errors might be corrected (Sutton et al. 2008), while recent approaches worked on a comparative research on a large number of case studies (Bruns and Stieglitz 2012) to show how events can present stable and comparable usage pattern

Dataset

The Twitter dataset has been collected using an ad-hoc version of yourTwapperkeeper software. The monitoring activity on the #terremoto hashtag started on May 5th 2012 - well before the actual earthquake - and ceased on Jan. 1st 2013. Although the very large dataset we are focusing on messages produced on May 20th from 4:00 am to 9:00 am. This is, for the goals of this paper, of paramount importance in order to be able to understand the dynamics taking place in the very few hours after a crisis event that have not been, mainly due to the technical difficulties of acquiring data starting from time zero, largely studied. The dataset counts 24121 tweets produced by 11219 distinct

users. The total amount of tweets contains, as expected for this kind of event, a large quantity of retweets (13252), a smaller quantity of reply messages (1819) and a fairly large quantity of messages containing link to external resources (8067).

From digital witnesses to gatewatchers

Basic indication of the type of users' communicative intentions might be obtained by observing the nature of the messages (tweet, retweet, replay), which are all shown in Figure 1. What can easily be noticed is that the ratio between retweets and tweets changes over time showing a proportional growth of retweeting activity compared with a less intense tweeting activity. Bruns and Stieglitz (Bruns and Stieglitz, 2012) show how by plotting the percentage of URLs in tweets against the percentage of

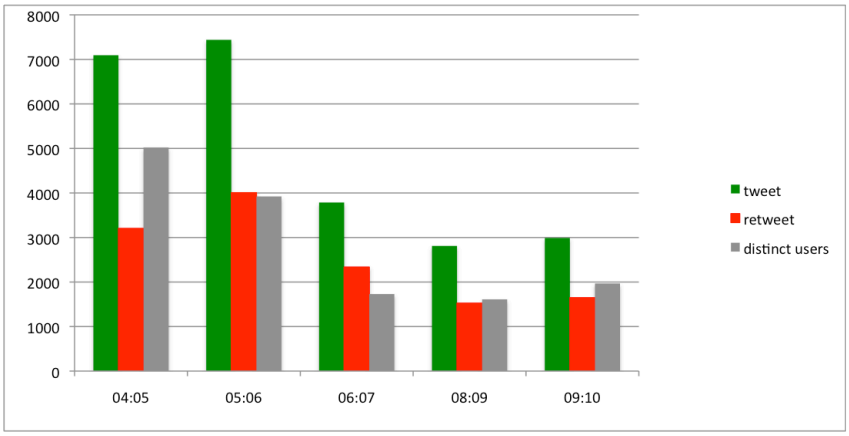

Figure 1: Tweet, retweets and single users per hour.

retweets in the overall data set it is possible to detect two specific clusters of hashtag case: breaking-news events and media events. The first cluster is characterized by collaborative gatewatching practices (Bruns, 2005), while the second is defined by the backchannel chatting arising from a shared media event. From a temporal dynamic perspective it is observable an evolution in the earthquake messages (Figure 2): from witnessing the event to clearer pattern of crisis communication (higher presence of retweets containing external links).

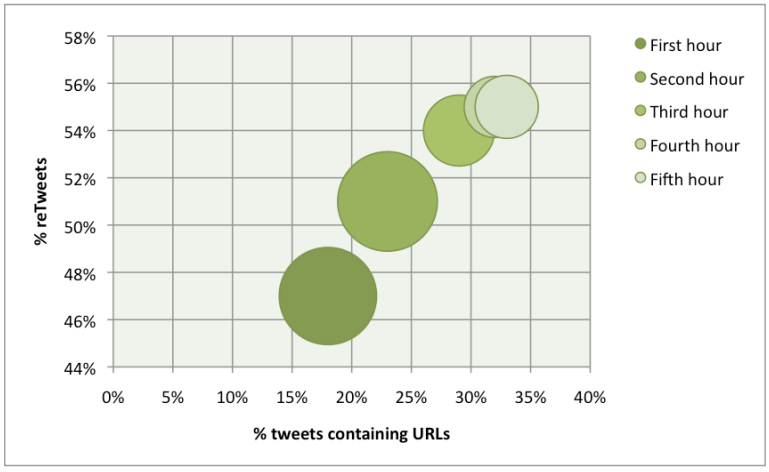

Figure 2: Percentage of retweets and percentage of tweets containing URLs. Size of the bubble is proportional to the number of messages.

We then adopted a SNA approaches to study the network produced by the retweet activity and focused our attention on the presence of a giant component made of users connected to one another through the

retweeting of each other's messages thus creating a more or less stable group of what we have defined gatewatchers. In previous research (Mislove et al. 2007) the analysis of giant component has been used to determine the behaviour of the largest fraction of the network containing both highly active and gregarious users. Nevertheless in our specific case the giant component (GC) contains mainly the most active users, in fact the giant component itself is composed by a relatively small fraction of users (37%) but it contains the largest part of edges (96%). These data result in a higher average degree for the nodes belonging to the GC (1,62) compared to the whole network average degree (0,62).

Figure 3: Evolution of the clustering coefficient over time (time frame 15 mins).

As it can be observed in Figure 3 the clustering coefficient computed on the whole RT network quickly grows up to 0,030 and then slowly stabilizes at approximately 0,034. This stabilization occurs approximately at t = 8 that means exactly 2 hours after the event, the same time when we have detected the change in users' behaviors from witnessing activity to gatewatching activity.

Reading the tweets

We have manually encoded 21937 tweets defining seven categories based on their content and assigned one to each tweet in order to observe aggregate evolution of messages. The categories we have defined are the following: Tell; Information; Ask; Tweet Consciousness; Assumption; Ironic; Complaints. At the beginning users started tweeting messages containing a poor level of information mainly based on their personal experience due to the lack of official information. After the initial shock, they started looking for information on websites and reported these external links in their tweets, or added photos and videos made with the aim of providing evidence acting as a sort of reporters. Simple Users, which represent the largest part of users, structured their tweets to be more and more similar to the official news language. Since information was not provided by the media organizations, had to be produced by the users themselves.

In the time slot from 06:00 a.m. to 07:00 a.m. it is assumable that the news media started broadcasting and this is observable by the growth of retweets, that starting from this point can rely on trustable sources to share information. Number of messages relative to Tell, Tweet Consciousness, Complaints and Ironic categories increase. We have interpreted this as a sign of the need to narrate the human side of the crisis (Tell, Ironic) when news media took back their official role, but it does not mean that the news are just given and shared by the users: they check the quality of the content (Complaints) and try to preserve this quality even underlining mistakes made by the users who retweeted messages without checking if they were correct (Tweet Consciousness).

Conclusions

Our analysis stressed the dynamic aspect of the phenomenon by analyzing the data with a fine level of temporal detail. The major discovery is that, while previous research stressed how users used Twitter during crises event mainly as a gatewatching platform, we are claiming that this is undoubtedly true focusing on the whole event but this emerges after first moment when users mainly witness the event.

Another aspect that we have discovered is that while the usage of Twitter evolves moving from witnessing to gatewatching a concurrent evolution happens in the structure of the retweet network leading to the emergence of a stable weakly connected cluster within the network. In our dataset this phenomena takes place after the second hours when we face at the same time a rise in the ratio between retweets and tweets and the emergence of a highly active giant component.

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