Chapter 51
Microblogs Information Retrieval for Disaster Management:
Identification of Prominent Microblog Users in the Context of Disasters

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ABSTRACT

This chapter proposes a new approach for microblog information retrieval during unexpected disasters. This approach consists of identifying prominent microblog users who are susceptible to share relevant and exclusive information during a specific disaster. By tracking these users, emergency first responders would benefit from a direct access to the valuable information shared in real time in microblogs. In order to identify such users, we represent each microblog user according to his behavior at each particular disaster phase. Through the proposed users' representation, different prediction models are learned in order to identify prominent users at an early stage of each disaster phase. We experimented with different user representations, taking into account both the microblog user behavior and disaster context specificities. We also analyzed the importance of the different microblog users' features categories according to the disaster phase context. The achieved experimental results show the efficiency of our phase-aware-user characterization approach.

INTRODUCTION

Climate change is manifesting itself with various unexpected effects transforming life in our planet. Every corner on earth has been affected by these changes. These new climate patterns provoke a multitude of unexpected disasters characterized by new unanticipated specificities that have never been perceived or analyzed previously. Seasons are shifting, climate is disrupting, etc.

The already collected information related to standard disasters is not anymore sufficient to deal with these unanticipated disasters patterns (Bizid et al., 2015). Managing such disasters requires a real-time situation awareness in the affected areas and surrounding the threatened regions in order to be able to detect, respond to or predict any potential emergencies.

In such situations, emergency first responders use to explore by themselves these threatened or affected regions. Such practices may represent a danger for emergency teams' lives if they do not have enough information about what is happening on the ground (e.g. blocked or damaged highways and bridges, hazardous areas, etc.). It is a waste of time if the previsions and adopted strategies by the emergency teams are not sufficiently precise. For example, targeting a zone with no real emergency risks while another distant region need an immediate intervention.

Microblogging platforms – such as Twitter – offer a real-time access and share of up-to-date information about fresh topics and exclusive events. These platforms are accessible through websites or cellphone applications which allow users to instantly post relevant information about what they are seeing, hearing and experiencing around them. In a disaster case, such platforms may contain valuable information shared to inform or alert a wide range of connected people about what is really happening on the threatened or affected areas. Exploring such platforms during unexpected disasters is indispensable to get vital information out from users geo-located on the affected and threatened areas in a quick and efficient manner.

During major disasters such as Boston Attack and Colorado Floods, it has been observed that exclusive information are generally shared in Twitter in an average of five minutes before their official announcement in media channels outlets and by disaster management organizations. The extraction of such vital information even before five minutes could save thousands of lives (Homeland Security, 2014). Thus, it is important for emergency responders to explore these platforms in order to have a global view about what is really happening and make the right decisions at the right time.

A huge amount of information is shared in microblogs during disasters. Thus, retrieving relevant and fresh information from microblogging platforms remains complex. This information is expressed in several languages and various forms (i.e. images, texts, links and videos). Moreover, the same information may be shared using different contents. Retrieving relevant disaster-related information has been generally addressed by using standard retrieval techniques appropriated for each content type such as text mining, image processing and video analysis (MacEachren, et al., 2010; Starbird & Stamberger, 2012). These mining and retrieval techniques are generally computationally expensive and need to take into account the particularities of both the analyzed disaster and the microblogging platform (Pal & Counts, 2011).

The research efforts directed toward retrieving relevant and exclusive disaster-related information contents have neglected the microblogs specificities that could give a direct indication on relevant and fresh information (e.g. number of favorites, number of retweets of each shared tweet, etc. – in the case of Twitter microblog –) (Starbird & Stamberger, 2012; Paul, Daniel, & Michelle, 2010). Efficiently exploring these specificities may lead us directly to vital relevant and exclusive information without the need to make an in-depth analysis of the tweets contents. However, referring only to the specificities

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