International Journal of Information Management 38 (2018) 86–96

Contents lists available at ScienceDirect

International Journal of Information Management

journal homepage: www.elsevier.com/locate/ijinfomgt

Research Note

Social network analysis: Characteristics of online social networks after a disaster

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ARTICLE INFO

Keywords:
Emergency information
Disaster communication
Social media
Disaster response
Social network analysis (SNA)

ABSTRACT

Social media, such as Twitter and Facebook, plays a critical role in disaster management by propagating emergency information to a disaster-affected community. It ranks as the fourth most popular source for accessing emergency information. Many studies have explored social media data to understand the networks and extract critical information to develop a pre- and post-disaster mitigation plan.

The 2016 flood in Louisiana damaged more than 60,000 homes and was the worst U.S. disaster after Hurricane Sandy in 2012. Parishes in Louisiana actively used their social media to share information with the disaster-affected community – e.g., flood inundation map, locations of emergency shelters, medical services, and debris removal operation. This study applies social network analysis to convert emergency social network data into knowledge. We explore patterns created by the aggregated interactions of online users on Facebook during disaster responses. It provides insights to understand the critical role of social media use for emergency information propagation. The study results show social networks consist of three entities: individuals, emergency agencies, and organizations. The core of a social network consists of numerous individuals. They are actively engaged to share information, communicate with the city of Baton Rouge, and update information. Emergency agencies and organizations are on the periphery of the social network, connecting a community with other communities. The results of this study will help emergency agencies develop their social media operation strategies for a disaster mitigation plan.

1. Introduction

Social media, such as Twitter and Facebook, plays a critical role in disaster management. It is ranked as the fourth most popular source for accessing emergency information (Lindsay, 2011). Mickoleit (2014) identified that government institutions are using platforms such as Twitter, Facebook, and blogs to communicate with their communities. Twitter accounts have been created in 24 out of 34 OECD member countries, which can be compared to 21 out of 34 for Facebook. Many studies have explored the systematic use of social media during emergency responses by extracting social media data to identify needs of a disaster-affected community (Imran, Elbassuoni, Castillo, Diaz, & Meier, 2013; Yin et al., 2015). For example, social media data was used to develop a GIS-based real-time map during 2012 Hurricane Sandy in NYC. It shared emergency information and community needs with emergency agencies and NGOs (Middleton, Middleton, & Modafferi, 2014). Furthermore, real-time data from social media has been used to develop an early warning system for a tornado (Knox et al., 2013; Tyshchuk, Hui, Grabowski, & Wallace, 2011). Social media is used to communicate emergency information and urgent requests between emergency agencies and disaster-affected people (Feldman et al., 2016; Lindsay, 2011). These approaches support emergency agencies in understanding emerging situations rapidly after a disaster.

More than 60,000 homes were damaged in the 2016 flood in Louisiana (Han, 2016). It was the worst disaster after Hurricane Sandy in 2012 (Yan & Flores, 2016). A couple of parishes in Louisiana used their social media to share emergency information with people affected by the disaster. The city of Baton Rouge in Louisiana actively used its social media, such as Facebook and Twitter, to deliver real-time emergency information to the affected people in a timely manner. Few studies have analyzed social network structures and roles during disaster responses. This study applied social network analysis (SNA) to understand the characteristics of social media networks in Louisiana during emergency responses.

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http://dx.doi.org/10.1016/j.ijinfomgt.2017.08.003
Received 30 June 2017; Received in revised form 15 August 2017; Accepted 25 August 2017

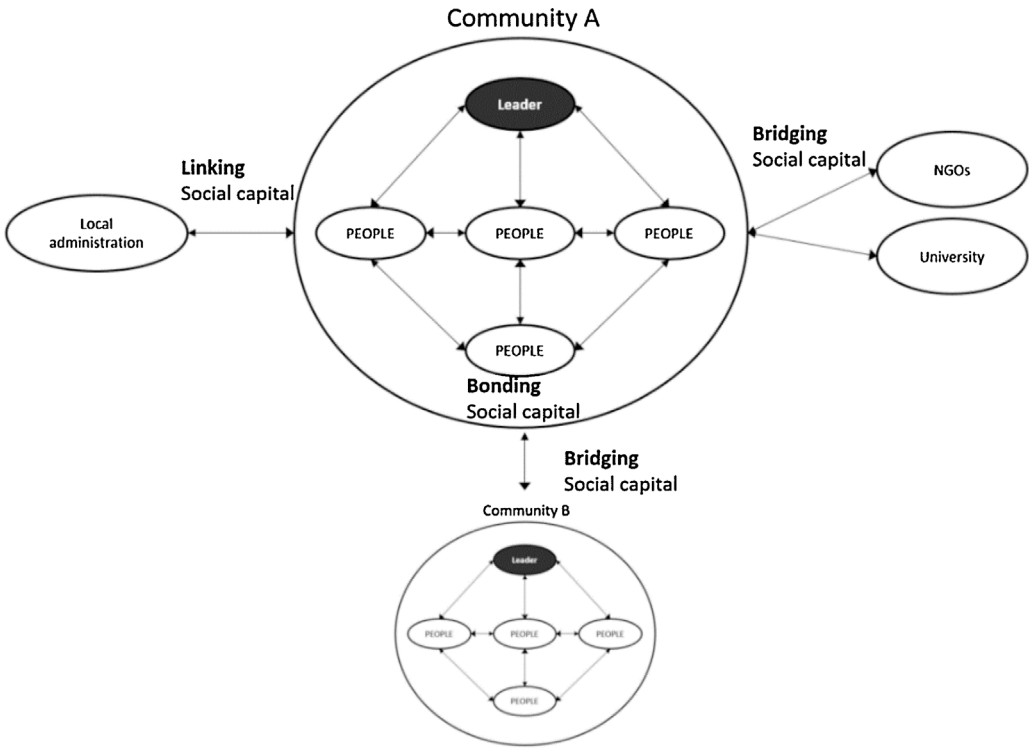

Fig. 1. Conceptual diagram of social capital (Nakagawa & Shaw, 2004).

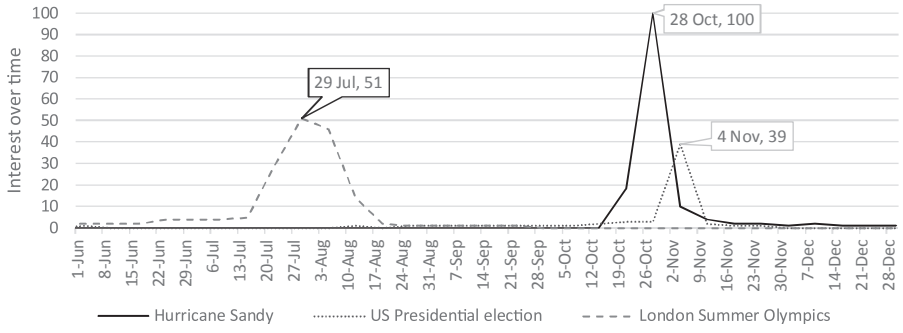

Fig. 2. Search-term comparison during 2012 Hurricane Sandy in the U.S. (Google Trends, 2017a).

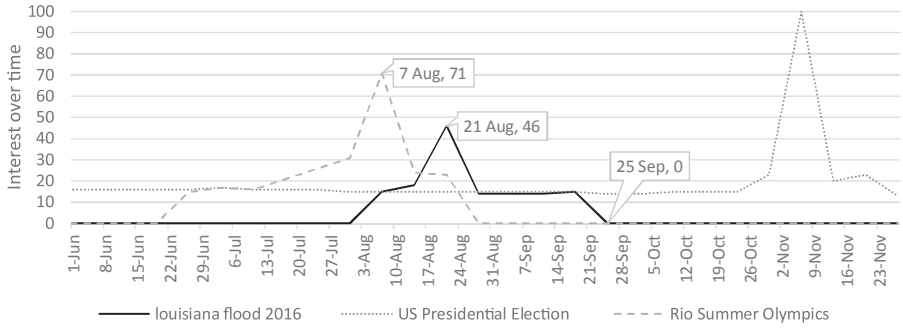

Fig. 3. Search-term comparison during 2016 Louisiana flood in the city of Baton Rouge, Louisiana, USA (Google Trends, 2017b).

2. Literature review

2.1. Social capital for disaster recovery

Social capital can be defined as "the resources accumulated through the relationships among people" (Coleman, 1988). Positive social outcomes from social capital have been identified through public health, lower crime rates, and financial markets (Adler & Kwon, 2002). In general, social capital brings a positive effect of interaction among participants in a social network (Helliwell & Putnam, 2004). Ellison, Steinfield, and Lampe (2007) identified that greater social capital

Table 1
Social media demographics and frequency (Duggan, 2015).

Facebook		Twitter
18–29	82%	32%
30–49	79%	29%
50–64	64%	13%
65+	48%	6%
Daily	70%	38%
Weekly	21%	21%
Less often	9%	40%