Online Human Behaviors on Social Media During Disaster Responses

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Executive summary

Social media plays a critical role in natural disasters as an information propagator that can be leveraged for disaster responses. This study analyzed the online user engagement on social media during the 2016 Louisiana Flood through the lens of Social Network Analysis (SNA). Our findings revealed temporal and spatial characteristics of online social engagement as well as a trend of online users' interests during the flood. We also identified how social capital/infrastructure and community leaders were engaged in improving a flood inundation map. The results will assist emergency agencies and organizations to understand characteristics of social media and the user behaviors during disasters.

Introduction

Social media platforms, such as Twitter and Facebook, play a vital role in disaster management by propagating emergency information to a disaster-affected community. Social media ranks as the fourth most popular source for accessing emergency information. Thus, emergency agencies need to understand characteristics of online social engagement and the network structure created by online user communications to expedite emergency information diffusion via their social media. The 2016 flood in Louisiana damaged more than 60,000 homes and was the worst U.S. disaster after Hurricane Sandy in 2012. The no-name storm deposited about 7.1 trillion gallons of water on Louisiana comparing to Hurricane Katrina (2.3 trillion gallons) and Hurricane Isaac (5.3 trillion gallons). The major media has been criticized by many leaders in Louisiana for the lack of coverage of the 2016 Louisiana flood, especially compared to the other major natural disasters in the U.S. (Berman, 2016; May & Bowerman, 2016; Pallotta, 2016; Scott, 2016). During the period, the media mainly covered the 2016 U.S. presidential election and the 2016 Rio Summer Olympics. Craig Fugate, the administrator of the FEMA, stated: "You have Olympics, you got the election. If you look at the national news, you are probably on the third or fourth page. … We think it is a national headline disaster" (O'Donoghue, 2016). Parishes in Louisiana actively used their social media such as Twitter and Facebook 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 investigated online user behaviors on Facebook in the city of Baton Rouge (CBR) during the 2016 Louisiana flood. We collected data from the Facebook page (facebook.com/cityofbatonrouge) during August 12 – December 1, 2016.

Results

The CBR used both Twitter and Facebook to share emergency information. The number of engagement on Facebook was higher than Twitter during the flood. The trend of Facebook engagement significantly increased in the first two weeks, reached its peak on August 20, and then declined over time: 47% of the engagements were generated within the first two weeks. We measured online user centrality to determine the prominence or importance of users in the network. The degree distributions are very heterogeneous and highly right-skewed (Kim & Hastak, 2018). That is, there were certain hubs in the network. The results revealed that individuals and agencies/organizations have different roles in the network. The individual users actively shared emergency information with their online friends by multiple activities such as tagging their friends, posting a comment, or sharing information with their online community: (1) *like* (76.56%), (2) *comment* (15.55%) and (3) *share a* (7.99%). In contrast, organizations/agencies played a critical role in connecting a network of the city of Baton Rouge with external social groups or online communities as a *gatekeeper*. Overall, the core of the online community consisted of numerous individuals, while agencies and organizations linked other communities.

Conclusions/Discussions

We compared search-term trends about the 2016 Louisiana flood and Hurricane Sandy of 2012. There were summer Olympic Games and presidential elections around the time of both disasters, but the trends of online user interests were significantly different. People's interest in the 2016 Louisiana flood was not significant and was lower than that shown for the summer Olympic Games and the presidential election, even though it was recorded as the worst disaster after Hurricane Sandy. Further investigations are needed to answer how these national events affect emergency information diffusion via social media and user behaviors during disaster responses.

We compared social engagement on Twitter and Facebook operated by CBR. Contrary to literature, disaster-related information was diffused actively via Facebook rather than Twitter during the flood (*as of Oct 3 2018, 10,748 followers on Facebook and 16,500 followers on Twitter*). There might be several reasons behind this. Firstly, Facebook has multiple functions for sharing numerous types of messages including images, videos, and hyperlinks. This flexibility of the platform might help users understand information faster and trigger them to share the information with others. Also, frequency of social media use might affect the difference of online engagement on Twitter and Facebook. Duggan (2015) identified that of Facebook's total number of users, 70% visit the platform daily, while for Twitter this is 38%. Thus, more people might a chance of being engaged in emergency information via Facebook.

Recently, Twitter doubled the text limit from 140 to 280 characters (Issac, 2017). It might affect Twitter user behaviors and patterns during disaster responses.

It is critical for the public to receive accurate, reliable and timely information from emergency agencies during disasters. As our findings reveal, SNA can be used to understand the heterogeneity of a large-scale social network and applied to accelerate information diffusion in emergency. A structure of social network would be homogeneous, but the components (vertices and edges) would be heterogeneous based on the built environment and human behaviors in a community. Thus, emergency agencies keep monitoring online social behaviors and engagement during multiple disasters and understand their characteristics in local-, state- and national level. Most questions could be answered by a multi-case study approach that would compare the use and effectiveness of social media across a broad range of disasters.

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