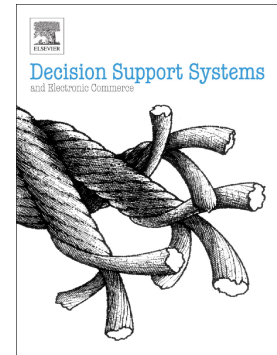


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Disaster Early Warning and Damage Assessment Analysis Using Social Media Data and Geo-Location Information

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Abstract

Societies are confronted with destructive natural disasters of increasing frequency. Social networks are playing an increasingly important role as early warning systems, aiding with rapid disaster assessment and post-disaster recovery. There is a need for both the public and disaster-relief agencies to better understand how social media can be utilized to assess and respond to natural disasters. However, existing research on the role of social media in society's response to natural disasters is neither holistic nor systematic. In this study, we conduct a hierarchical multiscale analysis based on multiple data resources, combining social media data, economic losses, and geo-information. We verify the role played by social media before, during, and after a natural disaster. We investigate whether the combination of social media and geo-location information can contribute to a more efficient early warning system and help with disaster assessment. This paper draws attention to the fact that during a disaster, citizens turn to social media and the majority of tweets contain information about the hurricane and/or its impact with negative sentiment. We demonstrate that the severity of damage in one area is positively correlated with the intensity of disaster-related activity. Meanwhile, the coastal areas and areas with close proximity to Hurricane center tend to suffer from higher losses during a disaster. Our findings explore the role played by social media from individuals in affected populations and how they respond to unfolding natural disasters. Results hold significance with regard to providing timely assistance for both official institutions and netizens.

KEYWORDS: Social media; Geo-location Information; Hurricane Sandy; Disaster early warning; Disaster assessment

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