Mapping Resilience on Social Media: How Online Interactions are Translated Into Mutual Aid Behaviors During the 2022 Buffalo Blizzard

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ABSTRACT:

This study looks into the intersection between urban resilience and crisis informatics through a case study of the 2022 Buffalo blizzard. The rationale for this work comes from the notion that cities are facing unprecedented environmental and social challenges from the increasing frequency of extreme weather events and climate change. In the face of these challenges, the concept of resilience has attracted much attention. Urban resilience can be defined as the systems' capacity to maintain or rapidly return to a steady state, or towards a better state.

Over the last decade, social media has become an effective communication platform during all phases of crises (i.e., preparation, response, recovery, and mitigation). At the same time, the emergent connections fostered by social media have the potential to be converted into long-term relationships and improve community resilience.

We would argue that despite the recognition of social media's role during crises, the mechanism of how individuals' activities on social media affect community resilience at a large scale is underexplored. This causal effect loop is difficult to capture in complex systems where resilience at the macro level not just emerges from individual behaviors, but also their interactions with each other and with the environment. Furthermore, individuals' heterogeneity, autonomy, and adaptation during crises make resilience outcomes difficult to explain. To fill this gap, this research examines the connections between individuals' usage of social media and resilience through a case study of the Buffalo blizzard.

In terms of background, in December 2022, Buffalo (NY) experienced the most devastating storm in its recorded history. The four-day blizzard driven by lake-effect snow knocked out power, paralyzed travel, and left at least 47 dead. While people were isolated at home during the blizzard, they used social media to remain connected. Over 80,000 Buffalonians joined Facebook groups that later became important communication hubs. Online interactions were not limited to information sharing but also stimulated on-ground behaviors where people exchange resources like food and medicine. Even though the blizzard has passed, the Facebook groups remain active and demonstrate value in reconnecting residents in future shocks.

The research question that we aim to understand is "Under what circumstances can online interactions translate into on-ground mutual aids and affect community resilience". To answer this question, we collected Facebook posts and comments sent out during the blizzard. We combine topic modeling, named entity recognition techniques, and manual labeling to analyze the textual data. Next, we explored the social networks in Facebook groups and how they evolved. Based on data analysis and literature, we then create an agent-based model to simulate individuals' behaviors during the blizzard in terms of online interactions and offline mutual aid provisions. The verified and validated model shows where mutual aid occurred. As such, this research shows how one can utilize social media to gain a greater understanding of resilience building and how such data can be integrated into models which can help a better understanding of mutual aid behaviors in future blizzards and hazards more broadly.

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