Crises, Crowds & Online Convergence: Crowdsourcing in the Context of Disasters

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Increasing Trend

- 2005 Hurricane Katrina: Craigslist used to help locate family, pets, shelter
- 2007 VT shooting: Students use Facebook to share their own status and identify victims
- 2007 San Diego fires: Twitter use, hashtag uptake
- 2010 Haiti Earthquake: 3.3M tweets in 3 weeks
- 2012 U.S. Tornados: 800 tweets per minute
- 2013 Boston Marathon Bombing: Reddit madness, Twitter rate-limited at 3000 tweets per minute
Social Computing & Crisis Events
Crisis Events catalyze Mass Convergence

Social Computing & Crisis Events
Opportunity: Citizen Reporting

From a viewer in Lyons. Wow. #9news. #boulderflood
pic.twitter.com/wuvxr16ZqX

2:41 PM - 12 Sep 2013

97 RETWEETS 11 FAVORITES
Opportunity: Crisis Communications

Evacuation notice for Eldorado Springs just ordered. Officials are telling residents to head to the barn @ 2875 Cty Rd 67 #boulderflood

11:22 PM - 12 Sep 2013

74 RETWEETS  1 FAVORITE
Challenges related to Digital Convergence

- Volume
- Noise
- Lost Context
- Misinformation & Disinformation
- Unstructured Data
How can useful information be extracted from social media updates?
The Crowd is Working to Organize Information
Sociologists of disaster: After a disaster event, people will converge on the scene to, among other things, offer help.
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Bianca @kwiklmkilctd
NJ people use #njgas for working gas stations and #njopen for stores and businesses. Let's keep this going!!!

Mike Smith @zipmws
#njgas, #njgasmorris: GAS available Rt 15/94 Lafayette Exxon and Quickcheck. Lines not too bad.

Greg Lewis @loie
#njgas Alex Hmlton rest area i95 south has gas with 2 hour wait from tollbooth.

Stefanie Zangrandio @szangrandio
#NJGas anyone know of any gas stations open around Belleville/Nutley?
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8:18 AM - 1 Nov 12 · Details

Mike Smith @zipmws
#njgas, #njgasmorris: GAS available Rt 15/94 Lafayette Exxon and Quickcheck. Lines not too bad.
7:42 AM - 1 Nov 12 · Details

Greg Lewis @loie
#njgas Alex Hamilton rest area i95 south has gas with 2 hour wait from tollbooth.
7:51 PM - 1 Nov 12 · Details

Stefanie Zangrando @szangrando
#NJGas anyone know of any gas stations open around Belleville/Nutley?
7:44 PM - 1 Nov 12 · Details
The Crowd is Working to Organize Information
Digital volunteers

The Crowd is Working to Organize Information
“Voluntweeters” for Haiti EQ Response
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- Identifying and amplifying actionable info
“Voluntweeters” for Haiti EQ Response

• Identifying and amplifying actionable info
• Routing information to response organizations
“Voluntweeters” for Haiti EQ Response

• Identifying and amplifying actionable info
• Routing information to response organizations
• Verifying information
“Voluntweeters” for Haiti EQ Response

• Identifying and amplifying actionable info
• Routing information to response organizations
• Verifying information
• Acting as “Remote operators”

@MelyMello  (Jan 20, 2010)RT @IamJane: Am stunned—have gotten supers in—saved people fr rubble—brought them drs—we have best team! We R voluntwitters!
Digital volunteers

The Crowd is Working to Organize Information
Digital volunteers

Emergent response organizations

The Crowd is Working to Organize Information
Network Graph
“Voluntweeters”
Ushahidi Crowdmap for Haiti
Ushahidi Crowdmap for Haiti
Digital volunteers

Emergent response organizations

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Digital Volunteer Communities

- OpenStreetMap’s Humanitarian Operations Team (HOT)
- The Standby Task Force (Ushahidi)
- Humanity Road (501c3)
- CrisisCommons
- Event-based Hack-a-thons
- Virtual Operations Support Teams (VOSTs)
Digital volunteers

Emergent response organizations

The Crowd is Working to Organize Information

Ongoing virtual volunteer organizations
Digital volunteers

Emergent response organizations

The Crowd is Working to Organize Information

Ongoing virtual volunteer organizations

Every member of the crowd works to organize the space
Networks, Information Flow, and Derivative Information

- Huge percentage (>90%) of Twitter information during crisis events is derivative (retweets, URLs)
- Another large portion is conversational (@mentions)
- Other social media is similar (re-posts, shares, likes, upvotes, etc.)
- Recommendation mechanisms - some user-driven conventions, some encoded within system structures
- Information in this information
- “Work” within the patterns of massive interaction
Detecting Misinformation
Detecting Misinformation

- Mendoza et al. (2010) tracked movement of “false rumors” after 2010 Chile Earthquake
- Find crowd spreads misinfo, BUT crowd also attacks misinfo (denies/questions)
- Suggests we can use aggregate crowd behavior to detect false rumors
Detecting Misinformation

Tweets about a report that a young girl running in the marathon was killed
Detecting Misinformation

Tweets per hour about mis-identifying Suspect #2.
Detecting Misinformation

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Detecting Misinformation

Tweets per hour about mis-identifying Suspect #2.
Misinformation

- Understand how the crowd attacks/corrects misinformation
- Develop algorithms to detect the correction
- Design Twitter clients to amplify the correction to reduce the spread of misinformation
Identifying On-the-Ground Users
Digital volunteers

Emergent response organizations

CrowdWork

Ongoing virtual volunteer organizations

Every member of the crowd works to organize the space
Socio-Technical Problems
Understanding Capacities of Crowds

- Empirically understanding capacities and functions of crowd work
- Motivations for participation
  - Relationship between motivations and structure of work
- Sustaining virtual volunteer organizations
Designing for Crowdwork during Crisis

- Time-critical and safety-critical context
- Low tolerance for inaccuracy
- Solution: keep people in the loop
- Integrating computational solutions with work of digital volunteers and other members of "the crowd"
  - Humans train algorithms
  - Algorithms push information to humans for further processing
Crowdwork and Crisis Events
Designing for Emergence

Crowdwork and Crisis Events
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Integrating with Response

• Structural, Legal, Ethical, Political Questions
• How do we weigh social media data against other information sources?
• Can responders rely on certain outputs from the crowd?
• Privacy concerns
• Malicious attacks