Social Media and Crisis Informatics Research in LIS

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Dinh, Ly	University of South Florida, USA lydinh@usf.edu
Hong, Lingzi	University of North Texas, USA lingzi.hong@unt.edu
Dumas, Catherine	University at Albany, USA cdumas@albany.edu
Patin, Beth	Syracuse University, USA bjpatin@syr.edu
Ghosh, Souvick	San Jose State University, USA souvick.ghosh@sjsu.edu
Li, Lingyao	University of South Florida, USA lingyaol@umich.edu
Khoury, Christy	Syracuse University, USA cjkhoury@syr.edu

ABSTRACT

Crisis informatics is centrally situated within the realms of LIS research and practice, given the focus on the interconnection between information, people, and technology during disasters such as hurricanes, earthquakes, wildfires, and global health crises. However, there is yet to be a community dedicated to crisis informatics research at ASIS&T, where researchers can exchange theoretical frameworks, the latest methodologies, and collected datasets, potentially fostering long-term collaborations. Therefore, this panel proposes to bring together scholars within LIS who have been active contributors to crisis informatics research, from multiple perspectives ranging from critical librarianship, machine learning, and human-computer interaction (HCI), to mixed-methods approaches. The panelists will first share their most current crisis-related research project and how they envision their research agenda advancing crisis informatics research and their prospective plans for advancing the field within the LIS research and practice community. The panel will foster collaborations and contribute to the improvement of response planning and policies through evidence about how information is sought, processed, and used during crises. This panel is sponsored by SIG Social Media (SIG SM).

KEYWORDS

Crisis informatics; community resilience; mixed-methods approaches; social media; network analysis

INTRODUCTION

Information plays a crucial role in crisis response, serving as the backbone of effective decision-making and coordination between responding agencies and the public. With the advent of social media and microblogging platforms, there is increasingly abundant information available to crisis responders, affected communities, and the general public that allows each of these groups to gain actionable knowledge about a disaster, known as situational awareness (Sarol et al., 2021; Bruns & Burgess, 2014; Imran et al., 2018). Extant literature in crisis informatics has found that Twitter (now X) is the most frequently used platform by citizens, volunteers, and emergency responders, where situational awareness information such as requests for help and resources (Sarol et al., 2020), updates on locations of shelters (Imran et al., 2013), and coordinating donation efforts (Olteanu et al., 2015) were actively shared. During the 2010 Haiti earthquake, for example, the public as well as response organizations exchanged large volumes of tweets across multiple geographical regions (Sarol et al., 2021). Such information has been used for crisis mapping (Norheim-Hagtun & Meier, 2010; Reuter & Kaufhold, (2018), specifically for purposes of finding missing persons, locating damaged infrastructure, and coordinating donation efforts.

Another major topic of research within the literature is the development of methodological approaches to quickly and reliably detect crisis-related content from sizable corpora of user-generated content (Reuter & Kaufhold, 2018; Palen & Anderson, 2016). Approaches have been a combination of computational, human-in-the-loop, and manual validation of crisis-related content (Verma et al., 2011; Olteanu et al., 2015; Sarol et al., 2020; Castillo et al., 2011).

These solutions often include the use of state-of-the-art models in natural language processing and machine learning to reliably extract words and phrases that distinguish tweets that contain useful information about a crisis and tweets that are generic in content. For instance, Verma and colleagues (2011) used linguistic features (unigrams, bigrams, parts of speech, subjective cues, register, tone) to distinguish useful from non-useful tweets, and achieved over 80% accuracy. Olteanu et al. (2015) built a classifier for informative versus non-informative tweets and found that among the informative tweets, 20% were about emotional support, 10% about donations and volunteering, 10% about caution and advice, 7% about infrastructure damages, and the rest contained other useful information. Sarol, Dinh, and colleagues (2020) applied the needs detection algorithm with human-in-the-loop validation to verify whether tweets contain relevant information about COVID-19 response, and achieved 68% accuracy via the who-needs-what triple extraction task. Recognizing that tweets may contain misinformation and rumors, Castillo et al. (2011) used 68 different features that were message-based (e.g., length of tweets), user-based (e.g., follower counts), topic-based (e.g., the number of tweets with a certain #hashtag), and propagation-based (e.g., the number of retweets) to build a classifier to assess disaster-related tweet's information trustworthiness. They found that the trustworthy tweets contained URLs, with high counts of retweets, and were created by users with active tweet history.

While extant research has recognized social media content such as Twitter (X) as a timely source for user-generated content (Vieweg et al., 2010; Imran et al., 2013), emergency responders, among others, have concerns that limit the eligibility of Twitter as a reliable information source about disasters. These concerns are related to sampling (Hargittai, 2015), misinformation from social bots (Hagen et al., 2022; Kim & Lim, 2023), trustworthiness (Castillo et al., 2011), information overload (Alam et al., 2020), and polarization of opinions (Steward et al., 2018). This motivates researchers to consider other platforms for crisis communication, such as TikTok (Khoury et al., 2023) or YouTube (Kim et al., 2021). Hence, another prominent topic of interest within the crisis informatics community is the socio-technical implications of integrating social media content into standardized, traditional disaster management practices. Overall, the development of methods for discerning crisis-relevant information, and the examination of the implications of sharing and consuming user-generated content during disasters are major areas of research that call for increased engagement from researchers within the LIS community.

STRUCTURE OF THE PANEL

The first sub-session of the panel is 60 minutes long, where each panelist will give an 8-10 minute 'lightning talk' about their current research agenda in crisis informatics. Moreover, each panelist will share their perspective on the current state of crisis informatics research within the LIS community and suggest 1-2 future directions or research questions that could stimulate further investigation and collaboration within the field. These may include the exploration of new data curation techniques for crisis-related information, the role of public libraries in community resilience, or the ethical considerations of privacy and information sharing during disasters. Panelists are encouraged to discuss interdisciplinary approaches and the potential for LIS researchers and professionals to contribute to the development of effective response capabilities by leveraging libraries and information centers as hubs for information dissemination and crisis response.

In the second sub-session, which is 30 minutes long, an interactive discussion will take place, focusing on the practical challenges and opportunities of implementing the ideas presented during the lightning talks. This will include a moderated Q&A segment, where the audience can pose questions to the panelists, relating to the content of their research talks, as well as broader questions about the field of crisis informatics in the LIS community. Additionally, this session will feature breakout discussions, enabling smaller groups to delve deeper into specific topics of interest, such as partnerships between libraries and crisis management agencies, computational methods for reliable extraction of crisis text content, or the ethical considerations and privacy concerns involved in utilizing social media data during disasters. Participants will have the chance to share experiences, propose solutions, and identify potential research collaborations. The goal is to collectively outline actionable strategies that the LIS community can undertake to enhance its role in crisis informatics and disaster response.

ATTENDANCE

We expect 30-40 participants to attend the panel. We anticipate a diverse group of participants, including academics, professionals, and students from all subfields within LIS, interested in topics relating to crisis informatics, public policy, computer science, and social sciences.

PRESENTERS

The presenters are experts in various subfields within LIS, who have been actively engaged in research and teaching within information science, library science, crisis informatics, data science, and HCI. Three panelists are also current board members of the Special Interest Group (SIG) in Social Media.

Presenter 1: Lingzi Hong

User-generated data on social media platforms can serve as critical information sources for early warning, real-time monitoring, and post-crisis analysis. Social media content reflects public sentiment, needs, observations, and experiences in crisis, which can contribute to situational awareness and guide emergency responders and policymakers in tailoring their communication and crisis management efforts more effectively. Although various social media platforms have imposed restrictions on accessing their data, there are substantial volumes of crisis data that have been collected and archived, which can be leveraged for multifaceted research. For example, the retrospective crisis social media data can be used to study the interactions of public service agencies and citizens to guide official accounts in information dissemination and management; Examine the needs and concerns of minority groups that have been studied less previously, including the immigrants and senior citizens; and Develop local knowledge bases for disaster response and management based on crowdsourced intelligence in social media data.

Dr. Lingzi Hong is an Assistant Professor of Data Science at UNT. Her research area is computational social science, crisis informatics, and data literacy. She has computational research published in top-tier artificial intelligence conferences, such as AAAI, NAACL, and EMNLP, and user needs and information behavior studies published in ASIS&T and IJHCI.

Presenter 2: Catherine Dumas

My current research examines how Library and Information Science (LIS) can implement virtual reality (VR) for teaching crisis response skills. VR training provides valuable opportunities for repeated practice, increased student motivation, ease in providing feedback, and a safe space for learning. My colleagues, Dr. Rachel Williams and Dr. Lydia Ogden, previous research studied in-person training focused on crisis communication and de-escalation skills and found barriers, including limited training options, logistical issues, and difficulty recalling skills. To mitigate those barriers, we developed VR training that mirrors in-person and Zoom-based training. Our initial study assessed the usability and effectiveness of conducting this training using VR with LIS students, highlighting the need for education opportunities that are repeatable, accessible, immersive, and effective.

Dr. Catherine Dumas is an Assistant Professor, Director of the Information Science Ph.D. program in the information sciences and technology department, and the Director of the UX & Immersive Technologies Lab at the State University of New York at Albany. Her research areas include: UX & usability of immersive extended reality (XR) technologies, virtual reality in teaching and learning, AI-driven analysis of user behavior in social virtual reality (SVR) platforms, online collective action, digital activism, and e-petitioning.

Presenter 3: Beth Patin

Libraries are vital community hubs, offering knowledge, refuge, and support (Summers & Buchanan, 2018). This is particularly true after a crisis (Bishop & Veil, 2013). Historically, library disaster management has faced criticism for its narrow focus, primarily addressing building-level incidents (Patin, 2021). However, in the past two decades, there has been a shift towards utilizing crisis informatics approaches to help plan for community-wide events (Rahmi et al, 2019). There is a gap in our LIS curriculum with "only ten courses offered around library disaster management or crisis informatics out of sixty-five programs" (Oliphant et al., under review). This places iSchools as the primary educators of information professionals on disaster and climate change issues and identifies a significant area for improvement within LIS education. It's imperative to move beyond occasional lectures to provide comprehensive study opportunities for students, current librarians, directors, and managers, empowering them to be proactive rather than reactive in crisis situations.

Dr. Beth Patin is an Assistant Professor at Syracuse University's iSchool and is working on an early career award from IMLS to work on her project, Interconnected, which supports leveraging public libraries to help build more resilient communities. Her research focuses on information equity, community resilience, crisis informatics, and cultural responsiveness.

Presenter 4: Souvick Ghosh

In a world where social media serves as the source of news for trillions of people, it is imperative to understand how public opinion shapes and spreads on social media during crises. Analyzing such opinions is paramount to managing crisis communication, controlling hysteria, and formulating policies. His research, employing the latest AI developments like in-context and zero-shot learning, offers new methodologies to scrutinize public sentiment across

geographical and professional domains during international conflicts and global pandemics (Ghosh & Thajudeen, 2023). By leveraging advanced machine learning techniques, such as GPT-x, Claude, and Gemini, his work provides new ways of annotating and identifying social media sentiments. By integrating cutting-edge AI with crisis informatics, we can enhance our understanding of public sentiment, improve crisis response strategies, and cultivate a data-informed interdisciplinary approach to managing global crises.

Dr. Souvick 'Vic' Ghosh is an Assistant Professor at the School of Information and the Director of the Intelligent Conversational Agents and Neural Networks Lab at San Jose State University. With a background in Human-Computer Interactions (HCI), Information Retrieval (IR), and Artificial Intelligence (AI), Dr. Ghosh specializes in applications that solve complex sociotechnical problems in information systems. His research on fake news, cyberbullying detection, and conversational agents has been published in top-tier conferences like ACM SIGIR, ACM CHIIR, CHI, ACM Web Conference, and EMNLP.

Presenter 5: Lingyao Li

Rapid appraisal of disaster impacts related to hazard events is of importance to first responders, government agencies, insurance industries, and other private and public organizations. While satellite monitoring, ground-based sensor systems, inspections, and other technologies provide data to inform post-disaster response, crowdsourcing through social media presents an additional and novel data source. Dr. Li's study aims to explore the potential utility of using social media data for rapid damage assessment after sudden-onset hazard events and to identify insights related to potential challenges. To do this, my study explores the natural language processing tools to parse the damage levels based on users' postings on social media, and then develops text classification models for rapid damage assessment. Although accuracy remains a challenge compared to ground-based instrumental readings and inspections, the proposed damage assessment model features rapidity with large amounts of social media data at spatial densities that exceed those of conventional sensor networks.

Dr. Lingyao Li is an assistant professor at the School of Information, University of South Florida. His research interests currently focus on two key domains. One area focuses on using social media data for investigations within urban environments, while the other involves using large language models to explore topics in health informatics. For crisis informatics, he has publications in the International Journal of Disaster Risk Reduction, International Journal of Information Management, Sustainable Cities and Society, and ASCE Journal of Engineering Management.

Presenter 6: Christy Khoury

Information communication technologies (ICTs) have salient roles for those impacted by, researching, or moderating a crisis and its response. As citizen-to-citizen communication is consistently occurring on ICTs, like social media, the creators of these platforms have the power to influence and curate crisis communication. Examples include Google Crisis Response, Facebook Crisis Response, and TikTok Safety, which themselves are crisis responders. Given the relative novelty of the application, and its shift from purely entertainment to now additionally moderating global, critical conversations, Christy's current research examines TikTok for contemporary crisis communication. After reviewing action items for crisis researchers to consider for more ethical studies, the implications of TikTok as a crisis dissemination tool will be discussed.

Christy Khoury is a Ph.D. Candidate at Syracuse University's School of Information Studies. Her dissertation examines TikTok as a contemporary crisis communication platform, and investigates the uses of the tool for sensemaking and resiliency to recent Lebanese crises. Her work additionally focuses on how crisis researchers can more ethically conduct their research. Christy's research has appeared in ASIST, AoIR, and ISCRAM.

Moderator: Ly Dinh

Dr. Ly Dinh is an assistant professor at the School of Information, University of South Florida. She examines how research methods such as network analysis, social simulation models, and text analysis, can be used to advance our understanding of various social and organizational systems. Her current projects place network science at the core to understand and explain a number of social and organizational phenomena ranging from egocentric networks to interagency emergency response networks. Ly's research has appeared in Quantitative Science Studies, Communication Research, Scientific Reports, Communication Studies, and peer-reviewed conferences such as ICWSM, ISCRAM, ACL, and EMNLP. Ly is an early-career faculty fellow at Florida Alliance for Graduate Education in the Professoriate (FL-AGEP), 2020 Grace Hopper Scholar for Women in Computing, and a 2018 Network Science Fellow at Visible Networks Labs.

GENERATIVE AI USE

We confirm that we did not use generative AI tools/services to author this submission.

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