

## Mining Social Media for Rapid Disaster Response

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### Background

Accurate damage assessment due to major natural and anthropogenic disasters is becoming critical due to increasing human and economic losses. This increase in loss of life and severe damages can be attributed to the growing population, and human migration and settlements in disaster prone regions of the world. Rapid damage assessment and dissemination of accurate information is critical for creating an effective emergency response. Remote sensing and geographic information systems (GIS) based techniques and tools are playing an important function in disaster damage assessment and reporting activities. Remote sensing data plays a critical role in disaster mapping of human settlements, which range from delineation of effected population areas to the assessment of structural damages to buildings and critical infrastructures. Previous studies have shown that the remote sensing technology has been most widely utilized in mapping and monitoring of hazards and identification of damages and effects of disasters. Remote sensing is also useful in (near) real time assessment of damages due to floods, forest fires, and other temporal phenomena. However, for supporting a comprehensive decision support system, it may require integration of several technologies includes remote sensing, GIS, modeling and simulation systems, and information extracted from social media.

### Social Media and its Role in Disaster Response

In addition to the traditional imagery and vector data, rapid damage assessments can highly benefit from the voluntary geographic information (VGI) and social media. It is clear that social media has become a powerful tool for disaster response efforts. Recent advances in Internet technologies and innovations have given raise to new social networks like twitter, Facebook, YouTube. In addition, advances in computer technology have given raise to new and powerful devises like smart touch phones and tablets equipped with GPS. These devices not only allow faster dissemination of social media data, but also allow creation of data can be used to post immediately to news websites, twitter, Facebook and the like. Therefore it is highly beneficial to use social media data in rapid damage assessment. Especially, such data can greatly benefit ground-truth collection that is required to build accurate supervised machine learning models for change and damage detection to the critical infrastructure and natural resources. However, social media can also be misused which will greatly impact damage assessments and emergency response. New algorithms are needed to integrate social media data into the rapid damage assessment workflows, with an eye for uncertainty and ambiguity. At ORNL we are investigating ways to: (i) efficiently mine social media data sources for extracting facts relevant to disasters, (ii) quantify uncertainty and disambiguate location information extracted from social media, (iii) integrate information mined from the social media with remote sensing and GIS data, and (iv) dissemination of disaster related information for rapid response.