Twitter as Information Source for Rapid Damage Estimation after Major Earthquakes

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Natural disasters like earthquakes require a fast response from local authorities. Well trained rescue teams have to be available, equipment and technology has to be ready set up, information have to be directed to the right positions so the head quarter can manage the operation precisely. The main goal is to reach the most affected areas in a minimum of time. But even with the best preparation for these cases, there will always be the uncertainty of what really happened in the affected area.

Modern geophysical sensor networks provide high quality data. These measurements, however, are only mapping disjoint values from their respective locations for a limited amount of parameters. Using observations of witnesses represents one approach to enhance measured values from sensors ("humans as sensors"). These observations are increasingly disseminated via social media platforms. These "social sensors" offer several advantages over common sensors, e.g. high mobility, high versatility of captured parameters as well as rapid distribution of information. Moreover, the amount of data offered by social media platforms is quite extensive.

We analyze messages distributed via Twitter after major earthquakes to get rapid information on what eye-witnesses report from the epicentral area. We use this information to (a) quickly learn about damage and losses to support fast disaster response and to (b) densify geophysical networks in areas where there is sparse information to gain a more detailed insight on felt intensities. We present a case study from the Mw 7.1 Philippines (Bohol) earthquake that happened on Oct. 15 2013. We extract Twitter messages, so called tweets containing one or more specified keywords from the semantic field of "earthquake" and use them for further analysis. For the time frame of Oct. 15 to Oct 18 we get a data base of in total 50.000 tweets whereof 2900 tweets are geo-localized and 470 have a photo attached. Analyses for both national level and locally for the City of Cebu show that Twitter is an important and useful piece to the situational awareness of the earthquake's impact.