

A Social Networks Data Historian Supporting Research in Emergency & Disaster Medicine and Management

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Abstract. The aim of this initial research is to show that data and information collected from Internet Social Networks support the understanding of individual and collective behaviors which can help emergencies and disasters managers to mitigate and to improve preparedness programs for future similar events and to make more suitable decisions.

Keywords. Social Media, Factual Databases, Emergency Medicine, Disaster Medicine, Incident Reporting, Risk Management

1. Introduction and background

Reported data and information flowing from a disaster [1] scene at its initial instants are disorganized due to the surprising effect and is sparse due to the different perceptions, confusion and feelings of people being on-scene and off-scene. Accordingly, data and information management and retrieval processes are challenged, raising the need for development of a knowledge management infrastructure approach, a "historian" algorithm that will assist in dealing with the preparedness programs and mitigation of emergency and disaster management. The aim of this seminal research is to advocate the need of a historian dealing with data from Internet Social Networks (SNs) for supporting research leading to a better understanding of individual and collective behaviors during unusual events like emergency situations and disasters. The availability of disasters-related data is important, at any time, more particularly near real time events, both for the general public and for all regional and extra-regional emergency organizations. SNs are taking an important part for modern society. They are pointing at, reporting, and discussing important events which are highly contributing for understanding the context of disaster crisis [2].

2. Material and methods

We developed a disasters ontology. It was based on the evaluation by domain experts reviewing the March 11, 2011, Fukushima disaster [3]. This disaster is the NaTech event of a series sequential events with combined effects which took place following an earthquake in northern Japan, a resulting tsunami and a major nuclear accident. From

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the disasters ontology perspective, the different types of disasters and their sub-types that influence each other. The current version of the disaster ontology is used, for supporting the development of the emergency/disaster historian (EDH) data model and database. It is used for defining the different kinds of events, their granularity and when relevant in a complex disasters (including different events), their relationships and the sequence between them. Based on the data extracted from the implemented EDH database report consists in a set of dashboards summarizing respectively, for example, the SNs activity related to a kind of emergency/disaster event or a time slot.

3. Preliminary results

In order to evaluate, our first development and implementation, we extracted 37,144 tweets including the term “earthquake” (with and without hashtag -#earthquake-) from Twitter between April 12 to 22, 2018. In the analyzed sample of tweets, the hashtag “#earthquake” is present in 74.64% of the messages, there median length is 140 with a median absolute deviation equals to 15, 53.91% are re-tweets meaning that they are not original messages but forwards and 1.19% were replies to another tweet, 11.57% tweets include longitude and latitude where the device used for tweeting was located. Furthermore, the volume of tweets is changing over time and spikes indicate unusual events and associated with reports of earthquakes of various intensities on governmental and scientific websites. Moreover, in this tweets set, for example, “earthquake” and “tsunami” appear together in 0.92% messages, “earthquake” and “nuclear” in 0.52%. Furthermore, emergency and disaster medicine related terms such as “injuries”, “injured”, “dead”, “death”, “suffer”, “healthcare”, “medical”, “emergency” “survival kit”, “emergency kit”, “first aid” appear in average 0.04%.

4. Discussion, conclusion and perspectives

Reports about hazardous events are produced by and on various media (e.g. newspapers, radio, and television, SNs). There is a difference in the quality of these different kinds of sources which affects the reliability of the information and its availability [4]. Thus, the next steps of the present project will consists of (1) expanding the disasters ontology to epidemiological and public health related aspects and interfaced with medical-domain ontologies, (2) automating the extraction over the time of disaster related messages posted in social networks, (3) improve the EDH data model to store compact but detailed data and information for supporting knowledge enrichment in emergency and disaster medicine and management.

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