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## Using analytics and social media for monitoring and mitigation of social disasters

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### Abstract

Public safety and emergency management requires tools that detect promptly the occurrence of emergencies and create a correct and detailed picture of the situation. Such tools may help alleviating desolation under harsh conditions related to natural or human-made disasters by fast and semi-automatic identification of the type, extent, place, intensity, and implications of the disaster. The research refers to the use of analytics to identify emergencies and recent disasters, based on social networks and media search, and direct relief proportional to the needs. We establish controlled vocabularies for a regional search (keywords to search in two languages) and propose ways to improve the search algorithms, and concepts and methods to interpret the findings. Several examples are discussed and conclusions are drawn.

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### 1. Introduction

A complex mixture of disasters, ranging from solar flares, cosmic explosions and meteorites, to earthquakes, tsunamis, landslides, floods, hurricanes, droughts, terrorism, wars, and to disasters due to technical failures or human operator faults imperil people, populations, civilization, and humankind. Defending against these threats requires various kinds of endeavors supported by varied tools and large technical and human capabilities. Advanced

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knowledge on the nature of emergencies and prompt awareness may help improving mitigation and reducing the costs of the defense against disasters in the making. Information and communication tools are vital in modeling emergencies and population response, and in the accurate and prompt monitoring of disasters [1-4].

Humanitarian technologies can benefit from the development of the new means and methods of data and information transmission, including the Internet, the social networks (SN) and social media (SM) [5], [6], various other types of media, such as ITV (Internet TV), and the numerous kinds of media monitors, such as Google Analytics™, Topsy™, and SocialMention™, or the monitoring through the network of IPTC™, to cite just a few tested in this study. We proposed ourselves in this study to identify some of the useful data sources, to determine ‘controlled vocabularies’ (lexicons of relevant terms), to contribute improving the search algorithms, and to improve analysis and interpretation methods for the search results. We report on some of the findings obtained by monitoring the onset, diffusion, and extinguishing of crises and emergencies in view to create models of crises and disaster evolutions and to help finding solution for mitigating them. The study refers to a region that is dominated in the recent history by natural and man-made disasters, including nuclear, chemical and ecological ones. From this point of view, the research is a humanitarian contribution aiming at alleviating desolation under harsh conditions related to natural or human-made disasters by fast and semi-automatic identification of the place, extent, type, intensity/amplitude, and implications of the disaster. The research is performed in the frame of a grant (SPS G4877) supported by the international Science for Peace and Security (SPS) Program (NATO). Our study purpose is similar with other attempts of using data on SNs, as [6-8], in emergencies.

### Nomenclature

CV	controlled vocabulary
IPTC	Comité International des Télécommunications de Presse, International Press Telecommunications Council
IPTV	Internet Protocol Television
SM	social media
SN	social network
SPS	Science for Peace and Security Program (NATO)

### Symbols

V	logic OR
∧	logic AND
¬	logic NON (negation)
or	delimiters in a list
→	insertion in a list

## 2. Description of the study

### 2.1. Region of interest

Analytics for disaster forecasting, relief and mitigation are better centered on specific regions, because each region may have its specific characteristics. This study regards a European region comprising Ukraine, Republic of Moldova, and the Northern and Eastern part of Romania. The choice of the region takes into account that on its N and E-parts, Romania has common borders with Ukraine and R. Moldova, while R. Moldova is ‘sandwiched’ between Romania and Ukraine. As a consequence, the three countries share a common history of disasters, including chemical and nuclear disasters (Chernobyl) that affected all three countries, common environment disasters affecting at least two of them (e.g., chemical spill in Western Ukraine that affected also Romania), floods in the basins of the rivers that constitute natural borders (Prut river between Ukraine and Romania, moreover between Romania and R. Moldova; Nipper river between R. Moldova and Ukraine, Danube separating the three on a small portion), and earthquakes in Romania which severely affect the capital (Kishinev) and other cities of R. Moldova, moreover cities

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