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Introduction to the DIRECT minitrack (Disaster Information, Technology, and Resilience) in the Digital Government track – HICSS 57

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Today, thanks to advances in data management, it is faster and more efficient to manage real time data, make maps from geo-localized data or make assessments based on scenarios that integrate data from different sources. These evolutions have helped to improve crisis management systems and support those who respond to disasters. Indeed, a lot of important decisions have to be taken before, during and after crises. These decisions are based on objective data and information but they are also influenced by subjective elements such as cognitive biases that can limit the effectiveness of the response. A way to limit the effect of cognitive biases is to improve the completeness of information in crisis management systems. Indeed, crisis management systems integrate diverse data from different sources to predict as finely as possible how a crisis will unfold and what will be its consequences on a given territory.

Despite the problems caused by the global COVID pandemic, some improvements (for example, in mutual aid or online tools) have emerged. In addition, following the increased access to more and more data/information, the articles selected for the DIRECT minitrack deal with data, video/image, social media, misinformation, information overload, collaboration and the involvement of volunteers. The more traditional subjects are still addressed, such as, decision support, resilience, crisis management strategies, and simulation.

The DIRECT minitrack of the eGov track of HICSS 57 presents eleven great papers addressing these issues. The following presents each of these articles.

1. Crisis Informatics in Environmental Decision-Making: A Systematic Review

Mustapha Yakubu, Lily Botsyoe, Jess Kropczynski, Joe Johnson, Feifei Pang, Emmanuel Kojo Gyanfi.

Despite the availability of data from many agencies, it can be difficult for citizens and local

decision-makers to discover and make sense of information about an unfolding environmental disaster in a timely manner. Crisis informatics tools can be used to share environmental information during a crisis. However, data from authoritative sources are not always present in social media. These results are discussed in light of insights from the crisis informatics field to support situation awareness during a crisis.

2. An empirical study on key impact factors of community resilience - an analysis based on the communities in China

Yumei Chen, Xiaoyan Zhu, Luis Luna-Reyes, Shanshan Chen, Huang Huang.

Communities can play an important role in enhancing disaster prevention, mitigation, and response capabilities within a larger administrative unit. Communities are often organized around shared interests or concerns, which makes it easier for individuals and groups to work together to prevent or respond to disasters. Community resilience is regarded as a new approach for disaster reduction, preparedness, and emergency recovery. Therefore, identifying the influencing factors of community resilience is highly necessary. Using survey data from community members in the Jinwan district in Zhuhai City in China, the authors develop a Structural Equation Model to identify key factors of community resilience.

3. Digital Resilience in Flux: A Comparative Analysis in Manufacturing Pre- and Post-Crisis

Hannah Stein, Sabine Janzen, Benedikt Haida, Wolfgang Maass.

Major disruptions or crises such as COVID-19 or the war in Ukraine impact various industries, which in turn leads to declines in production. These crises triggered lockdowns, problems in supply chains, and

the unavailability of production material. In order to be or become resilient in the face of disruptions and crises, manufacturing companies need to have strong digital resilience capabilities. This paper will explore how major disruptions impact a company's ability to absorb disruptions and adapt to new situations. By comparing the results of two surveys on digital resilience in manufacturing - one conducted before the crisis happened in 2019, and one repeated after it occurred in 2023 - it was found that major disruptions had a positive impact on a company's ability to handle disruptions effectively.

4. Motivated Bias in Detecting Climate Change Misinformation

Mia Fong, Richard John.

Misinformation erodes public awareness of the complexities of climate change and stymies public support for mitigation initiatives that promote resilience. This paper describes an empirical study (N=398) of U.S. individuals' accuracy and bias in recognizing real and fraudulent climate change headlines. Half of the headlines were true and half were false (fake news); similarly, half emphasized and half questioned the seriousness of climate change. Respondents answered whether they thought each of the 24 headlines was true or untrue, as well as their level of confidence. Pooled ROC studies revealed moderate accuracy (AUC = 0.68) and a bias ($c=0.09$) favoring accuracy for fake headlines (specificity = 0.67) while decreasing accuracy for factual headlines (sensitivity = 0.60). Political liberalism and actively open-minded thinking (AOT) positively predicted accuracy (AUC), but climate change anxiety (CCAS) positively predicted bias, according to regression analysis on individual Signal Detection Theory (SDT) performance measures.

5. A Design Theory for Spontaneous Volunteer Coordination Systems in Disaster Response

Hans Betke, Martina Sperling, Guido Schryen, Stefan Sackmann.

Over the last two decades, social media and mobile devices have both increased their potential as tools for disaster management. However, integrating spontaneous volunteers into official disaster management activities can be a challenge for public authorities and security organizations. This is because these volunteers often organize themselves in ways that are unpredictable and difficult to control. This paper presents a design theory for coordinating spontaneous

volunteers that is based on interviews and focus groups with practitioners. The theory is applicable to the KUBAS spontaneous volunteer coordination system, which has been implemented in practice. First exercise results illustrate the usefulness of the theory.

6. Damaged Building Detection using Multiple Object Tracking and Decision Tree from Aerial Videos for Disaster Response

Shono Fujita, Michinori Hatayama.

The automatic model developed in this study detects buildings damaged by earthquakes from aerial videos. It is composed of a multiple object tracking model of buildings, a classification model of damage, and a decision tree model to output final estimation by each track. This system would detect damaged and collapsed buildings, input time-series information to determine the extent of building damage, and use decision tree nodes for disaster response. This would reduce annotation labor and improve the accuracy of disaster response.

7. "Listening In": Social Signal Detection for Crisis Prediction

Sabine Janzen, Prajvi Saxena, Sebastian Baer, Wolfgang Maass.

Crises send out early warning signals, but it is often difficult to detect them amidst the noise of everyday life. Social signal detection based on Twitter data is challenging because of the high volume of noise. OSOS introduces a method for open-domain social signal detection of crisis-related indicators in tweets. OSOS uses multi-lingual Twitter data to combine multiple state-of-the-art models for data preprocessing and data filtering. It achieves excellent results in crisis domains by leveraging the fine-tuned GPT-3FT model and achieving benchmark results in the CrisisBench dataset. The method was exemplified within a signaling service for crisis management. The authors were able to evaluate the proposed approach by means of a data set obtained from Twitter (X).

8. Recognizing Similar Crises through the Application of Ontology-based Knowledge Mining

Ngoc Luyen Lê, Marie-Hélène Abel, Elsa Negre.

Recognizing and learning from similarities

in crisis situations is crucial for the development of effective response strategies. The authors addressed the challenge of identifying similarities within a wide range of crisis-related information by employing an ontology-based knowledge base enriched with crisis-related information. Additionally, they implemented a semantic similarity measure to assess the degree of similarity between crisis situations. The authors present a method for recognizing similar crises using ontology-based knowledge mining. Their experiments show that the approach is accurate and efficient, highlighting the potential of ontology-based knowledge mining for enhancing crisis recognition processes and improving overall crisis management strategies.

9. Simulating casualty transportation and allocation policies for mass casualty incident scenarios

Florentina Hager, Franziska B. Metz, Melanie Reuter-Oppermann.

When resources are limited during mass casualty events, it may be necessary to consider incorporating mass transportation vehicles into the response. This can help to get casualties to the nearest hospital as quickly as possible, which is often based on straightforward policies such as sending them to the closest hospital until capacity is reached. However, this integration necessitates a re-evaluation of conventional policies in order to keep everyone safe. This study aims to develop and evaluate various casualty transportation and allocation policies during mass casualty incidents using discrete-event simulation. The goal is to create a set of best practices that will allow for faster transport

times for life-threatening injured casualties while freeing up ambulances for more severely injured patients.

10. Adopting a Trading Zone Framework to Emergency Management

Kjetil Rustenberg, Jaziar Radiani, Terje Gjøsaeter.

This paper describes a novel framework for identifying and detailing the processes of information trading zones in emergency management. This framework is adapted from various scientific disciplines, specifically Emergency Management, and it is applied to a detailed case study involving information exchange and collaboration in emergency response efforts. Through this research, the authors provide insights into the relevance and effectiveness of this framework in addressing the unique challenges of information management in emergency management scenarios.