GLOBAL INITIATIVE OF ACADEMIC NETWORKS

MINISTRY OF HUMAN RESOURCE DEVELOPMENT

GOVERNMENT OF INDIA

सत्यमेव जयते

MALVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Disaster Information Management Systems

March 12– 16, 2018

Overview

Disasters, both natural (earthquakes, hurricanes, tsunamis, floods, tornadoes, and volcano eruptions) and *man-made* (environmental disasters, terrorist attacks and wars) are severe, large-scale and non-routine events that disrupt the normal functioning of a society and cause widespread and overwhelming losses and impacts. In the last decade, disasters have caused more than $800 billion in losses. The 9.0 magnitude *Tohoku earthquake* caused 15,889 deaths, 6,152 injuries, and 2,601 people missing. As for the destruction of infrastructure is concerned, 127,290 buildings collapsed, 272,788 buildings collapsed partially, and another 747,989 buildings were partially damaged. In the week right after the earthquake, the associated tsunami further triggered nuclear accidents that caused the evacuation of hundreds of thousands of residents who lived within 20 km radius of the Fukushima Daiichi Nuclear Power Plant.

Disaster management is the process of planning and taking actions to minimize the social and physical impact of disasters and reduce community's vulnerability to the consequences of disasters. The four important phases of a Disaster Management System are preparation, response, recovery, and mitigation. Effective disaster management has become a critical issue for the entire world, especially for disaster-prone countries such as China, Japan, and the United States. *Data-driven disaster management* refers to applying advanced data collection and analysis technologies to achieve more effective and responsive disaster management.

In this course, we will start by identifying various data sources that provide useful data for disaster management (governmental organizations, private companies, historical data pertaining to similar disasters, social media information identifying various disaster aspects used in the recovery and mitigation processes, etc.), how to effectively capture the status information and improve situational awareness from diverse information sources, and how to effectively capture user interests and deliver the relevant information to them. We will also review the architectures of a couple of Disaster Management Systems including BCIN (Business Continuity Information Network) implemented at Florida International University, as well as techniques to integrate information from different data sources. Data mining is used liberally in these systems to analyze the current and historical data in search of interesting patterns and trends, which form an indispensable basis for decision making. Finally, we will discuss the challenges involved in Disaster Informatics.

Objectives

The primary objectives of the course are to:

- Understand the extent of losses caused by both, natural and man-made disasters.
- Detailed discussion of various phases of the Disaster Management process.
- Learn about various data sources providing useful data to deal with a disaster event, and how to meaningfully integrate this data in an automated system to effect quick societal recovery from the event.
- Discuss architectures of and techniques employed in existing Disaster Information Systems by studying a few actual systems.
- Discuss challenges involved in the Disaster Informatics process due to involvement of various kinds of data, people of different technical capabilities, types of infromation deemed useful by the users of these systems, and so on.

Duration:	**March 12– 16, 2018**
Who can attend	• Computer Science Students at all levels (4th year undergraduates, MS, PhD). • Faculty members from the academic and technical institutions. • Researchers in other fields interested in Disaster Management (emergency managers, financial experts, insurance industry, civil engineers, and the like).
Registration Fee	• MNIT Course Registration Fee (exclusive of GIAN Portal Registration Fee) • Participants from abroad : US $100 • Industry/Research Organizations/PSU : Rs. 5000/- • Faculty members from Academic Institutions: Rs. 4000/- • Research Scholars from Academic Instititions*: Rs 2000/- • Faculty/Students from IIIT Kota* : Rs 2000/- • Faculty/Research Scholars/PG students (MNIT): NIL • Undergraduate students (in final year) (MNIT): NIL * Registration fee charged from students shall be as per GIAN-PH II guidelines. For any relaxation in Registration fee for SC/ST, GIAN-PH II guidelines shall be observed. ** The above fee includes all instructional materials, computer use for tutorials and lab sessions, free Internet facility in lecture hall and lab space. The participants will be provided with accommodation, if available, on payment basis.
Registration Details	1. Fees may be paid via Demand Draft in favour of "REGISTRAR (SPONSORED RESEARCH) MNIT Jaipur" payable at Jaipur. 2. Or fees can be paid through online (NEFT) Account No. : 676801700388 In name of "REGISTRAR (SPONSORED RESEARCH) MNIT Jaipur"

	Bank : ICICI Bank, Branch: MNIT Jaipur IFSC Code: ICIC0006768.
Proof of Registration/ Payment	Need to be Sent via e-mail **(skvipparthi@mnit.ac.in)** mention "GIAN (**Disaster Information Management Systems**) as Subject accompanied with attachments of (1) Registration Form, (2) GIAN registration and (3) Proof of Payment" send it on or before **Feb 25, 2017.**
Registration process	Create login and password at http://www.gian.iitkgp.ac.in/GREGN/index Login and complete the Registration Form and select Course(s). Confirm application and pay Rs. 500/-(nonrefundable) through online payment gateway. Download "Pdf file" of the application form.

Course details: March 12– 16, 2018

- 26.5 hrs. Lectures.
- 3 hrs. Tutorials.

Tentative Lecture Schedule		
Day 1 (12th March, 18)	Lecture-1 (1.5 hrs): **(JKN)**	Disaster Types – Natural and Man-made – Examples; Consequences of disaster events – Examples of past actual disasters; Disaster Informatics and its Usefulness.
	Lecture-2 (1.5 hrs): **(JKN)**	Phases of Disaster Information Management Data-driven Disaster Management System (DMS) Data Sources for a Data-driven DMS Goals of a DMS
	Lecture-3 (1.5 hrs): **(JKN)**	Critical Components/Responsibilities of a DMS Information Processing Requirements of a DMS
Day 2 (13th March, 18)	Lecture-4 (1.5 hrs): **(JKN)**	Architecture of a DMS – Case studies (Sahana, WebEOC, BCIN – Demonstration of Business Continuity Information Network developed at FIU
	Lecture-5 (1.5 hrs): **(JKN)**	Dealing with imperfect and incomplete data– Achieving data robustness and reliability in the face of unavailable data using various techniques
	Lecture-6 (1.5 hrs): **(JKN)**	Techniques for improving Situation Awareness Conscious awareness of the dynamic environment with respect to time and space in a disaster event –

		Integration of information from various sources – Textual information extraction
	Lecture-7 (2 hrs): **(SKV)**	Role of Image Processing in Disaster Management
Day 3 (14th March, 18)	Lecture-8 (1.5 hrs): **(JKN)**	Challenges and Solutions for Information Exchange in Disaster Management – Utilization of Social Media – Extracting related content and its statistical analysis.
	Lecture-9 (1.5 hrs): **(JKN)**	Techniques for predicting disaster events (not all disasters are equal) – Early Detection of disaster events - Disaster Recovery
	Lecture-10 (1.5 hrs): **(JKN)**	Information Retrieval for Emergency Disaster Data Management – Disaster Storyline – Event designation
	Lecture-11 (2 hrs): **(SKV)**	UAVs for Disaster Management
Day 4 (15th March, 18)	Lecture-12 (1.5 hrs): **(JKN)**	Personalized needs of Users of the DMS – Automatic Information Delivery – Determining relevance of an information unit using linear regression, matrix factorization, and such statistical techniques.
	Lecture-13 (1.5 hrs): **(JKN)**	Information Sharing strategies - Community Recommendations in Disaster Management.
	Lecture-14 (1.5 hrs): **(JKN)**	Data Mining and Learning Techniques in Disaster Management – Natural Disaster Prediction (Neural Network based, Decision Tree based, Clustering based, Associate Rule Mining based
	Lecture-15 (1.5 hrs): **(SKV)**	Adhoc Networks for Disaster Management
Day 5 (16th March, 18)	Lecture-16 (1.5 hrs): **(JKN)**	Florida Public Hurricane Loss Model, a multimedia Database Management System – Description of various components of FPHLM – Risks and Insurance modelling
	Lecture-17 (1.5 hrs): **(JKN)**	Dynamic Storm Surge Model for Hurricane Events – Demonstration of 3D-Storm Surge Model developed at FIU

Faculty members:

Dr. Jai Navlakha

Professor at Florida International University since September 1987
He has received Ph.D. Case Western Reserve University in Cleveland. Since then, he has been employed at FIU. He was also awarded Honorary Professorship, Universidad Nacional Daniel Alcides Carrion, School of Post Graduate Studies, Peru.

Dr. S. K. Vipparthi

Currently working as Assistant Professor in Dept. of CS, MNIT, and Adjunct Faculty IIIT Kota He has received
Ph.D. from IIT-BHU. His research areas include Feature extraction, content based video and image retrieval, under water image analysis, Object tracking

Dr. Lava Bhargava

Currently working as Associate Professor in Dept. of ECE, at, MNIT, Jaipur and, adjunct Faculty IIIT Kota.
He has received Ph.D. in VLSI from IIT Delhi
His research areas include Low power VLSI systems, VLSI physical design, FPGAs.