The Department of Civil and Environmental Engineering at the University of Houston presents...

CIVE 6111 Graduate Seminar

Uncertainty-aware crowdsourcing and artificial intelligence to support rapid and reliable post-disaster damage assessment

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Friday, October 14, 2022
2:45pm-3:45pm
Classroom Business Building (CBB) - Room 104
Zoom: https://uh-edu-cougarnet.zoom.us/j/95702511696?pwd=VFIybkh4emhETHNITGV0dXRHS3pIZz09

Abstract

Information and narratives of disaster impact provided by the preliminary damage assessment (PDA) significantly affect the development of both post-disaster response and recovery models as well as planning for future mitigation strategies. PDA's current practice is sending experts and reconnaissance teams to affected regions and collecting data through a door-to-door assessment and windshield survey. With emerging technologies in visual data collection, especially with the advent of Unmanned Aerial Vehicles in the disaster assessment and inspection domain, visual data collection's speed and spatial extent following a disaster have increased manifold. However, relying on experts and trained professionals to process this information and make inferences about the extent of impact from the visual data becomes a bottleneck due to several limitations, such as the availability and cost of trained human resources and the difficulty in accessing the affected area. These challenges call for a more efficient, resourceful, and faster means that minimizes the involvement of domain experts in extracting actionable information from the vast amount of visual data that could be available shortly after a disaster. The emergence of efficient and widespread social networking infrastructure, advances in sensing technology, and computer vision techniques have paved the way for more efficient, rapid, and scalable practices for post-disaster damage reconnaissance. Specifically, crowd sourcing and computer vision have recently gained attention as potential remedies for the limitations and constraints of expert-driven efforts. Despite the great potential, the outcome of both crowd sourcing and AI are subjected to uncertainty stemming from different sources such as model data quality. This uncertainty may corrupt our ability to make informed decisions with a sufficient confidence level. This talk will review some new advances in using artificial intelligence and crowd sourcing models for disaster damage assessment and how to enhance their reliability and interpret-ability by accounting for the underlying uncertainty.

Bio

Dr. Arash Noshadravan is an assistant professor in the Zachry Department of Civil and Environmental Engineering, Texas A&M University. His multidisciplinary research focuses on uncertainty quantification, multi-scale simulation, and life-cycle reliability assessment in civil engineering and structural mechanics. He is particularly interested in developing physics-based and data-driven predictive models for the structure and infrastructure reliability, resilience, and risk assessment in the context of progressive deterioration and the impact of natural hazards. Noshadravan's research has applied to problems in various applications, including buildings, transportation systems (pavements, bridges), coastal structures, pipelines, construction materials, and geomaterials for energy applications. He has published more than 20 papers in highly-regarded interdisciplinary journals such as Structural Safety, Computer-Aided Civil and Infrastructure Engineering, International Journal of Disaster Risk Reduction, Structural Control & Health Monitoring, and Environmental science & technology. Noshadravan is a member of several organizations and committees, including the Probabilistic Method Committee of ASCE Engineering Mechanics Institute (EMI) and Uncertainty Quantification Technical Thrust Areas of U.S. Association for Computational Mechanics (USACM). He is the recipient of Career Initiation Fellow from Texas A&M Institute of Data Science and Truman R. Jones Excellence in Graduate Teaching Award at Texas A&M University.