

Demystifying The Blackbox: A Glimpse into the Potential of Machine Learning in Advancing Knowledge Discovery in Civil Engineering Systems

M.Z. Naser, PhD, PE

Assistant Professor

School of Civil and Environmental Engineering and Earth Sciences

AI Research Institute for Science and Engineering (AIRISE)

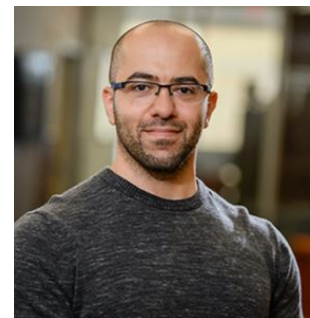
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Abstract

Machine Learning (ML) has been shown to generate attractive solutions to engineering problems. Such solutions often deliver surrogates with astonishing performance that far exceeds that of traditional methods. This brings exciting opportunities to expand and modernize our methods of investigation. In parallel, ML is rarely taught in a civil engineering curriculum. As such, we continue to primarily be secondhand ML users (i.e., applicers) and may not fully grasp the reasoning behind ML's predictions, how to dissect its Blackbox-derived decisions, nor how to responsibly apply ML. The above also brings scientific and ethical questions that warrant investigation and remains one of the elements behind the inertia towards ML. This seminar hopes to demystify the stigma of ML from a civil engineering perspective. Together, we will first start with a brief look into the big ideas behind ML (i.e., rationale, algorithms, etc.). Then, we will explore the current state of ML in civil engineering and how we can leverage ML to arrive at next-gen solutions for our problems. The second half of the seminar is dedicated to showcasing recent advancements in ML aimed to steer us away from the Blackbox nature of existing algorithms towards Glassbox, Explainable, Green, and Responsible ML. Finally, we will share a philosophical view into ML as a Knowledge Discovery system that will help advance the domain of civil engineering.

Biography

M.Z. Naser is a tenure-track Assistant Professor at the School of Civil and Environmental Engineering and Earth Sciences at Clemson University, a faculty member of the AI Research Institute for Science and Engineering (AIRISE), and a professional engineer. Dr. Naser's primary research areas are structural engineering and causal machine learning. He has co-authored over 70 peer-reviewed publications, including two books – *Leveraging Artificial Intelligence in Engineering, Management, and Safety of Infrastructure* (to be published by Taylor & Francis in 2022) and *Structural Fire Engineering* (published by McGraw Hill in 2020).



Date: Friday, October 8, 2021 Time: 11:00 AM

Zoom Link:

<https://buffalo.zoom.us/j/95179624416?pwd=bURzNHJGOUUp0RnhndHFIWSt6TFhudz09>

Meeting ID: 951 7962 4416

Passcode: 510449