ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems: Part A: Civil Engineering

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Call for Papers

A Special Collection (SC052A) on Benchmarking Data-driven Site Characterization Methods

Aims & Scope

Data-centric geotechnics is an emerging field that advocates a "digital first" agenda. One aspect of this agenda is to develop methods that can make sense of actual data. The end goal for any analysis is to improve decision making in geotechnical engineering, which is always related to a project carried out at a specific site. A site-specific knowledge of the ground conditions is thus necessary. It is natural for data-driven site characterization (DDSC) to attract the most attention in data-centric geotechnics. The purpose of DDSC is to produce a 3D stratigraphic map of the subsurface volume below a full-scale project site and to estimate relevant engineering properties at each spatial point based on site investigation data at the target site and relevant Big Indirect Data (BID) from other sites. This will fill an existing gap in Building Information Modeling (BIM) where a digital model for the subsurface is largely missing. There is an exciting prospect to implement risk and reliability-informed design at the systems level using BIM as a platform. Benchmark testing or benchmarking is used in machine learning (ML) to support unbiased and competitive evaluation of emerging ML methods. Recently, the theme of benchmarking has been discussed in geotechnical engineering to accelerate the progress of DDSC.

DDSC has received increasing attention and a number of DDSC methods have been proposed in the literature. Because site-specific data is incomplete and sparse, the DDSC methods are mainly probabilistic with Bayesian machine learning methods being the most popular. To promote the development of DDSC methods that are applicable to routine projects in a more purposeful way, the benchmark examples must be 3D, realistic in scale, stratigraphy, and properties, cover a range of ground conditions, restrict training dataset to only data that an engineer has at his/her disposal, and selection of validation dataset and performance metrics to meet the needs of practice.

This Special Collection aims to invite researchers in this important emerging field to apply/develop benchmarking and demonstrate the performance/value of DDSC methods using a benchmarking framework that will hasten their adoption in practice.

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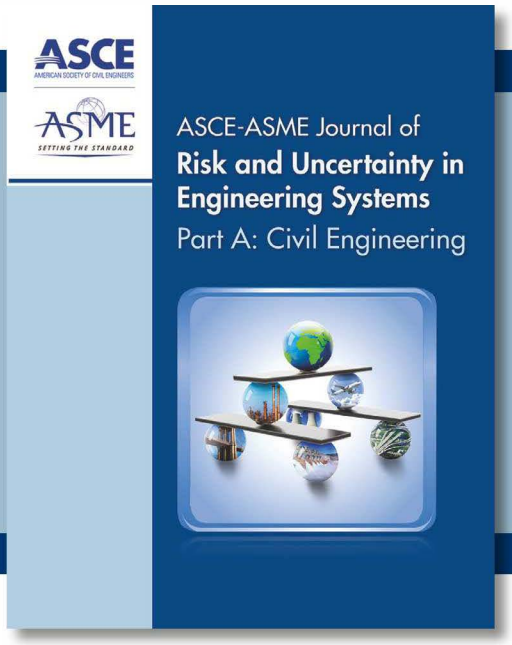

Contributions addressing the following topics are especially welcome

- Data-driven site characterization
- Multivariate Probability Distribution Using Sparse, Incomplete, and Spatially Variable Data
- Big Indirect Data
- Stratification analysis
- Site recognition
- Bayesian machine learning
- Artificial intelligence
- Benchmarking examples
- Software-related advancements
- Building Information Modeling
- Reliability-based design

Proposed Timeline:

1 January 2022	Call for papers/Paper solicitation
1 February 2022	Confirmation of corresponding authors and paper titles
1 August 2022	Deadline of submission
1 February 2023	Decision of all papers

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