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Special Issue on Machine Intelligence for Engineering under Uncertainties

Machine intelligence (MI) integrates computation, data, models, and algorithms to solve problems that are too complex for humans. During the last three decades, MI has been a highly researched topic and widely used for solving complex real-world engineering problems. The main theme of this Special Issue is dedicated to the development of MI methods that sheds a new light for solving problems deemed difficult in engineering sciences under uncertainties.

Many real-world engineering design problems can be formulated as optimization. Yet the curse of dimensionality with a large number of design variables, both discrete and continuous, makes the solution searching process difficult. Furthermore, interpretation of the large amount of simulation and experimental data needs advanced computation, data mining, Big Data analytics, and deep learning methodologies. The stochastic nature of real-world engineering systems makes these analyses even more challenging. Due to their complexity, real-world problems are difficult to solve using derivative-based local optimization algorithms. In the recent past, MI and its branches have been used to solve complex real-world engineering problems that cannot be solved using conventional methods.

This Special Issue strives to gather the latest developments of MI applications in real-world engineering systems, particularly the ones under uncertainty. On this basis, this Special Issue includes key applications of MI on different engineering disciplines such as engineering design, monitoring and maintenance, structural systems, applied mechanics, etc. Theories, methodologies, tools, computational aspects for MI topics include (but are not limited to):

Topic Areas

- Mathematical foundation of machine learning under uncertainties
- Probabilistic methods and statistical tools for scientific machine learning
- Neural networks and deep learning with probabilistic reasoning
- Genetic programming and evolved systems with uncertainties
- Evolutionary and Swarm Intelligence with uncertainties for multi-objective problems
- Stochastic and robust optimization using intelligent search methods
- Randomized algorithms (stochastic gradient, compressed sensing, etc.)
- Stochastic surrogate/metamodels with model-form and parameter uncertainties
- Machine learning based on emerging computing hardware
- Data-driven statistical inverse problems
- Data mining, pattern recognition, and data clustering
- Fuzzy control, optimization, and decision making under uncertainties
- Applications of MI in product engineering such as engineering mechanics, system dynamics, reliability
- Applications of MI in process engineering such as scheduling, system monitoring, maintenance, optimal control

Publication Target Dates

Paper submission deadline	January 15, 2022
Initial review completed	June 15, 2022
Special Issue publication date	December 2022

Submission Instructions

Papers should be submitted electronically to the journal at journaltool.asme.org. If you already have an account, log in as author and select **Submit Paper** at the bottom of the page. If you do not have an account, select **Submissions** and follow the steps. In either case, at the **Paper Submittal** page, select the [ASME Journal of Computing and Information Science in Engineering](#) and then select the Special Issue **Machine Intelligence for Engineering under Uncertainties**.

Papers received after the deadline or papers not selected for inclusion in the Special Issue may be accepted for publication in a regular issue. Early submission is highly encouraged. Please also email the Editor, Professor Satyandra K. Gupta, at guptask@usc.edu, to alert him that your paper is intended for the Special Issue.

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