

A SPECIAL ISSUE ON

Machine Learning in Numerical Analysis
and Optimization: Theory and Computation



The rapid advancement of machine learning and artificial intelligence has opened new horizons for numerical analysis and optimization. This Special Issue aims to bridge the gap between rigorous mathematical theory and modern data-driven computational methods.

We welcome high-quality original research papers and comprehensive review articles on theory, algorithms, computational frameworks, and applications at the intersection of numerical analysis, optimization, and machine learning.

The goal is to promote the development of intelligent, reliable, and efficient methods that address complex scientific and engineering challenges.

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IMPORTANT DATES



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peer-review process and must comply
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TOPICS OF INTEREST

A. NUMERICAL ANALYSIS

- Machine learning-assisted numerical methods
- Data-driven numerical methods for differential equations (ODEs, PDEs)
- Physics-informed and structure-preserving numerical methods (PINNs, variational and symplectic methods)
- Error analysis, stability and convergence of learning-based numerical methods
- Adaptive discretization, mesh generation and refinement using ML
- Operator learning and neural operators (FNO, DeepONet, etc.)
- Reduced order modeling and surrogate models for numerical problems
- Scientific machine learning for large-scale and high-dimensional problems
- Uncertainty quantification and inverse problems
- Scientific computing, HPC and parallel algorithms enhanced by ML
- Applications in computational physics, mechanics, fluid dynamics, materials science, climate modeling, and related fields

B. OPTIMIZATION

- Machine learning-based optimization algorithms
- Neural networks for optimization and metaheuristic methods enhanced by ML
- Deep and reinforcement learning for optimization and decision-making
- Bayesian optimization and multi-fidelity optimization
- High-dimensional, large-scale and combinatorial optimization with ML
- Convex and nonconvex optimization with ML techniques
- Online optimization and learning in dynamic environments
- Applications in engineering, finance, energy, healthcare, logistics, and industry



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Editorial Office, IJNAO
Department of Applied Mathematics
Ferdowsi University of Mashhad, Iran



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