Special Issue

New Advances in Learning Algorithms and Optimization: Methods and Applications

Message from the Guest Editor

The performance of intelligent systems is fundamentally driven by mathematical innovation in learning algorithms and optimization methods. While theoretical advances continue to push excellence, a critical challenge remains in their transformation into reliable, scalable, and impactful real-world applications. Bridging this gap is essential for society and requires new mathematical models of learning. This Special Issue invites two kinds of high-quality, original research contributions: papers that introduce novel learning and optimization algorithms with rigorous validation (highlighting their mathematical aspect) and contributions detailing the impactful application of advanced methods to solve tangible real-world problems.

Topics of interest include, but are not limited to, the following:

Scalable algorithms for large-scale data processing;
Gradient-free and black-box optimization;
Data-efficient, compute-efficient and robust learning methods;
Hybrid methods, including physics-informed learning and neuro-symbolic AI;
Practical implementations of federated and distributed learning;
Learning to optimize: Meta-learning and automated machine learning (AutoML).

Guest Editor

Dr. Himanshu Buckchash
Department of Science and Technology, IMC Krems University of Applied Sciences, 3500 Krems, Austria

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Mathematics
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
mathematics@mdpi.com

mdpi.com/journal/mathematics

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Message from the Editor-in-Chief

The journal *Mathematics* publishes high-quality, refereed papers that treat both pure and applied mathematics. The journal highlights articles devoted to the mathematical treatment of questions arising in physics, chemistry, biology, statistics, finance, computer science, engineering and sociology, particularly those that stress analytical/algebraic aspects and novel problems and their solutions. One of the missions of the journal is to serve mathematicians and scientists through the prompt publication of significant advances in any branch of science and technology, and to provide a forum for the discussion of new scientific developments.

Editor-in-Chief

Prof. Dr. Francisco Chiclana
School of Computer Science and Informatics, De Montfort University, The Gateway, Leicester LE1 9BH, UK

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Rapid Publication:

manuscripts are peer-reviewed and a first decision is provided to authors approximately 17.3 days after submission; acceptance to publication is undertaken in 2.8 days (median values for papers published in this journal in the second half of 2025).