Special Issue

Mathematics and Simulation of Brain-Inspired Computing: From Dynamic Models to Visual Intelligence

Message from the Guest Editors

This Special Issue explores mathematical frameworks driving brain-inspired computing systems, focusing on dynamic computational models and their applications in visual intelligence. We seek contributions that rigorously integrate the following: Mathematical modeling of neurobiological processes (e.g., coupled differential equations for spiking neurons, fractional calculus for synaptic plasticity); Learning algorithms with provable properties (e.g., convergence analysis of memristor-augmented backpropagation, Lyapunov stability in neuromorphic training); Optimization algorithms for energy-efficient neuromorphic architectures (e.g., stochastic gradient descent with biological constraints, gene algorithms based on memristor); Computational analysis of brain-inspired systems (e.g., complexity theory for event-based vision, entropy-driven information extraction); Statistical estimation in brain-like neural network vision tasks (e.g., Bayesian inference for brain-like neural network object detection, topological analysis of feature maps); Machine learning theory (e.g., convergence proofs for spiking neural networks, manifold learning for neuromorphic data).

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Deadline for manuscript submissions

1 April 2026

About the Journal

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.

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