Special Issue

Integrating Machine Learning and Physics in Engineering and Biology

Message from the Guest Editor

This Special Issue delves into the transformative convergence of machine learning (ML) and physics, showcasing its profound impact across engineering and biological disciplines. It highlights how the data-driven capabilities of ML are being rigorously informed and enhanced by fundamental physical principles, leading to more robust, interpretable, and generalizable models. A central theme is Physics-Informed Machine Learning (PIML), where physical laws, often expressed as partial differential equations, are embedded directly into ML architectures. This integration enables models to learn effectively from sparse data while adhering to known physical constraints, significantly improving predictive accuracy and reducing reliance on extensive datasets. Applications span diverse areas, including fluid dynamics, materials science, and climate modeling. In biology specifically, this integration is crucial for bridging scales, from molecular interactions to cellular and organismal behavior. Research presented includes ML applications in protein folding, drug discovery, biological transport, and biomechanics.

Guest Editor

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Message from the Editor-in-Chief

Algorithms are the very core of Computer Science. The whole area has been considered from quite different perspectives, having led to the development of many sub-communities: Complexity theory (limitations), approximation or parameterized algorithms (types of problems), geometric algorithms (subject area), metaheuristics, algorithm engineering, medical imaging (applications), indicates the range of perspectives. Our journal welcomes submissions written from any of these perspectives, so that it may become a forum for exchange of ideas between the corresponding scientific subcommunities.

Editor-in-Chief

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