

Special Issue

Applications Based on Asymmetry/Symmetry in Data Mining and Machine Learning

Message from the Guest Editors

As a guest editor for this Special Issue, it is my pleasure to introduce a collection of works exploring the profound role of symmetry and asymmetry in data mining and machine learning. The interplay between these two principles is fundamental. Symmetry provides structure, reduces complexity, and imbues models with invariances. Asymmetry captures the critical deviations, imbalances, and directional relationships that define the real-world data. This issue highlights cutting-edge research that leverages this duality. Contributions span theoretical advances exploiting group theory and geometric priors for innovative applications in graph neural networks, computer vision, and generative modeling. Several papers have addressed asymmetry in the form of data imbalance, algorithmic fairness, and asymmetric loss functions, tackling essential challenges in ethical AI and robust learning. We invite you to explore how understanding symmetry and asymmetry provides a powerful approach for designing next-generation intelligent systems.

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Deadline for manuscript submissions

31 August 2026



Symmetry

an Open Access Journal
by MDPI

Impact Factor 2.2
CiteScore 5.2



mdpi.com/si/253683

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About the Journal

Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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