Special Issue

Symmetries in Machine Learning and Artificial Intelligence

Message from the Guest Editors

Symmetries are crucial in Machine Learning (ML) and Artificial Intelligence (AI), improving model efficiency and generalization. Symmetries in data and models, such as rotational, translational, or scale invariance, allow algorithms to identify patterns regardless of orientation or scale. By incorporating symmetry, AI models prioritize important features, reducing complexity and improving performance. Symmetries are essential in various domains, including image recognition, speech processing, natural language processing, robotics, computer vision, reinforcement learning, neural networks, optimization, pattern recognition, and data mining. Convolutional neural networks (CNNs) utilize spatial invariance for object detection, leading to faster and more accurate results. Understanding symmetry is key to creating efficient, scalable, robust ML and AI systems.

Guest Editors

Dr. Rajesh Natarajan

Faculty of Information Technology, College of Computing and Information Sciences, University of Technology and Applied Sciences-Shinas, Shinas 324, Oman

Prof. Dr. Francesco Flammini

1. Division of Product Realisation, School of Innovation, Design and Engineering, Mälardalen University, 72123 Västerås, Sweden
2. Dalle Molle Institute for Artificial Intelligence, University of Applied Sciences and Arts of Southern Switzerland, 6928 Manno, Switzerland

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

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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.

Editor-in-Chief

Prof. Dr. Sergei Odintsov
1. ICREA, 08010 Barcelona, Spain
2. Institute of Space Sciences (IEEC-CSIC), C. Can Magrans s/n, 08193 Barcelona, Spain

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