Special Issue

Symmetry-Aware Generative AI: Emerging Trends and Applications in Intelligent Transportation Systems

Message from the Guest Editors

Generative artificial intelligence (GenAI) is reshaping the landscape of smart transportation by offering innovative solutions to optimize traffic flow, enhance safety, and improve infrastructure management. As transportation systems become increasingly complex, symmetry and asymmetry in data patterns, model architectures, and system behaviors are pivotal in achieving efficient and adaptive designs. This Special Issue explores the intersection of symmetry principles with GenAI to address key challenges in intelligent transportation systems (ITS), such as route optimization, anomaly detection, and predictive maintenance. We invite contributions that focus on the symmetric analysis of generative models, developing symmetric and asymmetric neural network architectures, and applying generative AI in ITS but are not limited to these areas. Submissions highlighting theoretical advancements, methodological details, and experimental results demonstrating reproducibility and practical applications are particularly encouraged.

Guest Editors

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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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