

Special Issue

Generative AI for Smarter UAVs: Enhancing Reinforcement Learning Decision-Making

Message from the Guest Editors

Unmanned Aerial Vehicles (UAVs) are increasingly vital to modern communication networks, yet challenges in decision-making hinder their full potential.

Reinforcement Learning (RL) offers promising solutions but faces limitations such as low sample efficiency and data scarcity, particularly in dynamic UAV environments. Diffusion Models (DMs), a class of generative AI, present a transformative approach by learning underlying data distributions and generating realistic synthetic data. This capability addresses RL's data scarcity and improves policy networks, enabling more effective decision-making in UAV communications. The integration of DMs with RL enhances UAV adaptability and real-time performance. DMs generate diverse synthetic data, improve policy networks, and create realistic simulation environments, overcoming RL's limitations. This Special Issue invites original research on integrating DMs with RL in UAV communications, focusing on innovative decision-making approaches.

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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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