

Sustainable AI for Industrial Cyber-Physical Systems

Theme: The pervasive integration of computing into the physical world together with the explosion of Artificial Intelligence (AI) and Machine Learning (ML) is setting the stage for transformative Industrial Cyber-Physical Systems (ICPSs) across diverse domains including smart cities, smart transportation, Industry 4.0, and smart healthcare. However, achieving the real-world industrial acceptance and long-term benefits of AI/ML in ICPSs hinges on sustainable AI learning algorithms encompassing both the environmental sustainability and social sustainability of AI. The growing trend towards larger and more complex ML models, trained with ever-growing datasets, raises environmental concerns due to the high energy footprint of AI/ML model training while also posing challenges in terms of computing resources, availability of labeled data, and data sharing. The technical dimensions of AI pertaining to social sustainability encompass learning techniques that will foster societal acceptance, ensure regulatory compliance, and mitigate risks. Consequently, this special collection aims to foster technical advances related to the enduring sustainability of AI/ML in ICPS and promote addressing challenges of AI/ML acceptance in ICPS practice by considering practical constraints, including resources, security, privacy, transparency, regulations, and others. Integrating environmental considerations into AI/ML algorithms and advancing technical aspects in support of societal acceptance will foster the practical use of AI/ML in ICPS, thereby driving the societal impact.

This special collection will focus on (but not limited to) the following topics:

- Reducing the size of AI/ML models for Industrial ICPS with techniques such as pruning, quantization, knowledge distillation, and matrix/tensor decomposition
- Federated (vertical and horizontal) learning for ICPS
- Active/online/incremental learning for ICPS
- Few shot learning and meta-learning for ICPS
- Unsupervised and semi-supervised learning for ICPS
- Transfer learning for ICPS
- AI fairness for ICPS
- Explainable and interpretable AI for ICPS
- AI/ML adversarial robustness in ICPS

Guest Editors

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Timetable:

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