CALL FOR PAPERS

IEEE Transactions on Emerging Topics in Computational Intelligence

Special Issue on Resource Sustainable Computational and Artificial Intelligence

I. AIM AND SCOPE

Recent years have witnessed the successful applications of computational and artificial intelligence (C/AI) in various disciplines due to the developments in the domain of neural networks and powerful computing hardware. At the same time, sustainable C/AI, which aims at studying the environmental impact of AI systems, is becoming increasingly important. On the one hand, the AI system itself, especially those deep learning-based ones, is computation-intensive, which leads to a considerable amount of energy consumption and carbon dioxide emission in the design, training, validation, re-tuning, implementation, and use of AI. On the other hand, AI can serve as a tool and a positive contributor to environmental sustainability in many industries. Specifically, computational AI methods, such as artificial neural networks, fuzzy systems, and evolutionary computing can help reliability engineering, material design, and manufacturing ensure sustainability.

The sustainability of AI focuses on the sustainable development of AI algorithms itself. It is primarily concerned with measuring the sustainability of developing and using AI models, such as designing efficient AI algorithms, improving the computational power of training algorithms, calculating the carbon footprint, etc. In addition, sustainable AI requires systems to support efficient and scalable execution of AI algorithms, including specialized accelerators, efficient at and low-power execution mode, appropriate offloading, scheduling strategies, identification of efficient parallelism in AI algorithms, etc. On the other hand, AI algorithms and technologies should be robust, resilient, producible to allow AI to proliferate. AI for sustainability (or nature-sustaining AI) aims to minimize resource consumption in various tasks and applications. For instance, C/AI can be enriched further by reducing computational overhead in real-time search, real-time optimization (e.g., Scheduling), real-time planning (e.g., robot motion planning), and coordination (e.g., Nash/Egalitarian equilibrium based multi-agent coordination). In addition, studying C/AI to minimize wasting/damaging natural resources in various industries remains a big challenge and less explored in the research community. For example, in the energy industry, C/AI can manage the demand and supply of renewable energy in intelligent grid systems to optimize efficiency and cut unnecessary carbon pollution generation.

II. TOPICS

The topics of interest for this special issue include, but are not limited to

- Efficient and low carbon AI algorithms
- Power-efficient data management
- Real-time energy resource modeling and management
- Power-aware efficient AI algorithms
- Data parallelism and model parallelism for AI
- Distributed and cooperative learning for AI
- Parallel & distributed computing for efficient and high-performance AI
- Offloading & scheduling strategy for efficient and high-performance AI
- Training and inference strategies for AI algorithms with decision making
- Real-time search, optimization, planning, and coordination
- Modeling and simulation-based performance optimization of industrial systems
- Nature-inspired optimization for sustainable AI
- C/AI algorithms for resources sustaining and management, smart grids scheduling, smart transportation, recycling and maximizing the efficiency of heating and cooling, manufacturing to reduce waste, and energy and sustainable material developing

III. SUBMISSIONS

Manuscripts should be prepared according to the "Information for Authors" section of the journal and submissions should be done through the journal submission website: https://mc.manuscriptcentral.com/tetci-ieee, by selecting the Manuscript Type of "Resource Sustainable Computational and Artificial Intelligence" and clearly marking "Resource Sustainable Computational and Artificial Intelligence" as comments to the Editor-in-Chief. Submitted papers will be reviewed by at least three different reviewers. Submission of a manuscript implies that it is the authors' original unpublished work and is not being submitted for possible publication elsewhere.

IV. IMPORTANT DATES

Paper submission deadline: Feb. 1, 2023
Notice of the first-round review results: Jun. 1, 2023
Revision Due: Aug. 1, 2023
Final Notice of Acceptance/Reject: Oct. 1, 2023

V. GUEST EDITORS

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