Call for Papers

Special Issue on "Advanced Learning-based Support for Large-scale Multi-agent Systems"

In the context of big models, distributed computing can have a significant impact on the efficiency and scalability of some applications. Large-Scale Multi-Agent Systems (LSMAS) is a field within distributed computing that aims to develop distinct problem solvers for specific tasks for each large-scale agent. One of the main advantages of LSMAS is that it can be used to solve complex problems that are difficult for a single agent to solve. By working together, the agents in a LSMAS can achieve goals that are beyond the capabilities of any individual agent. Additionally, LSMAS can be more fault-tolerant than centralized systems because the failure of one agent does not necessarily mean the failure of the entire system. However, there are also some challenges associated with LSMAS. One major challenge is the difficulty of designing agents that can work together effectively. Agents may have different goals, knowledge, and communication capabilities, which can lead to conflicts and coordination problems. Another challenge is the computational complexity of coordinating the actions of multiple agents in real time. To this end, there is a great need for advanced learning-based support technologies to provide more accurate, efficient, and effective solutions for the challenges in LSMAS. Advanced learning models include autoML, transfer learning, reinforcement learning, active learning, and explainable AI. By leveraging advanced learning-based support techniques, more powerful and accurate LSMAS can be realized and implemented to improve decision-making and drive the development of intelligence.

While advanced learning-based support approaches can benefit LSMAS, there are still challenges before full-scale integration. There is a deep need to understand the bigger picture on how advanced learning-based support will fit in an evolved network architecture and data scale in LSMAS. To this end, the objective of this special issue is to solicit the submission of high-quality papers from leading researchers actively working in the emerging field of advanced learning-based support for LSMAS to address the following fundamental themes.

- Explainable AI for LSMAS
- Federated learning for LSMAS
- Computational semantics for LSMAS
- Large-scale multi-agent reinforcement learning
- Robust cooperative control for LSMAS
- Application of advanced learning in LSMAS
- Mobile computing and applications for LSMAS
- Brain-inspired optimization/learning for LSMAS
- Data-driven control, and optimization for LSMAS
- Analysis, understanding, and searching of LSMAS
- Cooperative-competitive multi-agent framework
- Knowledge representation in LSMAS
- Learning-based multimodal platforms, systems, and architecture for LSMAS

Submission Guidelines: Submitted articles must not have been previously published or currently submitted for publication elsewhere. All submissions are subject to the IEEE System Journal's peer-review procedures. The journals must be submitted online at https://mc.manuscriptcentral.com/ieee-sj. The author guidelines can be found at https://ieeesystemsjournal.org/authorinstructions/. Select the paper type **"SI: Advanced Learning-based Support for Large-scale Multi-agent Systems"** upon submission to ensure that the article is considered for this special issue. Authors must also mention the same in their submission cover letter.

Important Dates:
Submission deadline: November 15, 2023
First round of review: December 15, 2023
Second round of review: February 15, 2024
Final decision: April 15, 2024

For further information, please contact any of the Guest Editors.

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