

CAIT 2026 - Track 17

1. Title

SI + Application: Swarm Intelligence and Application

2. Brief Description of the Session

This special session focuses on the frontier research and practical applications of Swarm Intelligence (SI). It aims to explore the theoretical foundations, algorithmic innovations, and real-world implementations of swarm-based optimization and collective behavior models. The session welcomes studies on classical and novel swarm algorithms (such as Particle Swarm Optimization, Ant Colony Optimization, and Artificial Bee Colony), multi-agent systems, distributed coordination, and their integration with machine learning and deep learning techniques. It also addresses key challenges such as scalability, dynamic environment adaptation, convergence analysis, and robustness in complex systems. By gathering global researchers and practitioners, this session promotes technological innovation, cross-domain implementation, and interdisciplinary collaboration, to accelerate the application of swarm intelligence in solving complex, large-scale, and multi-objective optimization problems across various industries.

3. Call for Papers

Swarm Intelligence (SI) has demonstrated remarkable capabilities in solving complex optimization and decision-making problems by simulating the collective behaviors of decentralized, self-organized systems. In recent years, the integration of SI with modern artificial intelligence, big data, and Internet of Things (IoT) technologies has unlocked tremendous potential in diverse fields, ranging from robotics and logistics to smart grids and healthcare.

This symposium focuses on the latest theoretical advancements and industrial applications driven by Swarm Intelligence. We invite researchers, engineers, and scholars engaged in SI and related fields worldwide to contribute relevant theoretical and applied research papers.

4. Topics

- Theoretical analysis and convergence proofs of swarm intelligence algorithms
- Novel swarm-based optimization algorithms and hybrid metaheuristics
- Multi-objective and many-objective swarm optimization
- Swarm robotics and multi-agent cooperative control
- Swarm intelligence in deep learning and neural architecture search
- Applications of SI in smart cities, IoT, and edge computing
- Swarm-based routing, scheduling, and logistics optimization
- SI applications in healthcare, bioinformatics, and medical imaging
- Distributed swarm intelligence for large-scale data mining and feature selection
- Swarm intelligence in autonomous vehicles and unmanned aerial vehicles (UAVs)
- Dynamic, robust, and scalable swarm systems in uncertain environments

5. Brief introduction of Chair and Co-chairs with photo



Fangyan Nie, College of Big Data and Intelligent Engineering, Guizhou University of Commerce, Guiyang 550014, China.

Fangyan Nie received his Ph.D. degree in Instrument Science and Technology from Chongqing University, Chongqing, China, in 2010. He received the M.S. degree in Computer Application Technology from Guizhou University, Guiyang, China, in 2005, and graduated from the undergraduate program in Computer Information Management at the National University of Defense Technology, Changsha, China, in 1999. Now he is a professor in College of Big Data and Intelligent Engineering, Guizhou University of Commerce. He is also a member of China Computer Federation (CCF). His current research interests include information acquisition and processing, swarm intelligence (SI) and its applications, computer vision, and machine learning.