

ETFA 2025

Porto Portugal

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30th IEEE International Conference on Emerging Technologies and Factory Automation

Call for Papers

SS03 – Addressing Data Scarcity: Machine Learning, Information Fusion, and Sustainable AI

Organized and Chaired by

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❖ **FOCUS.** Machine learning often relies on large datasets, but real-world applications frequently face data scarcity due to limited sensor capabilities, expensive labeling, or rare phenomena such as machine faults. The goal in dealing with scarce data must be to obtain as much information as possible from the available data. Overcoming data scarcity is not only a technical challenge but also a step towards sustainable AI, enabling the development of effective models with fewer resources and minimising energy-intensive data collection and labeling processes. Methods to address data scarcity include data efficient algorithms, data augmentation, transfer learning, and information fusion that explicitly model and manage uncertainty.

❖ TOPICS

- ❖ Data-efficient Machine Learning Algorithms
- ❖ Applications of Machine Learning with Scarce Data
- ❖ Machine Learning for Tabular Data
- ❖ Sustainable Artificial Intelligence in the Context of Scarce Data
- ❖ Augmented and Transfer Learning
- ❖ Synthetic Data Generation for Scarce Data Scenarios
- ❖ Information Fusion in the Context of Scarce Data
- ❖ Evaluation Metrics for Scarce Data Applications
- ❖ Multi-sensory Systems for Data Acquisition
- ❖ Data Spaces and Lakes in Smart Manufacturing
- ❖ Data Scarcity Challenges in Educational AI and Learning Analytics
- ❖ Information Fusion for Adaptive Learning and AI-Tutoring Systems
- ❖ Uncertainty Modelling
- ❖ Optimisation under Epistemic Uncertainty
- ❖ Informed Machine Learning for Uncertainty Reduction
- ❖ Cyber-Physical Systems for Scarce Data

❖ **AIM.** This Special Session aims at bringing together professionals from industry and academia to share cutting-edge concepts, recent developments, research results, and practical achievements in advanced machine learning and information fusion techniques for scarce data, with applications in predictive maintenance, quality management, optimisation, computer vision, and beyond.

❖ **CONFERENCE FORMAT.** The conference will comprise multi-track sessions for regular papers, to present significant and novel research results with a prospect for a tangible impact on the research area and potential implementations, as well as work-in-progress (WiP) and industry practice sessions.

❖ AUTHOR'S SCHEDULE (2025)

❖ Regular and special sessions papers

Submission deadline **April 18**
Acceptance notification **May 23**
Deadline for final manuscripts **July 4**

❖ Work-in-progress/Industry practice papers

Submission deadline **May 30**
Acceptance notification **June 20**
Deadline for final manuscripts **July 4**