

Call for Papers

SS05 - Learning on Scarce Data for Data-based Control and Operational Strategy

Organized and Co-Chaired by (sorted by last name)

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- ❖ **FOCUS.** The study and application of Machine Learning (ML) algorithms in the industrial domain have become a popular topic of research during the last years. Several authors have proposed data-based approaches to automate and/or optimize industrial activities such as predictive maintenance, quality assurance, stock/demand prediction, energy consumption, etc. Going a step further, ML has also been explored at industrial control level to conduct data-driven operational strategy and implement data-based controllers. A common denominator of these approaches is the need of a huge amount of data to ensure proper training and avoid overfitting. In the context of control and plant operation strategies, deployment on real environments could fall into the small data regime, i.e., the amount of available data is scarce. Scarce Data is not only limited to the volume of the data, but it could also refer to environments with highly unbalanced data or slow dynamics which prevent extracting the underlying pattern from training data. Besides, data-based controllers deal with temporal sequence and sensor data, which also implies an additional challenge to the application of Machine Learning mechanisms. In other ML domains, several strategies have been proposed to overcome the Scarce Data limitations such as the Transfer Learning of models trained at other (big data) scenarios, the generation of artificial data or the adoption of Reinforcement Learning. More recently, Bayesian approaches have also been recovered, where proper probabilistic modeling and the inclusion of prior knowledge is introduced at learning. The aim of this special issue is to address the problem of ML in Industrial Control and operational strategy when dealing with Scarce Data and propose mechanisms to overcome it.

- ❖ **TOPICS**
 - ❖ Data-efficient algorithms and Machine Learning in the context of Scarce Data
 - ❖ Machine Learning and Signal Processing for temporal sequences and sensor data
 - ❖ Generative models for industrial data augmentation
 - ❖ Reinforcement Learning solutions to tune system operation and data-based control design according to data availability
 - ❖ Transfer Learning solutions that use knowledge acquired in big data scenarios to deal with the small data regime
 - ❖ Probabilistic Models and Bayesian Learning: how to measure uncertainty and develop solutions to take it into account

- ❖ **AIM.** The aim of the Special Session is to bring together researchers and practitioners from the industry and academia and provide them with a platform to report on recent advances and developments in the newly emerging areas of Machine Learning for Industrial Control and operational strategy and the development of mechanisms to deal with Scarce Data.

- ❖ **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 (2023)**
 - ❖ **Regular and special sessions papers**

Submission deadline	March 31
Acceptance notification	May 5
Deadline for final manuscripts	June 16
 - ❖ **Work-in-progress/Industry practice papers**

Submission deadline	May 12
Acceptance notification	June 9
Deadline for final manuscripts	June 16