



21st IEEE International Conference on
Industrial Informatics

17th - 20th July 2023 | Lemgo, Germany



INDIN 2023 Special Session on

SS 08 – Machine Learning and Information Fusion in the Context of Scarce Data

organized by

Organizer 1: Diana Göhringer (diana.goehringer@tu-dresden.de)
Affiliation: Technische Universität Dresden, Germany



Diana Göhringer is professor for adaptive dynamic systems at TU Dresden, Germany. She received her PhD and her master degree in Electrical Engineering and Information Technology from the Karlsruhe Institute of Technology (KIT), Germany in 2011 and 2006, respectively. She is author and co-author of over 150 publications in international journals, conferences and workshops. Her research interests include Reconfigurable Computing, Multiprocessor Systems-on-Chip (MPSoCs), Networks-on-Chip, Hardware-Software-Codesign and Runtime Systems.

Organizer 2: Christoph-Alexander Holst (christoph-alexander.holst@th-owl.de)
Affiliation: inIT – Institute Industrial IT, Germany



Christoph-Alexander Holst received his master's degree in information technology from the Technische Hochschule Ostwestfalen-Lippe, Germany. He is working towards his doctoral degree in cooperation with the Computer Engineering Group at the Brandenburg University of Technology Cottbus-Senftenberg. His main research topics are information fusion, fusion system design based on machine learning techniques, and sensor orchestration.

Organizer 3: Michael Hübner (michael.huebner@b-tu.de)
Affiliation: Brandenburg University of Technology, Germany



Michael Huebner is a Full Professor with the Brandenburg University of Technology, Cottbus, Germany, and the Chair of Computer Engineering Group and vice president for research and transfer. He received his habil. and Dr.-Ing. degrees from the Karlsruhe Institute of Technology (KIT) in 2011 and 2007 respectively. His research interests are in reconfigurable computing with application in automotive systems, including the integration into high-level design and programming environments. Michael Hübner is main and co-author of over 250 international publications.

Organizer 4: Volker Lohweg (volker.lohweg@th-owl.de)
Affiliation: inIT – Institute Industrial IT, Germany



Volker Lohweg holds the professorship for Image processing and Information Fusion at TH OWL. He is heading the research group “Discrete Systems”, and is Director of the Institute Industrial IT (inIT). The research group’s working area is dedicated to Cognitive Systems in automation especially Information Fusion and Optical Document Security, including banknote inspection and authentication. He is active in SPIE and IEEE as a reviewer in image processing and data analysis. His current interests are sensory conflict modeling and Multi-Scale signal analysis based on artificial intelligence and machine learning.

Organizer 5: Simona Salicone (simona.salicone@polimi.it)
Affiliation: Politecnico di Milano, Italy



Simona Salicone is an Associate Professor of electrical and electronic measurements at the Politecnico di Milano, Italy. She received her M.Sc. and PhD in Electrical Engineering from the same university, where she has been a researcher, an assistant professor, and an associate professor. Her principal research interests are concerned with the analysis of advanced mathematical methods for uncertainty representation and estimation. She has published over 130 papers, edited two monographs, and serves as a reviewer for various journals, publishers, and conferences. She is a member of IEEE and GMEE, and has received numerous awards and recognitions for her contributions to the field of measurement uncertainty theory.

Call for Papers

Machine learning methods often assume the availability of large amounts of data, i.e. Big Data. However, the reality in industrial and various other real-world applications is that data is not always available in sufficient or satisfactory quantities. Although technical systems generate an increasing amount of data as integrated sensors become more available, measured data is often repetitive and contains the same information repeatedly, which only creates the illusion of Big Data. Such situations are summarised under the term data scarcity or Scarce Data. Data are often scarce because of technical limitations of sensors, an expensive labelling process, or rare concepts, such as machine faults, which are hard to capture.

The goal in dealing with Scarce Data must nevertheless be to obtain as much information and as much knowledge as possible from the little data that is available. Approaches to addressing data scarcity comprise data-efficient algorithms and methods for enabling data-hungry algorithms to be used on Scarce Data. Various methods have been devised and proposed for highly complex models that are intended to be applicable to scarce data, such as data augmentation or transfer learning. Data scarcity is often only implicitly taken into account by extending and adapting existing algorithms. In contrast, information fusion methods specifically expect data to be uncertain due to scarcity (as well as other data imperfections). Uncertainties based on data scarcity are explicitly modelled, quantified, and considered.

This special session aims to discuss and advance machine learning and information fusion methods that are able to deal with scarce data. Contributions in both areas are welcome. Potential application areas include all forms of technical systems and range from predictive maintenance and analysis, quality management, product design, assistance systems, optimisation, and computer vision.

Topics of the Session include, but are not limited to:

- Algorithms for sparse data handling
- Data-efficient Machine Learning Algorithms
- Machine Learning in the context of scarce data
- Sustainable Artificial Intelligence in the context of scarce data
- Augmented and Transfer Learning
- Fast Learner systems
- Information Fusion in the context of scarce data
- Multi-sensory systems for data acquisition
- Uncertainty modelling
- Optimisation under epistemic uncertainty
- Informed Machine Learning for uncertainty reduction
- Data Gap Analysis
- Cyber-Physical-Systems for scarce data
- Hardware-optimised data systems and accelerators

Submissions Procedure: All the instructions for paper submission are included in the conference website <https://2023.ieee-indin.org/index.php>

Deadlines:

Deadline for submission of papers:	March 01, 2023
Notification of acceptance of papers:	April 15, 2023
Final manuscripts due:	June 05, 2023

IEEE IES Technical Committee Sponsoring the Special Session (if any):

Name	Institution	Country	Email
Carsten Röcker	inIT – Institute Industrial IT	Germany	carsten.roecker@th-owl.de
Henning Trsek	inIT – Institute Industrial IT	Germany	henning.trsek@th-owl.de
Lukasz Wisniewski	inIT – Institute Industrial IT	Germany	lukasz.wisniewski@th-owl.de