

Conference Guide



6th Interdisciplinary Data Science Conference

May 26th - 28th 2025 | Puch/Salzburg, Austria
Salzburg University of Applied Sciences

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Andreas Weiler
Zurich University of Applied Sciences

Ladies and gentlemen, dear colleagues,

We are pleased to welcome you to the iDSC 2025, the 6th Interdisciplinary Data Science Conference. This year's theme, „From Deep Insight to Impact: Shaping the Future with Data Science & AI,“ brings together researchers, engineers, and business leaders to explore developments in data analytics, machine learning and artificial intelligence.

Hosted by Salzburg University of Applied Sciences, the iDSC 2025 is a key meeting place for experts in data science, AI, analytics, digitalization, and related fields. Within the next three days, the Urstein Campus will be a hub for decision-makers, researchers, and companies aiming to create value with data.

The event promotes dialogue between academic researchers and practitioners through an innovative program organized around five core thematic areas.

An exceptional lineup of renowned keynote speakers will share their expertise and insights.

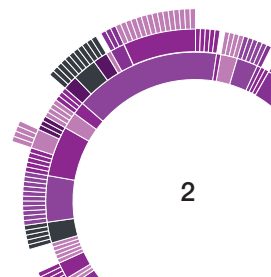
You will also have the opportunity to engage with a comprehensive programme of research presentations offering deep insights and practical applications, and explore impactful industry use cases, providing valuable insights into how data science is applied in various scenarios. Additionally, workshops will offer practical, hands-on experience. A special PhD retreat, organised in collaboration with the IDA-Lab, will provide valuable mentoring opportunities for early career researchers.

This important academic event has been made possible through the collaboration of several renowned and the support of industry leaders such as reqPOOL, COPA DATA and CONOVA. This creates a unique platform that combines theoretical research with practical industrial applications.

We would like to thank all the speakers and contributors, the reviewers, the programme committee and all the participants, without whom this knowledge exchange would not be possible.

We hope that the coming days will inspire new ideas, foster valuable connections and advance our collective understanding of the ever-expanding field of data science.

The Organizing Committee
May 2025



09:00-09:15

Welcome & Opening

FH-Prof. DI Dr. Stefan Huber, MSc [Salzburg University of Applied Sciences, Head of Research: Department Information Technologies and Digitalisation]
Dipl.-Ing. Dr. Simon Hirländer, BSc. [University of Salzburg, IDA Lab Team Head: Smart Analytics & Reinforcement Learning]
Room HS110

09:15-10:00

Keynote

Viola Gallina [Fraunhofer Austria]
Digital Product Passport Standardization in a European and Global Context
Room HS110

10:00-10:45

Keynote

Simon Hirländer [University of Salzburg]
From Theory to Practice: Reinforcement Learning as the 21st-Century ML Paradigm
Room HS110

10:45-11:00

Break

11:00-12:30

Cluster 2 - Room HS110

Research & Science

Session Chair: Viola Gallina

Towards Connected Digital Product Carbon Footprint Passports

Hörger, Eberhardt, Hermann, Benfer, Lanza, Gleich

Embedding the MLOps Lifecycle into OT Reference Models

Schindler, Huber, Lürzer, Binder

Achieving Technical Interoperability for Privacy-Enhancing Technologies in Data Spaces

Datema, Langenkamp, Kollenstart, Stoter, Witlox, Cornelisse

Cluster 1 - Room HS012

Applications & Use Cases

Session Chair: Stefan Huber

Machine Learning Assisted Optimization of 5G Network Parameterization

Krah, Greul, Farthofer-Oster [Salzburg Research]

AI4SimProd – AI-Assisted Simulation and Digital Twinning for Efficient Industrial Production

Casas, Vanerio, Bernado, Vignoli, Wachsenegger [Austrian Institute of Technology]

Predictive Maintenance for Wind Turbines: Leveraging Sensor Data with Traditional and Novel Machine Learning Techniques

Vanerio, Casas, Weißfeld [Austrian Institute of Technology]

12:30-13:30

Lunch

Room SE017

13:30-15:00

Cluster 1 - Room HS110

Research & Science

Session Chair: Simon Hirländer

One-Class Domain Adaptation via Meta-Learning

Holly, Eder, Bierweiler, von Dosky, Frikha, Heitzinger

Optimal Sizing and Operation of a Battery Energy Storage System for Demand Response in a Food Processing Plant using Deep Learning for Load Forecasting

Wohlgenannt, Moosbrugger, Hegenbart, Huber, Kolhe, Kepplinger

Cluster 1 - Room HS012

Applications & Use Cases

Session Chair: Thomas Lampoltshammer

Optimizing Production Planning with Mathematical Optimization: A Comprehensive Approach for a full Digitized Product Planning

Pfeiffenberger [Amer Sports]

Deriving Movement Patterns and Customer Behaviour using Data Loggers in Hydraulic Systems and setting up a Digital Twin

Harucksteiner [Palfinger]

Using Reinforcement Learning to Optimize Frequency Control of Autonomous Parking Garages

Schütz, Vereno, Maldonato, Bader, Neureiter

The Self-Driving Company: An Overview of the Mode

Schachinger, Schnitzhofer [reqPOOL]

15:00-15:30

Coffee Break

Room SE017

15:30-16:15

Keynote

Stefan Zeppetzauer [KPIT Technologies]

Data-Driven Revolution in Software Defined Vehicles: From Insights to Decision-Making

Room HS110

16:15-16:30

Break

16:30-17:30

Cluster 3 - Room HS110

Research & Science

Session Chair: Michael Gadermayr

Do we need Complex Deep Learning Models for Inferring Body Weight from CT Scans? Initial Insights from an Exploratory Study

Löwenstein, Gadermayr, Hehenwarter, Hinterberger, Schönberg, Hofmann

Influence of Body Composition on the Validity and Reliability of a Wearable Stride and Respiration Sensor

Hensler, Bernhart, Harbour, Schwameder

Cluster 2 | Cluster 3 - Room HS012

Applications & Use Cases

Session Chair: Viola Gallina

CEFoodCycle: AI-Driven Innovations for Closing Food Cycles and Enhancing Sustainability

Kaltner-Pomwenger, Portenkirchner [Salzburg University of Applied Sciences]

AI based Health Monitoring System for Cows

Walchhofer, Kempfner [cognify]

19:30

Conference Dinner

Casino Salzburg / Schloss Klessheim

Moderation

Monday, May 26th - FH-Prof. DI Dr. Stefan Huber, MSc

Cluster Legend

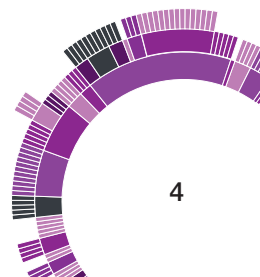
Cluster 1 - Industrial AI & Smart Infrastructure

Cluster 2 - Sustainable Tech, MLOps & Interoperability

Cluster 3 - Medical AI & Wearable Sensors

Cluster 4 - Topological & Temporal Pattern Recognition

Cluster 5 - NLP, Time Series Imputation & Reproducibility



09:00-09:45

Keynote

Hilda Kosorus [Onefold.ai]
Agentic AI: Unleashing the Next Wave of Transformation
Room HS110

09:45-10:30

Keynote

Carina Seidel [Runtastic GmbH]
Best Practises in Advanced Analytics / Real Life Examples and Use Cases of Data Science Models
Room HS110

10:30-10:45

Break

10:45-12:15

Cluster 4 - Room HS110

Research & Science

Session Chair: Stefan Wegenkittl

Topology-driven Identification of Repetitions in Multivariate Time Series

Schindler, Huber, Reich, Hoher

Persistence-based Hough Transform for Line Detection

Ferner, Messineo, Pop, Uray, Huber

Stiemer's Train Itineraries Enable Mobility Evaluating Research

Vangeneugden, Luong, Mercelis

Cluster 5 - Room HS012

Applications & Use Cases

Session Chair: Ruben Hettfleisch

Enhancing Contract Wordings Analysis with Generative AI: A Timeline of Efficiency and Accuracy

Singh, Tsarouchas [Swiss Re]

Demand Prediction of Time Series Data with NeuralProphet

Bär, Mák [Salzburg University of Applied Sciences]

Interactive Data Quality Enhancement for Multivariate Time Series Tree Growth Modeling Using AI and Explainable Insights

Wachsenegger, Zolles, Landivar, Lampert, Duro
[Austrian Institute of Technology / Austrian Research Centre for Forests]

12:15-13:15

Lunch

Room SE017

13:15-14:00

Keynote

Ruben Hettfleisch [Fraunhofer Austria / AI Austria / Klartext AI]
State of Generative AI – Where are we and where do we want to go?
Room HS110

14:00-14:15

Break

14:15-15:45

Cluster 5 - Room HS110

Research & Science

Session Chair: Ross King

Evaluating the Effectiveness of Large Language Models in Prompt-based Time Series Imputation

Doht, Havas

Context-Aware Content Moderation for German Newspaper Comments

Kietreiber, Neumaier, Krejca

GPU-Jupyter: A Framework for Reproducible Deep Learning Research

Schranz, Beeking, Pilosov

Cluster 1 - Room HS012

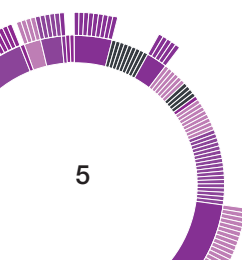
**Workshop
Real-Time Stream Processing for IoT**

Schiffner [Steadforce]

Cluster 2 - Room HS013

**Workshop
Data in Production – Chances and Opportunities for the Ecological and Digital Change**

Steinwender, Gallina, Lampoltshammer



15:45-16:15	Coffee Break Room SE017		
16:15-17:30	Cluster 5 - Room HS110 Workshop AI-Driven Analytics: Hands-on Working with Your LLM Agent Team Walchhofer, Ziegler [cognify]	Cluster 4 - Room HS012 Workshop From Research Repos to Real-World Results: Deepfake Video Detectors in Practice Hasenbalg, Poletti, Fischinger, Boyer, Pham	Cluster 2 - Room HS013 Workshop How can Data Science and AI drive the sustainable transformation? Lampert, Graser, Schallauer, Pargfrieder, Bügelmayer-Blaschek, Schicker
17:30	Closing FH-Prof. DI Dr. Stefan Huber, MSc [Salzburg University of Applied Sciences, Head of Research: Department Information Technologies and Digitalisation] Room SE017		

Moderation

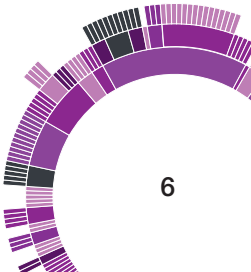
Tuesday, May 27th - FH-Prof. DI Dr. Michael Gadermayr, B.Eng.

Program Wednesday, May 28th

09:00	Social Event Discover Salzkammergut Join us for a guided cultural tour and networking experience in the picturesque Salzkammergut region.	Doctoral Retreat 3rd Data Science Doctoral Retreat Research presentations and peer feedback at Schloss Urstein, Salzburg University of Applied Sciences.
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Cluster Legend

- Cluster 1** - Industrial AI & Smart Infrastructure
- Cluster 2** - Sustainable Tech, MLOps & Interoperability
- Cluster 3** - Medical AI & Wearable Sensors
- Cluster 4** - Topological & Temporal Pattern Recognition
- Cluster 5** - NLP, Time Series Imputation & Reproducibility



An Evening of Elegance at Casino Salzburg Schloss Klessheim

Join us for an unforgettable evening at the historic Casino Salzburg Schloss Klessheim, a stunning baroque palace located just outside Salzburg. This exclusive venue combines grandeur, history, and modern luxury, providing the perfect setting for our Conference Dinner on Monday, May 26th.

Highlights of the Venue

A baroque palace with a rich history dating back to the 18th century.

Luxurious interiors and breathtaking architecture.

A unique blend of gaming, dining, and entertainment.

Surrounded by picturesque gardens and scenic views.

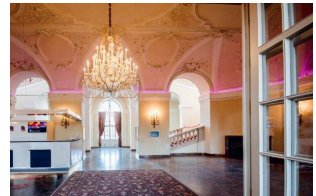
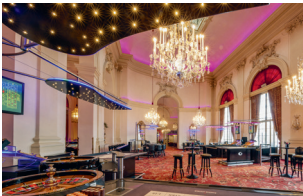


Dinner Experience

Enjoy a gourmet meal accompanied by fine wines in an elegant ambiance. The evening will also include networking opportunities and a chance to explore the palace.

By hosting the conference dinner here, we aim to create an evening that is not only enjoyable but also inspiring, leaving a lasting impression on all attendees.

Let's make this conference dinner an unforgettable experience at Schloss Klessheim!



Half-Day Panorama Tour

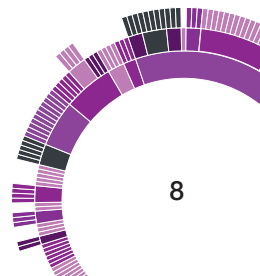
To round off the conference, we will do a guided bus tour through Salzburg's lake district »Salzkammergut« on Wednesday, May 28th 2025. You can continue the discussion in Austria's picturesque scenery.



We spend half a day in the famous towns Fuschl and St. Gilgen (30-45 min. stay) alongside some of the most beautiful lakes in Austria. You have the opportunity to reflect on presented topics and converse with attendees and speakers alike.



Exact departure time and meeting point for the tour will be announced on the second day of the conference.





Viola Gallina
Senior Researcher - Fraunhofer Austria

Dr. Viola Gallina is a senior researcher in the Factory Planning and Production Management division at Fraunhofer Austria. Her previous research focused on mathematical programming and machine learning. Currently, her work centers on the circular economy, with a particular emphasis on its data-driven aspects.

Her main area of focus is the digital product passport. She earned her PhD and MBA from TU Budapest and teaches at TU Vienna.



Ruben Hetfleisch
Research Associate - Fraunhofer Austria / Lead Generative AI Community - AI Austria / Founder - Klartext AI

Ruben Hetfleisch researches at Fraunhofer Austria on generative AI with a focus on the trustworthiness of language models. While being involved in projects ranging from the automation of sustainability reporting to the creation of the first austrian legal LLM, he runs an AI startup that uses generative AI to

make complex documents accessible and easy to understand. He also is the founder of the first GenAI-specialized platform in Austria called "GenAI Community by AI Austria", where his goal is to further push the GenAI ecosystem.



Simon Hirländer
Team Lead Reinforcement Learning and Smart Analytics - University of Salzburg - IDA Lab

Dr. Simon Hirländer leads the "Smart Analytics & Reinforcement Learning" team at the IDA Lab of Paris Lodron University Salzburg (PLUS). Following several years of international research at CERN—where he also obtained his

PhD—he focused on optimizing complex systems such as the CERN accelerator complex using machine learning, particularly reinforcement learning (RL). In addition, he explores a broad range of RL applications in fields like robotics, telecommunications, and quantum computing. Beyond his research, Dr. Hirländer works closely with local industry partners in Salzburg to implement advanced analytics methods such as anomaly detection, time series analysis, and automated classification processes. He is also actively involved in providing professional training for these partners and lectures at the university on topics including reinforcement learning and data analytics. Together with his team, he strives to translate the latest scientific insights into practical solutions for businesses and industry, and organises international events such as the first international RL Bootcamp, held in Salzburg last year.



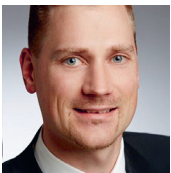
Hilda Kosorus
Founder & IT Strategist - Onefold.ai

Founder of Onefold.ai, an AI consultancy dedicated to simplifying AI adoption for businesses. With a Ph.D. in Computer Science and over 15 years of experience in AI and machine learning, I specialize in translating complex AI concepts into actionable strategies. At Onefold.ai, we guide companies from initial blueprints to full-cycle implementations, ensuring AI is accessible and delivers measurable ROI. Our mission is to unlock business potential through a straightforward, no-nonsense approach that drives real-world results and empowers organizations to harness the power of AI effectively.



Carina Seidel
Head of Data Science & Analytics - Runtastic GmbH

Carina Seidel is the Head of Data Science & Analytics at Runtastic GmbH, where she leads a team dedicated to leveraging data to enhance user experiences and drive business growth. With extensive experience in data analysis, visualization, and business intelligence, Carina has a proven track record of implementing data-driven strategies to optimize performance and innovation. Her expertise spans various domains, including online marketing and technical leadership.



Stefan Zeppetzauer
Vice President Integrated Diagnostics and Aftersales Transformation / Software Defined Vehicles - KPIT Technologies GmbH

Highly experienced technology professional with a strong background in computer science and telecommunication & -systems. Born in Salzburg, Austria, I graduated in 2005 with a MSc degree from Halmstad University in Sweden and at the University of Applied Science in Salzburg. My career has spanned over two decades, with early beginnings as a Software Developer at In2Soft GmbH. I joined KPIT Technologies GmbH in 2010, taking on key roles in customer projects and eventually leading the Diagnostic Business Unit globally since 2015. Currently, I oversee both the Diagnostic Business Unit (called iDART) and the Software Products of Technical Engineering in the Automotive SDV segment.

Achieving Technical Interoperability for Privacy-Enhancing Technologies in Data Spaces
Willem Datema, Peter Langenkamp, Maarten Kollenstart, Arjan J.R. Stoter, Kevin Witlox and Erik Cornelisse

Gaining insights based on privacy-sensitive data that are distributed between multiple parties poses restrictions, since these data cannot be shared freely. Privacy-enhancing technologies can lower the barrier for using privacy-sensitive data. Data space technology can help to remain in control about the usage of those data, as well as offer scalability. This paper describes how these two technologies can be combined from a technical point of view. With use of privacy-enhancing technologies, insights can be gained on data, without the possibility to trace back information to individuals. Although standardization of protocols for the use of privacy-enhancing technologies is not foreseen in the upcoming years, a standardized approach to use privacy-enhancing technologies in a distributed environment is technically feasible and has been demonstrated in a proof-of-concept. This paper focuses on the technical interoperability aspects of using privacy-enhancing technologies and data spaces based on currently available standards, such as the Dataspace Protocol.

Context-Aware Content Moderation for German Newspaper Comments
Tobias Kietreiber, Sebastian Neumaier and Felix Krejca

The increasing volume of online discussions requires advanced automatic content moderation to maintain responsible discourse. While hate speech detection on social media is well-studied, research on Germanlanguage newspaper forums remains limited. Existing studies often neglect platform-specific context, such as user history and article relevance. This paper addresses this gap by developing and evaluating binary classification models for automatic content moderation in German newspaper forums, incorporating contextual information. Using LSTM, CNN, and ChatGPT-3.5 Turbo, and leveraging the One Million Posts Corpus from the Austrian newspaper Der Standard, we assess the impact of contextaware models. Results show that CNN and LSTM models benefit from contextual information and perform competitively with state-of-the-art approaches. In contrast, ChatGPT's zero-shot classification does not improve with added context and underperforms.

Do we need Complex Deep Learning Models for Inferring Body Weight from CT Scans? Initial Insights from an Exploratory Study
Katja Löwenstein, Michael Gadermayr, Lukas Hehenwarter, Florian Hinterberger, Justin Michael Schönberg and Patrick Hofmann

Accurate knowledge of a patient's body weight is essential for numerous medical applications, including medication dosing and diagnostic imaging. However, the integration of precise physical weight measurements into clinical workflows remains challenging, primarily due to the associated time and labor requirements. These difficulties are particularly pronounced in the case of bedridden patients, for whom specialized equipment is typically required. In such scenarios, however,

medical imaging data, especially computed tomography (CT) scans, is frequently available. This study investigates various image analysis approaches to infer patient weight directly from CT scans. Using a large-scale dataset, we evaluated multiple conceptually different approaches, including both 2D and 3D deep neural networks, as well as simplified models that aggregate voxel intensities and tissue categories by means of histogram-based features. The results demonstrate that remarkably simple voxel-based methods perform competitively, in some instances surpassing more sophisticated deep learning models in terms of estimation performance.

Embedding the MLOps Lifecycle into OT Reference Models

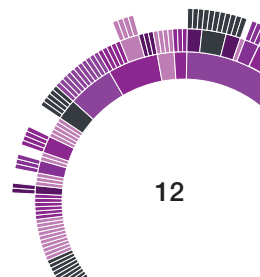
Simon Schindler, Christoph Binder, Lukas Lürzer and Stefan Huber

Machine Learning Operations (MLOps) practices are increasingly adopted in industrial settings, yet their integration with Operational Technology (OT) systems presents significant challenges. This paper analyzes the fundamental obstacles in combining MLOps with OT environments and proposes a systematic approach to embed MLOps practices into established OT reference models. We evaluate the suitability of the Reference Architectural Model for Industry 4.0 (RAMI 4.0) and the International Society of Automation Standard 95 (ISA-95) for MLOps integration and present a detailed mapping of MLOps lifecycle components to RAMI 4.0 exemplified by a real-world use case. Our findings demonstrate that while standard MLOps practices cannot be directly transplanted to OT environments, structured adaptation using existing reference models can provide a pathway for successful integration.

Evaluating the Effectiveness of Large Language Models in Prompt-based Time Series Imputation

Carolyn Dohrt and Clemens Havas

Large Language Models (LLMs) are increasingly being integrated into various processes to enhance efficiency, automate tasks, and tackle complex challenges. Ultimately they are transforming problemsolving approaches across diverse fields. Inspired by the achievements in natural language processing (NLP), researchers are now exploring the potential of LLMs in time series analysis. This paper addresses the research question: How effective are LLMs in predicting missing values in time series data using prompting, considering different missing value ratios and the presence of temporal patterns? The study emphasizes prompt-based methods, incorporating Chain-of-Thought (CoT) prompting to encourage sequential, logical reasoning, allowing LLMs to better capture complex data patterns. The findings indicate that LLMs possess inherent capabilities to understand time series data and perform imputation tasks effectively through prompting. However, since the experiments were conducted on a specific dataset, further research is needed to assess their generalization capabilities across different tasks, domains, and modalities. The performance of LLMs is comparable to models like recurrent neural networks (RNNs) and k-nearest neighbors (kNN). However, key challenges are identified, including the LLMs' tendency to miss a substantial number of values, generate hallucinations, and to exhibit unreliable prediction stability.



GPU-Jupyter: A Framework for Reproducible Deep Learning Research

Christoph Schranz, Moritz Beeking and Michael Pilosov

Reproducibility is acknowledged as a fundamental requirement of the scientific method. Yet, many meta-studies highlight a reproducibility crisis across diverse scientific domains. The rise of machine learning further complicates the replication of research by introducing additional requirements in computational environments. In this work, we propose GPU-Jupyter, a framework for reproducible research for deep learning. The experiment setup is encapsulated into an isolated container environment with GPU support and a comprehensive data science toolstack, thus mitigating version conflicts and providing a well-defined setup. We demonstrate four scenarios in which GPUJupyter facilitates reproducibility and collaboration among researchers. Researchers can share their research including the experimental setup in version-controlled and taggable images, reproducible with one single command. Conversely, existing work, whether published with or without GPU-Jupyter, can be reproduced rapidly and without affecting the existing local setup. Finally, we compare GPU-Jupyter with alternative solutions, highlighting its ability to meet key requirements for reproducible deep learning research. By streamlining environment management, GPUJupyter lowers the barriers to reproducibility, fostering a more seamless, open, and trustworthy research culture.

Influence of Body Composition on the Validity and Reliability of a Wearable Stride and Respiration Sensor

Sophia Hensler, Severin Bernhart, Eric Harbour and Hermann Schwameder

Body composition plays an important role in clinical and sports settings. Skinfold measurement gains increasingly more attention. There is also an increasing spread of small devices like inertial measurement units (IMUs) and textile-based sensors. A custom-developed stride and respiration sensor (SRS) contains both, for flow reversal (FR) and step detection in running. The aim of this study is to investigate the influence of body composition on the event detection accuracy and precision of the SRS. Twenty participants completed an anthropometry assessment and four runs with different speeds and breathing depths. The SRS is synchronized with accelerometers and spirometry and its accuracies and precisions were evaluated compared to validated algorithms. The participants were separated into different clusters respective groups for descriptive and inferential analysis. FR and especially step detection accuracies and precisions decrease from skinny to thick participant clusters with distinct sum of six skinfolds ($\Sigma 6SF$), waist-to-hip ratio (WHR) and body mass index (BMI). Even body composition has influence on the accuracy and precision of the SRS, it is still valid and reliable in various running settings for women with different body compositions.

One-Class Domain Adaptation via Meta-Learning

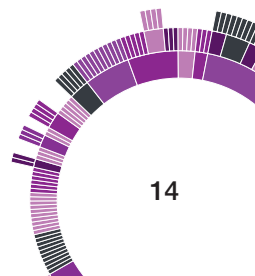
Stephanie Holly, Thomas Bierweiler, Stefan von Dosky, Ahmed Frikha, Clemens Heitzinger and Jana Eder

The deployment of IoT (Internet of Things) sensor-based machine learning models in industrial systems for anomaly classification tasks poses significant challenges due to distribution shifts, as the training data acquired in controlled laboratory settings may significantly differ from real-time data in production environments. Furthermore, many real-world applications cannot provide a substantial number of labeled examples for each anomalous class in every new environment. It is therefore crucial to develop adaptable machine learning models that can be effectively transferred from one environment to another, enabling rapid adaptation using normal operational data. We extend this problem setting to an arbitrary classification task and formulate the one-class domain adaptation (OC-DA) problem setting. We take a meta-learning approach to tackle the challenge of OC-DA, and propose a task sampling strategy to adapt any bi-level meta-learning algorithm to OC-DA. We modify the well-established model-agnostic meta-learning (MAML) algorithm and introduce the OC-DA MAML algorithm. We provide a theoretical analysis showing that OC-DA MAML optimizes for meta-parameters that enable rapid one-class adaptation across domains. The OC-DA MAML algorithm is evaluated on the Rainbow-MNIST meta-learning benchmark and on a real-world dataset of vibration-based sensor readings. The results show that OC-DA MAML significantly improves the performance on the target domains and outperforms MAML using the standard task sampling strategy.

Optimal Sizing and Operation of a Battery Energy Storage System for Demand Response in a Food Processing Plant using Deep Learning for Load Forecasting

Philipp Wohlgenannt, Lukas Moosbrugger, Sebastian Hegenbart, Gerhard Huber, Mohan Kolhe and Peter Kepplinger

High energy prices pose a significant challenge for the food industry due to their energy intensity. One promising method to reduce energy costs is demand response (DR). In this paper, we design a battery energy storage system (BESS) for DR in a food processing plant, which we use to shift the electrical load from high-price periods to low-price periods. A known challenge of load shifting is load forecasting. We compare extended long short-term memory (xLSTM), long short-term memory (LSTM), and Transformer with persistent prediction and historical average load profiles for load forecasting and evaluate the financial impact of forecasting errors in a case study. Despite using a small feature set, machine learning-based (ML) forecasts demonstrate strong performance, with symmetric mean absolute percentage error (sMAPE) values of 11.65% for xLSTM, 11.02% for LSTM, and 11.03% for Transformer, compared to 16.59% for historical average load profiles and 20.08% for persistent prediction. In the case study investigated, savings in electrical costs of 37,270 EUR per year could be achieved. This shows the enormous potential of BESS in combination with ML-based forecasting for industrial DR.



Persistence-based Hough Trans-form for Line Detection

Johannes Ferner, Saverio Messineo, Angel Pop, Martin Uray and Stefan Huber

The Hough transform is a popular and classical technique in computer vision for the detection of lines (or more general objects). It maps a pixel into a dual space – the Hough space: each pixel is mapped to the set of lines through this pixel, which forms a curve in Hough space. The detection of lines then becomes a voting process to find those lines that received many votes by pixels. However, this voting is done by thresholding, which is susceptible to noise and other artifacts.

In this work, we present an alternative voting technique to detect peaks in the Hough space based on persistent homology, which very naturally addresses limitations of simple thresholding. Experiments on synthetic data show that our method significantly outperforms the original method, while also demonstrating enhanced robustness.

This work seeks to inspire future research in two key directions. First, we highlight the untapped potential of Topological Data Analysis techniques and advocate for their broader integration into existing methods, including well-established ones. Secondly, we initiate a discussion on the mathematical stability of the Hough transform, encouraging exploration of mathematically grounded improvements to enhance its robustness.

Stiemer's Train Itineraries Enable Mobility Evaluating Research

Maarten Vangeneugden, Ngoc Quang Luong and Siegfried Mercelis

This paper describes the process of building the Stiemer dataset, a dataset consisting of more than six years of precisely measured passenger train operations on the Belgian network. It combines publicly available records from NMBS, Infrabel and OpenStreetMap, respectively providing planned timetables, the actually driven itineraries and a geographical graph network, combined and parsed into one cohesive dataset. Almost every processed day offers more than one thousand unique train itineraries, each of them measured up to the second. It is available under licenses that grant researchers the liberties required to study and evaluate their findings without being encumbered by contracts or other legal restrictions.

Topology-driven identification of repetitions in multi-variate time series

Simon Schindler, Stefan Huber, Elias Reich and Simon Hoher

Many multi-variate time series obtained in the natural sciences and engineering possess a repetitive behavior, as for instance statespace trajectories of industrial machines in discrete automation. Recovering the times of recurrence from such a multi-variate time series is of a fundamental importance for many monitoring and control tasks. For a periodic time series this is equivalent to determining its period length. In this work we present a persistent homology framework to estimate recurrence times in multi-variate time series with different generalizations of cyclic behavior (periodic, repetitive, and recurring). To this end, we provide three specialized methods within our framework that are provably stable and validate them using real-world data, including a new benchmark dataset from an injection molding machine.

Towards Connected Digital Product Carbon Footprint Passports

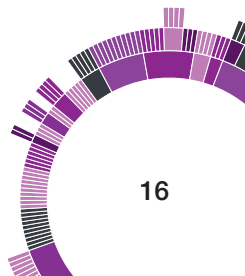
Moritz Hörger, Julius Eberhardt, Yannik Hermann, Martin Benfer, Gisela Lanza and Kevin Gleich

Counteracting the aggravating climate crisis, stricter legal requirements increasingly force companies to reduce their environmental impacts and establish more sustainable business practices. In this context, creating transparency, e.g., concerning resource consumption and emissions along the value chain, is particularly important. Digital product passports are a key enabler for this, as they provide a centralized source of information to improve transparency, traceability, and sustainability across product life cycles. However, challenges related to data collection, technical standardization, and thus exchangeability pose a hurdle for a broad industry implementation of digital product passports. The present paper introduces a structured, modular, scalable framework focusing on connectivity and interoperability to overcome this challenge. A prototype digital product passport system is developed, covering standardized data points and linking them with life cycle analysis software to calculate and update product carbon footprints along the value chain. The approach is validated against the electric motor production use case in the Learning Factory Global Production. The results show that the digital product passport increases sustainability data transparency by enabling continuous data exchange and lifecycle analysis.

Using Reinforcement Learning to Optimize Frequency Control of Autonomous Parking Garages

René Schütz, Dominik Vereno, Francesco Maldonato, Elias Bader and Christian Neureiter

As the growing adoption of inverter-based renewables places increased strain on the electric grid, frequency balancing services must adapt to meet the additional demand. The innovation of Automated Valet Charging (AVC) allows parking garages to autonomously guide and robotically connect electric vehicles (EVs) to charging stations. Optimizing vehicle scheduling and charging control could allow AVC garages to leverage available EVs to participate in the energy market as a virtual power plant (VPP). However, classical rule-based strategies struggle with heterogeneous market requirements and can be computationally expensive. To address this challenge, this work explores the viability of reinforcement learning (RL) for improving the efficiency of an AVC garage VPP, capable of adapting to complex garage behavior and dynamic market entry constraints through experience. We first formalize the management system as a Markov decision process (MDP), then focus on optimizing the subtask of charging control using proximal policy optimization (PPO). Our results show that the RL agent, although limited by a sparse reward signal, surpasses a quadratic optimization baseline by tripling the number of vehicles fully charged by the time they are retrieved, while continuously satisfying energy market constraints. We also demonstrate that these processes can be modeled as temporally decomposed subtasks, paving the way for further improvements through hierarchical RL. Overall, these findings indicate that RL can match or even outperform traditional rule-based approaches for AVC VPPs, offering greater adaptability to complex operational goals and constraints.



AI4SimProd – AI-Assisted Simulation and Digital Twinning for Efficient Industrial Production **Pedro Casas, Juan Vanerio, Laura Bernado, Michela Vignoli and Anahid Wachsenegger** **[Austrian Institute of Technology]**

AI4Industry represents the integration of Artificial Intelligence (AI) and data-driven methodologies into industrial environments, aiming to transcend traditional automation by optimizing complex manufacturing processes. This paper explores the challenges and opportunities of AI adoption in industry, emphasizing the need for specialized models, large-scale data management, and rigorous validation to ensure reliability and scalability. Key applications include digital twins, anomaly detection, predictive maintenance, and quality control.

Within this context, AI4SimProd emerges as a novel AI-assisted simulation and digital twinning framework designed to enhance industrial efficiency and sustainability. By developing the AI Data-Driven Digital Twin (AI3DT) technology, AI4SimProd focuses on optimizing energyintensive manufacturing processes such as carbon fiber-reinforced polymer (CFRP) composite curing and Vertical Direct Chill (VDC) billet casting. Through collaborations with industry partners, the project aims to reduce energy consumption by 10-20% and minimize material waste by up to 40%, aligning with EU's climate neutrality goals. This paper outlines the methodology and expected impact of AI4SimProd, demonstrating the potential of AI to revolutionize industrial production while promoting environmental sustainability.

AI based Health Monitoring System for Cows **Norbert Walchhofer and Stefan Kemptner [cognify]**

The agricultural industry faces challenges in livestock monitoring, particularly in rural and resource-constrained environments. Traditional methods such as RFID tracking and wearable sensors are costly and require maintenance, while manual observation is impractical. We are working on an AI-driven health monitoring system for cows, developed through a two-year FFG-funded project. By leveraging computer vision and ML techniques, the system enables real-time video analytics for individual re-identification (ReID) and behavior tracking. The contribution highlights algorithmic challenges, such as object detection and tracking, and presents solutions using supervised and weakly supervised learning techniques. Future work will focus on improving model generalization and forecasting behavioral patterns with veterinary experts.

CEFoodCycle: AI-Driven Innovations for Closing Food Cycles and Enhancing Sustainability

Werner Kaltner-Pomwenger, Reinhard Portenkirchner [Salzburg University of Applied Sciences]

Globally, one-third of food produced is wasted, with Europe dis-carding approximately 47 million tons annually, despite 8% of its citizens face food insecurity. This waste squanders critical resources such as water and land while contributing nearly 170 million tons of CO₂ equivalents to the atmosphere. Addressing these challenges is essential for advancing a Circular Economy in the agrifood sector. In response, the CEFoodCycle consortium is launching Circular Food Hubs

in five Alpine regions—Austria, Germany, France, Italy, and Slovenia—to explore opportunities for reducing food waste and CO₂ emissions.

The initiative brings together diverse stakeholders, including manufacturers, retailers, hospitality providers, energy companies, and crosssector collaborators, facilitating knowledge transfer, networking, and the adoption of innovative digital solutions. Central to the project is FoodCycle.AI, an intelligent decision support system that leverages Life-Cycle Assessment indicators and state of the art advanced Large Language Models (LLM). The tool estimates a company's ecological footprint from surplus food and recommends strategies such as donating to food banks, collaborating with processors for repurposing goods, or extending product shelf life. Unlike traditional LCA tools, FoodCycle.AI focuses on surplus food recirculation by evaluating multiple pathways and fostering stakeholder collaboration. Furthermore, a partnership with VCG—a leading big data platform in the European bioeconomy—ensures integration with existing IT infrastructures, enabling continuous updates and long-term sustainability. A live demonstration will showcase how FoodCycle. AI transforms food waste management, delivering environmental and economic benefits.

Demand Prediction of Time Series Data with NeuralProphet

Katrin Bär, Eszter Mák [Salzburg University of Applied Sciences]

In pharmaceutical logistics, precise demand forecasts are crucial in order to distribute medicines efficiently, avoid bottlenecks and reduce waste. However, current forecasting models often reach their limits, especially with dynamic demand cycles. The aim of this project was to investigate and apply Neural Prophet, a modern AI algorithm, to improve existing forecasting models.

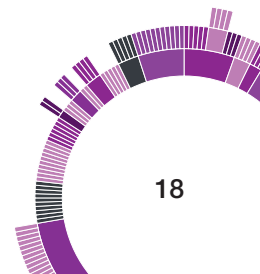
Using historical data from Jacoby GM Pharma, models were trained with Neural Prophet and their performance was compared with the existing SARIMA model. The data was cleaned, adjusted and a separate model was developed for each product. The evaluation was based on the mean squared error. The models with Neural Prophet showed a significant improvement in error rates, with reductions of up to 93% compared to SARIMA. Peaks and seasonal patterns could be mapped more precisely.

Neural Prophet offers great potential for optimizing pharmaceutical logistics, reducing costs, protecting the environment and ensuring the availability of essential products. The model can also be transferred to other industries with time-critical requirements.

Deriving Movement Patterns and Customer Behaviour using Data Loggers in Hydraulic Systems and setting up a Digital Twin

Guido Harucksteiner [Palfinger]

Based on the data from various sensors and data loggers, a holistic and detailed overview of customers behaviour on hydraulic systems is created. A subsequent, comprehensive data analysis creates a quantifiable database that can be assigned to the individual movements. As a result of these analyses, both future, intuitively operable HMIs and customer features can be developed and the basis for energy-efficient systems based on electrified actuators can be created.



Enhancing Contract Wordings Analysis with Generative AI: A Timeline of Efficiency and Accuracy

Pratyush Singh and Charilos Tsarouchas [Swiss Re]

In the rapidly evolving landscape of insurance and reinsurance, the integration of advanced analytics and generative AI presents unprecedented opportunities for innovation and efficiency. This paper outlines a novel application of generative AI in the context of Reinsurance Contracts analysis especially Life and Health Treaties, demonstrating its potential to revolutionize the way contracts are managed and analysed. The approach provides an efficient method for generating insights from 25 years of digital contracts, thus accelerating the work process of lawyers and contract experts by at least 50% and up to 80%.

The project involves parsing contracts from digital formats, such as PDFs and TIFFs, into structured formats like MS Excel and JSON while preserving the layout information of the contracts. It includes methods to remove sensitive information from the contracts before analysis. We present multiple methods with trade-offs to segment the contract into individual clauses and metadata for detailed analysis and insights generation. The application utilizes advanced machine learning models and large language models like GPT to extract, summarize, and compare clauses from different contracts. This enables experts to identify how a contract or clause has evolved over time. Retrieval-Augmented Generation (RAG) is utilized to extract essential information from the contracts and integrate it into the final structured output. Additionally, we outline the validation cycle of our predictions, completing the Human-in-the-loop (HITL) process. The output is displayed on a dashboard for quick insights and easy access.

All the features mentioned above are systematically validated via HITL and achieved F1 score of >91%. The implementation not only streamlines the contract analysis process but also enhances accuracy and efficiency, providing valuable insights for business decision-making. The structured digital twin of the contract enables numerous downstream use-cases, including automated compliance checks, integration with ERP or CRM systems, and contract lifecycle management. The integration with platforms like Azure Document Intelligence and the use of advanced techniques such as prompt engineering and RAG further bolster the application's capabilities.

In conclusion, this innovative application in contracts analysis represents a significant advancement in the insurance industry. It offers a robust solution for managing complex documents, ultimately driving better business outcomes and fostering a deeper understanding of contractual terms.

Interactive Data Quality Enhancement for Multivariate Time Series Tree Growth Modeling Using AI and Explainable Insights

Anahid Wachsenegger, Anita Zolles, Carlos Landivar, Jasmin Lampert and Refiz Duro [Austrian Institute of Technology / Austrian Research Centre for Forests]

As part of our project, we developed a data-centric framework combining artificial intelligence (AI), explainable AI (XAI), and interactive tools to improve tree growth modeling and data quality in forest monitoring. It addresses the challenges faced by forest experts working with noisy and incomplete datasets, with the aim of reducing manual effort and increasing transparency. Real-world use

cases shaped system requirements, followed by a review of time series forecasting methods, XAI frameworks, and data quality tools. A key finding was the limitation of existing open-source XAI tools for ecological time series data. Exploratory analysis identified strong dependencies between tree growth and environmental factors such as soil moisture and temperature. XGBoost models performed well for growth classification and forecasting, particularly with corrected input data. SHAP values were effective for model explanations, though time series analysis support was limited. An interactive tool enabled domain experts to assess model outputs and validate corrections, improving data curation efficiency. Future work will refine models using transfer learning and additional ecological variables.

Machine Learning Assisted Optimization of 5G Network Parametrization

Dominik Krah, Johannes Greul and Stefan Farthofer-Oster [Salzburg Research]

In this work, we present the use of classical Machine Learning algorithms during our investigation of data rates achievable by individual clients in a mobile network with multiple communicating clients. In our study, we investigated the effect of differently parametrized 5G networks. In particular, we were interested in the effect of a custom prioritization parametrization on the overall performance of a network. Information on the utilization of a 5G cell is typically only available to the network provider and in very limited resolution, but was a central feature of our analyses. To obtain this information, we passively observed the network by an off-the-shelf software defined radio and estimated the cell utilization by a methodology based on Gaussian Mixture Modeling and k-means. Appropriate pre-processing and usage of lightweight, classical ML-models allowed us to run the estimation software on a Mini-PC, resulting in a versatile, mobile and cost-efficient measurement setup.

Optimizing Production Planning with mathematical optimization: A Comprehensive Approach for a full digitized product planning

Thomas Pfeiffenberger [Amer Sports]

This Industry Contributions presents an advanced production planning system integrating smart planning with mathematical optimization for demand order management. The system leverages key parameters, including mold dimensions (height, length, width, curve, number of molds) and press specifications (length, height, curve, number of presses), to optimize production schedules. By incorporating gamification elements, the system enhances user engagement and provides a comprehensive review of the entire process. It ensures accurate validation of results, prevents errors in product and production system miss mapping, and significantly reduces planning time. The architecture, based on Docker virtual machines, offers easy scalability and robust virtual services, empowering planners to continuously improve production processes.

Predictive Maintenance for Wind Turbines: Leveraging Sensor Data with Traditional and Novel Machine Learning Techniques

Juan Vanerio, Pedro Casas and Axel Weißenfeld [Austrian Institute of Technology]

Predictive maintenance has emerged as a critical strategy to improve efficiency and reliability of wind turbines. By leveraging advanced technologies such as machine learning and data analytics, wind farm operators can detect potential issues early, optimize maintenance schedules, and reduce downtime. Through monitoring and analysis of SCADA sensor data, predictive maintenance enables proactive interventions that extend the lifespan of turbines and improve operational performance.

This study presents a case for generator failures from a wind farm with 10 WTGs, with a dataset based on one year of SCADA measurements. The proposed approach leverages well-known shallow learning models and a novel anomaly detection mechanism, to predict the normal operating range of generator bearing temperature using covariates derived from current and lagged SCADA signals. The anomalies are identified by using well-known tabular data state-of-the-art XGBoost to learn to distinguish normal operation samples from normal ones on a self-supervised fashion. The example case demonstrate the successful application of predictive maintenance in the wind energy sector, specifically on identifying early warning signs of generator failures,, showcasing significant improvements in turbine performance and reliability.

The Self-Driving Company: An overview of the model

Daniel Schachinger and Florian Schnitzhofer [reqPOOL]

The model of the „Self-Driving Company“ describes a future in which businesses operate increasingly autonomously using artificial intelligence and advanced software systems. Comparable to autonomous vehicles, companies evolve several levels from fully manual operations to fully autonomous enter-prises with people focusing on strategy, creativity, and empathy. The transition requires deep process knowledge, industry expertise, and advanced technology, supported by change management. The transformation follows an iterative, agile process: benchmarking current maturity, identifying improvement areas, proto-typing solutions, and scaling up through automation and continuous learning.

AI-Driven Analytics: Hands-on Working with Your LLM Agent Team

Norbert Walchhofer and Andreas Ziegler [cognify]

Generative AI (GenAI) and large language models (LLMs) are rapidly becoming integral to various professional domains, fundamentally reshaping workflows and decision-making processes. This interactive workshop provides hands-on experience in co-working with an AI agent team to tackle real-world analytical challenges. The session highlights the importance of data literacy, effective AI prompting, and agent orchestration in solving business-relevant problems.

Data in Production – Chances and Opportunities for the Ecological and Digital Change

Arko Steinwender, Viola Gallina and Thomas J. Lampoltshammer

Integrating data-driven approaches into production is a key enabler of the Twin Transition, which combines ecological and digital transformation. As regulatory frameworks demand greater transparency and sustainability, concepts such as the Digital Product Passport (DPP) and Data Spaces are emerging as essential tools for ensuring compliance and fostering innovation. The DPP offers a structured method for tracking a product's lifecycle data, enhancing initiatives in the circular economy and resource efficiency. Simultaneously, Data Spaces promote secure and interoperable data exchange among stakeholders, enabling new business models and collaborative value creation. However, ensuring adherence to data sovereignty, privacy, and industry standards remains challenging. By leveraging digital technologies and interconnected production environments, companies can optimize operations, reduce emissions, and achieve competitive advantages. This workshop explores how data utilization in industrial production can drive sustainable innovation, the role of digital infrastructure in enabling this transition, and the challenges and opportunities posed by regulatory and market changes.

From Research Repos to Real-World Results: Deepfake Video Detectors in Practice

Marcel Hasenbalg, Silvia Poletti, David Fischinger, Martin Boyer and Lam Pham

Thanks to advancements in deep learning, models for video manipulation and generation have become widely accessible through open-source implementations and can be run on consumer-grade hardware. However, these technologies also pose significant risks when leveraged for malicious purposes, such as identity theft, political misinformation, defamation, and non-consensual explicit content. This motivated the research community to develop methods for detecting manipulated or synthesized videos or images (e.g. deepfakes). This work addresses the gap between state of the art research in deepfake video detection and the practical deployment of user-friendly deepfake video detection applications for real-world use cases. While significant advancements have been made in the development of neural network model architectures for computer vision and deepfake detection, their real-world usability and performance often remain untested outside controlled environments. We propose a structured, multiphase workflow designed to translate state-of-the-art research findings into practical applications for end-users. This workflow is demonstrated through a case study focused on the development of a user-centric deepfake video detection application.

How can Data Science and AI drive the sustainable transformation?

Jasmin Lampert, Anita Graser, Peter Schallauer, Joachim Pargfrieder, Marianne Bügelmayer-Blaschek and Irene Schicker

The transition to a sustainable future requires innovative approaches that leverage Data Science and Artificial Intelligence (AI) to address environmental challenges. This workshop explores how AI-driven solutions can support climate action, resource optimization, and sustainability efforts in various sectors. We will highlight insights from several AI for Green projects that showcase real-world applications and best practices. The workshop includes an expert talk to establish the scope, a panel discussion on measuring AI impact on climate change, and an interactive dialogue with participants to foster knowledge exchange and collaboration.

Real-Time Stream Processing for IoT

Stephan Schiffner [Steadforce]

The proliferation of Internet of Things (IoT) devices is generating huge amounts of real-time data that requires scalable and efficient processing. Apache Flink enables real-time stream processing and provides low-latency and fault-tolerance features that are essential for IoT analytics. This hands-on workshop introduces participants to real-time IoT data processing with Flink, covering topics from data ingestion, stream transformations to real-time analytics.

Company wording

Salzburg University of Applied Sciences
Fachhochschule Salzburg GmbH

Legal form

Gesellschaft mit beschränkter Haftung (Limited Corporation)

Line of business

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