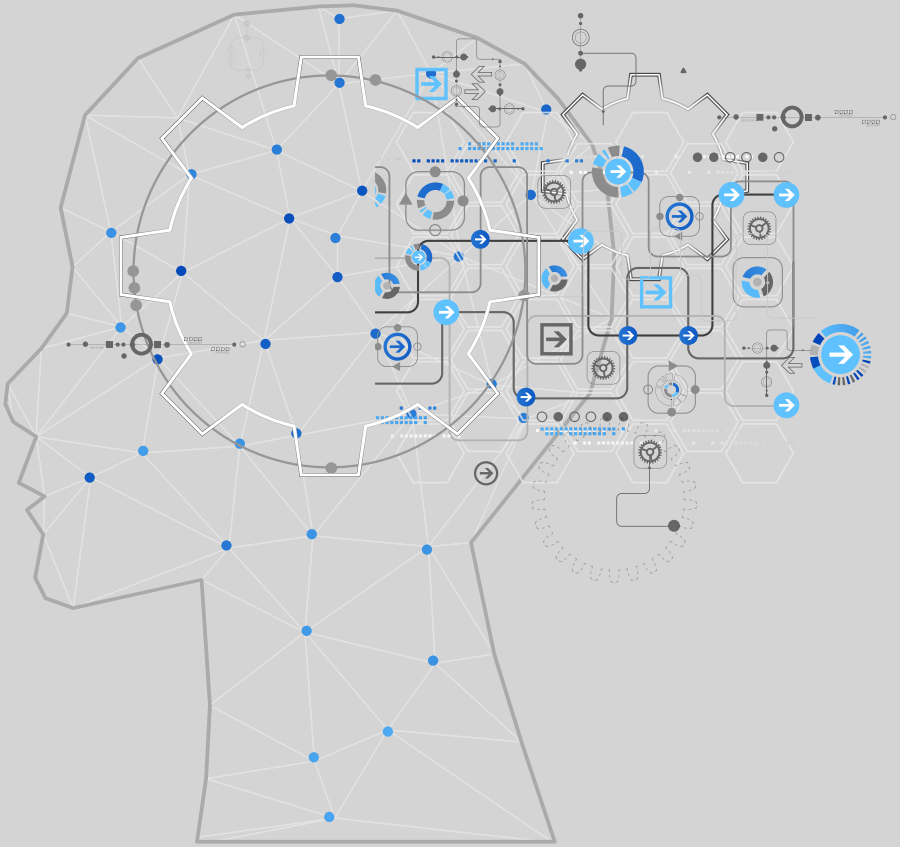
Zurich University
of Applied Sciences

7th European COST Conference on Artificial Intelligence in Industry and Finance

28th September 2022, 09:45 -17:15



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Foreword

Dear participants

We would like to welcome you at the 7th European COST Conference on Artificial Intelligence in Industry and Finance. It is a true pleasure to organize this conference, which is now taking place for the 7th year in a row. We are exci¬ted to host a great number of participants from Switzerland and all across Europe as well as around 25 distinguished speakers both from academia and industry. The conference brings together policy makers, national and European academics, participants from industry and finance, and it serves as a forum for interdisciplinary discussion and exchange of ideas on the adoption of innovative artificial intelligence technologies in industry and finance.

Looking back at the beginnings of this conference we have reason to be proud. In 2016 we started with 20 speakers and about 80 participants, mostly from Switzerland. In the meantime the European Conference on Artificial Intelligence in Industry and Finance has grown to a truly European event with participants and speakers from various European countries.

This series of conferences has started with research funding from the European Union under the COST scheme, the longest-running European intergovernmental framework for cooperation in science and technology. We are now grateful to be supported also by the Swiss government with Innosuisse funding, as well as numerous sponsors.

This year we have four streams of presentations that focus on the following fields:

- Artificial Intelligence in Industry
- Artificial Intelligence in Finance
- Ethical questions in Artificial Intelligence
- Best practices and use cases in industry-academia cooperations

In the name of the entire team at ZHAW, I wish you an enjoyable, fruitful, and exciting time here in Winterthur.
Sincerely,

Dr. Andreas Henrici, ZHAW
On behalf of the entire organization team

| Conference on Artificial Intelligence in Industry and Finance

Timetable

7th European COST Conference on Artificial Intelligence in Industry and Finance

When/where: September 28th, 2022, 09:45-17:15 / ZHAW School of Engineering

Registration
More information

		AI in Industry (TN E0.46)	AI in Finance (TN E0.54)	Ethical Questions in AI (TN E0.58)	Academia-Industry Best practice / Use cases (TN E0.58)
09:45-10:00	**Intro (TN E0.46/54):** Dirk Wilhelm, Dean of ZHAW School of Engineering				
10:00-10:45	**Keynote (TN E0.46/54):** Peter Mattson, Google: MLCommons: driving ML innovation with benchmarks				
10:45-11:15	**Coffee Break**				
11:15-11:45		Martin Keller, Acodis: Structuring Today's Data to Save Tomorrow's Lives	Fabian Woebbeking, Axiomatec/Univ. Frankfurt: "Let me get back to you" - A machine learning approach to measuring non-answers	Ricardo Chavarriaga, ZHAW: Operationalizing AI ethics: Challenges for organizational governance	
11:45-12:15		Ekaterina Sirazitdinova, NVIDIA: Synthetic Data and Simulation Workflows for AI Training in Robotics	Blanka Horvath, TU München: Machine Learning - Market Simulation Generating Financial Markets with Signatures	Nicole Büttner, Merantix: AI and Mafia	
12:15-12:45		Armando Geller, Scensei: Decision Support, AI and good practices	Dominik Boos/Linus Grob, Avena Capital/ZHAW: Tracking Speculative Trading	Eleonora Viganò, UZH: Ethics of algorithmic prediction: How algorithms threaten our right to be unpredictable	
12:45-14:00	**Lunch Break**				
14:00-14:30		Martina Perani, FFHS: Deep neural networks for predicting track geometry in additive manufacturing	Thomas Krabichler, FH Ost: Deep Asset-Liability-Management	Jérôme Koller, Mobiliar: You have your ethical framework, so what?	
14:30-15:00		Giulia Fischetti, UniVe: Automatic Classification of Multiplets in 1H NMR Spectra with Deep Learning	Matthias Niggli/Christian Rutzer, Univ. Basel: What is it worth? Predicting the Importance of Patents Using Supervised Learning	Andreas Blum, Unit8: How to ensure "Trustworthy AI" from a governance perspective and get ready for the planned EU AI Act, also affecting Swiss entities	
15:00-15:30	**Coffee Break**				
15:30-16:00		Sebastian Welter, IKEA: tbd	Ken Cassar, Umnai: Hybrid Intelligence – Machine Enhanced Decision Making beyond the current frontier		Patricia Deflorin, FHGR: Databooster – Open innovation activities to boost data based innovation Hanspeter Bär, Innosuisse: How to be successful with your Innosuisse Application for innovation project funding
16:00-16:30		Nikola Pascher/Thilo Stadelmann, Mettler Toledo/ ZHAW: Data-centric transfer learning as a solution to key-challenges in industrial data-based solutions	Marc Wildi/Branka Hadji Misheva, ZHAW/BFH: A Time Series Approach to Explainability for Neural Nets with Applications to Risk-Management and Fraud Detection		Manuel Eicher, Geobrugg: Smart protection systems - where do we go from here? Amin Amini/Arman Iranfar, CertX: certAInty - A Certification Scheme for AI systems
16:45-17:15	**Final Panel:** Peter Schwendner ZHAW (Moderation) / Jennifer Scurrell ETH / Pius von Däniken ZHAW: Impact of interdisciplinary data driven research				

Speakers

Keynote Speaker

Dr. Peter Mattson: «MLCommons: driving ML innovation with benchmarks»

Peter Mattson is a Google senior staff engineer. He co-founded and is President of MLCommons, and co-founded and was General Chair of the MLPerf consortium that preceded it. Previously, he founded the Programming Systems and Applications Group at NVIDIA Research, was VP of software infrastructure for Stream Processors Inc (SPI), and was a managing engineer at Reservoir Labs. His research focuses on understanding machine learning models and data through quantitative metrics and analysis. Peter holds a PhD and MS from Stanford University and a BS from the University of Washington.

Abstract

MLCommon.org is a non-profit with a mission to make ML better for everyone by building the ML ecosystem, principally benchmarks, datasets, and best practices. The talk will describe several benchmarks with applicability to finance, including the MLPerf speed benchmark, the DataPerf data quality benchmarks, and the MedPerf benchmark approach to federated evaluation. It will also speculate on the potential for benchmarks in the finance industry.

Industry

Martin Keller: «Structuring Today's Data to Save Tomorrow's Lives»

Martin Keller is co-founder and CEO of Acodis where he has built a tech startup that is pioneering the field of intelligent document processing. Prior to Acodis, Martin worked in finance and management consulting. He studied International Relations at The Graduate Institute in Geneva and completed his MBA at IESE Business School in Barcelona

Abstract

80% of the world's data that could be used to make critical decisions is unstructured data. In health, this information is typically locked in documents like patient data, studies, leaflets, and health regulations. The issue is that these documents are hard to analyse and process in large amounts because they are neither machine-readable nor ready for downstream consumption.Breakthroughs in AI are now available to extract and structure the correct information at scale. To provide NLP and data teams with the crucial context (including headers, tables, pictures, and handwriting) for accurate data analytics.Join this talk to learn how to leverage your unstructured data, discover new insights, and save lives with AI.

Dr. Ekaterina Sirazitdinova: «Synthetic Data and Simulation Workflows for AI Training in Robotics»

Ekaterina is a senior data scientist at NVIDIA specialized in solving computer vision and video analytics problems by means of AI. Her current focus also includes deep learning inference optimization on embedded devices. Previously, Ekaterina was a research engineer applying deep learning to medical image analysis. She has also authored several peer-reviewed journal and conference publications on various applications of image-based 3D reconstruction, localization and tracking. Ekaterina received her Ph.D. in Computer Science and M.Sc in Media Informatics, she also holds a Diploma in Business Informatics.

Abstract

Developing robots capable of perceiving complex environments in a scalable way is not a trivial task. Relying on AI, robots become more intelligent, flexible, and robust, but AI training requires lots of data. Data collection and annotation are time consuming and expensive. Furthermore, in order to create models which generalize well, data needs to be diverse and balanced. With advancement in simulation tools and generative models, more and more AI practitioners start utilizing synthetic data as a possible alternative to real data. In this session, we will focus on NVIDIA's approach to synthetic data generation and robotics simulation and will showcase the underlying value of our tools for realistic and accurate data creation.

Industry

Dr. Armando Geller: «Decision Support, AI and good practices

Armando Geller is Managing Partner at Scensei (Switzerland) GmbH, a boutique enterprise specializing in AI-driven constructive simulation. Armando holds a doctor of philosophy from the University of Zurich, did his postdoctoral degree at the Centre for Policy Modelling at Manchester Metropolitan University, and worked as a research assistant professor at the Department for Computational Social Science at George Mason University.

Abstract
Supporting decision makers in making the right decisions using computer simulations goes back decades and the literature on related challenges is abundant. As of today, when AI is thrown into the mix the good practices from the old times hold true by and large. Yet, we've been confronted with new challenges that arguably bear their own qualities when employing AI in decision support via computer simulation. Discussing these challenges and the best practices that address these challenges in context is important to establish practical relevance. What does, for example, "Can I explain the outcome of my simulation?" mean applied to a real world case? What is the actual implication of the answer to "Is the output of my simulation ethical?" During my talk I will invite you to play a short serious game to co-explore both these new challenges and the good practices to address them.

Dr. Martina Perani: «Deep neural networks for predicting track geometry in additive manufacturing»

Dr. Martina Perani holds a PhD degree in Physics from the University of Bologna, where she focused on the optoelectronic and morphological characterization of semiconductors for photovoltaic applications. She then moved to the Fernfachhochschule Schweiz (FFHS), where she further developed her competences in the field of data science and artificial intelligence. Currently, she leads the research field "Data Science for Energy, Environment and Materials" at the FFHS. Her research interests lie in the application of artificial intelligence to address research questions in these technical disciplines, with projects in the areas of additive manufacturing, photovoltaics and warning system

Abstract
Laser Metal Deposition (LMD) is an additive manufacturing technology that attracts great interest from the industry, thanks to its potential to realize parts with complex geometries in one piece, and to repair damaged ones, while maintaining good mechanical properties. The complexity of the LMD process has however limited its widespread adoption so far, as different part geometries, strategies and boundary conditions can yield very different results in terms of external shapes and inner flaws. Deep learning based architectures have been used to estimate the size of tracks deposited by LMD using powders of Inconel 718, a relevant material for the aerospace and automotive sectors. An architecture that combines the output of a convolutional neural network (that takes melt pool images as inputs) with scalar variables (process and trajectory data) is used to predict the track geometry. Moreover, preliminary results suggest that long-short memory networks are effective in modeling the temporal evolution of the deposition process using process and trajectory data.

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Industry

Giulia Fischetti: «Automatic Classification of Multiplets in 1H NMR Spectra with Deep Learning»

Giulia Fischetti obtained her B.Sc. (2017) and M.Sc. (2020) in Physics from the University La Sapienza of Rome. During her academic studies, she focused on the statistical physics of complex and disordered systems. For her Master's thesis, she investigated the dynamics and storage properties of models for associative memory, such as the Hopfield model. She continued working on the statistical properties of neural networks thanks to a post-lauream fellowship (2021) at the University La Sapienza of Rome while cultivating her arising interest in artificial intelligence and deep learning algorithms. Currently, she is pursuing a PhD in Science and Technology of Bio and Nanomaterials from the University Ca' Foscari of Venice. For her PhD project, she is collaborating with the ZHAW School of Engineering and the Bruker BioSpin Group to implement machine learning techniques to perform automatic analysis of Nuclear Magnetic Resonance (NMR) dates.

Abstract
The identification and classification of signal peaks (multiplets) in Nuclear Magnetic Resonance (NMR) spectra is a decisive stage in the characterization of complex chemical compounds. Unfortunately, the process of retrieving information from the spectra is often burdensome, time-consuming and susceptible to errors. Moreover, it requires the involvement of experienced users. Therefore, introducing automation into the NMR analysis workflow holds the promise of speeding up the process while increasing the robustness and reproducibility of the results. We will present how a supervised deep learning algorithm can perform automatic detection and classification of multiplets in 1H NMR spectra, the most straightforward kind of NMR experiments. The training set is composed of a large number of synthetic spectra designed with complete control over the features represented in the samples. The output is a point-by-point prediction of a label value that corresponds to a given multiplet category. Furthermore, we will discuss how implementing an ensemble learning framework can help distinguish overlapping multiplets from non-overlapping ones. The precise location of signal regions can guide the integration of peaks' profiles, while the correct classification gives information on the number of peaks within signal regions, facilitating peak picking and coupling constants extraction. We will show that our model can discriminate signal regions effectively and minimize classification errors between different types of multiplets. Most importantly, we will demonstrate that the network generalizes remarkably well on real experimental 1H NMR spectra.

Industry

Sebastian Welter: «Innovate a retailer with AI: The life of an innovation manager in IKEA»

Sebastian Welter is leading AI innovation at IKEA. His background is classical IT, being an IT architect by profession. His first steps in AI were taken at IBM, when he was responsible as architect in Germany for the AI that started the hype in 2011 - IBM's Watson. From there he went into consulting, spending some years in defining AI strategies and solutioning analytics/cloud/data/AI projects as a director at Accenture. Now his focus is technology driven innovation, whether its AI or any other fascinating digital technology.

Abstract

Everyone "does AI" nowadays, and the larger the company, the bigger the fails and maybe the achievements are. But how do you do it? Follow me on a typical day in innovation in IKEA on our journey to create a better everyday life for the many people. The talk will touch on how AI and innovation can change a company, what challenges to overcome and how to make it all work in grand scale.

Industry

Dr. Nikola Pascher, Dr. Thilo Stadelmann: «Data-centric transfer learning as a solution to key-challenges in industrial data-based solutions»

Dr. Nikola Pascher is the global head of Mettler Toledo's R&D team in the strategic business unit standard industry. She is responsible for the product portfolio, consisting of weighing solutions for industrial applications, controllers and software, covering the entire technology-stack from the sensor to the cloud. She studied physics at the University of Augsburg in Germany. Her phd at ETH Zurich, Switzerland and a consecutive postdoctoral assignment at IBM Research, Zurich were focused on quantum science. After leaving academia, she worked in various positions in technology and innovation management with a focus on high-precision measurement instrumentation and data science for digital solutions and services. She extended her knowledge with an Executive MBA from the University of St. Gallen. Her main interest is to create value with breakthrough technologies.

Dr. Thilo Stadelmann is professor of artificial intelligence and machine learning at the ZHAW School of Engineering in Winterthur, director of the ZHAW Centre for Artificial Intelligence and head of its Computer Vision, Perception and Cognition Group. A computer scientist by training, he received his doctor of science degree from Marburg University in 2010, where he worked on multimedia analysis and voice recognition. Thilo worked in engineering and leadership roles in the automotive industry for 3 years prior to switching back to academia. His current research focuses on robust deep learning to solve diverse pattern recognition tasks such as biometrics, document analysis or computer vision for industrial and medical applications. He is fellow of the European Centre for Living Technology in Venice, Italy, co-founder and board member of Switzerland's largest innovation network, the data innovation alliance, and of the ZHAW Datalab, one of Europe's first dedicated research hubs for data science. His book „Applied Data Science - Lessons Learned for the Data-driven Business" was published 2019 by Springer, a pre-print on „A Theory of Natural Intelligence" that informs a future roadmap for machine learning research was released recently.

Abstract

To date, most of the applications of machine learning in industrial companies have an inward focus. Methods form data science are used to simplify company processes, place efficient marketing, automatic digitalization of documents and many more. The industrial internet of things instead, is focused outwards, towards the customers with the goal to create true value from their data, which is obtained, e.g., from running industrial applications. IIoT pictures a beautiful perspective, yet many companies struggle to offer data-based solutions, which are based on measured sensor-data from industrial processes. Digital innovators meet a variety of obstacles, which prevent them from efficiently developing solutions which turn data from the customer's production sites into value. Taking Mettler Toledo's industry division as an example, we picture the pathway of a very traditional industry company extending their technology stack to the top. A general problem in industrial applications of machine learning is that (labeled) training data is rarely available. Either the creation of labeled ground-truth data sets is too expensive, or the data belongs to the customers, who might be worried to share their data with a solution provider. On top of that, machine learning models do not generalize efficiently. Model performance is poor, if the pre-trained model is applied to different data sets it was not trained for initially. This means a big pain to the solution provider and to the customer, as extensive model training would have to be included in the customer workflow.

We focus on a data-centric approach in combination with transfer learning as a possible solution scenario for the above-mentioned challenge. We show an example from medical imaging, where we improve the performance of automated image recognition of the spine with an unsupervised domain adaptation (UDA) approach for vertebrae detection and identification based on a novel Domain Sanity Loss (DSL) function. This example can be abstracted to a variety of different processes and could be a valid solution to facilitate the use of machine learning in industrial processes.

Finance

Dr. Fabian Woebbeking: «Let me get back to you» - A machine learning approach to measuring non-answers»

As a financial economist and data scientist I focus on computational finance, financial risk management, impact investing, natural language processing, extreme value theory, econlinguistics and systemic risk. As a lecturer at Frankfurt School of Finance & Management, I teach courses in financial economics and derivative pricing. I am a co-founder of two companies, namely Axiomatec AG, a fin-tech company that develops quantitative investment and risk management solutions for institutional clients. As well as Hiveanalytica UG that focuses on business analytics.

Abstract
Using a supervised machine learning framework on a large training set of questions and answers, we identify 1,364 trigrams that signal non-answers in earnings call Q&A. We show that this glossary has economic relevance by applying it to contemporaneous stock market reactions after earnings calls. Our findings suggest that obstructing the flow of information leads to significantly lower cumulative abnormal stock returns and higher implied volatility. As both our method and glossary are free of financial context, we believe that the measure is applicable to other fields with a Q&A setup outside the contextual domain of financial earnings conference calls.

Dr. Blanka Horvath: «Machine Learning - Market Simulation Generating Financial Markets with Signatures»

Professor Dr. Blanka Horvath's current research interests focus on asymptotic and numerical properties of stochastic volatility models, in particular models with rough paths (rough volatility), as well as using generative methods -across models- to generate synthetic financial market data. For her contributions to the calibration of (rough) stochastic volatility models with deep neural networks, she received the Rising Star Award from Risk Magazine in 2020. Blanka Horvath was appointed Professor at the Chair of Financial Mathematics at the Technical University of Munich in April 2021.

Abstract
Market Simulation and Deep Hedging: Neural network based data-driven market simulation unveils a new and flexible way of modelling financial time series, which has recently inspired a surge of research activity in the quantitative finance community. While most generative models tend to rely on large amounts of training data, we present here a generative model that works reliably even in environments where the amount of available training data is small, irregularly paced or oscillatory. We show how a rough paths-based feature map encoded by the signature of the path outperforms returns-based market generation both numerically and from a theoretical point of view. Finally, we also propose a suitable performance evaluation metric for financial time series and discuss some connections of our signature-based Market Generator to deep hedging.

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Finance

Linus Grob, Dr. Dominic Boos: «Tracking Speculative Trading»

Linus Grob is a research associate at the Institute for Wealth and Asset Management at the ZHAW School of Management and Law and a business analyst at the Bank Vontobel AG. He graduated in Banking and Finance at the ZHAW School of Management and Law and is now pursuing his Ph.D. in Banking and Finance at the University College Dublin. His research focuses on machine learning applications in capital markets and the application of alternative data in Finance.

Dominik Boos is a lecturer at the Institute for Wealth and Asset Management at the ZHAW School of Management and Law. His teaching focuses on active and quantitative investment strategies as well as on sustainable investing. Dominik has more than twenty years of industry expertise in strategy research and active investment management. He is also an investment advisor for Serafin Asset Management and founded Avena Capital in 2017. Dominik worked as Head of Global Macro Research at SSGA where he was a member of the global macro investment committee and directed the development and the implementation of the relative value book. Before, Dominik worked as a Senior Investment Strategist at the Swiss National Bank, responsible for the strategic asset allocation of the foreign reserves. Previously, he was Head of Quant Research at Zurich Cantonal Bank. Between 2004 and 2009, Dominik worked at Kraus Partner, a Zurich-based asset management company. As Partner and Head of Investment Management he was responsible for research, portfolio management and trading. Dominik has earned a PhD in Finance and Economics from the University of St. Gallen and a Masters in Mathematics from the Swiss Federal Institute of Technology.

Abstract
Managed futures funds are predominantly trend-followers. By analyzing positioning data, we provide novel evidence for this claim and estimate signals applied by these funds. We write trend-followers aggregate position as a weighted sum of past daily returns and use a generalized ridge regression for regularization and parameter estimation. This procedure prevents overfitting but remains flexible enough to capture various patterns. For the 23 commodities considered, trend-following can explain speculators' position changes with an average R^2 of more than 40 percent. Finally, we document that producers act as contrarians in a way that closely mirrors the behavior of momentum traders.

Finance

Dr. Thomas Krabichler: «Deep Asset-Liability-Management»

Thomas Krabichler is a lecturer and quant researcher at the OST – Eastern Switzerland University of Applied Sciences. He holds a doctoral degree from ETH Zürich in mathematics. His research focuses on applications of machine learning in finance. Previously, he worked as a quant specialist for the pricing and hedging of financial derivatives. In this role, he provided technical model validations of valuation models for major investment banks in London and Paris.

Abstract

Recent advances inspired by reinforcement learning support well-balanced risk-taking and unprecedented risk-adjusted pricing. In ongoing initiatives with several colleagues and partners, we are utilising these techniques in order to tackle high-dimensional optimisation problems in the presence of constraints and frictions. The range of applications involves optimal decision making for treasurers, optimal procurement of commodities, or the optimisation of hydroelectric power plants.

Dr. Matthias Niggli, Dr. Christian Rutzer: «What is it worth? Predicting the Importance of Patents Using Supervised Learning»

Matthias Niggli is a research data scientist and project manager at the Center for International Economics and Business | CIEB of the University of Basel. He holds a PhD from the University of Basel, has a special interest in experimenting with all kinds of machine-learning methods and is enthusiastic about discovering novel approaches to visualize data.

Christian Rutzer is deputy director and project manager at the Center for International Economics and Business | CIEB of the University of Basel. He holds a PhD in economics from the University of Basel and likes to apply new methods from data science to analyze economic issues.

Abstract

We demonstrate that a combination of deliberate feature engineering and deep learning methods can be used to predict the technological importance of recently filed patents. This provides a scalable framework for early assessments of companies' current innovation pipelines.

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Finance

Dr. Ken Cassar: «Hybrid Intelligence – Machine Enhanced Decision Making beyond the current frontier»

Ken is a co-founder and co-CEO of Umnai where he has been part of a team that has invented and productised a ground breaking technology since 2019. Prior to UMNAI Ken founded and ran two enterprises in the Fintech space, building a cutting edge physical/online POS infrastructure and later as a payment service provider in online card processing in Europe and North America.

Abstract

Recent advances in Neuro-Symbolic AI bring transformative changes to how we can conceive, design, build and consume data informed automated decision systems. This talk will introduce Hybrid intelligence and look at how it empowers organisations to resolve the problems of bias, risk, ethics, fairness and human oversight.

Finance

Prof. Marc Wildi / Prof. Branka Hadji Misheva: «A Time Series Approach to Explainability for Neural Nets with Applications to Risk-Management and Fraud Detection»

Prof. Dr. Marc Wildi is Professor of Econometrics at the Zurich University of Applied Sciences. His research interests are about forecasting, real-time signal extraction, business-cycle analysis, algorithmic trading and risk management. His recent work emphasizes hybrid approaches (mixing real-time filter designs and generic trading concepts) as well as explainability (XAI) of computationally intensive approaches (NN) in the context of longitudinal data (time series).

Prof. Dr. Branka Hadji Misheva is a Professor in Applied Data Science and Finance at BFH, working on AI applications in finance, XAI methods, network models and fintech risk management. She holds a PhD in Economics and Management of Technology with a specific focus on network models as they apply to the operation and performance of P2P lending platforms, from the University of Pavia, Italy. In the past, she has led several research and innovation projects on Artificial Intelligence and Machine Learning for Credit Risk Management (Innosuisse, EU Horizon 2020, COST Action). She is a research author of over 17 papers in the field of credit risk modeling, graph theory, predictive performance of scoring models, lead behavior in crypto markets and explainable AI models for credit risk management.

Abstract

Artificial intelligence (AI) is creating one of the biggest revolution across technology-driven application fields. For the finance sector, it offers many opportunities for significant market innovation and yet broad adoption of AI systems heavily relies on our trust in their outputs. Trust in technology is enabled by understanding the rationale behind the predictions made. To this end, the concept of eXplainable AI (XAI) emerged introducing a suite of techniques attempting to explain to users how complex models arrived at a certain decision. For cross-sectional data classical XAI approaches can lead to valuable insights about the models‘ inner workings, but these techniques generally cannot cope well with longitudinal data (time series) in the presence of dependence structure or non-stationarity. In this talk I will present common work with Branka Hadji about a novel XAI-technique for deep learning methods (DL) which preserves and exploits the natural time ordering of the data. After a brief introduction to the main concepts, simple applications to financial data illustrate the potential of the approach in the context of risk-management and fraud-detection.

Ethics

Dr. Ricardo Chavarriaga: «Operationalizing AI ethics: Challenges for organizational governance

Ricardo Chavarriaga, PhD, is a neuroscientist passionate about responsible development and societal implications of technology. His work is focused on fostering research and innovation in emerging technologies towards the benefit of society.Dr Chavarriaga is senior researcher at the Zürich University of Applied Sciences (ZHAW) and Polymath fellow at the Geneva Center for Security Policy (GCSP). He is the head of the Swiss office of the Confederation of Laboratories for AI Research in Europe (CLAIRE). CLAIRE is the largest European network on Artificial Intelligence (AI), comprising more than 400 research groups and 3’000 individual supporters. He chair the principles sub-group of IEEE P2863 Working group on Recommended Practices for Organisational Governance of AI.

Abstract

Upcoming regulatory frameworks for Artificial Intelligence (AI) systems will require organizations to certify that the systems they develop comply with requirements based on ethical principles such as transparency, fairness reliability, and safety. Making the bridge between these ethical principles and organizational processes is not an easy feat. This talk will discuss this challenge and present current examples of initiatives aimed at tackling it.

Nicole Büttner: «AI and Mafia»

Nicole Büttner is a tech optimist at heart and is active as an entrepreneur, investor and board member. Her passion is to create real impact with new technologies useful to companies and people. Nicole is co-founder and CEO of MerantixMomentum, a leading AI solutions firm and member of the management board of Merantix, an AI venture studio based in Berlin. Nicole is Digital Leader at the World Economic Forum and was nominated as a Young Leader by the Aspen Institute. She was selected twice as 40 under 40 by Capital Magazine and Rising Talent by the Women’s Forum. Previously, she worked as a hedge fund portfolio manager at OFI AM in Paris and led the global business development for Autionomics, Nobel Prize winner Paul Milgrom’s tech and consulting firm. She serves on the Board of Alumni of the University of
St.Gallen and on the board of the German Startup Association.
She regularly lectures at the University of St. Gallen and other academic institutions. Nicole trained as an economist and econometrician at the University of St.Gallen, Stockholm School of Economics and Stanford University and holds a MA in Quantitative Economics and Finance.

Abstract

The challenges of our times are becoming more complex and innovating with AI is different than with classic software tools. What can we learn from the mafia for building successful AI solutions?

Ethics

Dr. Eleonora Viganò: «Ethics of algorithmic prediction: How algorithms threaten our right to be unpredictable»

Eleonora Viganò is Postdoctoral Researcher at the Institute of Biomedical Ethics and History of Medicine, at the University of Zurich. She was recently the Executive Manager of the ELSI-Task-Force for the Swiss National Research Programme 75 “Big Data” and developed the moral aspects of the Swiss National Research Programme 77 project “Socially acceptable AI and fairness trade-offs in predictive analytics”. Her main research areas are Neuroscience of Ethics and Digital Ethics. She is currently working on the ethical issues of digital technologies aiming to improve people’s well-being. Her latest publication is the book “Moral choices for our future selves” for the series Routledge Focus on Philosophy.

Abstract

Predictive algorithms give an unprecedented support for decision-making in high-stakes domains such as the assignment of medical treatments, jobs, loans, and parole, as well as for everyday choices such as the suggestion of what news to read or movie to watch. Yet, such a support comes at ethical costs concerning privacy, lack of transparency, discrimination, profiling, and choice manipulation. In this talk, first, I will discuss an ethical issue of predictive algorithms involving the essence of being a person in the sense of an agent able to make choices autonomously. This ethical issue is due to an aspect of the design of predictive algorithms: a predictive algorithm treats people as mere members of a group it assigns them to, thus overlooking their uniqueness deriving from being autonomous agents and the possibility that their behavior deviates from the group they are assigned to. Then, I will defend the right to be unpredictable, which requires that we consider the possibility that the subject of an algorithmic decision can be an exception to the algorithm’s prediction, and analyze some decisional contexts in which this right is applicable.

Jérôme Koller: «You have your ethical framework, so what?»

Jérôme Koller, Head of Arena Steuerung, La Mobilière. Jérôme is a passionate artificial intelligence professional committed to delivering value from data at scale in the organization. He has built and led a team of 25 scientists implementing projects across La Mobilière and aiming to a broad adoption of AI within the company. Jerome has previously held various positions in the field of data at La Mobilière, from risk management to data warehousing, business intelligence and customer analytics. He currently is in charge for the strategic steering of the agile organization of La Mobilière. He studied mathematics and informatics at the University of Fribourg and completed his EMBA degree at IMD Business School in Lausanne in 2022.

Abstract

Many companies are incorporating AI and data-driven solutions in their toolkit to create value for their customers. Using more data usually leads to ethical questions and can raise passionate internal debates about what to do or not. Is the ethical questioning coming from the more innovative side of the company, arguing that you must define such policies today to „stay tuned“ with society, or is it a way for the more conservative employees to question the transformation? At La Mobilière, we defined our ethical framework in 2019 and have been using it since then. I will give an overview of the ethical principles of La Mobilière, explain how we use them, and give my lessons learned from this journey. By focusing on which problems the framework can solve and which ones, in my opinion, are still open, I will highlight some underestimated values of clarifying ethical thoughts in Business.

| Conference on Artificial Intelligence in Industry and Finance

Ethics

Andreas Blum, MBA: «How to ensure «Trustworthy AI» from a governance perspective and get ready for the planned EU AI Act, also affecting Swiss entities»

Andreas leads the Financial Services Practice and the Digital & AI Consulting Practice of Unit8, a Swiss data & analytics consultancy with focus on both implementation and strategic advisory. He is a senior strategy consultant with more than 10 years of experience in both external and inhouse management consulting. During this time he conceptualised and implemented strategic initiatives across different industries and functions, in recent years with increasing focus on Digital Transformation and Data & Analytics. He started his career with the strategy consultancy A.T. Kearney in Zürich and later worked for the strategy & transformation advisor goetzpartners in Germany. Before joining Unit8, he was a project manager within the Strategy & Business Development unit of UBS in Zürich. He holds an MBA from INSEAD and an MPhil in Innovation & Strategy from Cambridge University. In his spare time, Andreas likes to ski, explore European cities and run (half-)marathons. Andreas is based in the Zurich office of Unit8.

Abstract

Considering the far-reaching impact of AI including potential negative consequences and ethical questions of flawed AI systems, lawmakers across the globe are currently working on regulating its use. Most noteworthy is the so-called “Artificial Intelligence Act”, a proposal by the European Commission to lay down harmonized rules on the use of AI. This planned regulation by the European Commission could not only change the way how AI is developed in the EU but could also have profound implications for businesses in Switzerland. It is planned that non-compliance will lead to heavy fines, amounting to up to 6% of global company turnover or EUR 30m (which would be even heftier than fines imposed by the GDPR). It has not yet been decided when and in which exact shape this regulation will come into force, but companies are well advised to already now start ramping up their AI & advanced analytics governance effort to mitigate business, reputational and also compliance risks. This presentation will provide practical guidance on what to expect and how to prepare.

The planned EU AI Act: How the EU wants to enforce “Trustworthy AI”, also affecting Switzerland

In recent years, the use of AI in organisations has drastically increased. As a result, lawmakers around the world have been paying close attention to the developments in the field of AI too. While there is no comprehensive law that regulates the use of AI today, there are clear signs that Swiss and European organisations should prepare for an upcoming, stricter regulation.

AI-specific regulations are set to enter into force soon

Nowadays, organisations are at different stages of AI maturity. Some are just getting started, some have already established comprehensive risk and governance mechanisms to manage AI effectively. Considering the wide application of AI, it is clear that various societal risks are associated with its use by private- and governmental organisations alike. Lawmakers have been paying attention to those risks, and have started revising and creating new laws surrounding AI. In Switzerland, the revised Swiss Federal Data Protection Act (revFDPA) is set to come into force in September 2023. At the European level, the Artificial Intelligence Act – a proposal by the European Commision to lay down harmonised rules on the use of AI – has been drafted and is likely to get passed in the coming years.

The Artificial Intelligence Act in brief

Even though the draft proposal has not yet entered into force, it provides clear insights into the future development of AI regulations in Europe. Similar to GDPR, the Artificial Intelligence Act will have an extraterritorial scope, meaning that not only EU-based companies will need to comply with it. In fact, the upcoming regulations will apply to:

- providers placing AI systems on the market or putting them into service in the EU,
- users of AI systems located within the EU, and
- providers and users of AI systems that are located in a third country, where the output produced by the system is used in the EU.

The act takes a risk-based approach and classifies AI systems according to four risk categories: 1) unacceptable risk, 2) high risk 3) limited risk, and 4) minimal risk. The below table provides a high-level overview of risk categories, exemplary use cases which fall into the risk category and associated legal requirements.

Risk category	Example use cases	Legal requirements for AI system owner
Unacceptable Risk	Government ‘Social scoring’ Live identification based on biometrics	Use of systems which fall into this category is prohibited (very narrow exceptions apply)
High Risk	Employee management and recruiting; law enforcement; credit scoring; systems to manage and operate critical infrastructure; education and vocational training; safety components of products; medical devices; toys (n.b.: there are many more categories of included AI systems, please refer to Title III of the legislative proposal for a more comprehensive list)	Complex legal requirements for the use of such systems apply (e.g. risk assessment, high data quality, activity logging, documentation, transparency, robustness)
Limited Risk	AI Chatbots Systems manipulating image, audio or video content	Transparency obligations apply to inform the user on the use of AI systems
Minimal Risk	Spam filter Inventory management systems	No additional legal requirements apply

Challenges with AI and consequences of non-compliance

The application and use of AI comes with technical, legal and ethical challenges not to be underestimated. With AI models being used for credit approval, recruitment and healthcare, having faulty or discriminatory algorithms can have a significant impact on “life-changing” decisions.

Consequently, organisations bear a legal and moral responsibility when using AI systems and should provide a guarantee to system users or consumers that their algorithms are neither biased nor faulty in any way. Results need to be fair, reliable and explainable (the definition of what constitutes a “fair” algorithm can of course be subject to debate). In addition to these requirements, algorithms should also be secure from a cybersecurity perspective. In practice, companies should proactively try to prevent potential attackers from influencing the outcomes of AI models by, for example, introducing “poisoned” data during model training.

Companies failing to comply with the regulations of the EU AI Act after its entry into force will face heavy monetary penalties of up to €30 million or 6% of global annual company revenue. This makes potential penalties heftier than those incurred for violations of the GDPR.

How can organisations start preparing for these upcoming regulatory changes?

At the dawn of upcoming regulatory changes, and to ensure ethical, legal and security compliance of their AI applications or systems, organisations need to start now to address such challenges raised by the use of AI. Organisations affected by these new regulations should also keep in mind that the planned EU AI Act is likely only the forerunner of many other regulatory standards to come. Therefore, it is crucial that preventive investments are made early on to avoid getting hit by the wave once it lands. But how can your company prepare for this disruption?

Specifically, organisations can take the following actions:

- **Risk classification and assessment**

Conduct an in-depth conformity assessment of existing or planned AI systems to identify their likely risk classification according to the AI Act.

- **AI & Analytics governance framework**

Put in place an AI & Analytics governance framework to facilitate the development of responsible and technologically robust AI systems.

- **Model catalogue**

Build-up a model catalogue to register all AI systems across the organisation and document their performance, training data, algorithmic features and people responsible.

- **Mitigate AI-specific risks**

Investigate AI-specific risks, such as the intentional manipulation of AI algorithms, and document these risks for each model and use case.

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About Unit8

Headquartered in Lausanne and with offices in Zürich, Bern and Krakow, Unit8 was founded in 2017 to support companies, institutions, and industries to accelerate their digital transformation with the help of artificial intelligence, data, and advanced analytics.

A trusted partner to dozens of well-known brands including Daimler, Firmenich, Merck, Tecan and WWF, Unit8 has a positive track record of having delivered over 150 data & AI projects.

Moreover, the international scaleup has partnerships with tech leaders such as Microsoft or Amazon Web Services. Unit8 employs nearly 100 world-class data experts including former employees of Apple, Amazon, Google, and Palantir.

Academia-Industry best practices

Prof. Patricia Deflorin: «Databooster – Open innovation activities to boost data based innovation»

Prof. Dr. Patricia Deflorin is Research Director at the Swiss Institute for Entrepreneurship (SIFE), FH Graubünden, and lecturer at the University of Zurich. Within the NTN Innovation Booster Databooster, she is the co-leader of the focus topic Industry 4.0. Her research focus on innovation, supply chain and digital transformation. Her area of experience includes the design and implementation of data-based services, the generation and analysis of IoT business models and the identification of necessary technologies for the successful implementation of digital transformation.

Abstract

Technologies, data analysis, interfaces and standards. Companies pursuing Industry 4.0 and smart services are facing many decisions on how to pursue their activities. But which investments may lead to a radical innovation? The NTN Innovationbooster Databooster supports companies in their quest to develop and implement databased innovations. Patricia Deflorin shows which topics industrial companies seem as relevant to pursue and how these topics may differ between small and larger companies. In addition, she sheds light into the Databooster activities and how industrial companies can profit from the networks activities.

Dr. Hanspeter Bär: «How to be successful with your Innosuisse Application for innovation project funding»

Hanspeter Bär's background is in Electrical Engineering (Dr. sc. techn./ETHZ in Communications Technologies) and Business Management. He spent his business life in 2 international Swiss companies (Zellweger Uster and Huber+Suhner), in various positions from Sales Engineer, R&D Manager to Division Manager and Member of the Group Management. Since his retirement, he is active as an Innovation Mentor for Innosuisse. In this role, he has coached more than 300 project teams, supporting them in writing a convincing application for Innosuisse funding of an innovation project.

Abstract

I will present the key instruments Innosuisse is offering for project funding. Furthermore, I will talk about the criteria for a successful application.

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Academia-Industry best practices

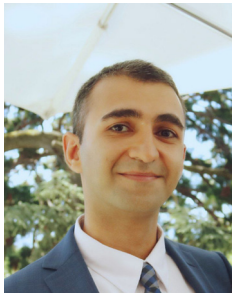
Manuel Eicher: «Smart protection systems - where do we go from here?»

Manuel Eicher is in the role as General Manager Geohazard Solutions at Geobrugg, an international company that is a leader in the development and production of protection systems against natural hazards. Manuel learned his profession as a mechanic and further developed his knowledge in Business Processes HF, Sales and Marketing FH in the direction of business management EMBA. In his activities at Geobrugg, he was significantly involved in laying the foundation for a data-based business model in order to develop the company from a purely industrial company to a producing service provider.

Abstract

Protection systems against natural hazards are mostly remote and difficult to monitor. In this setting, remote monitoring is a suitable new offering with great potential. In this presentation, it will be shown how Geobrugg identified the opportunity, developed the Geobrugg GUARD and started implementing the new hardware solution. But how does an industrial company deal when it suddenly has a monitoring solution that generates data and has to deal with other customers? The Geobrugg GUARD is used as an example to show how Geobrugg, together with the FH Graubünden, develops a data-based, international and scalable service model for protection against natural hazards in an Innosuisse project.

Dr. Arman Iranfar, Amin Amini: «certAInty - A Certification Scheme for AI systems»



Arman Iranfar received his PhD in electrical engineering from EPFL in 2020 with a focus on applied machine learning in embedded systems. He has published over 20 peer-reviewed papers in top-notch conferences and journals and served as a reviewer in several top-ranked conferences and journals including IEEE TC, IEEE TSUSC, and IEEE TSC. He is currently a senior data scientist at CertX, building the first certification scheme for AI trustworthiness.

Amin Amini is leading the functional safety expert of CertX since September 2018. Based on his strong background in telecommunications and automotive industry, he has developed functional safety certification schemes for supporting customers to meet the State-of-the-Art, as well as to demonstrate their best practices to authorities across different market segments. Amin is an ISO 26262, OPST and IEC 61508 certified engineer and expert member of ISO 26262 2nd edition and ISO/PRF PAS 21448 (SOTIF) standardisation group.

Abstract

Certification of AI Systems by an accredited body increases trust, accelerates adoption and enables their use for safety-critical applications. Under the Innosuisse umbrella, CertX is developing a Certification Scheme comprising specific requirements, criteria, measures, and technical methods for assessing Machine Learning enabled systems.

Closing Panel

Prof. Dr. Peter Schwender

Prof. Dr. Peter Schwendner leads the Institute of Wealth & Asset Management at Zurich University of Applied Sciences, School of Management and Law. He collected 15 years of work experience in the financial industry as a head of quantitative research at Sal. Oppenheim and as a partner at Fortinbras Asset Management after he completed a doctorate in physics. He has been developing analytics for primary and secondary markets and quantitative risk premia strategies with financial industry partners.

Jennifer Victoria Scurrell

Jennifer Victoria Scurrell is a PhD candidate at the Center for Security Studies (CSS) at ETH Zurich. In her dissertation, she examines the influence of AI agents on political opinion formation in online social networks using experimental methods and ML. Jennifer is a political scientist by training and holds a MA and a BA from the University of Zurich.

Pius von Däniken

Pius von Däniken is a research assistant at the ZHAW Centre for Artificial Intelligence. As a member of the Natural Language Processing group, he focuses on malicious behavior in Social Media and the dynamics of online radicalization. His other research interests include the evaluation of dialogue systems and the development of NLP tools for Swiss German. He holds a BSc in Computer Science from EPFL and is currently a MSE student at the ZHAW.

Notes

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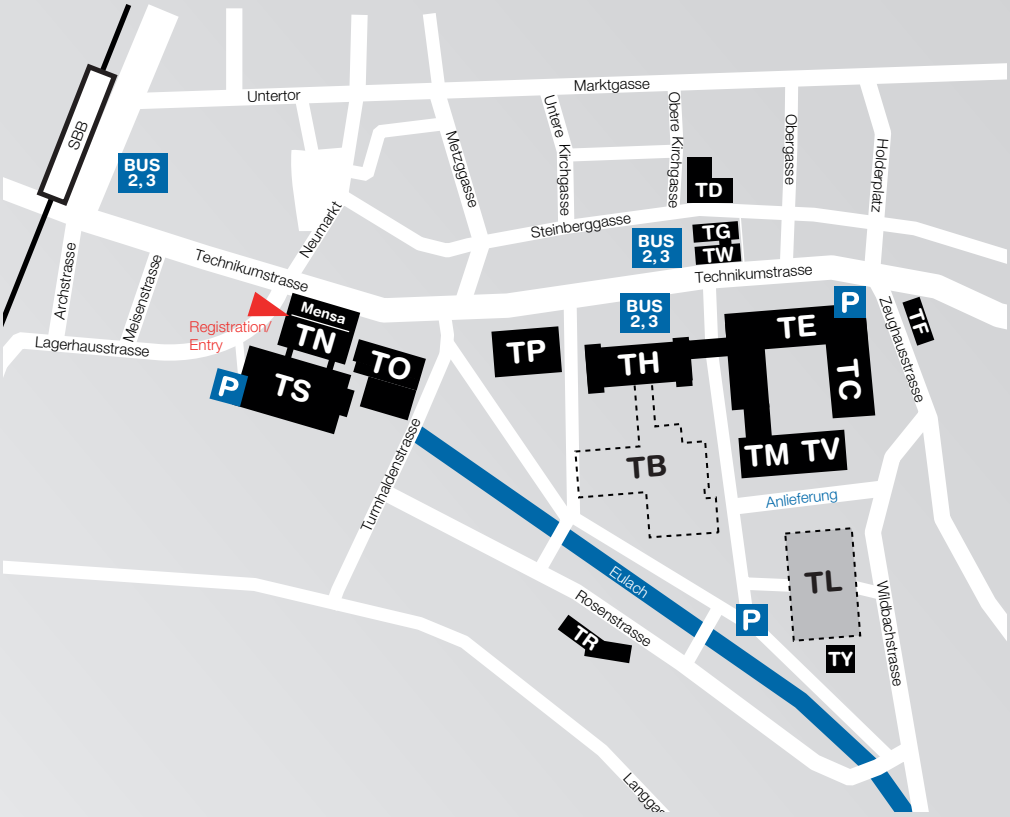

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