

Artificial Intelligence in Industry and Finance

(3rd European COST Conference on Mathematics for Industry in Switzerland)



September 6, 2018

9:00 – 17:30

Zurich University of Applied Sciences,
Technikumstr. 71, 8401 Winterthur

Registration

[Artificial Intelligence in Industry and Finance](#)

Aim of the conference

The aim of this conference is to bring together European academics, young researchers, students and industrial practitioners to discuss the application of Artificial Intelligence in Industry and Finance within the COST research network.

COST is the longest-running European framework supporting transnational cooperation among researchers, engineers and scholars across Europe. The [2nd European COST Conference in Switzerland](#) on this topic was held on September 7, 2017.



Keynote Talk in 2017

Speakers



Session in Progress in 2017

We have invited 20 speakers both from within Switzerland as well as abroad, working on AI in Finance and Industry.

One track will focus on financial mathematics and its applications of machine learning, whereas the other one will tackle the implications for industry.

Anna Maria Nowakowska

InCube

A Brief Biography

Anna Maria Nowakowska leads the Data Analytics team at InCube, which focuses on delivering data consulting services to clients within the Swiss financial sector. She holds a Master of Engineering degree in Electronics and Electrical Engineering from the University of Edinburgh, as well as the Chartered Financial Analyst® designation from the CFA Institute. She has over 7 years of experience in the software and financial services industries and has worked in the UK, US and Switzerland.



Recommender Systems for Mass Customization of financial Advice

Recommender systems have been widely adopted in areas such as online shopping and movie streaming. They automatically suggest new items to users based on their characteristics and previous behaviour. Despite the support that recommender systems can bring to decision making in finance, their application to banking data is an underexplored field, and our research is focused on filling this gap. We build recommenders for private and retail banking use cases, following the growing push for digitization and mass customization of financial advice. The vision is to enhance the quality of personal financial advice and to make it accessible to a wider client base, by automating a large part of the process.

Dr. Daniel Egloff

Flink AI/ QuantAlea

A Brief Biography

Dr. Daniel Egloff is the founder of Flink AI and QuantAlea. Flink AI is developing new AI solutions using Reinforcement Learning and is advising banks, hedge funds and eCommerce companies on practical applications of AI and Deep Learning. QuantAlea is a Swiss based software engineering company specialized in GPU software development and high performance numerical computing. He studied mathematics, theoretical physics and computer science and worked for more than 15 years as a quant in the financial service industry before he started his entrepreneurial career in 2007.



Trade and Manage Wealth with deep Reinforcement Learning and Memory

In this session we present how Deep Reinforcement Learning (DRL) and memory extended networks can be used to train agents, which optimize asset allocations or propose trading actions. The memory component is crucial for improved mini-batch parallelization and helps to mitigate catastrophic forgetting. We also address how concepts from risk sensitive and safe reinforcement learning apply to improve the robustness of the learned policies. The DRL approach has several advantages over the industry standard approach, which is still based on the Mean Variance portfolio optimization. The most significant benefit is that the information bottleneck between the statistical return model and the portfolio optimizer is removed and that the available market data and trade history is used much more efficiently

Prof. Dr. Markus Loecher

*Berlin School of Economics
And Law*

A Brief Biography

Prof. Dr. Markus Loecher has been a professor of mathematics and statistics at the Berlin School of Economics and Law (HWR Berlin) since 2011. His research interests include machine learning, spatial statistics, data visualization and sequential learning. Prior to joining HWR Berlin he worked as principal and lead scientist at various data analytics companies in the United States. In 2005, he founded a consulting firm, DataInsight, which focused on applying novel statistical learning algorithms to massive data sets. Prior to DataInsight, he worked at Siemens Corporate Research (SCR) in Princeton, NJ for 5 years, where he focused on failure prediction. Markus Loecher completed his postdoctoral research in physics at the Georgia Tech University in which he studied the spatiotemporal chaos. He holds a PhD in physics and a master degree in statistics.



Pitfalls of Variable Importance Measures in Machine Learning

Random forests and boosting algorithms are becoming increasingly popular in many scientific fields because they can cope with "small n large p" problems, complex interactions and even highly correlated predictor variables. The predictive power of covariates is derived from the permutation based variable importance score in random forests. It has been proven that these variable importance measures show a bias towards correlated predictor variables. We demonstrate the fundamental dilemma of variable importance measures as well as their appeal and wide spread use in practical data science applications. We address recent criticism of the reliability of these scores by residualizing and deriving analogous procedures to the F-test

Dr. Jürgen Hakala

Leonteq Securities AG

A Brief Biography

Jürgen works for Leonteq Securities AG, where he is involved in modelling and financial engineering for all asset classes. His interests are numerical methods in mathematical finance, in particular multi-asset and hybrid modelling, as well as the impact of regulation onto markets and models. Backed by his PhD was on Neural Network he recently rekindled his interest in machine learning methods, now applied to problems in financial engineering. Initially he worked on foreign exchange, where he is co-editor of a textbook about FX derivatives.



Machine Learning applied to SLV Calibration

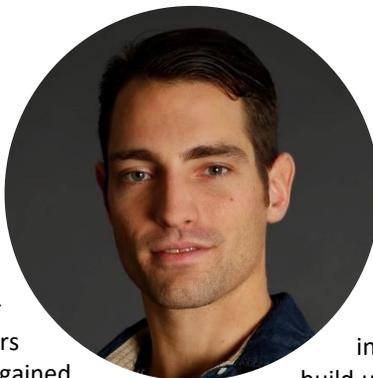
We calibrate local stochastic volatility using the particle method developed by [Guyon, Henry-Labordere]. A critical step in this method is an estimation of the conditional expectation of the stochastic volatility process, given the realized spot. We reformulate this estimation as a non-linear regression at each time-step of the discretized process, which allows us to apply machine-learning (ML) techniques. We review appropriate ML techniques, compare results and Performance.

Dr. Yannik Misteli

Julius Bär

A Brief Biography

Dr. Yannik Misteli leads the Advisory Analytics Team at Julius Bär in Zürich. The team develops new data based approaches with the aim of better supporting the relationship managers who serve the clients. During his PhD he gained experience in numerical high-performance computing, multi-objective optimisation algorithms as well as statistical mechanics. He was always keen to transfer his insights gained from academic research over to industry and is now enjoying working to shape the future of the financial sector.



Decision Trees in Machine Learning

Decision trees neither are the most sophisticated classifier nor are they accurate predictors. However, they are a powerful instrument to establish machine-learning techniques within a company as they are easily and intuitively interpreted. They can be used to gradually build up understanding and confidence in using machine learning techniques amongst (senior) management, introducing more sophisticated methods once this confidence has been achieved. We demonstrate the use of decision trees in the context of identifying clients that should be moved to a different service model. A simple partition tree classifier is used to model the different customers and hence the leaf nodes are investigated for misclassified clients.

Prof. Dr. Paolo Giudici

University of Pavia

A Brief Biography

Professor of Statistics and Data Science at the Department of Economics and Management of the University of Pavia. His current research interests are: Financial networks, Financial risk management, Systemic risk, and their application to Cryptocurrencies and Fintech platforms. Director of the University of Pavia Financial Technology laboratory (formerly Data Mining laboratory) which, since 2001, carries out research and consulting projects, for leading financial institutions.



Scoring Models for Robo-advisory Platforms: A Network Approach

Due to technological advancement, robo-advice platforms have allowed significant cost reduction in asset management. However, this improved allocation may come at the price of a biased risk estimation. To verify this, we empirically investigate allocation models employed by robo-advice platforms. Our findings show that the platforms do not accurately assess risks and, therefore, the corresponding allocation models should be improved, incorporating further information, through clustering and network analysis.

Prof. Dr. Marc Wildi

ZHAW School of Engineering



A Brief Biography

Marc Wildi holds an M.Sc. in Mathematics from the Swiss Federal Institute of Technology (ETH) in Zurich; he obtained his PhD from the University of St-Gallen, Switzerland. After being lecturer in Statistics at the Universities of Fribourg and of St-Gallen, he began his current position as a Professor in Econometrics in 2002 at the Zurich University of Applied Sciences. His novel forecast and signal extraction methodology, the so-called Multivariate Direct Filter Approach (MDFA), won two international forecast competitions in a row. His current research interests involve applications of the MDFA to mixed-frequency (daily) macro-economic indicators and to algorithmic trading.

FX-trading: challenging intelligence

FX-trading is widely recognized as one of the most challenging forecast applications with the range of methodological complexity reaching from appalling simplicity to frightening complexity. We here sweep through this methodological range by proposing a series of novel and less novel, linear and non-linear, intelligent and less so approaches, either in isolation or in combination. Empirical results are benchmarked against plain-vanilla approaches, based on the most liquid and therefore most challenging (FX-)pairs. R-users will be pleased to replicate results.

Alla Petukhina

Humboldt University of Berlin



A Brief Biography

Alla Petukhina holds a M.Sc. in economics from the Ural state university, Russia. Since 2014 she has joined the Ladislaus von Bortkiewicz chair of statistics at the Humboldt-University in Berlin as a Ph.D. candidate. Her research interests are focused on asset allocation strategies and risk modelling for high-dimensional portfolios, investment strategies in crypto-currencies market.

Portfolio allocation strategies in the cryptocurrency market

Current study aims to identify pro and con arguments of crypto-currencies as a new asset class in portfolio management. We investigate characteristics of the most popular portfolio-construction rules such as Mean-variance model (MV), Risk-parity (ERC) and Maximization diversification (MD) strategies applied to the universe of cryptocurrencies and traditional assets. We evaluate the out-of-sample portfolio performance as well as we explore diversification effects of incorporation of cryptocurrencies into the investment universe. Taking into account a low liquidity of crypto-currency market we also analyze portfolios under liquidity constraints. The empirical results show crypto-currencies improve the risk-return profile of portfolios. We observe that crypto-currencies are more applicable to target return portfolio strategies than minimum risk models. We also found that the MD strategy in this market outperforms other optimization rules in many aspects.

Dr. Damian Borth

DFKI Kaiserslautern

A Brief Biography

Dr. Damian Borth is a computer scientist and head of the centre of competence for deep learning at the German research center for artificial intelligence in Kaiserslautern (DFKI). He was awarded his PhD in Computer Science at the TU Kaiserslautern and the center of competence for multimedia analysis and data mining (MADM). For his achievements Borth and his team received various prizes, such as the McKinsey business technology award and the google research award. (*Karrierefuehrer.de*)



Deep Learning & Financial Markets: A Disruption and Opportunity

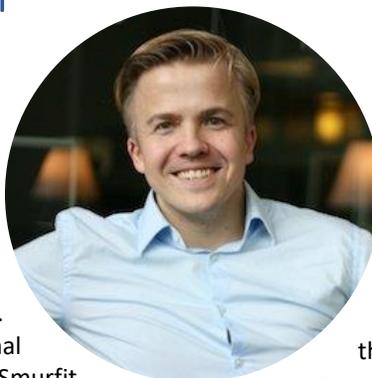
Learning to detect fraud or accounting irregularities from low-level transactional data e.g. general ledger journal entries is one of the long-standing challenges in financial audits or forensic investigations. To overcome this challenge we propose the utilization of deep autoencoder or replicator neural networks. We demonstrate that the latent space representations learned by such networks can be utilized to conduct an anomaly assessment of individual journal entries. The representations are learned end- to-end eliminating the need for handcrafted features or large volumes of labelled data. Empirical studies on two accounting dataset support our hypothesis. We evaluated the methodology utilizing two anonymized and large scaled datasets of journal entries extracted from Enterprise Resource Planning (ERP) systems.

Prof. Dr. Andreas Hoepner

UCD/ MFS/ Henley Business School/ University of Hamburg

A Brief Biography

Professor Andreas G. F. Hoepner, Ph.D., is a Financial Data Scientist working towards the vision of a conflict-free capitalism. Formally, Dr. Hoepner is Full Professor of Operational Risk, Banking & Finance at the Michael Smurfit Graduate Business School and the Lochlann Quinn School of Business of University College Dublin (UCD). Andreas is also heading the 'Practical Tools' research group of the Mistra Financial Systems (MFS) research consortium which aims to support Scandinavian and global asset owners with evidence-based tools for investment decision making. Furthermore, he is currently a visiting Professor in Financial Data Science at the University of Hamburg, as well as at the ICMA Centre of Henley Business School, where he was an associate Professor of Finance.



Finance Keynote Talk: Embracing AI Opportunity = (Humans*Teamwork)^Machine -1

Prof. Hoepner argues that AI and augmented Intelligence (Augml) can both have huge potential, with the use case suggesting which one to deploy, and how to organize ones team. He cites Gary Kasparov's observation that the Freestyle Chess Championships were won neither by the best grand master nor the best machine but by the best human-machine team: two amateur chess players using three machines simultaneously. Based on an immediacy, confirmability, population size and time-series attributes of use cases, he argues that AI is superior for real-time repeated recognitions of static objects, while Augml is likely to remain preferred choice for quite a while in regular but not real-time predictions of reactive processes. Augml also demands a strong focus on creating an excellent teamwork between among all involved humans and them and their machine(s). Lastly, Prof. Hoepner connects both AI abbreviations with the pressing need of climate change mitigation based on the use case of corporate GHG emissions reporting.

Participants

In September 2017, we have had more than 190 participants, both from Academia and Industry. The latest installment of the COST conference also saw a large number of international guests and speakers, travelling to Switzerland from destinations such as the UK, Germany, the United States and Bulgaria.

The largest proportion of participants come from the industry complemented by a significant number of academic researchers. This mirrors our unique approach of connecting the academic world to their respective fields of application, putting new exciting concepts to work in industrial frameworks, where they can open up new opportunities.



Organizing Committee

The organizing committee consists of members of ZHAW, both the School of Engineering and the School of Management and Law:

Prof. Dr. Ruedi Füchslin
Dr. Andreas Henrici
Prof. Dr. Jörg Osterrieder
Prof. Dr. Dirk Wilhelm
Prof. Dr. Peter Schwendner

