

# Machine Learning in Quant Finance

Practical examples of how quants are driving machine learning forward by finding uses through data selection, and applying machine learning techniques such as regression and reinforcement learning

Marriott West India Quay, Canary Wharf,  
London, UK

12 – 14 November 2018



Conference Workshops on 14<sup>th</sup> November 2018

**Workshop A:**  
Attention and LSTM models for time series

**Workshop B:**  
NLP for Calls and reports analysis using Seq-2-Seq models

**Workshop C:**  
Deploying an AI strategy pipeline properly

Led by:

**Jakob Aungiers**  
CEO and Co-Founder  
Altum Intelligence

Attending This Premier **marcus evans** Conference  
Will Enable You to

- **Discover** how quants are selecting and applying data to machine learning to gain statistical analysis and answers to business problems
- **Explore** best practices in machine learning techniques with a focus on reinforcement learning and regression
- **Validate** machine models throughout their programming and continuously test the patterns formed
- **Practical** examples of how quants have developed machine models and embedded this into the business
- **Advance** calibration and estimations of models using machine learning methods

Learn from Key Practical Case Studies

- **Nomura** offer a demonstration of Bayesian inference, variational encoding and hyper-prior modeling
- **Scotiabank** examine machine learning and illiquid counterparties
- **MUFG Securities** highlight reinforcement learning for KVA pricing
- **Groupe Credit Agricole** construct proper control throughout the development of a machine model to minimise learning concerns
- **Arabesque Asset Management** demonstrate deep reinforcement learning of an AI agent to handle specific markets of a Darwinian nature
- **Standard Chartered** highlight how an algo can lead to MVA optimisation
- **Natixis** advance model calibration through machine learning

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Traditional roles in **financial institutions** are shifting by 20% in favour of **quants** to lead this **crucial march towards machine learning**

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In the Chair, Day One

**Gilles Artaud**  
Head of Model Risk Audit  
Groupe Credit Agricole

Expert Speaker Panel

**Abhinandan Deb**  
Head of Global X-asset Quantitative  
Investment Strategies  
Bank of America Merrill Lynch

**Christian Schwarz**  
Executive Director, Head of Quant Research  
Mizuho

**John Estrada**  
Co-Head of FX Spot Trading  
Credit Suisse

**Alexander Giese**  
Head of Quantitative and Digital  
Development for Trading  
Unicredit Bank AG

**Gilles Artaud**  
Head of Model Risk Audit  
Groupe Credit Agricole

**Richard Bateson**  
Director  
Bateson Asset Management

**Nadhem Meziou**  
Head of Fixed Income  
Quantitative Research  
Natixis

**Alexei Kondratyev**  
MD, Financial Markets  
Standard Chartered

**Jan Novotny**  
eFX Quant, Global Banking and Markets  
HSBC

In the Chair, Day Two

**Thibault Jaisson**  
Quantitative Analyst  
Pictet Asset Management

**Dr. Yasin Rosowsky**  
Head of AI Research  
Arabesque Asset Management

**Maxime Legrand**  
Data Science, Quant  
Nomura

**Zhongmin Luo**  
Quantitative Researcher  
Birkbeck, University of London

**Chris Kenyon**  
Director: Head of XVA  
Quant Modelling  
MUFG Securities EMEA plc

**Andrew Green**  
Managing Director and XVA:  
Lead Quant  
Scotiabank

**Thibault Jaisson**  
Quantitative Analyst  
Pictet Asset Management

**Blaz Zlicar**  
Quantitative Researcher  
Sequoia Capital Fund Management

**Emad Mostaque**  
Co-CIO  
Capricorn Fund Managers UK Ltd.

**Bartt Kellermann**  
CEO and Co-Founder  
Global Capital Acquisition

**Monday 12<sup>th</sup> November 2018**

08.30 Registration and Coffee

09.00 Opening Address from the Chair

**Gilles Artaud**  
Head of Model Risk Audit  
**Groupe Credit Agricole**

**DRIVE MACHINE LEARNING FORWARD WITH QUANTS:  
FINDING THE ANSWER IN LARGE DATA SETS**

09.15 **Case Study**

**Hunt and vet alternative data for machine learning used for long/short equity portfolios**

- Introduction to the Machine Learning ('ML') 'toolkit'
- Limitations of ML in financial market applications including 'over-fitting' and regime changes
- Algorithmic and Systematic approaches versus Machine Learning techniques
- The k-Nearest Neighbours approach for financial market prediction
- Applying k-NN to Long/Short equity portfolios
- Incorporating Alternative Data sources such as news and sentiment

**Richard Bateson**  
Director  
**Bateson Asset Management**



**PANEL DISCUSSION**

10.00 **Connect quants to the business to anticipate the needs of the market with machine learning**

- Discover use cases: Understand the problems of the business, and use machine learning to yield results
- Apply an analytical eye to understand the problem: Enter critical thinking to apply the right methods to the problem
- Cut through the hype of machine learning: Find the right place for your new tool that will add value to your business
- Employ the right experts with a diversified background in control theory, computer science, statistical science and maths to find the business problem
- Demonstrate cost saving through long term investment into resources: Adopt the right tools and people with the right skill set

**Abhinandan Deb**  
Head of Global X-asset  
Quantitative Investment  
Strategies  
**Bank of America**  
**Merrill Lynch**

**Alexander Giese**  
Head of Quantitative  
and Digital Development  
for Trading  
**Unicredit Bank AG**

**Christian Schwarz**  
Executive Director,  
Head of Quant Research  
**Mizuho**  
**Bart Kellermann**  
CEO and Co-Founder  
**Global Capital Acquisition**

10.45 **Refreshme**

11.15 **Discovering individuals based on behaviour: Use Bayesian inference, variational encoding and hyper-prior modelling**

- Problem: Given a dataset of the actions from a number of 'actors', determine with high confidence the number of actors and associate each with their actions
- Potential applications include breaking order book tick data into individual traders or desks
- How would we classically approach this problem? What can machine learning do to improve our analysis?
- Under reasonable behavioural assumptions we will use Bayesian inference to determine the most likely set of agents
- Using variational encoding we can create a meaningful representation space and derive transparent and consistent estimators
- With further information, such as known agents, we can narrow down the results and add control with hyper-prior modelling

**Maxime Legrand**  
Data Science, Quant  
**Nomura**

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**APPLY MACHINE LEARNING TECHNIQUES SUCH AS REINFORCEMENT LEARNING AND REGRESSION**

12.00 **Case Study**

**A brief overview of an AI engine used to power the investment decisions of an equity portfolio**

- Connecting raw data sources and machine learning (supervised and unsupervised) models in a multi-layered network architecture
- Handling massively large distributed computational graphs consisting of billion's of nodes and edges
- Challenges understanding spurious financial relationships and how to minimise overfitting
- Current and future evolutions of the AI engine

**Dr. Yasin Rosowsky**  
Head of AI Research  
**Arabesque Asset Management**

12.45 Lunch

13.45 **Machine Learning and Illiquid counterparties**

- The CDS "tree" and "average" credit curves
- Revisiting linear regression on CDS spreads
- Machine Learning Regression models
- Numerical results: accuracy and stability through time

**Andrew Green**  
Managing Director and XVA: Lead Quant  
**Scotiabank**



**PANEL DISCUSSION**

14.30 **Computational programming of machine models in isolation of the business**

- Develop, test, and apply data to the machine learning models before bringing it into the business
- Challenge of developing machine models that cannot be bought off the shelf
- Benefits of having quant specialists with a knowledge of algos to develop machine learning
- Design machine learning models with controls to prevent model risk

**Blaz Zlicar**  
Quantitative Researcher  
**Sequoia Capital Fund**  
**Management**

**Maxime Legrand**  
Data Science, Quant  
**Nomura**

**Dr. Yasin Rosowsky**  
Head of AI Research  
**Arabesque Asset**  
**Management**

15.15 **Refreshme**

15.45 **CDS rate construction methods by machine learning techniques**

- Why do we care about CDS Proxy Construction Methods?
- What are the problems with two popular CDS Proxy Construction approaches: e.g., arbitrage, hedging implications from curve mapping and cross-sectional regression
- What can Machine Learning/Classification do for us?
- How does ML-based CDS Proxy Construction approach compare with other two approaches in terms of performances?

**Zhongmin Luo**  
Quantitative Researcher  
**Birkbeck, University of London**

16.30 **Reinforcement learning for marginal KVA pricing**

- Capital creation and consumption
- Models for lifetime costs and benefits of capital in trading
- Contract design vs KVA model
- Solution framing and methods: F-K/FBSDE: Stochastic programming; reinforcement learning
- Numerical results

**Chris Kenyon**  
Director, Head of XVA Quant Modelling  
**MUFG Securities EMEA plc**

17.15 Closing Comments from the Chair

**Tuesday 13<sup>th</sup> November 2018**

08.30 Registration and Coffee

09.00 Opening Address from the Chair

**Thibault Jaisson**  
Quantitative Analyst  
**Pictet Asset Management**

**TIGHTEN GOVERNANCE OF MACHINE LEARNING MODELS:  
SET CONTROLS TO AVOID AMISS LEARNINGS**

09.15 **Case Study**

**Construct proper controls as you develop the machine programme to minimise learning concerns**

- Test the efficiency and accuracy of each algorithm on a case-by-case basis
- Validate machine models like any other model
- Define a transparent and clear governance standard before implementation of the model
- Learn to cut the cord at the beginning if appropriate controls cannot be placed, even if a valuable model
- Discuss outcomes, triggers and thresholds to be monitored with the business and model owners
- Get the desk, first line and second line to recognise cracks in the machine before the firm is exposed

**Gilles Artaud**  
Head of Model Risk Audit  
**Groupe Credit Agricole**

**EXHIBITION OF TODAY'S MOST REVOLUTIONARY  
(AND EVOLUTIONARY) ALGORITHMS IN QUANT FINANCE**

10.00 **Explore how an algo led to MVA optimisation**

- Propose machine learning techniques to optimise initial margin costs through trade selection
- Use algorithms to reduce margin costs over the life of the portfolio whilst maintaining market risk on exposures
- Handle the many parameters and the evolution of a non-linear problem: Why traditional optimisation methods do not simulate and reduce MVA?
- Implement a calculation that gets better with time evolving into a population of solutions: Watch SIMM initial margin flatten out and MVA reduced

**Alexei Kondratyev**  
MD, Financial Markets  
**Standard Chartered**

10.45 **Refreshme**

11.15 **Case Study**

**Digital transformation to optimise the trading floor:  
Automatic booking and smart algorithms**

- Unpack the reality of AI uses on the trading floor
- Explore machine learning models used to generate electronic trading signals
- Examine how AI is already helping traders perform better in some of the leading banks
- Supporting traders with automated systems freeing human talent for more complex tasks

**Jan Novotny**  
eFX Quant, Global Banking and Markets  
**HSBC**

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### PANEL DISCUSSION

12.00 **Q&A: Digital transformation to optimise the trading floor**

- What is the reality if digitalisation taking place on the trading floor?
- Explore machine learning models used to generate electronic trading signals
- Examine how AI is already helping traders perform better in some of the leading banks
- Supporting traders with automated systems freeing human talent for more complex tasks

**Jan Novotny**  
eFX Quant, Global Banking and Markets  
**HSBC**

**John Estrada**  
Co-Head of FX Spot Trading  
**Credit Suisse**

**Alexei Kondratyev**  
MD, Financial Markets  
**Standard Chartered**

12.45 Lunch

13.45 **Application of graphical models to the evaluation of analysts' recommendations**

- Review of the IBES recommendation database
- Econometric study of the role of analysts in the price formation process
- The evolution of analyst impact on prices
- Detection of good analysts using variational inference.

**Thibault Jaisson**  
Quantitative Analyst  
**Pictet Asset Management**

### USE MACHINE LEARNING IN THE CALIBRATION OF MODELS

14.30 **Case Study**

**Advanced model calibration through machine learning**

- Learning from historical data to better fit today's market conditions
- Reconciliation of historical pricing with market implied pricing
- Reviewed debate of linear regression versus neural networks
- Calibration through optimal hedge & P&L variance minimization
- High dimensional calibration and reduced factor set

**Nadhem Mezou**  
Head of Fixed Income Quantitative Research  
**Natixis**

15.15 **Refreshme**

15.45 **Investing in and against AI in public markets**

- Investing in AI from a public markets perspective
- How we structure our AI investment thesis both direct (eg iflytek) and those that use it
- Against is where we trade against increasingly sophisticated quant funds

**Emad Mostaque**  
Co-CIO  
**Capricorn Fund Managers UK Ltd.**

16.30 Closing Comments from the Chair

### Who Should Attend

#### Financial Firms, Heads of:

- Quantitative Analytics/Research
- Quantitative Investment Strategies
- Model Risk
- Algorithmic Trading

### Business Development Opportunities

Does your company have services, solutions or technologies that the conference delegates would benefit from knowing about? If so, you can find out more about the exhibiting, networking and branding opportunities available by contacting:

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# Interactive Conference Workshops

**Wednesday 14<sup>th</sup> November 2018**

08.30 Registration and Coffee

09.00 Workshop Leader's Introduction and Opening Remarks

## ZOOM IN ON MACHINE LEARNING MODELS AND TECHNIQUES

### 09.15 **Workshop A: Attention and LSTM models for time series**

- Time series analysis for price momentum and anomaly detection
- First reviewing the use of long short-term memory deep neural networks, their rise and falls
- Then looking at the current state of the art, multi-headed attention networks that are used in Google translation tasks, re-applying them for time series

### 10.00 **Workshop B: NLP for Calls and reports analysis using Seq-2-Seq models**

- Earnings calls and quarterly reports are high-volume low-information type tasks that are tedious to process
- We look at using context free grammar rules combined with a sequence-to-sequence model to trigger rule sets from generalised text
- The sequence-to-sequence models we examine are basic LSTMs, LSTMs with attention and multi-headed attention models

10.45 **Refreshme**

### 11.15 **Workshop C: Deploying an AI strategy pipeline properly**

- From pure research to productionised implementation, this step is arguably the hardest to getting a robust system in place.
- Here we examine the high-level steps that it takes to productionise an AI system or strategy.
- A key focus is also the hidden costs associated with AI systems deployment

11.45 Closing Comments from the Workshop Leader

12.00 End of the Workshop

*Led by:*

**Jakob Aungiers**  
CEO and Co-Founder  
**Altum Intelligence**

### About your Workshop Leader

**Jakob Aungiers** formerly headed up Quantitative Research Development for Investment Strategy at HSBC Global Asset Management. Since leaving that role Jakob has been the Managing Director at Altum Intelligence, a strategic consultancy and development firm focused at helping hedge funds and investment managers leverage the power of AI in their workflow. Jakob holds an MEng in Computer Science with a focus on AI and agent-based modelling from the University of Southampton. His former roles also include a quantitative proprietary trading firm in Sydney as well as being the first data scientist at the Schroders Data Insights team.

### Testimonials

**"Good conference on a different/developing/evolving topic. Please continue to organise this event annually"**

Quantitative Analytic Manager  
**Wells Fargo**

**"It was well-organised and professionally delivered"**

Quantitative analyst  
**Mizuho**

## Speaker Profiles

**Dr. Richard Bateson** is Director of Bateson Asset Management ('BAM'), an FCA regulated investment management company specialising in quantitative strategies employing the latest Machine Learning technologies across multiple global markets and asset classes. Prior to founding BAM, Richard worked at \$80bn Man Group plc one of the world largest hedge funds and was Head of Dimension, AHL's multi-strategy systematic fund, including the Evolution and Genesis funds. During this time, Richard was an associate of the Oxford-Man Institute, Oxford University and a Research Committee member and pioneered research projects into AI driven investment strategies. He was also Senior Quantitative Research Strategist for all discretionary macro, fixed income and emerging market funds at GLG Partners. Other key roles Richard has held include CEO of MGIM, a quantitative corporate event-driven and relative value hedge fund manager, and Managing Director at Royal Bank of Canada. Richard is a former CERN physicist and has a first class degree and a doctorate from Cambridge University. He is the author of "Financial Derivative Investments" (WSP 2011) and has also written many physics papers.

**Zhongmin Luo**, Senior Quant and Machine Learning expert with 10+ years in model development and validation in Credit, Market Risks, Regulatory and Economic Capital at investment and corporate banking areas with HSBC, Cheyne Capital and others from both buy-side and sell-side financial institutions.

**Gilles Artaud** has been working in investment banking for the last 25 years, where he held various positions within Quant, Front Office and Risk Department, working all along on many underlying types, pricing, validation, regulatory and economic capital, market risk and counterparty credit risk topics. After managing teams in the 1<sup>st</sup> line of defence (Front Office) setting in place the methodology and library for pricing, market risk, then CCR and CVA, he move to 2<sup>nd</sup> line of defence (Risk) to lead topics around CCR, XVA, initial margins on non-cleared transactions, and many regulatory topics. He's now in charge for the 3<sup>rd</sup> line of defence of Model Audit for Internal Audit at Group Credit Agricole SA.

**Alexei Kondratyev**, in his role as Managing Director and Head of Data Analytics at Standard Chartered Bank, Alexei is responsible for providing data analytics services to Financial Markets sales and trading. He joined Standard Chartered Bank in 2010 from Barclays Capital where he managed a model development team within Credit Risk Analytics. Prior to joining Barclays Capital in 2004, he was a senior quantitative analyst at Dresdner Bank in Frankfurt. Alexei holds MSc in Theoretical Nuclear Physics from the University of Kiev and PhD in Mathematical Physics from the Institute for Mathematics, National Academy of Sciences of Ukraine.

**Nadhem Meziou** is currently the Head of Fixed Income Quantitative Research at Natixis CIB, where he looks after modelling and pricing needs of Rates, FX and Credit business lines. Previous to that, Nadhem was running the Quantitative Research team of Dresdner Equity Derivatives in London. He started his career as a quantitative analyst at Banque Internationale de Placement in Paris. Nadhem graduated from the Ecole Polytechnique and the Ecole Nationale Supérieure des Techniques Avancées both in Paris. He holds a master's degree in Applied mathematics from the University of Paris-Dauphine and an MBA degree in finance from the University of Wisconsin-Madison.

**Dr Blaz Zlicar** works as a quantitative researcher at Sequoia Capital Fund Management, focusing on short-term investment strategies in currency markets. He completed a PhD in computational finance and machine learning from University College London, and collaborated with Aspect Capital as an academic research partner. He holds a joint MSc in finance degree from Universities of Amsterdam and Ljubljana, as well as MRes in financial computing from UCL, prior to which he worked as an FX spot and derivatives trader at NLB Group

**Yasin Rosowsky** is the Head of Artificial Intelligence Research at Arabesque Asset Management. He holds a PhD in Machine Learning from University College London.

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**Christian Schwarz**, MHI Head of Quantitative Research, joined MHI in April 2016 after 10 years at Credit Suisse where he was most recently Senior Credit Strategist. Prior to that, he held positions within Interest Rate and FX Controlling at HVB Group. At Mizuho he focuses both on Macro/Quant Credit Strategy as well as Machine Learning. His objective is to optimise the trading franchise, e.g. by implementing algorithmic trading. Christian has a diploma in Financial Mathematics from Technische Universität München and is invested in several AI start-ups. Consequently, there are 3 things about Machine Learning and AI that keep him up at night: The maths behind, the commercial opportunities and the impact on society.

**Abhinandan Deb** is a Managing Director and Head of Global Cross Asset Quant Investment Strategy at BofA Merrill Lynch, with ~14 years of experience in the industry. His research areas and expertise include volatility as an asset class, dividends, correlation, hedging or alpha generation using derivatives, cross asset risk factors+premium and quantitative strategy development. Previously, he worked at Barclays as a vice president in equity derivatives research. Deb has a BSc (Hons) in Physics from the University of Delhi, a BA in Computation from the University of Oxford and an MSc in Advanced Computing from Imperial College, London.

**Maxime Legrand**, in his role as Data Scientist at Nomura's AI Labs of which he is a founding member, Maxime is responsible for facilitating the creation of a smart analytics ecosystem used by many divisions of the bank, from the Sales and Trading desks to Front-Office Supervision. He joined Nomura in 2017 as an Exotic Rates Derivatives Quantitative Analyst before taking place in the firm's fast-paced digitization effort. Prior to joining Nomura, he was a research student at Kyoto University's Research Institute for Mathematical Sciences. Maxime is an alumni of École Normale Supérieure where he studied Mathematics and Computer Science, and holds the MSc "El Karoui" of Probability theory for Finance from Université Pierre et Marie Curie.

**Thibault Jaisson** is a Quantitative analyst at Pictet Asset Management in the Quantitative Equities team. He works on integrating various data sources (fundamental, technical, analysts, ownership, ...) into investment strategies. Thibault holds a PhD in Applied Mathematics from Ecole Polytechnique during which he worked on high frequency financial statistics.

**Andrew Green** is a Managing Director and lead XVA Quant at Scotiabank in London. He is the author of XVA: Credit, Funding and Capital Valuation Adjustments which is published by Wiley, co-editor of Landmarks in XVA which is published by Risk Books and co-author of a number of technical articles on XVA in recent years.

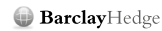
**Dr. Chris Kenyon** is head of XVA Quant Modelling at MUFG Securities EMEA plc. Previously he was Head of XVA Quantitative Research at Lloyds Banking Group, head quant for Counterparty Credit Risk at Credit Suisse, and (post-crisis) Head of Structured Credit Valuation at DEPFA Bank Plc. He is active in XVA research, introducing KVA and MVA, with Andrew Green, in Risk papers 2014-15 and their accounting treatment in 2016-17 as well as double-semi-replication. He publishes mostly in the Cutting Edge section of Risk magazine (most-cited author 2016, 5<sup>th</sup> most-published author 1988-present), co-wrote "Discounting, LIBOR, CVA and Funding" (Palgrave 2012) and co-edited "Landmarks in XVA" (Risk 2016). He has a Ph.D. from Cambridge, and is an author of the open-source software Quantlib.

**Alexander Giese** is the Head of Quantitative and Digital Development for Trading at UniCredit. Prior to his current role, Alexander was heading the quant team at UniCredit. He graduated in financial mathematics from Technical University Berlin and also holds a MSc in financial mathematics from Florida State University.

**John Estrada** is the co-head of FX Spot Trading at Credit Suisse. He has been at Credit Suisse since 2011 working previously at BNP, Sun Trading, and Lehman Brothers in a variety of roles. John earned a PhD in atomic physics at MIT working at CERN before his career in finance.



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