



MACHINE LEARNING & AI IN QUANTITATIVE FINANCE CONFERENCE

NOVEMBER 14-16, 2018

SPEAKERS

Peter Carr: Professor and Dept. Chair of FRE Tandon, **New York University**

Marcelo Labre: Executive Director, **Morgan Stanley**

Terry Benzschawel: Founder and CEO, **Lambda Financial, LLC.**

Richard V. Rothenberg: Executive Director, **Global AI Corporation, New York, NY**
and Research Affiliate, **Lawrence Berkeley National Laboratory, Berkeley, CA**

Miquel Noguer Alonso: Adjunct Assistant Professor, **Columbia University**

Igor Halperin: Research Professor of Financial Machine Learning,
NYU Tandon School of Engineering

Gordon Ritter: Senior Portfolio Manager, **GSA Capital**

ShengQuan Zhou: Quantitative Researcher, **Bloomberg LP**

Michael Beal: CEO, **Data Capital Management**

Sol Steinberg: Founding Principle, **OTC Partners**

Amit Srivastav: Executive Director, Quantitative Analytics Group (Model Risk), **Morgan Stanley**

Ksenia Shnyra: Senior Advisor, **Deloitte**

Cristian Homescu: Director, Portfolio Analytics, **Bank of America Merrill Lynch**

Bernhard Hientzsch: Director, Head of Model, Library,
and Tools Development for Corporate Model Risk, **Wells Fargo**

Joseph Simonian: Director of Quantitative Research,
Portfolio Research & Consulting Group, **Natixis Investment Managers**

Arik Ben Dor: Managing Director and Head of Quantitative Equity Research, **Barclays**

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LOCATION:

Downtown Conference Center
157 William Street
New York, NY 10038
USA

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WEDNESDAY, NOVEMBER 14:

PRE-CONFERENCE WORKSHOP DAY

Machine Learning, AI, & FinTech in the Capital Markets
by Sol Steinberg

THURSDAY, NOVEMBER 15:

MAIN CONFERENCE, DAY ONE

Machine Learning & AI In Quantitative Finance

FRIDAY, NOVEMBER 16:

MAIN CONFERENCE, DAY TWO

Machine Learning & AI In Quantitative Finance

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- Super Early Bird Discount: 25% until September 7, 2018
- **Early Bird Discount: 20% until October 5, 2018**
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IMPORTANT NOTES:

Conference presentation files on USB memory sticks will be provided on arrival. The conference files will also be made available for download via a password protected website before the event. Please print out each presentation if you wish to have hard copies before the conference and bring them with you.

Also, Wi-Fi access will be available at the venue to view presentations on laptops and mobile devices.

PRE-CONFERENCE WORKSHOP: WEDNESDAY, NOVEMBER 14

DAY SCHEDULE: 9:00 – 5:00

BREAK: 10:30 – 11:00 / LUNCH: 12:30 – 1:30 / BREAK: 3:00 – 3:30

MACHINE LEARNING, AI, & FINTECH IN THE CAPITAL MARKETS BY SOL STEINBERG

Module 1

Modern Market structure looking beyond 2020: The rise of alternative technology, marketplaces, and products such as exchange traded derivatives, and crypto currencies.

- Exchanges, Clearing houses, and Collateral
- Exchange traded & OTC derivative landscape
- Big Data, AI, and machine learning in trading, finance, and operations

Module 2

- HFT, Connectivity, & AI in Trading- Have we hit a wall? How competitors have reached critical mass
- Combating HFT?
IEX launches HFT proof exchange, reviewing the offering and why it works and why it doesn't matter anymore.
- Case Study: No more traders?
How market leader JPM is automating almost their entire worldwide trading business – eventually
- Case Study: Hedge Fund Renaissance & Artificial Intelligence greatest success story in the Markets -
How Renaissance's Medallion Fund Became Finance's Blackest Box

Module 3

- Big Data in the financial eco-system: Financial modelling, data governance, integration, NoSQL, batch and real-time computing and storage
- Infrastructure and technology
- New data sources
- Modern data analysis: Structured / Unstructured data and new models

Module 4

Machine Learning Models: what is your best fit use in your business?

- Asymmetric Trading Strategies
- Non Linear Multi-Factor Models
- High Frequency Trading
- Advanced Machine Learning

Module 5

Machine learning in finance - Opportunities and challenges

- Algo-Grading 101, Interpretation
- Data mining biases: overfitting, survivorship and data-snooping
- Robust trading strategies: The future of machine learning in finance

PRE-CONFERENCE WORKSHOP: WEDNESDAY, NOVEMBER 14

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COURSE TUTOR:



Sol Steinberg is a OTC Markets Subject Matter Expert and specializes in Risk Management, OTC derivatives, Market structure, Collateral, Trade Lifecycle, Valuation, Financial Technology Systems, Strategic development, and Monetization.

Sol is the founding principle of his firm, OTC partners. OTC partners is a boutique value add firm that specializes in research, content, development. Before starting OTC Partners Sol was a senior executive at the world's leading clearing house LCH.Clearnet. Sol also spent nine years on the buy side and Citi, performing product development, risk management, and valuation for the OTC markets.

Sol has a wide-ranging network of asset managers, analytic providers, execution venues, regulatory, and government contacts. He used his eco system to successfully commercialize analytics, data, and other non commercialized intellectual property and had significant monetization success. He brought to market several initiatives, including institutional and commercial risk engines such as SMART tool, Risk Explorer, Global Market Risk System for Citi: the largest VaR engine in the world from 2004 to 2006, as well as developing CCP2 – a derivative education & certification program for leading consultancies. Sol also contributed to OTC industry's clearing and default management policies for the cleared OTC swap markets as well as contributed to industry standard risk analytics in times of low market rates.

Awards/Honors

Waters Magazine's award "Best risk analytics initiative 2012" & "Best risk analytics initiative (Sell Side) 2013"

FTF's award for "Most cutting edge risk contribution 2013" for developing the SMART risk analytics tool.

Global nominee in 2012 for "Best Practices in Global Financial Risk Management" from PRMIA, Professional Risk Managers International Association.

MAIN CONFERENCE DAY ONE: THURSDAY, NOVEMBER 15

8:30 REGISTRATION AND MORNING WELCOME COFFEE

9:00 – 10:00 KEYNOTE SPEECH

by **Marcelo Labre**: Executive Director, Morgan Stanley

MACHINE LEARNING AND AI IN FINANCE: APPLICATIONS, CASES AND RESEARCH

- Machine learning and deep learning applications in quantitative finance and risk management
- Practitioners' case studies
- Research and development in deep learning

10:00 – 10:45 DEEP LEARNING AND COMPUTATIONAL GRAPH TECHNIQUES FOR DERIVATIVES PRICING AND ANALYTICS

We review some new approaches from research and literature and Wells Fargo's work to apply deep learning techniques and computational graph techniques (including algorithmic differentiation) to the solution of high-dimensional forward-backward SDE and PDE in derivative pricing, present some fundamental ideas, applications to derivatives pricing and analytics with some results, and some current and planned extensions

Presenter: Bernhard Hientzsch: Director, Head of Model, Library, and Tools Development for Corporate Model Risk, Wells Fargo

10:45 – 11:15 MORNING BREAK AND NETWORKING OPPORTUNITIES

11:15 - 12:00 DEEP LEARNING IN FINANCE – LSTN'S

- Modern Data Analysis
- Times Series Models Univariate
- Linear Factor Models
- Multivariate Time Series
- Modern Financial Engineering
- Long Short Term Memory Networks
 - Results
 - Conclusions

Presenter: Miquel Noguera Alonso: Adjunct Assistant Professor, Columbia University

MAIN CONFERENCE DAY ONE: THURSDAY, NOVEMBER 15

12:00 - 12:45 MODEL-FREE OPTION PRICING AND HEDGING BY REINFORCEMENT LEARNING

In discrete time, option hedging and pricing amount to sequential risk minimization. In particular, a discrete-time version of the Black-Scholes-Merton (BSM) option pricing model can be formulated as a problem of dynamic Markowitz optimization of an option replicating (hedge) portfolio made of an underlying stock and cash. This talk shows how this problem can be approached using Reinforcement Learning (RL). Once the problem is posed as an RL problem, option pricing and hedging can be done without any model for the underlying stock dynamics, using instead model-free, data-driven RL methods such as Q-learning and Fitted Q Iteration. As a result, both option price and hedge are obtained by a well-defined and converging maximization problem that uses only market prices and option trading data (inter-temporal re-hedges and hedge losses in the replicating portfolio) to find the optimal option hedge and price. The model can learn when re-hedges in data are suboptimal/noisy, or even purely random. This means, in particular, that our RL model can learn the BSM model itself, if the world is according to BSM.

Computationally, the RL-based option pricing model is very simple, as it uses only basic linear algebra and linear regressions to compute the option price and hedge. The only tunable parameters in this approach are parameters defining the optimal hedge and price themselves. This approach does not need any model calibration (as there is no model anymore), and it automatically solves the volatility smile problem of the BSM model. We also discuss some extensions of this approach, including in particular an Inverse Reinforcement Learning setting, where inter-temporal losses from re-hedges are unobservable.

Presenter: Igor Halperin: Research Professor of Financial Machine Learning, **NYU Tandon School of Engineering**

12:45 - 1:45 LUNCH

1:45 - 2:30 MACHINE LEARNING MODELS FOR CORPORATE BOND DEFAULT, RECOVERY IN DEFAULT, AND RELATIVE VALUE

Presenter: Terry Benzschawel: Founder and CEO, **Lambda Financial, LLC.**

2:30 - 3:15 USING NATURAL LANGUAGE PROCESSING (NLP) TO ANALYZE EARNING CALL TRANSCRIPT

Presenter: Arik Ben Dor: Managing Director and Head of Quantitative Equity Research, **Barclays**

3:15 - 3:45 AFTERNOON BREAK AND NETWORKING OPPORTUNITIES

3:45 - 4:30 APPLYING MACHINE LEARNING TO EVALUATE SYSTEMIC RISK AND CONTRIBUTION OF INDIVIDUAL SIFIS

Presenter: Ksenia Shnyra: Senior Advisor, **Deloitte**

MAIN CONFERENCE DAY ONE: THURSDAY, NOVEMBER 15

4:30 - 5:30 MACHINE LEARNING & AI IN QUANTITATIVE FINANCE PANEL

PANELLISTS:

- **Miquel Noguer Alonso:** Adjunct Assistant Professor, **Columbia University**
- **Igor Halperin:** Research Professor of Financial Machine Learning, **NYU Tandon School of Engineering**
- **Marcelo Labre:** Executive Director, **Morgan Stanley**
- **Terry Benzschawel:** Founder and CEO, **Lambda Financial, LLC.**
- **Bernhard Hientzsch:** Director, Head of Model, Library, and Tools Development for Corporate Model Risk, **Wells Fargo**
- **Arik Ben Dor:** Managing Director and Head of Quantitative Equity Research, **Barclays**
- **Joseph Simonian:** Director of Quantitative Research, Portfolio Research & Consulting Group, **Natixis Investment Managers**

TOPICS:

- What is the current state of utilisation of machine learning in finance?
 - What are the distinct features of machine learning problems in finance compared to other industries?
 - What are the best practices to overcome these difficulties?
 - What's the evolution of a team using machine learning in terms of day to day operations?
 - What is a typical front office 'Quant' skillset going to look like in three to five years time?
 - How do we deal with model risk in machine learning case?
 - How is machine learning expected to be regulated?
 - What applications can you list among its successes?
 - How much value is it adding over and above the "classical" techniques such as linear regression, convex optimisation, etc.?
 - Do you see high-performance computing (HPC) as a major enabler of machine learning?
 - What advances in HPC have caused the most progress?
 - What do you see as the most important machine learning techniques for the future?
 - What are the main pitfalls of using Machine Learning currently in trading strategies?
 - What new insights can Machine Learning offer into the analysis of financial time series?
 - Discuss the potential of Deep Learning in algorithmic trading?
 - Do you think machine learning and HPC will transform finance 5-10 years from now?
If so, how do you envisage this transformation?
 - Can you anticipate any pitfalls that we should watch out for
 - Discuss quantum computing in quant finance:
 - Breakthroughs
 - Applications
 - Future uses
-

MAIN CONFERENCE DAY TWO: FRIDAY, NOVEMBER 16

8:30 MORNING WELCOME COFFEE

9:00 – 9:45 KEYNOTE SPEECH

by **Richard V. Rothenberg**: Executive Director, **Global AI Corporation, New York, NY** and Research Affiliate, **Lawrence Berkeley National Laboratory, Berkeley, CA**

“AI-DRIVEN ESG / SDG STRATEGIES FOR INVESTMENT AND RISK MANAGEMENT”

The key discussion points will include:

- Using AI to quantify unstructured data on ESG/SDG factors and associated non-financial risks
- The use of Natural Language Processing and ESG/SDG taxonomies to quantify textual data in multiple languages
- Ranking and benchmarking stocks based on ESG/SDG factors to implement Thematic, Long-Short and ESG/SDG-Tilted investment strategies
- The relevance of SDG and non-financial risk factors for Alpha Research, Fiduciary Duty, Materiality Assessments, Country Risk and Risk Management

9:45 – 10:30 HOW DATA SCIENCE IS IMPACTING MULTI-ASSET INVESTING

- How Data Science is Impacting Multi-Asset Risk Measurement
- How Data Science is Impacting Multi-Asset Trading Strategies
- How Data Science is Impacting Multi-Asset Model Portfolio Programs

Presenter: Joseph Simonian: Director of Quantitative Research, Portfolio Research & Consulting Group, **Natixis Investment Managers**

10:30 – 11:00 MORNING BREAK AND NETWORKING OPPORTUNITIES

11:00 - 11:45 TRADING STRATEGIES USING A MIXTURE OF SUPERVISED AND REINFORCEMENT LEARNING

Abstract:

Machine learning is rapidly transforming the field of quantitative finance. In this talk, we discuss how two distinct subfields of machine learning, namely reinforcement learning and supervised learning, can be combined into a single model that harvests the power of reinforcement learning in handling multi-period problems with delayed rewards and costs, and simultaneously harvests the power of supervised-learning to learn the structure of a non-linear model with interactions. Our technique fuses the two within the framework of generalized policy iteration by generating training sets which are then used by the supervised learner to learn a better representation of the action-value function, which is then used to generate a better training set for the next iteration. We show that our method outperforms tabular Q-learning in a simulation involving trading a very illiquid asset, and can handle discrete as well as continuous predictors.

Presenter: Gordon Ritter: Senior Portfolio Manager, **GSA Capital**

11:45 - 12:30 OPPORTUNITIES AND CHALLENGES OF MACHINE LEARNING IN QUANTITATIVE INVESTMENT AND WEALTH MANAGEMENT

I describe specific opportunities and challenges of leveraging machine learning within context of quantitative investment and wealth management. Such applications include forecasting of financial time series, classification of alternative data, identification of market regimes, clustering-based portfolio diversification, assessment of risk factors.

Presenter: Cristian Homescu: Director, Portfolio Analytics, **Bank of America Merrill Lynch**

(Presenter and topic to be confirmed)

MAIN CONFERENCE DAY TWO: FRIDAY, NOVEMBER 16

12:30 - 1:30 LUNCH

1:30 - 2:00 USING MACHINE LEARNING TO FORECAST REALIZED VOLATILITY

Presenter: Peter Carr: Professor and Dept. Chair of FRE Tandon, **New York University**

2:00 - 2:45 "RISKS AND REGULATORY FRAMEWORK AROUND USING AI MODELS"

Presenter: Amit Srivastav: Executive Director, Quantitative Analytics Group (Model Risk), **Morgan Stanley**

2:45 - 3:00 AFTERNOON BREAK

3:00 - 3:45 DELIVERING ALPHA: ARTIFICIAL INTELLIGENCE IN CAPITAL MARKETS INVESTING

- Why artificial intelligence for capital markets investing?
 - Challenge 1: Data acquisition, integration, processing power
 - Challenge 2: Artificial intelligence and its subcomponents
- Where should financial services professionals focus their effort?

Presenter: Michael Beal: CEO, **Data Capital Management**

3:45 - 4:30 FACTOR INVESTING USING VOLATILITY DATA & MACHINE LEARNING

- Equity factors
- Volatility surface
- Style investing

Presenter: ShengQuan Zhou: Quantitative Researcher, **Bloomberg LP**

END OF CONFERENCE



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