

DOWNTOWN CONFERENCE CENTER, NEW YORK



MACHINE LEARNING & AI IN QUANTITATIVE FINANCE CONFERENCE

JUNE 27-29, 2018

SPEAKERS

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

Peter Decrem: Director, **Citigroup**

Miquel Noguera 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**

Jared Broad: CEO, **QuantConnect**

Leigh Drogen: Founder and CEO, **Estimize**

Ksenia Shnyra: Senior Advisor, **Deloitte**

Luis Cota: Data Scientist, **Thalesians**

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CONFERENCE OVERVIEW

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

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WEDNESDAY, JUNE 27:

PRE-CONFERENCE WORKSHOP DAY

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

THURSDAY, JUNE 28:

MAIN CONFERENCE, DAY ONE

Machine Learning & AI In Quantitative Finance

FRIDAY, JUNE 29:

MAIN CONFERENCE, DAY TWO

Machine Learning & AI In Quantitative Finance

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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, JUNE 27

DAY SCHEDULE: 09:00 – 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, JUNE 27

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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, JUNE 28

08:30 REGISTRATION AND MORNING WELCOME COFFEE

CHAIR:
To be confirmed

09:00 – 09:45 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

09:45 – 10:30 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 Noguer Alonso: Adjunct Assistant Professor, Columbia University

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

11:00 - 11:45 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

MAIN CONFERENCE DAY ONE: THURSDAY, JUNE 28

11:45 - 12:30 MACHINE LEARNING - RECENT TRENDS AND APPLICABILITY TO RISK AND RELATED AREAS

- Supervised, unsupervised, Reinforcement
- Deep learning, feature Learning, incremental learning
- Predictive power and robustness

Presenter: To be confirmed

12:30 - 1:30 LUNCH

1:30 - 2:15 APPLICATION OF NATURAL LANGUAGE PROCESSING AND RELATED MACHINE LEARNING TECHNIQUES AT LARGE COMMERCIAL BANKS

Increased digitalization of communication and recent advances in natural language processing allow us to satisfy new regulatory requirements and to advance automation in the financial industry. But our industry has its own quirks and challenges – a unique, highly formalized parlance coupled with a lack of large sets of labeled data. We use neural nets and a variety of tools from statistical machine learning to help us solve these evolving problems. Even more exciting, these methods can now be applied to pricing and risk management methods; fields that have largely stagnated over the last few decades, and that have not adapted to the reduced holding periods of risk by liquidity providers. Comprehensive data policies and the ability to integrate probabilistic models on this data are preconditions for successful deployment of machine learning in capital markets.

Presenter: Peter Decrem: Director, Citigroup

2:15 - 3:00 A WORKED EXAMPLE OF USING NEURAL NETWORKS FOR TIME SERIES PREDICTION

Many publicly available examples of time series prediction with neural networks use fake or random data. Other examples, particularly in finance, present poorly performing models. It is very hard to learn good practices when only presented with toy examples. Instead, this talk aims to teach the full process of using a neural network for time series prediction by walking through a real problem from start to finish.

We will begin by explaining the concrete problem we would like to solve and how to frame our problem in a way that we can model. Once we understand our problem, we will discuss how to collect the needed data. We will discuss the process of reducing our input data into important features for the model to consume. We will then learn how to use Keras to implement our neural network. Once we have a working model, we will cover some tricks to improve its performance.

At every step, we will cover problems faced while working on this model. We will show how to use data visualization to aid in model development and catch problems early. We will also cover tips for using numpy to work with time series data efficiently.

By the end of the talk, audience members will:

- Know how to frame a problem in a way that a neural network can model
- Know how to think about feature selection
- Be familiar with the Keras API for time series predictions
- Understand that the hardest problems come before you even get to Keras

Presenter: To be confirmed

3:00 - 3:30 AFTERNOON BREAK AND NETWORKING OPPORTUNITIES

MAIN CONFERENCE DAY ONE: THURSDAY, JUNE 28

3:30 - 4:15 APPLYING MACHINE LEARNING TO EVALUATE SYSTEMIC RISK AND CONTRIBUTION OF INDIVIDUAL SIFIS

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

4:15 - 5:15 MACHINE LEARNING & AI IN QUANTITATIVE FINANCE PANEL

MODERATOR:

- **Luis Cota:** Data Scientist, **Thalesians**

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**

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
-

MAIN CONFERENCE DAY TWO: FRIDAY, JUNE 29

08:30 MORNING WELCOME COFFEE

CHAIR:
To be confirmed

09:00 – 10:00 KEYNOTE SPEECH

To be confirmed

TOPICS IN SELF-LEARNING AGENTS AND TRADITIONAL QUANTITATIVE MODELS IN FINANCE

- What can we draw from our experience of training and running an industry first self-learning agent for electronic order execution?
 - Will traditional hand-crafted heuristic- and quant-based execution algorithms go extinct within 10 years?
 - Does the success of ML and AI agents in finance indicate the eventual demise of traditional quantitative models?
 - Practical aspects of using feeder models and heuristics in AI agents for trading applications.
 - Do we have practical solutions for the equivalence puzzle in Neural Nets
-

10:00 – 10:45 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

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

11:15 - 12:00 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

12:00 - 12:45 TOPIC TO BE CONFIRMED

Presenter: Leigh Drogen: Founder and CEO, Estimote

12:45 - 1:45 LUNCH

MAIN CONFERENCE DAY TWO: FRIDAY, JUNE 29

1:45 - 2:30 TOPIC TO BE CONFIRMED

Presenter: Jared Broad: CEO, QuantConnect

2:30 - 3:15 QUANTITATIVE FACTOR INVESTING STRATEGIES

Presenter: ShengQuan Zhou: Quantitative Researcher, Bloomberg LP

3:15 - 3:30 AFTERNOON BREAK

3:30 - 4:15 FROM ARTIFICIAL INTELLIGENCE TO MACHINE LEARNING, FROM LOGIC TO PROBABILITY

Applications of Artificial Intelligence (AI) and Machine Learning (ML) are rapidly gaining steam in quantitative finance. These terms are often used interchangeably. However, the pioneering work on AI by participants of the Dartmouth Summer Research Project --- Marvin Minsky, Nathaniel Rochester, and Claude Shannon --- was more symbolic than numerical, and often used the language of logic. Recent advances in ML --- especially Deep Learning --- are more numerical than symbolic, and often use the language of probability. In this talk we shall show how to connect these two worldviews.

Presenter: To be Confirmed

END OF CONFERENCE



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