# THE 3RD MACHINE LEARNING & AI IN QUANTITATIVE FINANCE CONFERENCE
## DECEMBER 5-6, 2019

## SPEAKERS

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

**Luca Capriotti:** Global Head Quantitative Strategies Credit and Financing, **Credit Suisse**

**Terry Benzschawel:** Founder and Principal, **Benzschawel Scientific, LLC**

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

**Knarig Arabshian:** Senior Associate Knowledge Engineer in Technology Innovation, **Federal Reserve Bank of New York**

**Ioana Boier:** Head of Quantitative Portfolio Solutions, **Alphadyne Asset Management**

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

**Jos Gheerardyn:** Co-Founder and CEO, **Yields.io**

**James Baker:** Product Manager, **Suite LLC**

**Alexander Fleiss:** CEO, **Rebellion Research – The Ai Machine Learning Robo Advisor**

**Ivailo Dimov:** Quant and Data Science Research, **Bloomberg LP** & Adjunct Professor, **NYU Courant Institute**

**Miquel Noguer Alonso:** Co–Founder and Chief Science Officer, **Artificial Intelligence Finance Institute (AIFI)**

**Vladyslav Ivanov:** Quantitative Researcher

**Robert Almgren:** Co-Founder and Head of Research, **Quantitative Brokers**

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# CONFERENCE OVERVIEW

**LOCATION:**
Downtown Conference Center
157 William Street
New York, NY 10038
USA
Tel: +1 212 618 6990   |   Website: www.downtownmeetings.com

**THURSDAY, DECEMBER 5:**
**CONFERENCE, DAY ONE**
The 3rd Machine Learning & AI in Quantitative Finance Conference

**FRIDAY, DECEMBER 6:**
**CONFERENCE, DAY TWO**
The 3rd Machine Learning & AI in Quantitative Finance Conference

**CONFERENCE BOOKINGS: DISCOUNT STRUCTURE:**
- ~~Super Early Bird Discount: 25% until October 25, 2019~~
- ~~Early Bird Discount: 10% until November 15, 2019~~
- SPECIAL OFFER: When 2 colleagues attend the 3rd goes free!
- 70% Academic Discount (FULL-TIME Students Only)

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The presentation files will 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.

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# CONFERENCE DAY ONE: THURSDAY, DECEMBER 5

**8:00 – 9:00   REGISTRATION AND MORNING WELCOME COFFEE**

**9:00 – 10:00   KEYNOTE SPEECH**

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

**PORTFOLIO MODEL RISK FOR SYSTEMATIC / QUANT TRADING**

**10:00 – 10:45   DYNAMIC REPLICATION AND HEDGING: A REINFORCEMENT LEARNING APPROACH**

**Abstract:**
We address the problem of how to optimally hedge an options book in a practical setting, where trading decisions are discrete and trading costs can be nonlinear and difficult to model. Based on reinforcement learning, a well-established machine learning technique, our model is shown to be flexible, accurate and very promising for real-world applications.

This is joint work with Gordon Ritter.

**Presenter: Petter Kolm:** Director of the Mathematics in Finance Master's Program and Clinical Professor, **Courant Institute of Mathematical Sciences, New York University**

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

**11:15 – 12:45   ADVANCED NATURAL LANGUAGE PROCESSING (NLP) TECHNIQUES**

**Presenter: Terry Benzschawel:** Founder and Principal, **Benzschawel Scientific, LLC**

**12:45 – 2:00   LUNCH**

**2:00 – 2:45   QUANTIFYING MODEL UNCERTAINTY WITH ARTIFICIAL INTELLIGENCE**

- Defining model risk and model uncertainty
- Overview of relevant regulatory frameworks
- Measuring uncertainty with ML
- Model risk of AI

**Presenter: Jos Gheerardyn:** Co-Founder and CEO, **Yields.io**

**2:45 – 3:30   LATEST DEVELOPMENTS IN DEEP LEARNING IN FINANCE**

**Presenter: Miquel Noguer Alonso:** Co–Founder and Chief Science Officer, **Artificial Intelligence Finance Institute (AIFI)**

**3:30 – 4:00   AFTERNOON BREAK AND NETWORKING OPPORTUNITIES**

## 4:00 – 4:45   MACHINE LEARNING AND SIGNALS IN HIGH FREQUENCY TRADE EXECUTION

We describe a framework for processing market data to produce short-term price forecasts for optimizing trade execution in futures and interest rate markets. The framework first computes a substantial number of simple features based on order book data. It then determines a number of signals from the features, using a variety of techniques including machine learning. Finally, a consensus layer uses a new clustering algorithm to decide which combination of signals to believe in which market conditions. The framework is in production use and is delivering substantial value.

**Presenter: Robert Almgren:** Co-Founder and Head of Research, **Quantitative Brokers**

## 4:45 – 5:45   MACHINE LEARNING & AI IN QUANTITATIVE FINANCE PANEL

### PANELLISTS:

- **Terry Benzschawel:** Founder and Principal, **Benzschawel Scientific, LLC.**
- **Gordon Ritter:** Senior Portfolio Manager, **GSA Capital**
- **Knarig Arabshian:** Senior Associate Knowledge Engineer in Technology Innovation, **Federal Reserve Bank of New York**
- **Jos Gheerardyn:** Co-Founder and CEO, **Yields.io**
- **Miquel Noguer Alonso:** Co−Founder and Chief Science Officer, **Artificial Intelligence Finance Institute (AIFI)**

### 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

# CONFERENCE DAY TWO: FRIDAY, DECEMBER 6

**8:30 – 9:00   MORNING WELCOME COFFEE**

**9:00 – 9:45   KEYNOTE SPEECH**

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

**APPLYING MACHINE LEARNING TO INVESTMENT AND WEALTH MANAGEMENT: OPPORTUNITIES AND CHALLENGES**

**9:45 – 10:30   ACTIONABLE ARTIFICIAL INTELLIGENCE**

**Abstract:**
Artificial intelligence (AI) algorithms typically operate in high-dimensional spaces, are trained on vast and often heterogeneous data sets, and involve non-linear models that attempt to capture previously unknown patterns. In areas where the results of such algorithms are filtered through human decisions, insight into the pattern generation processes is key to fully capitalizing on the power of AI. Actionable AI (AAI) aims to build trust between collaborating human and software agents. In Finance, AAI is paramount not only to addressing regulatory requirements for transparency, but also to the widespread adoption of AI methods in areas largely driven by human decisions. In this presentation, we delve into the challenges and state-of-the-art solutions for AAI in the context of quantitative modeling for investment management decisions.

**Presenter: Ioana Boier:** Head of Quantitative Portfolio Solutions, **Alphadyne Asset Management**

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

**11:00 – 11:45   USING BAYESIAN MACHINE LEARNING AS AN INVESTMENT STRATEGY**

**Presenter: Alexander Fleiss:** CEO, **Rebellion Research – The Ai Machine Learning Robo Advisor**

**11:45 – 12:30   BIG DATA AND MACHINE LEARNING FOR GLOBAL MACRO & FX STRATEGIES**

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

**12:30 – 1:30   LUNCH**

**1:30 – 2:15   QUANTUM MECHANICS-BASED METHODS FOR OPTION PRICING**

**Presenter: Luca Capriotti:** Global Head Quantitative Strategies Credit and Financing, **Credit Suisse**

**2:15 – 3:00   INVESTIGATING WHAT VOLATILITY OF NEWS SENTIMENT - AND OTHER NLP-DRIVEN MEASURES - CAN TELL US ABOUT MARKET VOLATILITY**

**Abstract:**
An investigation of how aggregate measures of news article sentiment can prefigure changes in market volatility. This will use a variety of natural language processing techniques – including Sentiment Analysis and doc2vec – to determine aggregate measures of sentiment for an individual stock. The measures are used as an input to a neural network classifier to predict whether the article will lead to market changes.

**Presenter: James Baker:** Product Manager, **Suite LLC**

# CONFERENCE DAY TWO: FRIDAY, DECEMBER 6

**3:00 – 3:05   AFTERNOON COFFEE**

## 3:05 – 3:50   APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN ALGORITHMIC TRADING

An introduction of computing has revolutionized the financial trading industry, making it possible to track market changes and execute an enormous number of orders at a speed of light. Today, AI-driven trading systems are launching the next wave of innovation that will result in the most significant transformation in finance history. In this talk, Vladyslav Ivanov is going to introduce the audience to the development and production level algorithmic trading pipelines and their primary components. The talk will cover how the three primary subsets of Artificial Intelligence: Machine Learning, NLP, and Vision are being used in an effort to gain better market insights and ultimately a trading advantage. Topics as fetching and storing the time-series financial data, application of alternative data, and aspects of the financial markets will also be discussed. Finally, we will conclude by talking about using AI in conjunction with traditional models for describing market volatility, such as GARCH.

**Presenter: Vladyslav Ivanov:** Quantitative Researcher

## 3:50 – 4:30   MINING NEWS TOPICS WITH pICA

**Abstract:**
A suitably ICA-corrected Latent Semantic Analysis (pICA) is shown to produce linear factors on text data which are maximally parsimonious according to a specific criterion. The model produces stable and mostly interpretable unsupervised factors for Bloomberg Story-Level data for both News and Twitter feeds. A wide variety of applications of the model are discussed, ranging from factor-specific sentiment aggregation to theme discovery and tracking. Connections to neural net methods are clarified.
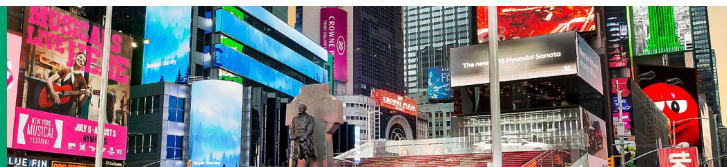
**Presenter: Ivailo Dimov:** Quant and Data Science Research, **Bloomberg LP** & Adjunct Professor, **NYU Courant Institute**

**END OF CONFERENCE**

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**The Artificial Intelligence Finance Institute's (AIFI)** mission is to be the world's leading educator in the application of artificial intelligence to investment management, capital markets and risk. We offer one of the industry's most comprehensive and in-depth educational programs, geared towards investment professionals seeking to understand and implement cutting edge AI techniques.

Taught by a diverse staff of world leading academics and practitioners, the AIFI courses teach both the theory and practical implementation of artificial intelligence and machine learning tools in investment management. As part of the program, students will learn the mathematical and statistical theories behind modern quantitative artificial intelligence modeling. Our goal is to train investment professionals in how to use the new wave of computer driven tools and techniques that are rapidly transforming investment management, risk management and capital markets.

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Yields.io is the first FinTech platform that uses AI for real-time model risk management on an enterprise-wide scale.

Our clients use our solution to speed up model validation tasks, to generate regulatory compliant documentation and to industrialize model monitoring. The platform works with all models that are used within the financial sector such as credit risk models, valuation algorithms, market risk, AML, AI and behavioural models.

Yields.io was founded by Jos Gheerardyn and Sébastien Viguié. The company is expanding quickly and has offices in Brussels and London. Yields.io has an international portfolio of clients with both investment banks as well as regional financial institutions.

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Both through regulation and industry practice, there is an increasing number of risk calculations that need to be done on a regular basis. These calculations require the valuation of portfolios on up to hundredths of thousands of scenarios making them computationally very expensive in time and cost.

MoCaX technology, based on Chebyshev Spectral Decomposition methods, is a methodology and software application which massively reduces the computational burden in a risk calculation. This is achieved by pricing the portfolio on very small number of pre-defined collection of points yielding an object capable of approximating a pricing function and its greeks to a very high degree of accuracy. The object can then be evaluated on thousands of risk scenarios in an ultra-efficient and numerically stable manner.

Several benefits are obtained with this technology. Applications include Market Risk VaR, IMA-FRTB, Dynamic Initial Margin for MVA and IMM, Exposure profiles for CVA and IMM, what-if analysis tools, etc.

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The Numerical Algorithms Group (NAG) are experts in numerical algorithms, software engineering and high-performance computing. They have served the finance industry with numerical software and consulting services for over four decades because of their outstanding product quality and technical support. Specifically, relevant to the finance industry, NAG pioneer in the provision of the NAG Library – numerical and statistical components ideal for building Quant Libraries, Risk Applications and the like. NAG also provides best-in-class C++ operator-overloading AD tools for CPU and GPU called dco (derivative computation through overloading) and dco/map (dco meta adjoint programming). The NAG Library and AD tools are used by many of the largest Investment Banks where they are embedded in Quant Libraries and XVA applications. As a not-for-profit company, NAG reinvests surpluses into the research and development of its products, services, staff and its collaborations.

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**DOWNTOWN CONFERENCE CENTER, NEW YORK**
**DECEMBER 5-6, 2019**

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