



University of Bergamo/Georgia Institute of Technology
2018 WORKSHOP on

***Stochastic Optimisation and Data Analytics
for Computational Management***

University of Bergamo, DMEQM
February 8-9, 2018

The field of stochastic optimization has grown over the years attracting both theoretical and applied contributions spreading from finance to energy, supply chain management, revenue management and operations management, in this way becoming a core and central stream in Operations research and Management science. The solution of complex management problems under uncertainty as well as the definition of optimal strategies through time, furthermore, appears both theoretically and practically increasingly dependent on large information flows and the adoption of computationally intensive statistical approaches. From the stochastic optimisation perspective the area of big data analytics leads naturally in several application domains to an extension of current mathematical formulations to integrate evolving probability spaces and information sets, investigate problems' decision consistency and coherence with longly established optimisation paradigms. From a data analyst viewpoint, on the other hand, stochastic optimisation offers a variety of numerical and optimization algorithms until now only seldomly adopted in the Big data domain but expected in the future to penetrate significantly this scientific field with the adoption of heuristic approaches and decomposition methods. It has been highlighted that data analytics and the growing importance of machine learning approaches in the industry is problem-dependent and the techniques employed are to a large extent problem-specific.

On these grounds, the workshop intends to bring together scholars from the stochastic optimization and data science communities to analyse the potentials of optimisation theory and data analytics within management problems emerging in a sufficiently broad domain, including finance and economics, energy management, supply chains and logistics, revenue management and operations management.

The 3rd UniBG-GeorgiaTech workshop aims at continuing the cooperation between the University of Bergamo and Georgia Tech in the area of Computational management and Optimisation, integrating in the 2018 event contributions coming from statistical learning and data analytics and attracting Italian and European scholars working in this domain.

Workshop's key organisation details:

- Single stream program, all invited speakers with a core participation by GeorgiaTech and UniBG researchers.
- **GeorgiaTech speakers** from <https://www.isye.gatech.edu>
<https://www.isye.gatech.edu/research/isye-research-areas/optimization> and <http://ml.gatech.edu/> include Anton Kleywegt (Co-Organiser, Stochastic optimization e Management science), Christos Alexopoulos (Computational methods) , David Goldsman (Simulation, statistics and finance), Huan Xu (Machine learning and high-dimensional statistics) and He Wang (Machine learning and Operations management).
- **Other distinguished speakers:** Emanuele Borgonovo (Bocconi University, IT), Milos Kopa (Charles University of Prague, CZR), Patrick Gallinari (Sorbonne university, LIP6, FR), Laureano Escudero (University Rey Juan Carlos, SP), Felipe Ortega (University Rey Juan Carlos, SP) Riccardo Cambini (Universty of Pisa, IT), Marco Campi (University of Brescia, IT), Simone Garatti (Polithecnique of Milan, IT), Paola Zuccolotto and Marica Manisera (University of Brescia, IT), Paolo Giudici (University of Pavia, IT), Gloria Polinesi (University of Ancona, IT).
- **Corporate speakers:** IBM Italy (<https://www.ibm.com/it-it/>) and Operations Research Systems (<https://www.ors.it/index.php/en/>) with an overview of several application domains and case-studies based on smart combinations of optimisation techniques and big data analytics.
- **Intended audience:** PhD students, PostDocs and young researchers working in the field. Academics primarily from the applied maths, OR, computer science, statistics and management science communities.
- Free participation: to help us with the organization details (conference room, coffee breaks, etc.) please comunicate your interest to take part by writing an email to **unibGtech3@unibg.it** before **February 4, 2018** with subject: *2018 Workshop UniBG-GeorgiaTech on stochastic optimization and data analytics* and writing your name, surname and university in the main text.
- Proceedings on a special issue of the **IMA Journal of Management Mathematics** (<https://academic.oup.com/imaman> -- Oxford University Press): priority will be given to the workshop speakers and participants. Deadline for submission: June 30, 2018.

- **Endorsed** by the Stochastic Programming section of the Italian Operations Research society (<http://www.airo.org/index.php/it/attivita/sezioni-tematiche/programmazione-stocastica>)
- **When and where:** starting on February 8, 2018 at 9:15 and ending the following day at 17:00. The workshop will be held in Room 10, second floor at the Department of Management, Economics and Quantitative Methods in Via dei Caniana, 2, Bergamo. See <https://www.unibg.it/ateneo/sedi-universitarie/caniana>
- **Further informations:** write by email to giorgio.consigli@unibg.it for any further detail you may need.

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Program

February 8, 2018

9:30 Anton Kleywegt (GeorgiaTech): Distributional Robustness and Regularization in Statistical Learning

10:00 Christos Alexopoulos (GeorgiaTech): Effective Sequential Methods for Estimating Steady-State Quantiles

10:30 David Goldsman (GeorgiaTech): Jackknifing Methods for Simulation Output Analysis

11:00 COFFEE BREAK

11:30 Marica Manisera and Paola Zuccolotto (Univ.of Brescia): Machine Learning and Data Analytics as a tool for Sport Management

12:00 Gloria Polinesi (Univ.of Ancona) and Paolo Giudici (Univ.of Pavia): Scoring models for roboadvisory platforms: a network approach

12:30 Marco Bonomelli, Rosella Giacometti and Sergio Ortobelli (Univ.of Bergamo): On the impact of the joint tails in portfolio selection stochastic volatility models

13:00 LUNCH BREAK

14:30 IBM Italy: Recent developments in artificial intelligence and cognitive sciences for management strategies

15:30 Laureano Escudero and Antonio Ayuso-Alonso (Univ.Rey Juan Carlos): On strategic multistage operational graph / two-stage modelling to cope with uncertainties in stochastic dominance-based risk averse management

16:00 Riccardo Cambini (Univ. of Pavia): Optimal Level Solutions Method in Large Dimension Low Rank Problems

16:30 Francesca Maggioni (Univ. of Bergamo) and Georg Ch Pflug (Univ.of Vienna): Guaranteed Bounds for Non-discrete Multistage Risk-Averse Stochastic Optimization Programs through stochastic dominance

February 9, 2018

9:30 Huan Xu (GeorgiaTech): Practicable robust Markov decision processes

10:00 He Wang (GeorgiaTech): Re-solving Heuristics in Revenue Management

10:30 Milos Kopa (Charles University): Stochastic optimization problems with decision dependent randomness - contamination and stress testing

11:00 COFFEE BREAK

11:30 Marco Campi (Univ.of Brescia): Scenario optimization: the relation between risk and complexity

12:00 Simone Garatti (Politecnico di Milano): The performance-risk tradeoff in scenario optimization

12:30 Patrick Gallinari (Univ.Pierre e Marie Curie, LIP6): tba

13:00 LUNCH BREAK

14:30 Pierluigi Riva (Operations Research Systems): Corporate introduction, case studies and demo from the frontier between optimization and big data analytics

15:30 Felipe Ortega (Univ Rey Juan Carlos): Unconventional applications of statistical learning methods: efficient indexing of complex datasets

16:00 Emanuele Borgonovo (Bocconi University): Business Analytics and Big Data: A Critical Overview

16:30 Giorgio Consigli and Vittorio Morriggia (Univ.of Bergamo): Goal-based portfolio management and information-driven online investment solutions.

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