Thursday 3:00pm – 4:00pm

■ TD01

Dodds Auditorium

Plenary: Optimization Challenges in Electric Power Markets – Richard O'Neill

Federal Energy Regulatory Commission

Thursday 4:00pm – 5:30pm

■ TE01

Dodds Auditorium

Machine Learning and Optimization – I

Contributed Session

Chair: Gah-Yi Vahn, Management Science & Operations, London, United Kingdom

1. Bayesian Dynamic Learning and Pricing with Strategic Customers
Xi Chen, Stern School of Business, 1 Washington Square Village, Apt 4H, New York, NY, United States, 10012
Co-Author: Zizhuo Wang, 1009 5th Street SE, Minneapolis, MN, United States, 55414

We study the dynamic learning and pricing problem when the customer behave strategically in making his purchase decision. By using a Bayesian setting, we first show that a naive myopic Bayesian policy (MBP) by the seller may lead to incomplete learning. To resolve this issue, we propose a randomized Bayesian policy (RBP).

2. On Predicting Home Telemonitoring Patients' Adverse Events
Andrea Lodi, MAGI, Montréal, QC, Canada
Co-Authors: Louis-Martin Rousseau, MAGI, Montréal, QC, Canada, Jonathan Vallee, Montréal, QC, Canada, Nicolas Chapados, MAGI, Montréal, QC, Canada

We review home healthcare agency's challenges addressable by optimization and machine learning. This includes a risk prediction framework for home telemonitoring patients where we use maxout neural networks to predict patient's adverse events. Extended tests show dramatic improvements over logistic regression and manually engineered alerts.

3. Optimization and Learning for Sequential Decision Making
Shipra Agrawal, Riverside, New York, NY, United States, 10027

In this talk, I will present techniques that combine optimization and learning for decision making in complex, uncertain, online environments. Much of this work is motivated by challenges faced in modern revenue management problems, namely, a) unknown or difficult to estimate demand distributions, b) multiple complex nonlinear constraints and objectives, c) the need for fast large-scale algorithms, and d) personalized decisions. Formulating these problem aspects into an "online stochastic convex programming" framework, we devise fast algorithms that combine primal-dual paradigm with online learning to achieve provably optimal performance bounds. When applied to the special case of online packing, our ideas yield simpler and faster algorithms with optimal competitive ratio for this widely studied problem.

4. Performance-based Regularization in Data-driven Portfolio Optimization
Gah-Yi Vahn, Management Science & Operations, London, United Kingdom
Co-Authors: Andrew Lim, Professor, Decision Science, Singapore, Singapore, Noureddine El Karoui, Associate Professor, Statistics, Berkeley, CA, United States

We investigate performance-based regularization (PBR), on the portfolio optimization problem. The idea is to constrain the sample variances of the estimated quantities in the problem; for portfolio optimization they are the portfolio risk and return. We consider PBR for mean-variance and mean-CVaR portfolio optimization problems.

■ TE02

Bowl 1

Games and Distributed Optimization

Contributed Session

Chair: Andrew L Liu, Industrial Engineering, West Lafayette, IN, United States, 47906

1. Tropical Optimization Problems. Solution Techniques and Application Examples
Nikolai Krivulin, Professor, Faculty of Mathematics and Mechanics, 28 Universitetsky Ave., St. Petersburg, Russian Federation, 198504

We consider unconstrained and constrained problems formulated in the framework of tropical algebra to minimize nonlinear functions defined on vectors over an idempotent semifield. We give a brief overview of known problems and existing solution methods. Applications in project scheduling, location analysis and decision making are discussed.

2. Witsenhausen's Counterexample and Learning In Teams of Agents
Abhishek Gupta, Electrical and Computer Engineering, 205 Dreese Laboratories, 2015 Neil Avenue, Columbus, OH, United States, 43210

Consider a team, in which each agent observes a random variable and then takes an action. The team acts to minimize a common cost function. A novel approach to establish the existence of a team-optimal solution will be discussed. Further, the challenges in devising a learning algorithm to compute an optimal solution will also be discussed.

3. Benders Decomposition for the Optimum Communication Spanning Tree Problem
Ivan Contreras, Concordia University, Montreal, QC, Canada;.icontrer@encs.concordia.ca
Co-authors: Carlos Luna-Mota, Elena Fernández, Technical University of Catalonia, Barcelona, Spain

In this talk we present an exact algorithm based on a Benders decomposition of an arc-based formulation for the optimum communication spanning tree problem. The standard algorithm is enhanced through the use of a Benders-branch-and-cut scheme and the generation of strong optimality cuts. Computational experiments are reported.

4. Bridging Game Theory and Large Scale Optimization through Potential Games
Andrew L Liu, Assistant Professor, Industrial Engineering, West Lafayette, IN, United States, 47906

We showed that under player-wise convexity, an equilibrium of a potential game is equivalent to a stationary point of the potential function optimization problem, and designed convergent sequential and parallel algorithms to solve both stochastic large-scale potential games and block-structured optimization problems.

■ TE03

Bowl 2

Robust Optimization

Contributed Session

Chair: Ekaterina Kostina, Institute for Applied Mathematics, Im Neuenheimer Feld 293, Heidelberg, Germany, 69120

1. Distributionally Robust Inventory Control When Demand Is a Martingale
Linwei Xin, Industrial and Enterprise Systems Engineering, 104 S. Mathews Ave., Urbana, IL, United States, 61801
Co-Author: David Goldberg, 755 Ferst Drive, Atlanta, GA, United States, 30332-0205

Independence of random demands across periods is typically assumed in multi-period inventory models. We consider a distributionally robust model in which the sequence of demands must take the form of a martingale with given mean and support. We explicitly solve this problem. We also compare to the setting in which demand is independent across periods.