

Operations Research Seminar Series in 2012

Seminars are listed in reverse chronological order, most recent first.

5 December - Guillermo Gallego (Columbia University)

Constrained Assortment Optimization for the Nested Logit Model

We study assortment problems under variants of the nested logit (NL) choice model. The objective is to find an assortment that maximizes the expected revenue per customer. We show that the problem is polynomially solvable for the standard NL model (dissimilarity parameters less than one and customers purchasing from the selected nest). Relaxing either assumption renders the problem NP-hard. For the hard cases, we develop parsimonious collections of candidate assortments with worst-case performance guarantees. We then study the problem with a cardinality, space, or parent-child constraint for the standard model. We show that an optimal assortment under cardinality or parent-child constraints can be obtained by solving a linear program. We show that the problem is NP-hard under space constraints and provide a 2-approximation algorithm for this case. This approximation algorithm also provides a performance guarantee of $1 / (1 - \epsilon)$ when the space requirement for each product is at most a fraction ϵ of the space availability in each nest. We also develop a linear program to obtain an assortment with an arbitrarily good performance guarantee under space constraints, whose size increases with the performance guarantee. (Joint work with J. Davis and H. Topaloglu.)

5 December - Jérémie Gallien (London Business School)

Improving the Public Distribution of Essential Medicines in Sub-Saharan Africa: The Case of Zambia

Despite remarkable and successful recent improvements efforts by the government and its partners, the current public distribution system of essential medical drugs in Zambia still results in low availability to patients relative to private sector standards. We present an original explanation of this performance gap based on extensive field data, and develop an alternative system design involving mobile devices and optimization. We report simulation results suggesting that this proposal would improve drug availability at the clinics and reduce inventory and drug expiry costs, and ongoing field implementation efforts. (Joint work with Prashant Yadav and Zachary Leung)

21 November - László Végh (LSE)

Concave generalised flows with applications to market equilibria

We consider a nonlinear extension of the generalised network flow model, with the flow leaving an arc being an increasing concave function of the flow entering it. We give a polynomial time combinatorial algorithm for solving corresponding optimisation problems, and show that this general convex programming model serves as a common framework for several market equilibrium problems, including the linear Fisher market model and its various extensions.

7 November - Victor DeMiguel (London Business School)
Practical Portfolio Optimization

The Nobel laureate Harry Markowitz showed that an investor who cares only about the mean and variance of portfolio returns should hold a portfolio on the efficient frontier. To implement these portfolios in practice, one needs to estimate the means and covariances of asset returns. Traditionally, the sample means and covariances have been used for this purpose. But due to estimation error, the portfolios that rely on the sample estimates typically perform poorly out of sample. In this talk, we will first illustrate the difficulties inherent in estimating mean-variance portfolios, and then we will discuss several approaches that can be used to overcome these difficulties in practice.