The Management Sciences Seminar Series presents

Peter Frazier

Associate Professor   
School of Operations Research and Information Engineering  
Cornell University

Bayesian Optimization in the Tech Sector

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W107 PBB

Abstract:

We discuss Bayesian optimization, a class of methods for optimizing expensive or slow-to-evaluate objective functions. We describe optimization as a decision-making task ("where should I sample next?"), and show how guidance from decision theory can reduce the number of function evaluations required to find approximate optima. We discuss these methods in the context of applications from the tech sector: optimizing e-commerce systems, real-time economic markets, mobile apps, and hyperparameters in machine learning algorithms. Motivated by these applications, we present a new Bayesian optimization method designed for parallel noisy function evaluations, the parallel knowledge gradient method. This method makes use of infinitessimal perturbation analysis within a stochastic approximation framework to find a one-step average-case optimal set of points at which to evaluate the objective function. We conclude with examples of how this and other closely-related methods are used in practice, based on the speaker's experiences working with Yelp, Uber, and the Bayesian Optimization startup company, SigOpt.

This talk is based on https://arxiv.org/abs/1807.02811 and https://arxiv.org/abs/1606.04414.