Title: Models and Methods for Omni-channel Fulfillment

Abstract:

Omni-channel retailing, the combination of online and traditional store channels, has led to the use of traditional stores as fulfillment centers for online orders. A key aspect of omni-channel fulfillment problems is the tradeoff between cancellations of accepted online orders and profits: a riskier fulfillment policy may result in more online sales but also more cancelled orders.

In this talk, I will describe two approaches to the fulfillment problem cast generally as a stochastic optimization problem of setting inventory thresholds above which the online channel stays open.

In the more traditional approach, we build a stochastic model of the process leading to order cancellations for a single item so that retailers may find inventory and fulfillment policies that effectively use this information along with shipping costs between various locations. We describe iterative algorithms based on Infinitesimal Perturbation Analysis (IPA) that converge to optimal and locally optimal policies within certain flexible policy classes for the multiple-location version of this model, and show their empirical performance on simulated data based on real data from a high-end North American retailer.

If time permits, I will describe a more modern approach applying techniques from machine learning and discrete optimization to find fulfillment policies that perform well empirically at maximizing revenues subject to a constraint on cancellations across a large portfolio of items.

This talk is based on the dissertation of Jeremy Karp at CMU describing work carried out jointly with Prof. Sridhar Tayur (CMU) and Dr. Srinath Sridhar (Onera Inc).