

The Hong Kong University of Science and Technology

Dept of Information Systems, Business Statistics
and Operations Management
Dept of Industrial Engineering & Logistics Management
Joint Seminar Announcement

A Dynamic Clustering Approach to Data-Driven Assortment Personalization

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Date : 10 June 2016 (Friday)
Time : 11:00 am - 12:15 pm
Venue : Room 3005, LSK Business Building



Abstract: We consider a retailer facing heterogeneous customers with initially unknown product preferences. Customers are characterized by a diverse set of demographic and transactional attributes. The retailer can personalize the assortment offerings based on the available customers' profile information to maximize cumulative revenue. To that end, the retailer must estimate customer preferences by observing transaction data. This, however, may require a considerable amount of information given the broad range of customer profiles and large number of products available. At the same time, the retailer can aggregate (pool) purchasing information among customers with similar product preferences. For a simplified version of the problem, we analytically characterize settings in which pooling transaction information is beneficial for the retailer. We also show that there are economies of scale in learning in the sense that there are diminishing marginal returns to pooling information from an increasing number of customers. We next propose a *dynamic clustering* policy that adaptively adjusts customer segments (clusters of customers with similar preferences) and estimates customer preferences as more transaction information becomes available. We conduct an extensive numerical study to examine the benefit of pooling transaction data and personalizing assortment offerings by adopting the dynamic clustering policy. The study suggests that the benefits of dynamic clustering -- over an "oblivious" policy that ignores profile information and treats all customers the same or over a "data-intensive" policy that treats customers independently -- can be substantial.

Bio: Fernando Bernstein is the Bob J. White Professor of Operations Management at the Fuqua School of Business, Duke University. He obtained a Ph.D. in Operations Management from the Graduate School of Business at Columbia University and joined Duke University in July 2000.

Prof. Bernstein's research interests include supply chain management, production planning and inventory control, applications of game theory for production and distribution systems, revenue management, and online retailing. Prof. Bernstein has published papers in leading journals such as *Operations Research*, *Management Science* and *Manufacturing and Service Operations Management*. He also serves as Associate Editor for these three journals. Prof. Bernstein teaches the core Operations Management course for the Weekend, Global, and Cross-Continent Executive MBA programs at Duke University, in addition to various Executive Education courses on operations management and health care operations. He has earned the Excellence in Teaching Award for a core course for his teaching at Duke.