The Hong Kong University of Science and Technology
Dept of Information Systems, Business Statistics and Operations Management

Frontiers in Operations Management Workshop

Assortment Optimization Under the Multivariate MNL Model

by

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Date : **3 December 2022 (Saturday)**

Time : **11:30 AM – 12:15 PM**

Venue : **Room G012, LSK Business Building, HKUST**

Abstract:

We study an assortment optimization problem under a multi-purchase choice model in which customers choose a bundle of up to one product from each of two product categories. Different bundles have different utilities and the bundle price is the summation of the prices of products in it. For the uncapacitated setting where any set of products can be offered, we prove that this problem is strongly NP-hard. We show that an adjusted-revenue-ordered assortment provides a 1/2-approximation. Furthermore, we develop an approximation framework based on a linear programming relaxation of the problem and obtain a 0.74-approximation algorithm. This approximation ratio almost matches the integrality gap of the linear program, which is proven to be at most 0.75. For the capacitated setting, we prove that there does not exist a constant-factor approximation algorithm assuming the Exponential Time Hypothesis. The same hardness result holds for settings with general bundle prices or more than two categories. Finally, we conduct numerical experiments on randomly generated problem instances. The average approximation ratios of our algorithms are over 99%.

Bio:

Dr Menglong Li is an Assistant Professor of Management Sciences at the College of Business, City University of Hong Kong. Before joining CityU, he was a postdoctoral associate at MIT Institute for Data, Systems, and Society. He received a Ph.D. degree in Operations Research from the University of Illinois at Urbana-Champaign, an MS degree in Mathematics from the University of Pierre and Marie Curie, and a BS degree in Mathematics from Tsinghua University. His research interests include inventory management, revenue management, (discrete) convex analysis, combinatorial optimization, approximation algorithms, and data-driven decision-making.

All interested are welcome!

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