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RANDOMIZED ROBUST PRICE OPTIMIZATION



Abstract: The robust multi-product pricing problem is to determine the prices of a collection of products so as to maximize the worst-case revenue, where the worst case is taken over an uncertainty set of demand models that the firm expects could be realized in practice. A tacit assumption in this approach is that the pricing decision is a deterministic decision: the prices of the products are fixed and do not vary. In this paper, we consider a randomized approach to robust pricing, where a decision maker specifies a distribution over potential price vectors so as to maximize its worst-case revenue over an uncertainty set of demand models. We formally define this problem -- the randomized robust price optimization problem -- and analyze when a randomized price scheme performs as well as a deterministic price vector, and identify cases in which it can yield a benefit. We also propose two solution methods for obtaining an optimal randomization scheme over a discrete set of candidate price vectors based on constraint generation and double column generation, respectively, and show how these methods are applicable for common demand models, such as the linear, semi-log and log-log demand models. We numerically compare the randomized approach against the deterministic approach on a variety of synthetic and real problem instances; on synthetic instances, we show that the improvement in worst-case revenue can be as much as 1300%, while on real data instances derived from a grocery retail scanner dataset, the improvement can be as high as 92%.

Short Biography: Velibor Misić is an associate professor of Decisions, Operations and Technology Management at the UCLA Anderson School of Management. His research interests are broadly in optimization, stochastic control and analytics, with a focus on applications in revenue management. His work has been recognized with several awards, including second place in the INFORMS Junior Faculty Interest Group Paper Competition. He currently serves as an associate editor for Operations Research, Management Science, Manufacturing & Service Operations Management and Production and Operations Management. Prior to joining UCLA, he received his BASc and MSc degrees in industrial engineering from the University of Toronto, and his PhD in operations research from MIT.

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Responsable / Organizer:
Pierre Miasnikof

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