

YUKAI HUANG

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Updated: September 18, 2024

EDUCATION

Washington University in St. Louis , St. Louis, MO	2019 - 2025 (Expected)
Ph.D. in Supply Chain, Operations and Technology	
Advisor: Dr. Jacob Feldman	
University of North Carolina at Chapel Hill , Chapel Hill, NC	2017 - 2019
M.S. in Statistics and Operations Research	
Thesis Advisor: Dr. Vidyadhar Kulkarni	
Shanghai Jiaotong University , Shanghai, China	2013 - 2017
B.S. in Applied Mathematics	

RESEARCH INTERESTS

- **Research Topics:** Online Matching, Pricing and Inventory Control, Assortment Optimization, On-line Decision Making with Advice, Data-Driven Optimization.
- **Methodologies:** Approximate Algorithm, Integer Programming, Robust Optimization, Combinatorial Optimization, Stochastic Optimization.

RESEARCH

Job Market Paper

- Yukai Huang, Heng Zhang, Jacob Feldman. "Basic Reusability and Beyond: Joint Inventory and Online Assortment Optimization with Reusable Resources." **Job Market Paper**.

Manuscripts Under Review

- Jacob Feldman, Panos Kouvelis, Yukai Huang. "Prophet Inequalities and Approximation Schemes for a New Class of Overbooking Problems in Container Shipping." *Under major revision at Operations Research* (2024) [SSRN](#)

Working Papers

- Jacob Feldman, Yukai Huang, Danny Segev, Levi DeValve. "Approximation Schemes for Dynamic Pricing with Opaque Products." *Work in Progress*

TEACHING EXPERIENCE

Teaching Assistant - Washington University in St. Louis

- Operations Management (MBA Core) FL20, FL21
- Operations Fun: Data-Driven Optimization (Undergraduate Core) FL22, FL23, FL24
- Stochastic Models for Production and Service Systems (Ph.D. Core) SP21
 - Individual teaching session: *Introductions to Newsvendor Models*.
 - Individual teaching session: *Queueing Network*
- Inventory and Supply Chain Management Theory and Research (Ph.D. Core) FL22

CONFERENCES PRESENTATIONS

Approximation Schemes for Dynamic Pricing with Opaque Products

- INFORMS Annual Meeting, Anaheim, CA 2021
- INFORMS Annual Meeting, Indianapolis, IN 2022
- INFORMS Revenue Management and Pricing Section Conference (Virtual) 2022
- Annual POMS-Conference , Orlando, FL 2023
- 2023 INFORMS Annual Meeting, Phoenix, Arizona 2023

Basic Reusability and Beyond: Joint Inventory and Online Assortment Optimization with Reusable Resources

- INFORMS MSOM Conference, Minneapolis, MN 2024
- INFORMS Revenue Management and Pricing Section Conference, Los Angeles, CA 2024
- Purdue Operations Conference, Lafayette, IN 2024
- INFORMS Annual Meeting, Seattle, WA 2024
 - [To present on Oct. 20 \(Session Link\)](#)

SKILLS

Programming/Software: Mathematica, MATLAB, R, Python, Gurobi, \LaTeX
Language: English (fluent), Chinese (native)

REFERENCES

Jacob Feldman

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Basic Reusability and Beyond: Joint Inventory and Online Assortment Optimization with Reusable Resources

Yukai Huang, Heng Zhang, Jacob Feldman., Job Market Paper

This paper addresses the joint optimization of inventory stocking and online assortment decisions for reusable resources, a challenging problem that unfolds in two stages: determining initial inventory levels and dynamically offering subsets of available products to maximize revenue over a selling horizon.

In this work, we develop an approximation framework that jointly optimizes both decisions and provides provable performance guarantees, assuming product usage follows an increasing failure rate distribution. We leverage a choice-based deterministic linear program (CDLP) as a surrogate function to approximate expected revenue in the online allocation stage. We demonstrate that approximating a version of the CDLP using its counterpart based on geometric distributions results in only a constant multiplicative loss, and that the resulting optimization problem becomes submodular, allowing for efficient solution methods. This leads to a high-quality joint solution for initial inventory stocking and dynamic assortment decisions, under such constraints on the initial inventory as cardinality, knapsack, or matroid.

Our second contribution extends this framework to a more complex setting, which we term network reusability. In this scenario, returned resources can transform into different products, reflecting real-world challenges such as product quality degradation or resource relocation. We develop a novel CDLP for network reusability and propose a “back-and-forth” refinement process that iteratively adjusts inventory decisions based on feedback from the online stage. This ensures that the final policy achieves near-optimal revenue performance, even in network settings the CDLP is shown to be a loose upper bound of the expected revenue. Through numerical experiments, we show that our approximation strategies perform near optimally across a wide range of reusability scenarios, demonstrating the robustness and practicality of our approach. This work provides a comprehensive framework for addressing the joint inventory and assortment problem, with significant implications for industries relying on reusable resources.