YUKAI HUANG

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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:** Reusable Resources, Revenue management and Pricing, Assortment Optimization, Social Responsible AI, AI in Business Analytics.
- **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." *Under Revision in management science*. SSRN

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." *Manuscript under Preparation*
- Yukai Huang, Chongbo Wang. "The Influence of Location Data Disclosure on Comment Polarization: Evidence from Weibo Using a Fine-Tuned Large Language Model." *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

Individual Instructor - Webster University

- Business Information Systems (BUSN-3150) SP25 (Expected)

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 Angelas, CA 2024
- Purdue Operations Conference, Lafayette, IN 2024
- INFORMS Annual Meeting, Seattle, WA 2024

REFERENCES

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ABSTRACTS OF JOB MARKET PAPER

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

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

In this work, we study the joint inventory and online assortment problem, wherein a decision maker (DM) must first select initial inventory levels for a collection of available products, and then offer personalized assortments to customers who arrive over a finite selling horizon, all with the intention of maximizing expected revenue. We are the first to consider this joint optimization framework when the resources are reusable. That is, upon purchase or rental, each unit is consumed for a random duration, after which it returns to the DM for future use. Our cornerstone result when reusability is modeled in its classic form, is a constant factor approximation scheme when the usage duration distributions satisfy the increasing failure rate (IFR) property. In a nutshell, our approach exploits notions of submodularity within a fluid approximation of the original problem. Quite interestingly, this fluid problem approximates the IFR-based usage durations with appropriately defined geometric random variables. To show that this approximate approach is indeed valid requires establishing a novel link between the CDFs of geometric and IFR-distributed random variables, which may find broader applications beyond those considered in this paper. Next, we consider our joint optimization problem under an augmented version of basic reusability, wherein consumed resources can return the DM as transformed versions of their original selves. The intent of this novel modeling feature is to capture settings where reusability is prominent, and where the identity of a product can possibly change due to its consumption (a product purchased online and returned to the seller may become damaged during the try-on process) or through the very nature of a return (a bike rented at one dock may be returned to a different one). In this so-called network reusability setting, we propose a novel inventory refinement process that iteratively adjusts inventory decisions based on feedback from the online assortment stage. We ultimately establish a strong performance bound for our overall approach, which is network dependent. 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.