ILGIN DOGAN

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Education

University of California, Berkeley

Ph.D. in Industrial Engineering and Operations Research — May, 2024 (expected)
Advisors: Zuo-Jun Max Shen and Anil Aswani

M.S. in Industrial Engineering and Operations Research — 2019

Middle East Technical University, Ankara, Turkiye

M.S. in Industrial Engineering — 2018
B.S. in Industrial Engineering — 2016

Research Interests

My research broadly centers on the design of stochastic models and computational algorithms for *operations management* involving *strategic agents* with *information asymmetries*, which manifest by *limitations in data* shared between parties. My work exploits methods from online sequential learning, statistics, artificial intelligence, optimization, and principal-agent theory.

I am particularly interested in studying applications in the domain of *(environmental) sustainability analytics*, where I specialize in formulating sustainable business operations that effectively mitigate the climate crisis. Moreover, my work holds wide practical relevance, extending to areas such as supply chain management and healthcare analytics.

Journal Papers

Estimating and Incentivizing Imperfect-Knowledge Agents with Hidden Rewards.
Ilgin Dogan, Zuo-Jun Max Shen, and Anil Aswani.
Submitted to **Operations Research**.

Repeated Principal-Agent Games with Unobserved Agent Rewards and Perfect-Knowledge Agents.
Ilgin Dogan, Zuo-Jun Max Shen, and Anil Aswani.
Submitted to **Operations Research**.

Regret Analysis of Learning-Based MPC with Partially-Unknown Cost Function.
Ilgin Dogan, Zuo-Jun Max Shen, and Anil Aswani.
Conditionally accepted to **IEEE Transactions on Automatic Control**.

Representing the Nondominated Set in Multi-objective Mixed-integer Programs.
Ilgin Dogan, Banu Lokman, and Murat Koksalan.
European Journal of Operational Research (2022), Vol. 296 (3), pp. 804-818.

Working Papers

Strategies for Climate Resilience: Mitigating Flooding Risks in Location Planning.
Ilgin Dogan, Anil Aswani, Ho-Yin Mak, and Zuo-Jun Max Shen.

Incorporating Fairness into Incentive Design in Principal-Agent Models with Adverse Selection and Moral Hazard.
Yoon Lee, **Ilgin Dogan**, Anil Aswani, and Zuo-Jun Max Shen.

Teaching Experience

Industrial Engineering & Operations Research, University of California, Berkeley
Course Instructor

- INDENG 151 - Service Operations Design and Analysis — Fall 2022
  Teaching effectiveness evaluation: 6.72 / 7.00 (Department mean: 6.03)

Teaching Assistant

- INDENG 151 - Service Operations Design and Analysis — Fall 2019, Fall 2020
  Teaching effectiveness evaluation: 4.60 / 5.00 (Department mean: 4.27)
- INDENG 165 - Engineering Statistics, Quality Control, and Forecasting — Spring 2020
  Teaching effectiveness evaluation: 4.62 / 5.00 (Department mean: 3.95)

Haas School of Business, University of California, Berkeley

Reader

- UGBA 141 - Production and Operations Management — Spring 2021

Department of Industrial Engineering, Middle East Technical University

Teaching Assistant — 2015 - 2018

- Courses: Stochastic Optimization with Applications / Management Accounting / Engineering Economy / Engineering Statistics, Quality Planning and Control / Quality in Engineering Management / Special Topics in IE: Multi-objective Combinatorial Optimization.

Industry Experience

Apple — Summer 2023

Advanced Analytics Ph.D. Intern

WorldWide Business Process Re-engineering – Advanced Analytics, Sunnyvale, CA

Project 1: iPhone Facility Layout Optimization

- Engineered an automated pipeline for generating two-dimensional optimal facility layouts, with visualizations and utilization metrics, for iPhone production. Leveraged mixed-integer linear programming models and Gurobi optimization software.
- Validated models in close collaboration with business stakeholders, resulting in space utilization savings and reducing layout generation time substantially from days to minutes.

Project 2: Parallel Optimization for AppleCare Supply Planning Solvers

- Employed relevant graph decomposition techniques from network theory to efficiently break down the bill of materials into manageable planning groups for AppleCare supply planning solvers. Improved solver run-time by more than 15%.
- Conducted simulations to devise the best parallel optimization strategy by leveraging generated planning groups, balancing hardware resource allocation and run-time enhancements.

Meta — Summer 2022

Research Data Scientist Intern

Infrastructure Strategy Data Science, Menlo Park, CA

Project: Targeting Viewers and Broadcasters for Ultra-Low End-to-End Live Stream Latency

- Developed a framework encompassing data analysis, data pipeline construction and maintenance, as well as the development and productionization of machine learning models.
- Attained a classification model precision of 70%, recall of 63%, and covered 91% of total latency-sensitive broadcast watch time.

Robert BOSCH GmbH — Summer 2015

Service Operations Intern

Business Excellence Deployment, Bursa, Turkiye

Project: Deploying Kaizen Methodology

- Developed statistical quality control models to enhance the deployment of Kaizen (continuous improvement) methodology and lean manufacturing techniques at the enterprise level.
- Actively participated in departmental meetings and delivered presentations to executive leadership.

BAUER Casings Summer 2014

Manufacturing Operations Intern

Production Planning Operations, Ankara, Turkiye

- Utilized the company's ERP database system for daily data monitoring and reporting, contributing to informed decision-making in enhancing material flow, line balancing, and overall operational efficiency.
- Gained comprehensive insight into end-to-end manufacturing operations ecosystem and actively engaged in departmental meetings.

Honors, Fellowships, and Awards

IEOR Faculty Fellowship, UC Berkeley, 2021.

"This fellowship stands as the top graduate student award within the department. This annual recognition is awarded to an outstanding graduate student, selected from a pool of graduate students who excel in academics and leadership, as nominated by the faculty."

Outstanding Graduate Student Instructor Award, UC Berkeley, 2021.

"This award honors UC Berkeley teaching assistants annually for exceptional teaching on campus, as nominated within their department."

IEOR Ph.D. First-year Fellowship, UC Berkeley, 2018-2019.

Graduate Research Fellowship, TUBITAK (*NSF-equivalent*), 2017-2018.

Graduate Courses Performance Award, METU, 2018.

Dean's High Honor List in B.S., Department of Industrial Engineering, METU, 2016.

Graduation with **High Honor Degree and ranked in top 10**, Scientific Scholar Development Program, TED Ankara College Foundation Private High School, 2012.

High School Scholarship (top 1% ranking among 1 million students in the national high school entrance exam), TED Ankara College Foundation Private High School, 2009-2012.

Other Research Experience

University of California, Berkeley 2019 - present

Graduate Student Researcher - Department of Industrial Engineering & Operations Research

Turkish Scientific and Technological Research Council (*NSF-equivalent*) 2016 - 2018

Research Scholar

Project: Nondominated Points of Multi-Objective Integer Programs: Approaches and Applications

- Developed efficient algorithms that aim at producing a small number of representative nondominated points (up to 50% less than the existing approaches) while satisfying a prespecified coverage gap value for combinatorial multi-objective mixed-integer programs.
- Conducted extensive simulation experiments in C using CPLEX for mixed-integer knapsack and assignment problems with up to 5 objectives.

Middle East Technical University (METU) 2015 - 2016

System Design Project Analyst

Project: Designing Sustainable & Data-Driven In-Campus Transportation System

- Formulated a multi-objective optimization model to address diverse stakeholder goals within the expansive METU, Ankara campus (11,100 acres).
- Utilized SQL to manage the categorical and numerical data collected from various sources. Conducted root-cause analysis.
- Employed a simulation model in Arena to perform empirical analyses on actual data. Achieved a 15% reduction in shuttle travel distances (attributed to increased non-motorized trips and bike-share services) and a 5% decrease in average travel time per person.

Invited Talks

Estimating and Incentivizing Imperfect-Knowledge Agents with Hidden Rewards.

- 2023, INFORMS Annual Meeting, Phoenix, AZ.
- 2023, Annual POMS Conference, Orlando, FL.

Repeated Principal-Agent Games with Unobserved Agent Rewards and Perfect-Knowledge Agents.

- 2023, Annual POMS Conference, Orlando, FL.
- 2022, INFORMS Annual Meeting, Indianapolis, IN.

Regret Analysis of Learning-Based MPC with Partially-Unknown Cost Function.

- 2021, INFORMS Annual Meeting, Anaheim, CA.
- 2020, INFORMS Annual Meeting, Virtual.

Representing the Nondominated Set in Multi-objective Mixed-integer Programs.

- 2019, INFORMS Annual Meeting, Seattle, WA.
- 2018, INFORMS Annual Meeting, Phoenix, AZ.
- 2017, International Conference on MCDM, Ottawa, Canada.

Service

Mentor

- UC Berkeley Engineering Summer Undergraduate Research Program (BESURE), 2023.
- UC Berkeley Graduate Division Getting into Graduate School (GiGS), 2021.

Session Chair

- "Responding Climate Crisis with Data-Driven OM", 2023 INFORMS Annual Meeting.
- "Stochastic Approaches to Healthcare Analytics", 2023 INFORMS Annual Meeting.
- "Incorporating AI into Healthcare Delivery", 2022 INFORMS Annual Meeting.
- "ML for Healthcare Applications", 2022 INFORMS Annual Meeting.

Reviewer

- INFORMS Journal on Data Science.
- IEEE Transactions on Automatic Control.
- European Journal of Operational Research.

Participant

- POMS Doctoral Consortium, 2023.
- INFORMS Doctoral Student Colloquium, 2020.
- Theory of Reinforcement Learning Boot Camp, The Simons Institute for the Theory of Computing, 2020.
- Deep Reinforcement Learning Workshop, The Simons Institute for the Theory of Computing, 2020.

Panelist

- UC Berkeley IEOR Info Session for Prospective M.S. and Ph.D. Students, 2021 & 2022.

Member

- The Institute for Operations Research and the Management Sciences (INFORMS).
- The Production and Operations Management Society (POMS).
- International Society on Multiple Criteria Decision Making (MCDM).

Computer Skills

- Programming Languages: C, Python, SQL.
- ML Frameworks & Libraries: Scikit-Learn, SciPy, Pandas, NumPy, Matplotlib.
- Tools: LaTex, Microsoft Office.
- Statistical Softwares: RStudio, Minitab.
- Optimization Softwares: Gurobi, CPLEX, GAMS.
- Simulation Softwares: Arena (Siman).